Agronomy at Cornell

Soils, Field Crops and Atmospheric Science 1868-1980

Marlin G. Cline
Professor of Soil Science, Emeritus

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1868

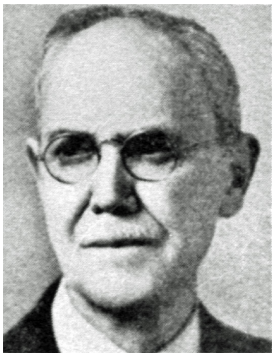
George C. Caldwell

1903–1912

T. F. Hunt

1906

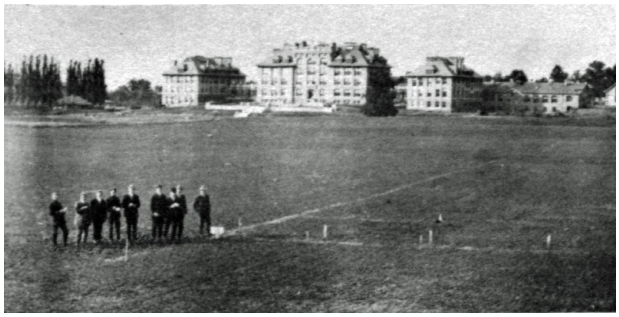
Soils Teaching Lab, Morse Hall



T. L. Lyon

E. G. Montgomery

1914



College of Agr., Stone Hall

John H. Barron

1915

Caldwell Hall

1937

Richard Bradfield

1968

Bradfield–Emerson Halls

AGRONOMY AT CORNELL

1868 to 1980

by

Marlin G. Cline, Professor of Soil Science, Emeritus

1982

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GEORGE CHAPMAN CALDWELL

Professor of Agricultural Chemistry
1868-1903
Faculty Leader for Agriculture
1868-1874
Director of the Cornell University Experiment Station
1879-1888

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AGRONOMY AT CORNELL UNIVERSITY

Marlin G. Cline

1982

The account which follows focuses on the subject matter within the Department of Agronomy as of 1980, namely soils, production of field crops other than vegetables and fruit, and atmospheric science. That combination is unique among universities, and description of its evolution is one of the purposes of this document. In the early years, these subjects were so intimately intertwined with others under the broad identity "Agriculture" that they cannot be separated as discrete areas of endeavor, but as the university developed, their identities emerged. They were organized and reorganized repeatedly under several different departmental structures during subsequent years, often with subjects that are not now included in Agronomy. These are discussed to the extent that they relate to the development of the Department. Work at the New York Agricultural Experiment Station at Geneva, which was a separate institution for many years, is discussed, as that station is now part of the New York State College of Agriculture and Life Sciences of Cornell.

A list of sources of information is given at the end of the text. Most of the information about aspects of University development has been taken from Colman's (1963) history. Some references to this work are cited specifically in the text, but much more has been drawn from it. Annual reports of the two experiment stations are major sources. University course announcements have been used to compile lists of course offerings and the faculty in charge. The Cornell University Record has been used extensively. A number of unpublished manuscripts and photograph albums found in extension files of the Department are included in the list. These have been deposited in the University Archives. Certain other sources, such as Department files which are not generally available, are identified in the text and are included in the list. The author has drawn on his personal experience as a member of the faculty from 1942 onward.

A. Agronomy in New York before Cornell

Knowledge about crops, soils, and climate of New York was substantial, though primitive, by the time Cornell University was founded. Gilmore (1903) noted that the earliest accounts he found were fragments buried in letters and casual notes of travelers engaged in land transactions, commerce, the fur trade, and fisheries, for agriculture was a minor occupation during most of the 1700s. Eventually agriculture reached a stage which prompted leading agriculturists to establish the New York State Agricultural Society, through which experience and ideas could be exchanged. In 1798 or 1799, the society commissioned Dr. Samuel L. Mitchell, a medical doctor and scientist, to compile information about soils, rocks, and other natural resources of the State relevant to promotion of agricultural interests. His report, which the author has not seen, was published in volumes 1, 3, and 5 of the Medical Repository of New York in 1800 and succeeding years. According to Gilmore, Mitchell's principal scientific contribution was an accurate description of the character and origin of peat. This was forty years before publication of Liebig's treatise on the balance sheet theory of plant nutrition and at the time when the humus theory of plant growth was prevalent. Dr. Mitchell contributed a short section on peat in Mather's "Geology of New York" cited below.

During its earliest years, the proceedings of the New York State Agricultural Society were apparently not recorded. From 1841 to 1876 the Society published its transactions. It also published a journal from 1850 to 1873. These documents provide excellent perception of the knowledge and experience of the time through the recorded notes of comments and addresses of leading farmers and agricultural authorities at the meetings and through papers that appeared in the journal. These and the published transactions from 1887 to 1899 and from 1910 to 1920 are es-

sential reading for students interested in an historical perspective of agriculture, including agronomy, as conceived by those most directly involved.

About 1835 the New York State Legislature established the New York State Geological Survey with the expressed purpose of providing information about the mineral and agricultural natural resources of the State. Dr. Lewis C. Beck was employed to examine localities of ores, soils, and mineral waters, to sample them, and to analyze the samples. (Dr. Beck's salary was $1,200 per year and he bore his own expenses.) About the same time, the State was divided into four districts, each in charge of a geologist, and reports of their findings were issued from 1837 onward. Beginning in 1843, comprehensive reports were issued for each of the districts as part of the publication series "Natural History of New York". Of these, Part 1 by William Williams Mather (1843) is the most comprehensive.

Mather reported in meticulous detail on what he called "Quaternary deposits" (lake and river sediments) and "drift deposits" (glacial till) at many locations. He compared the "drift" of New York with similar deposits he had studied across northern United States and reviewed current theories of their origin. He rejected Agassiz' theory of glaciation on grounds that the occurrence of "drift" on nearly level plains precluded ice movement under forces of gravity. Sloping land was assumed to be necessary for ice movement. He finally proposed that "drift" must be a water deposit and, since striae on boulders and bedrock showed movement from north to south, theorized massive water flow from the poles toward the equator brought about by centrifugal forces created by a cooling and shrinking earth.

In the early 1840s Dr. Ebenezer Emmons was commissioned to prepare a comprehensive report on the agriculture and agricultural resources of the State. His report consisted of five massive volumes under the title "Agriculture of New York" as Part V of the series "Natural History of New York". Volume I in 1846 carried the subtitle "Comprising an account of the classification, composition, and distribution of the soils and rocks - together with a condensed view of the climate and the agricultural production of the State". It gave a summary of soils, their elements and compounds, composition, classification, and temperatures in general and continued with soil character, agriculture, soil improvement and manures, climate, and water resources by districts. A separate section recorded "premium crop yields" obtained by identified farmers. Volume II published in 1849, detailed the field crops of the State, their distribution and production. Volume III described the fruit crops, and Volume IV consisted of plates illustrating the kinds of fruit described in Volume III. Volume V dealt with destructive insects. These are extraordinary publications, which provide a truly comprehensive perspective of the agriculture and the natural resources that supported it some 15 to 20 years before Cornell University was founded.

B. At the Opening of the University, 1868

The University had no professor concerned primarily with agriculture or any of its subject matter areas when it opened. Colman (1963) suggests that President Andrew Dickson White had little enthusiasm for agricultural education, and actions of the Board of Trustees in subsequent years suggest that a majority of that body was similarly unenthusiastic. Agriculture could not be ignored, however, because Ezra Cornell, the founder, was deeply committed and the provisions of the act establishing the federal land grant required its inclusion. Considerable effort had been expended to recruit a professor for agriculture, but without success, when the University opened.

George Chapman Caldwell was recruited in 1867 as Professor of Chemistry, the first professor of the new University. (Colman refers to him as Professor of Agricultural Chemistry.) He was President White's primary representative for agriculture and was sent to Michigan before the University opened to attempt to recruit Manly Miles as Professor of Agriculture and Albert N. Prentiss as Professor of Botany. Prentiss accepted, but Miles declined. President White then approached Joseph Harris, a successful farmer and agricultural journalist of Rochester, New York. He would not consent to join the faculty full-time, but he did agree to visit the University occasionally and

attempt to coordinate agricultural education. That arrangement ultimately proved to be highly unsatisfactory. The University opened in September, 1868, with Professor Caldwell nominal leader of an informal group of three professors who had interests that impinged upon agriculture:

George Chapman Caldwell, Professor of Chemistry
Albert N. Prentiss, Professor of Botany
James Law, Professor of Veterinary Medicine

Caldwell's concerns in agricultural chemistry extended to soils and fertilizers; Prentiss' teaching of botany included some references to crops. (For a concise statement of Professor Caldwell's contributions, see *The Cornell Countryman*, Vol. II, No. 1, October 1913.)

C. From 1868 to the Arrival of Isaac P. Roberts in 1874

The search for a Professor of Agriculture continued. The following individuals were employed in abortive attempts to provide leadership for agricultural education and the University farm:

1868-69. Joseph Harris, journalist and farmer: part-time coordinator of agricultural education.
1869-70. Lewis Spaulding, former history student of White at Michigan: Assistant Professor of Agriculture and Director of University Farm.
1870-71. Allen B. Benham, farmer: Director of University Farm.
1871-73. Henry McCandless, a recent graduate from Ireland who was dedicated to British farming systems: Professor of Agriculture.

All were failures. The University farm deteriorated with mismanagement to the point that Vice President Russell was moved to describe it publicly as a disgrace to the University. Instruction in agricultural subjects was minimal.

Resident Instruction

The 4-year curriculum in agriculture was devoted to languages, science, and mathematics for the first two years. Agricultural chemistry and veterinary subjects were added in the third year. Subjects directly related to farming were offered only in the fourth year. Enrollment in agriculture decreased from 30 when the University opened in 1868 to 7 in 1873-4. During that period, only 2 students graduated in agriculture.

The "faculty" of agriculture consisted mainly of the informal group listed in the preceding section, plus the Professor of Agriculture of the moment. Caldwell provided such leadership as existed. One or two professors besides those named may have contributed in a minor way. The subject matter of agronomy was probably touched upon by Caldwell and Prentiss during the first academic year, but specific reference to it is rare in the documents seen.

To supplement instruction by the "faculty", President White engaged John Stanton Gould as a Visiting Professor and Lecturer during the second academic year, 1869-70. Gould served in that capacity until 1874, shortly before his death.

Gould was a classically educated scholar, but he was intensely interested in scientific agriculture. As a trustee of the University and in his role as Visiting Professor, he was instrumental in providing at least minimal instruction in agricultural subjects, including crops and soils. In addition to lecturing himself, he recruited guest speakers in various fields of agriculture. In 1871, 9 guest speakers gave 53 special lectures.

Although the number of students in agriculture was small, 112 students were enrolled in agriculturally related programs by 1872-73. Agricultural subjects were taken by students in related fields, such as Natural History. The University trustees required Professor Gould's courses of all students, who numbered between 412 and 609 during this period. (See Colman, pp. 49-65.) Thus, courses in agriculture had significant numbers of students, though the number specializing in agriculture was very small by 1873-74. The subject matter of agronomy was not identified

separately from other agricultural teaching, so it is difficult to estimate its scope in those early courses. Professor Caldwell probably included soils and fertilizers in his teaching of agricultural chemistry, and material on crops and cropping was undoubtedly presented by Professor Gould and the guest lecturers. From the backgrounds of the individuals involved in teaching and the academic atmosphere of the time, one might suspect that the instruction was not strong in the applied aspects of the subject matter. The pronounced decline of students in agriculture during this period cannot be attributed to that alone, however. The fact that they were required to spend two years before taking any agricultural subjects was a strong deterrent to youths looking forward to a farming career.

Research

Except for a few modest trials initiated by Professor Gould with help from Ezra Cornell and Allen Benham, experiments with crops were nonexistent during this period. Professor Caldwell conducted a modest analytical program on crop products, soils, and soil amendments. The University farm was an object lesson in the consequences of poor husbandry; by 1874 wheat yields had declined to less than 8 bushels per acre. (See Colman, p. 87.) Neither resident instruction nor the feeble beginnings of extension were supported by relevant agricultural research.

Extension

Agricultural extension, in fact if not in name, began in 1869 when Professors Caldwell, Prentiss, and Law began lectures to groups of farmers in various parts of the state under the auspices of the New York State Dairymen's Association. The New York State Agricultural Society had grown to a prestigious organization by the 1870s, and in 1870 Professor Law was an invited speaker at its annual meeting. In addition to the annual meeting, the Society sponsored itinerant lecturers. No record has been found which would indicate that Caldwell, Prentiss, or Law participated in that program during this period, but they were active in the society and participated in later years.

None of the three professors had strong instincts for the details of practical farm operations, but their ideas about the applications of science to farming were apparently well received. Their audiences were composed of leading agriculturalists, among whom farm operators who depended on farming for a livelihood were apparently in the minority. Many were probably men who derived their principal income from other walks of life and farmed as a hobby or for supplemental income. Some were professional people who were interested in agriculture but had little direct experience with practical farm operations. Nevertheless, the public lectures of these three professors marked the beginning of the public service that was instrumental in development of public support for the University in later years.

D. From Arrival of Professor Roberts in 1874 to Formation of a Cornell Experiment Station in 1879

The transformation that finally brought credibility to agriculture at Cornell began with the arrival of Isaac P. Roberts from Michigan in 1874. Colman (pp. 65-79) has described Roberts' contributions in some detail, and most of that which follows is drawn from Colman's account.

Roberts succeeded Henry McCandless as Professor of Agriculture and was appointed Director of the University farm. As Professor of Agriculture he was the leader for all agricultural activities and "honorary dean" of an informal "department of agriculture". The following contributed to the extent that their subjects had agricultural applications:

George Chapman Caldwell, Professor of Agricultural Chemistry
Albert N. Prentiss, Professor of Botany
James Law, Professor of Veterinary Medicine
Henry Comstock, Instructor in Entomology
W. R. Lazenby, Instructor in Horticulture

Caldwell, Prentiss, and Law held positions co-equal to that of Roberts and represented disciplines independent of agriculture. Comstock, though hired as an instructor, also was responsible for an independent discipline. His work focused on the basic zoology and taxonomy of insects. Lazenby was subordinate to Prentiss in botany and, after his arrival in 1874, gradually assumed most of Prentiss' work in applied botany. The contributions of these men to agriculture were peripheral to their main interests, but they were substantial. Responsibility for agriculture, however, rested squarely on Roberts' shoulders, and he made the most of it.

Resident Instruction

Resident instruction was the primary purpose of the University during the 1870s. Roberts' arrival focused agricultural instruction on the details of practical farm operations. His teaching ranged throughout the scope of farm activities and problems, including such subjects as crop husbandry, animal husbandry, soil management, farm accounting, and farm buildings, roads, and machinery. He set out to make the University farm the laboratory for students in agriculture. His first objectives were to completely rehabilitate buildings, machinery, fences, roads, and fields and to reestablish respectable livestock. Much was accomplished during the 5 years prior to establishment of an experiment station in 1879, though it was not until 1882 that wheat yields increased from their low of 8 bushels when Roberts arrived to as much as 30 bushels per acre on the farm. Nevertheless, the farm quickly became the practical laboratory for Roberts' teaching. For the first time, agronomic subjects, and others as well, were taught from the perspective of the real world.

Enrollment in agriculture increased markedly after Roberts' arrival, from a low of 7 students in 1873-74 to 42 in 1877-78. Although Roberts' teaching may have had some impact on numbers, it is much more likely that the increase was due primarily to the trustees' decision to exempt students in agriculture from tuition. Professor Roberts' instruction was appended after 3 years of language, science, and mathematics. Students oriented to farming as a profession were mainly unwilling or unprepared to spend 3 years exclusively on these subjects. There is evidence that at least part of the increase was from students interested in the arts and sciences but enrolling in agriculture to escape tuition.

Research

With Robert's arrival in 1874, President White announced establishment of an experimental farm on the University property. This was significant mainly in that it implied official sanction for field experimentation and, presumably, some commitment for financial support. Funds available for experimentation were extremely limited, however, and the professors involved had to be most frugal in their operations. In 1877, for example, Roberts conducted experiments on 134 plots at a cost of $268.00. If a professor spent more than the amount appropriated by the trustees, the excess was deducted from the professor's salary. Nevertheless, experimentation began promptly. The First Annual Report of the newly established Cornell University Experiment Station in 1880 records the following experiments relating to crops, soils, and meteorology before the Experiment Station had been established: (Note that the experimental farm was established in 1874, but the Experiment Station was not chartered until 1879.)

Experiments by Roberts

1. Wheat. Nine experiments on fertilization, seeding methods, and culture from 1874-75 through 1879-80.
2. Oats. Culture, 1874; culture, seeding, and fertilization, 1876; fertilization and variety tests, 1877; fertilization, 1879.
3. Corn. Seven experiments on culture, fertilization, and varieties, 1875 through 1879.
4. Grass. Three experiments on fertilization and manuring, 1876 through 1879.

Experiments by Caldwell

1. Fertilizers for Indian corn. Thirty-three experiments, 1875 through 1878.
2. Analyses of fertilizers and soil amendments, 1874 through 1879.
3. Analyses of plant products, 1874.

Experiments by Prentiss

1. Climates of fields vs. woodlands. 1875 & 1876.
2. Viability of weed seeds in field soils. 1878 & 1879.

This list does not appear to be consistent with Roberts' statement before the New York Agricultural Society that 200 varieties of wheat were being tried and that 60 experiments were under way testing the relationships of soil variation and the application of manure for wheat production (Colman, pp. 69-70).

Extension

Barron's unpublished manuscript (1938) reports that during the late 1870s faculty of the "department of agriculture" lectured at the annual meetings of the New York State Agricultural Society and at times served as itinerant lecturers for the Society. Although Barron was not specific about subject matter covered, he was writing about the history of agronomy extension. Roberts and Caldwell were probably the faculty who covered that subject matter. Although Lazenby was concerned primarily with horticultural crops, he may have dealt with some agronomic subject matter as well. Lazenby cultivated farmer contacts as diligently as did Roberts, and according to Colman (p. 67), he became Cornell's first extension specialist when he was awarded a small appropriation specifically for work with farmers.

Roberts also lectured to farmers' clubs during this period. His and other faculty members' contacts with farmers were much less than he considered desirable, however, and in 1877 (Colman) he with five other faculty members initiated the first Cornell Farmers Institute. This consisted of meetings on campus under the sponsorship of the Ithaca Farmers Club. Weeds, cultivation of corn, and fertilizers were among the topics of lectures by Cornell faculty. Barron (cited above) gave 1885 as the first Cornell Farmers Institute, but this appears to have been the date at which the Institutes were resumed after several years when they were not held. Barron mentions that farmers' institutes had been held by agricultural colleges of several mid-western states prior to the 1885 meeting at Cornell. It is possible that they were inspired by Roberts' pioneering effort in 1877.

Although Caldwell, Law, and others had made special efforts to show farmers how science could be applied to farming during earlier periods, Roberts and his co-workers gave the idea of extension as a function of the University substantial impetus during this period. Perhaps more importantly, they focused on day-to-day practical farm problems for an audience dominated by practicing farmers.

E. From Establishment of the Cornell University Experiment Station in 1879 to Formation of a College of Agriculture in 1888.

In 1877, a bill was introduced in the legislature to establish a State experiment station. The bill was sponsored by the Grange, which clearly intended that the station would be located at Cornell. When the bill did not pass, Caldwell, with the cooperation of Roberts and several other faculty members, took the initiative and organized what was called the Cornell University Experiment Station. He was supported in this action by eight agricultural organizations of the State. The Board of Trustees, however, did not recognize the station's existence and allocated no funds to it. The first report published in 1880 was made possible only by a personal gift from Jennie McGraw (see Colman).

Trustee opposition to experimental work at the University was strong. The opposition was led by Chairman of the Board, Henry W. Sage, and was reinforced by President White's general philosophy that such activities were beneath the dignity of a proper institution of higher learning.

The bill to establish a State experiment station was re-introduced in the legislature in 1881 with Grange support, but this time the Grange supported its location at Geneva. When the trustees made no effort to have the station assigned to Cornell, the new New York State Agricultural Experiment Station was established at Geneva with an

annual appropriation of about $20,000. That same year, 1881, Caldwell and Roberts, with grudging support from President White, finally obtained an allocation of $1,000 from the Trustees, who thereby conceded that a Cornell University Experiment Station did exist. In 1883 when a movement to abolish the station failed by a narrow margin, the trustees embarked on a deliberate policy of slow death by successive reductions in funding. A comparison of financing of the two stations follows:

The Cornell University Experiment Station		**The New York State Agricultural Experiment Station at Geneva**	
Year	Funds	Year	Funds
1880-81	$ 250 (gift)		
1881-82	1,000	1882	$20,000
1882-83	1,145	1883	16,700
1883-84	750	1884	19,000
1884-85	250	1885	23,500
1885-86	150	1886	22,000
1886-87	- -	1887	20,700

President Adams, who succeeded President White in 1885, took a strongly positive stance toward both the "department of agriculture" and the Experiment Station. The Trustees' earlier convictions prevailed, however, until the Hatch Act promised availability of federal funds. (For the foregoing see Colman, pp. 70-85.)

The University still had no college or departmental structure during the 1880s. Informal "departments" were identified with individual professors representing specific disciplines. Those most closely related to agriculture were:

Professor Isaac P. Roberts — "department of agriculture"
Professor George C. Caldwell — "department of chemistry"
Professor Albert N. Prentiss — "department of botany"
Professor James Law — "department of veterinary medicine"
Professor John H. Comstock — "department of entomology"
Instructor W. R. Lazenby — "department of horticulture"

Of these, Roberts and Caldwell provided almost all of the instruction and research in agronomic subjects.

Horticulture was, in fact, not a "department" in the sense of the others but a subsidiary of botany under Prentiss. Its activities were closely related to that of agriculture, and Roberts tried to have it assigned to his "department". Prentiss resisted. Finally in 1880, the trustees abolished the "department of horticulture", and Lazenby abandoned his pioneering extension activities to become Head of a Department of Horticulture at Ohio State University (Colman, pp. 76 & 81).

Work in meteorology at Cornell began a year before the Cornell University Experiment Station was organized. Professor Estevan A. Fuertes had long been convinced of the importance of systematic and continuing weather observations, and in 1878, he set up a weather station in conjunction with civil engineering. It was a part-time operation inadequate for complete records, but it was a beginning. Fuertes worked diligently to obtain a New York meteorological station at Cornell coordinated with the national Weather Bureau throughout this period, but without success until later. The Cornell trustees of this period gave him no support.

Resident Instruction

Until the fall of 1885, agricultural instruction remained appended at the end of three years of language, science, and mathematics. After the marked increase of students during the 1870s, enrollment in agriculture decreased again, to a low of 13 in 1884-85, in spite of waiver of tuition. By 1885, the University had graduated 1,028 students, but only 30 of these were in agriculture.

In 1886, a new program for special students was introduced in agriculture. It was designed to serve highly motivated farm boys who lacked the preparation necessary to meet University entrance requirements for the four-year course. The special students were admitted for either one or two years after screening by the program director. They took the regular courses offered in agriculture but were not required to pass the examinations given to four-year students. In the same year, the regular four-year curriculum in agriculture was modified to make courses of the last two years almost entirely elective except for 12 required credits in agriculture. These two changes were made to make agricultural instruction available to young people who were sincerely interested in agricultural education but who had either been excluded by entrance requirements or had been unwilling to spend three years before they had any instruction in agriculture. Enrollment of regular students increased from 13 to 33 by 1888, and 12 special students enrolled the second year that program was offered.

There were no courses that treated agronomic subject matter exclusively. Professor Roberts' instruction integrated information about crops, soils, manures, fertilizers, tillage, and the like with relevant subject matter of farm management, engineering, and other disciplines as we know them today. These kinds of agriculturally related subjects were primarily Roberts' responsibility for both groups of students, though Bailey's instruction in horticulture also ranged across such disciplinary lines. Caldwell's agricultural chemistry courses contained much about fertilizers and the composition of soils and plants. As student numbers increased the teaching load of these three professors increased to some degree, but that did not become a problem until enrollment reached much higher levels during the 1890s.

Research

It is relevant at this point to give some perspective of the state of knowledge about agronomic subject matter during this period, when both the Cornell University Experiment Station and the New York State Agricultural Experiment Station were established.

Field experimentation as a research technique had been known since Boussingault conducted his experiments in France in 1834. If his work was not known by faculties of the two stations, that which had been under way at Rothamsted since 1840 must have been. Replication, however, consisted mainly of duplicates if it was practiced at all, and statistical treatment of data to determine significance was unknown.

The principles of mineral nutrition of plants expounded by Liebig in 1840 were well known, and it is likely that Caldwell at Cornell and Babcock at Geneva accepted Liebig's over-simplified balance sheet theory of plant-soil relationships. The faculties of both institutions were undoubtedly aware of the work of Lawes and Gilbert at Rothamsted, where by 1855 they had demonstrated plant requirements for the three macronutrients in the field and had noted the abnormal behavior of legumes with respect to nitrogen. The reasons were unknown.

The principles of both nitrification and nitrogen fixation were probably unknown at both stations. Warrington had demonstrated that nitrification is a biological process in 1878, but it was not until 1890 that Winogradski isolated the organisms. It was not until 1886 that Hellriegel and Wilfarth demonstrated fixation of atmospheric nitrogen with legumes, and it was not until 1890 that the organism was isolated.

Wallny in Germany and King in Wisconsin began to focus attention on the importance of physical soil properties during the 1870s. Nevertheless, Liebig's enormous influence on ideas still prevailed. Roberts, as a practical man, was certainly aware of the significance of physical soil conditions. Farm manure was the principal source of fertilizing nutrients on the farms of New York, but commercial sources were known. Nitrate of soda, 16% superphosphate, and potassium salts were the main inorganic sources. Organic nitrogen and phosphorus carriers, such as cottonseed meal, tankage, and bone meal were more common fertilizers.

The basic principles of plant physiology were known but knowledge about the detail of the processes involved was primitive. The basic principles of heredity had been discovered by Mendel in 1866 but remained unremarked by biologists until after 1900. The term "genetics" originated in 1906. Many varieties and strains of crop plants

associated with seed sources existed but were largely uncharacterized in terms of the plant characteristics they possessed.

It was within this frame of reference that the research at both the Cornell and Geneva stations began. The field experiments were largely empirical trials deficient in replication and other techniques that were later to become routine.

Work at the Cornell station continued mainly along the lines begun on the experimental farm prior to 1879. A major study of stable manure, its preservation and its value, was a notable addition by Roberts. The research of the Station, including that on crops and soils, was conducted on an extremely limited budget with largely volunteer labor and makeshift equipment. The principal work related to crops and soils reported in the Experiment Station Reports follows:

I.P. Roberts

Field experiments with crops:
- Oats - 1879-80 through 1884-85
- Wheat - 1879-80 through 1884-85
- Corn - 1879-80 through 1883-84

Self-fertilization of corn, 1883-84
- Cost and value of stable manure, 1882-83 through 1884-85
- Quantity and value of manure from milk cows, 1884-85

G.C. Caldwell

- Analysis of land plaster, 1882-83
- Nutrients in tops and butts of corn stalks, 1882-83
- Fodder analyses, 1882-83 & 1884-85
- Volumetric determination of P_2O_5, 1882-83
- Cost of plant food in commercial fertilizers, 1882-83 through 1884-85
- Miscellaneous analyses of commercial fertilizers, 1879-80 through 1884-85
- Effect of potash salts as fertilizers for the grape, 1884-85

The report for 1884-85 was the last published. Work after that year was presumably similar to that listed above.

At the Geneva station, circumstances were much different. E. Lewis Sturtevant was the Director, and he and his assistant reported most of the work related to agronomy. S. M. Babcock, a former student of Caldwell, was the Chemist. He became increasingly involved with dairy products, including a test for butterfat in milk. He developed the "Babcock" test shortly after he left Geneva for Wisconsin in 1887. Emmet Goff was Horticulturist and devoted much of his time to cataloging seeds of horticultural crops and characterizing plants from them. Arthur was the Botanist. With annual appropriations approximating $20,000, the staff was highly productive.

Though the title to the Geneva farm did not pass to the State until 1882, the Director's report for that year includes the following studies related to agronomy:

1. Studies of the effects of soil temperature on germination.
2. Construction of 3 small lysimeters to study the amount and composition of soil drainage water.
3. Analysis of pigweed, red root, cow pea, string bean, soybean, and corn at different stages of growth, as well as of milk and fertilizers.
4. Field experiments with wheat, barley, oats, corn, beans, potatoes, sorghum, cowpeas, millet, alfalfa, and weeds. These experiments variously studied plant populations, fertilization, varieties, depth of planting, cultivation, and root pruning.

Dr. Sturtevant and his associates were responsible for most of the agronomic work until 1887. They reported each year on experiments with one or more of varieties, seeding, cultivation, fertilization and other practices with most of the field crops commonly grown in New York. They also tried some crops that were not grown in New York but were thought to have potential in the State. Work with some aspects of seed technology was reported in the first and subsequent Station reports. Characterization and testing of crop plants from different seed sources were important elements of the work of both the Director and the Horticulturist.

Work with the lysimeters at Geneva continued throughout the period, and analyses of the leachates were expanded with time. A meteorological station was established to provide continuous weather records. Soil temperatures were recorded at 1, 3, 6, and 24 inches for study of temperature relations to plant performance. Studies on water tables, drainage, and soil moisture were started in 1886. The effects of tillage on soil moisture were investigated, and the results led Dr. Sturtevant to propose a theory of moisture conservation by disruption of soil capillaries, which remained prominent in soil textbooks for 40 years. Fertilizer trials at first were confined mainly to phosphorus carriers, but near the end of the period, nitrogen and potassium were included.

The Chemist performed the usual analyses of plants, milk, water, and fertilizer materials and, near the end of the period, complained bitterly about the service aspects of fertilizer analyses and the poor samples he received from farmers. There was, however, increasing concern at the station about the lack of legislation for fertilizer control.

For several years, Dr. Sturtevant studied the agreement, or lack of it, between duplicate field plots. In his final report of 1887, he concluded that "These trials indicate the utter unreliability of field experimentation and should suffice to convince the public of the lack of certainty which attends all general conclusions gained by this process." He continued in the report, however, to enlarge on the great potential he saw for agricultural research providing experimenters made due allowance for the deficiencies of their work.

Extension

Farmers Institutes, like that held in 1877, were reestablished during this period. The first of the new series was a three-day meeting held at the University under the sponsorship of the New York State Agricultural Society in 1885.

According to Barron (1938) the attendance was so large that the University classrooms could not accommodate the participants. The meetings were moved to "down-town" Ithaca. At its close, the meeting requested the New York State Agricultural Society to hold additional institutes the following year. Meetings were arranged at Ithaca, Lockport, Oswego, Batavia, and Schenectady for the winter of 1886-87 and were successful beyond expectations. Some of the speakers were farmers, but Roberts and other faculty members of Cornell and staff members of the New York Agricultural Experiment Station were prominent contributors.

The success of the institutes prompted an appropriation of $6000 by the New York Legislature to the New York State Agricultural Society for similar institutes during 1887-88. Twenty meetings were held. The Society continued as the sponsor of Farmers Institutes until 1893, when the State appropriation for the work amounted to $15,000. Cornell faculty were major contributors to the programs and thus had access to many of the agricultural communities that they had reached only through news releases and bulletins of the Experiment Station previously. The subject matter was far-ranging and included much on crop husbandry based on Roberts' experiments and experience on the University farm. The institutes were a major outlet for extension until 1894.

The Director of the New York State Agricultural Experiment Station at Geneva was extremely sensitive to the need to acquaint farmers with the results of work at the station if it was to be of practical value. He initiated a series of press releases, called bulletins, very shortly after the Station had begun to operate. Bulletin No. 1 was released July 24, 1882. When this series was replaced in 1885, it had accumulated to Bulletin No. 115 and was used by 42 magazines and newspapers distributed not only about New York but also eastward to New England, south as far as Georgia, and westward to California. The new series that succeeded it was in the form of sheets for mail distribution as well as use by the press to reach a larger audience. The bulletins covered the range of interests represented

at the Station, among which the subject matter of agronomy was prominent during this period.

F. From Establishment of the Cornell University College of Agriculture and the Cornell University Agricultural Experiment Station in 1888 to Creation of the New York State College of Agriculture in 1904.

As the academic year 1887-88 opened, the faculty of the informal "departments" related to agriculture remained essentially unchanged from that after Roberts' arrival in 1874:

George Chapman Caldwell . . . .agricultural chemistry
Isaac N. Prentiss. . . . . .botany
James Law . . . . . .veterinary
Henry Comstock . . . . . .entomology

W. R. Lazenby for horticulture had left in 1880, leaving that subject matter area to Prentiss of botany. One part-time assistant supported Roberts. During the period from 1879 to 1887, however, President Adams had gradually changed the trustees' seeming hostility toward agriculture. By the beginning of the 1887-88 academic year, the trustees had made two landmark decisions: (1) To establish a College of Agriculture and (2) To work actively to obtain federal funds for agricultural research.

In June, 1888, the "departments" of agriculture (Roberts), agricultural chemistry (Caldwell), botany (Prentiss), entomology (Comstock), and veterinary medicine (Law) were combined to form the Cornell College of Agriculture. The name distinguishes it from the New York State College of Agriculture which succeeded it in 1904. Horticulture, which had been a subsidiary of botany until it was discontinued by the trustees in 1880, was reestablished as an independent department of the College, and Liberty Hyde Bailey was recruited as Professor and Head. Roberts was appointed "Director" of the College and Dean of its faculty, while retaining his role as Professor of Agriculture, heading a Department of Agriculture within a college of the same name. Until 1896, all educational questions of the new College, as well as those of others, were under the jurisdiction of the University Faculty as a whole. In 1896, the University underwent a general reorganization which made the Faculty of Agriculture responsible for the academic work of students in the College.

Under the Hatch Act of 1887, $15,000 of federal funds were made available to each state for support of agricultural research. Under provisions of the act, state legislatures could assign those funds to research institutions as they might see fit. In New York, both the Cornell University Experiment Station and the New York State Agricultural Experiment Station at Geneva were potential recipients.

In anticipation of Hatch funds, the Cornell trustees re-organized the Cornell University Experiment Station under the new name "Cornell University Agricultural Experiment Station", which remains its official name to the present. It was not until April, 1888, however, that Cornell was awarded the $15,000 Hatch appropriation. Initially, University authorities believed that the Experiment Station should be maintained as an entity separate and distinct from the teaching functions of the University. When an attempt to recruit a qualified Director independent of College faculty failed, however, Roberts was appointed to the directorship. As Roberts was also Director of the College and Dean of its faculty, this act established the coordination between research and instruction that has persisted to the present.

The Hatch funds gave the Cornell University Agricultural Experiment Station a resource base more nearly equivalent to that of the New York State Agricultural Experiment Station at Geneva. Four full-time assistants were hired for research where only one part-time assistant had been available previously. Additional personnel with half teaching, half research responsibilities were provided by splitting salaries between Hatch and Cornell funds, enhancing both the teaching and research programs. The additional resources benefitted the entire scope of the College, but the agronomic subject matter areas were enhanced as much or more than others. The Morrill Act of

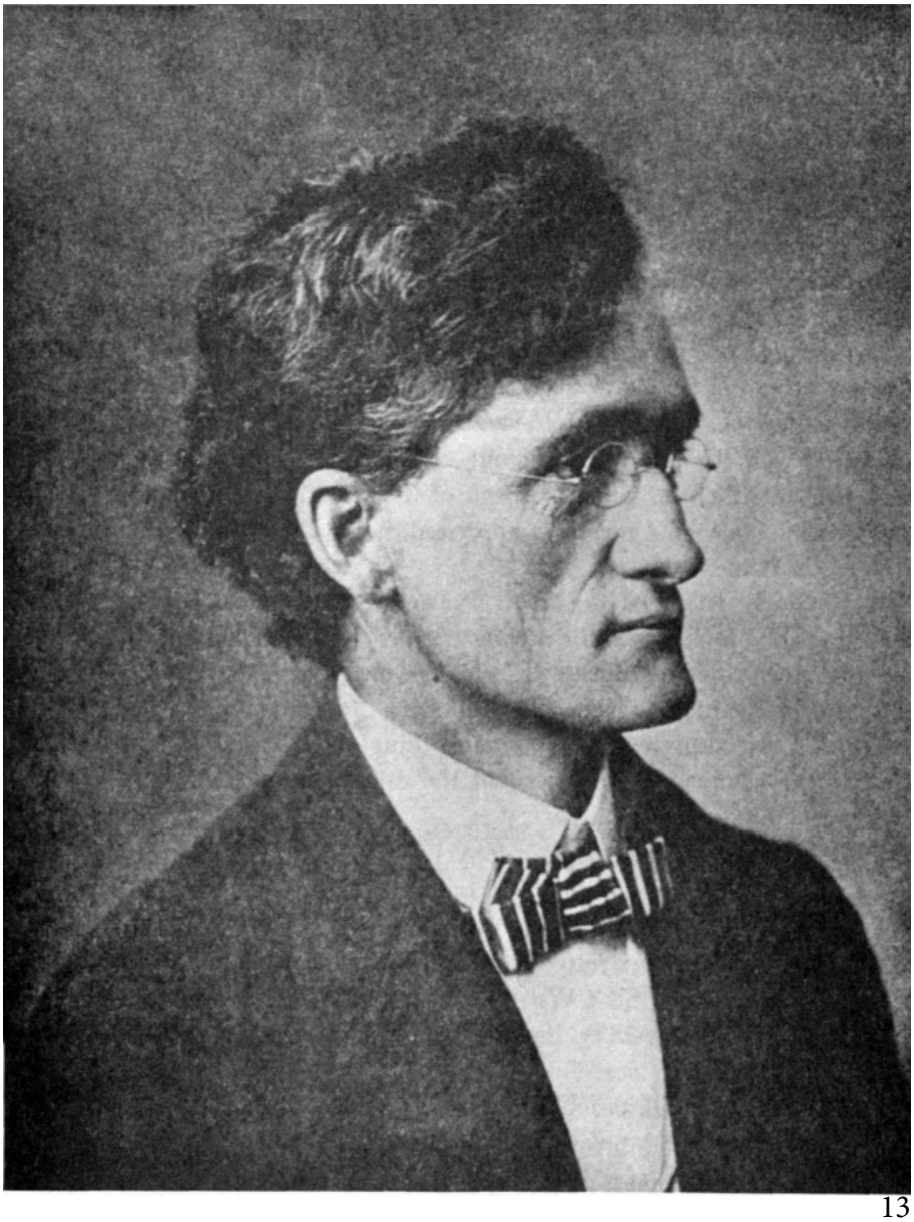
1890 allowed additional expansion of resident instruction in agriculture, but mainly in areas not directly related to agronomy. Expansion from that source was short-lived, however, when the trustees reallocated much of the Morrill funds that had gone to Agriculture to other colleges of the University. The faculty and supporting professional staff that resulted from the aggregate of all sources of funds are listed on page 12 (below) for the three departments most concerned with the subject matter of agronomy.

Faculty and Professional Staff of Departments Most Concerned with the Subject Matter of Agronomy, 1887-88 to 1902-03.

Year	Agriculture	Agricultural Chemistry	Horticulture
1887-88	Prof. I.P. Roberts	Prof. G.C. Caldwell	Prof. L.H. Bailey
	Asst. J.M. Drew	Asst. W.P. Cutter	Asst. W.M. Munson
1889-90	Prof. I.P. Roberts	Prof. G.C. Caldwell	Prof. L.H. Bailey
	Asst. C.D. Smith	Asst. H. Snyder	Asst. W.M. Munson
1891-92	Prof. I.P. Roberts	Prof. G.C. Caldwell	Prof. L.H. Bailey
	Asst. G.C. Watson	Asst. G.W. Cavanaugh	Asst. L.C. Corbett
1893-94	Prof. I.P. Roberts	Prof. G.C. Caldwell	Prof. L.H. Bailey
	Asst. G.C. Watson	Asst. G.W. Cavanaugh	Asst. E.G. Lodeman
1895-96	Prof. I.P. Roberts	Prof. G.C. Caldwell	Prof. L.H. Bailey
	Asst. L.A. Clinton	Asst. G.W. Cavanaugh	Asst. E.G. Lodeman
1897-98	Prof. I.P. Roberts	Prof. G.C. Caldwell	Prof. L.H. Bailey
	Asst. L.A. Clinton	Asst. G.W. Cavanaugh	Asst. G.N. Lauman
	*Instr. J.L. Stone	*Instr. A.L. Knisley	Instr. C.E. Hunn
			*Instr. J.W. Spencer
1899-1900	Prof. I.P. Roberts	Prof. G.C. Caldwell	Prof. L.H. Bailey
	Asst. L.A. Clinton	Asst. Prof. G.W. Cavanaugh	Instr. C.E. Hunn
	*Instr. J.L. Stone	*Instr. A.L. Knisley	*Instr. J.W. Spencer
1901-02		Same as 1899-1900	
1902-03	Prof. I.P. Roberts	Prof. G.C. Caldwell	Prof. L.H. Bailey
	Agriculturalist J.W. Gilmore	Asst. Prof. G.W. Cavanaugh	Instr. C.E. Hunn
	*Instr. J.L. Stone		*Instr. J.W. Spencer

* Instructors Stone, Knisley, and Spencer were members of a "Bureau of Extension" created in response to State appropriations specifically for extension. They are listed here with the departments in which their principal work was vested. J. W. Spencer was Associate Director for Extension under Bailey until 1902 when Prof. John Craig was appointed Director.

Left: Isaac P. Roberts



Right: Liberty Hyde Bailey

The "Assistants" were Experiment Station employees subordinate to the individual in charge of the department, who was normally also a university professor. J. W. Gilmore, rather than Roberts, was in charge of Experiment Station research for the Department of Agriculture in 1902-03 and had the title of Agriculturist. Roberts and Caldwell were approaching retirement. From about 1895 onward, L. A. Clinton assumed increasing responsibility for the Department of Agriculture, and G. W. Cavanaugh, for the Department of Agricultural Chemistry.

Until 1889, meteorology at Cornell was confined to Professor Fuertes' part-time efforts to record continuing weather records. In 1889, the New York legislature established a New York State Weather Bureau and located its headquarters at Cornell. That action was a result of Professor Fuertes' continuing efforts and was taken in spite of the conspicuously negative attitude of the Cornell trustees. The action was significant not only for meteorology but also as a precedent for State support of an educational program at Cornell.

In 1898, the New York State College of Forestry was established at Cornell on the initiative of officers of State government. University officials appear to have neither encouraged nor discouraged the legislation. Conflicting views about management of the Adirondack State Park had prompted the movement to establish a State institution to study forest management. With the College, Cornell received an experimental forest management area in the Adirondacks and the mistaken belief on the part of State officials that it should be self-sustaining financially. The history of the College of Forestry is relevant to agronomy only by the fact that its location at Cornell for a time led to a Department of Forestry in the College of Agriculture, which in turn probably influenced the Charles Lathrop Pack family to endow a faculty "chair" in forest soils.

Resident Instruction

Between 1888 and 1903, enrollment in the four courses of study offered by the College of Agriculture increased from 58 to 252:

Course of Study

Year	Regular 4-year	Special	Winter	Graduate
1888-89	37	21	--	N.A.
1890-91	32	20	--	N.A.
1892-93	24	24	48	9
1894-95	24	21	77	9
1896-97	34	34	60	20
1898-99	46	39	89	17
1900-01	48	50	94	23
1902-03	60	53	121	18

Roberts and Caldwell were responsible for almost all of the instruction in subjects related to agronomy during that period. The curriculum of the regular course required 4 credits in Agricultural Chemistry for each of 3 terms in the sophomore year; 2 credits in soils in the second term of the junior year; and 7 credits in applied agriculture, including farm crops, in each of 3 terms during the senior year. During the 1898-99 academic year, Roberts offered 3 courses directly related to agronomic subject matter:

Agriculture 1. Wheat culture (including a wide-ranging array of subject matter). 5 credits. Fall term.
Agriculture 5. Farm drainage and tillage. 5 credits. Spring term.
Agriculture 6. Farm practice. 1 credit. Spring term.

Caldwell offered 2 courses directly related to agronomy:

Agricultural Chemistry 16. General agricultural chemistry. 4 credits. Each of 3 terms.
Agricultural Chemistry 17. Agricultural chemistry reading. 1 credit.

The courses by Caldwell covered such subjects as fertilizers, composition of soils and plants, and chemical principles. Both Caldwell and Roberts offered several other courses which were not directly related to the subject matter of agronomy. Some of the 10 courses offered by Bailey also contributed to agronomic subject matter as it relates to horticulture. Special students took the same courses as the regular students.

The winter short course was started in 1892-93 for farm youth who could not attend the regular course because of lack of time or money, or who were unable to meet the entrance requirements. The first session was in general agriculture. It started in January, 1893, and lasted for eleven weeks. Professor Roberts in general agriculture, Professor Caldwell in agricultural chemistry, Professor Rice in poultry, Professor Law in veterinary medicine, and Martha Van Rensselaer in home economics constituted the instructional staff. All of the forty-eight students enrolled were required to take the following courses:

Fertility of the Land: Chemical and physical aspects of soils.
Agronomy: Field crops and their management.
Animal Husbandry: Principles of breeding and feeding animals.
Horticulture: Principles of fruit and vegetable growing.
The Farm Home: Farm buildings, sanitation, convenience.

Students interested in the history of the Winter Course should consult the manuscript by C. A. Taylor (1939) cited in the list of sources. Taylor reports that by 1914 the program had grown to seven short courses with a combined enrollment of 549:

Course	started in	students
General Agriculture	1893	296
Dairy Industry	1894	108
Poultry Husbandry	1905	69
Horticulture	1906	42
Home Economics	1906	39
Flower Growing	1913	14
Vegetable Gardening	1913	8

Until 1913, the Horticulture course included flowers and vegetables; from 1913 onward it was confined to fruit.

Agronomic subject matter was covered mainly in the General Agriculture Course. Soils and fertilizers were also subjects of Horticulture and Vegetable Gardening.

Enrollment in all of the courses declined markedly during the First World War and never again reached the high of 1914. Vocational Agriculture courses in the State's high schools supported under the Smith-Lever act offered a viable alternative for farm youth. The Winter Course continued into the 1940s, however, and H. O. Buckman of the Department of Soil Technology, later Agronomy, is mentioned by Taylor as a major contributor throughout many years.

Graduate studies had begun in the early 1880s, but during that decade only twelve advanced degrees had been in agriculture. During the 1890s, that number increased to 151. H. B. Cannon is believed to have been the first to receive an M.S. degree in soils from an American institution. His thesis on soil as a factor in plant variation was completed in 1898, probably under Roberts but possibly under Caldwell. C. G. Hopkins, who was destined to become the grand old man of soils at the University of Illinois, completed M.S. and Ph.D. degrees in Agricultural Chemistry under Caldwell, but the theses were not on soils topics. The Masters thesis presented in 1894 was on standard reagents for titration; the Ph.D. thesis in 1898 was on the chemistry of the corn kernel. J. G. Lipman completed M.S. (1901) and Ph.D. (1903) degrees under Caldwell on nitrification and nitrogen fixation, respectively. He became the father of American soil microbiology during his long and distinguished career at Rutgers University.

J. A. Bizzell also completed the Ph.D. in soils under Caldwell in 1903. He remained at Cornell as a member of its faculty until his retirement in 1940. Lipman and Bizzell may have been the first to earn Ph.D. degrees in soils at an American institution.

Research

Intense competition developed between the Cornell and Geneva experiment stations during this period, each marshaling support from influential individuals and organizations to substantiate its claims to both state and federal support. In 1893, the Grange reversed its stand on the Geneva station and recommended its transfer to Cornell. Friends of the Geneva station convinced the Governor otherwise, however, and in 1894 the legislature reallocated 10% of the Hatch appropriation to the Geneva station. The legislature also appropriated $8,000 to the Geneva station for extension, and in a separate bill, it provided the Cornell station with funds to begin extension work on horticulture in western New York. Then in 1897, a State appropriation of $25,000 to Cornell provided for extension in all phases of agriculture throughout the State. These extension appropriations are mentioned under research because they financed the establishment of a large program of cooperative experiments and trials with farmers, which was classified as extension but included a substantial research element.

The Hatch funds instilled new life into the Cornell station and brought its research to a level more nearly comparable to that of the Geneva station. Agronomic investigations that had been under way, such as fertilizer trials and experiments with culture and varieties of wheat, corn, and oats were continued but at an expanded level. Weed control became more important than before. The work on farm manure continued for a time but was gradually phased out. Roberts started new work on silage, which was to prove very important for New York farmers. He also initiated studies of tillage, testing the theories promoted by Jethro Tull of England in the 1730s. Work was begun on methods to conserve moisture.

In response to a national effort for self-sufficiency in sugar production, the station cooperated with U.S.D.A. on sugar beet trials from 1893 to the end of this period, only to have the effort condemned to oblivion by a national decision to admit Cuban sugar preferentially. John Stone, employed under the State extension appropriation, was in charge of the sugar beet studies from 1897 onward. He was also in charge of a new program of cooperative experiments with farmers. In 1897, 203 farmers of 45 counties cooperated with fertilizer trials, and more than 300 farmer cooperators had sugar beet trials.

The scope of the research effort of the Cornell station increased enormously during the 1890s to serve florists, orchardists, dairymen, and others. Consequently, some agronomic aspects of farming received less attention than they might have merited. Work with forage, for example, was limited. Horticulture under Bailey was on the ascendency; agronomic work, though increasing, was overshadowed by the aggressiveness and productivity of the Department of Horticulture. In 1894, for example, 17 of the 21 bulletins of the Cornell station were on horticultural subjects. Some of Bailey's work had a direct bearing on agronomic subject matter; his Bulletin 174 in 1900, for example, was about the problem of "impoverished land". Clinton of the Department of Agriculture was also concerned about this problem and was studying "soil renovation".

At the Geneva station, Dr. Peter Collier succeeded E. Lewis Sturtevant as Director in 1887, and he in turn was succeeded by Dr. W. H. Jordan in 1896. Where Dr. Sturtevant had placed major emphasis on agronomic crops and soils, his successors emphasized dairy and horticulture. In 1901, Director Jordan wrote that "Excepting for the inspection work, members of the Station staff are dealing largely with problems particularly affecting dairy and horticultural interests". In that year, the 20th, the total budget from all sources was $105,000.

After 1888, the main agronomic work at the Geneva station that can be considered strictly research consisted of limited studies of sugar beet production, silage, sugar content of corn and sorghum, and comparative yields of forage crops. The meteorological records were maintained, including soil temperatures. Some soil investigations for horticultural crops had agronomic implications.

Extension

By 1888, Roberts in particular, but other faculty as well, had established respect for Cornell in the agricultural community. Farmers Institutes continued through the early 1890s and were popular and effective. The greatest impetus to extension came, however, in 1894 with a State appropriation of $8,000 for horticultural extension in Western New York.

In 1893, grape farmers in Chautauqua County had requested the Cornell University Agricultural Experiment Station to establish trials in their vineyards. The College authorities could not respond favorably without sacrificing on-going work, but they agreed to assign a staff member to the work if the Chautauqua group could raise funds for travel, fertilizers, and other operational materials. During the winter of 1894, the Chautauqua group obtained a State appropriation of $8,000 for the work through the influence of their assemblyman, S. P. Nixon. The funds were assigned to the Cornell University Agricultural Experiment Station for horticultural work in the Fifth Judicial Department, which included sixteen western New York counties. The appropriation was increased to $16,000 in 1895. This was repeated in 1896 but for twenty two counties. Finally in 1897, $25,000 was appropriated to the College of Agriculture, rather than the Experiment Station, and was mandated for agricultural extension in general, not just for horticulture, throughout the State.

It was the 1897 appropriation which brought J. W. Spencer, an influential farmer friend of Cornell, to the College as Deputy Director of Extension under Roberts. J. L. Stone, for whom Stone Hall was named in later years, also came under this appropriation.

Extension focusing specifically on agronomic subject matter emerged about 1895. Immediately prior to that time, Professor Roberts, L. A. Clinton, and A. L. Knisley had handled most of the extension of agronomic subject matter, largely within the context of agriculture in general. Barron (1938) has noted that after State appropriations became available for extension the point of view of the College regarding work with farmers changed markedly. Lectures had been recognized as an extension tool to communicate information, but field trials on operating farms had been considered primarily as a research device for gathering data. They are discussed as research in the preceding subsection for that reason. With funds for extension, emphasis shifted to the dissemination of information, and particular attention was given to: 1. Local experiments as a means of teaching. 2. Easily read expository bulletins. 3. Itinerant schools of several days duration, especially for horticulture. 4. Dissemination of information to teachers in rural schools. 5. Instruction by correspondence and reading courses. The change was probably due in part to demands of the farming public for information about subjects that were innovative at that time, such as the potential of alfalfa as a forage crop, the potential of sugar beets in New York, use of inorganic commercial fertilizers, and potato production.

J. L. Stone was the prime mover in the development of trials on farms as an extension tool. He came to Cornell specifically to work on sugar beets as a new crop, but his interests led him far beyond that subject. He used field trials and publications that explained the subject to be investigated as his principle tools. Circulars explaining how to conduct the trials, including forms for recording results, were distributed to cooperators. By 1902 cooperative trials on farms covered a broad range of agronomic subjects:

Fertilizers: . . . . . Tests of N, P, and K on different soils.
Wheat: . . . . . Varieties, especially their resistance to Hessian fly.
Sugar beets: . . . . . Varieties and culture.
Buckwheat: . . . . . Varieties and culture.
Alfalfa: . . . . . Adaptation to different soils.
Soils: . . . . . Restoration of productivity after depletion.
Sunflowers: . . . . . Use for silage.
Soybeans: . . . . . Varieties for forage and green manure.
Bokhara clover: . . . . . Value as a soil renovator.
Rotations: . . . . . Crop sequences and their value.
Sandy soils: . . . . . Crops adapted to them.

Cooperators were selected from successful participants of previous years, promising farmers in the Cornell Reading Course, and, later, members of a student organization called the "Experimenters League". The League was organized in 1902-03 with 60 members. It continued until 1914, when county Farm Bureaus were established, and had grown to 1,000 members.

Barron (1938) has noted that extension schools on agronomic subjects met with little success, compared to those in horticulture for which Bailey's dynamic leadership was responsible. Attendance was usually small. It was finally concluded that schools would not be held for agronomic subjects until interest had been awakened by other means. The Cornell Reading Course for Farmers, initiated in 1898, was a convenient vehicle for that purpose. Of the five lessons prepared the first year, three were about soils and soil problems:

The Soil. What it is.
Tillage and Underdrainage. Reasons Why.
Fertility of the Soil and What it is.
A fourth lesson was added in 1900, *Soiling Crops and Silage.*

The lessons consisted of a text detailing the subject matter in lay terms, followed by a series of questions. During the winter of 1898, 280,000 pages of literature were distributed to 7,500 farmers. By 1900, the enrollment was 20,000 for all subjects. Slightly earlier, Spencer and Bailey had initiated "Nature Study Leaflets" for rural school teachers and "Junior Naturalist Clubs". Though these had limited bearing on agronomic subjects, they were part of the whole that firmly established agricultural extension as a function of the College.

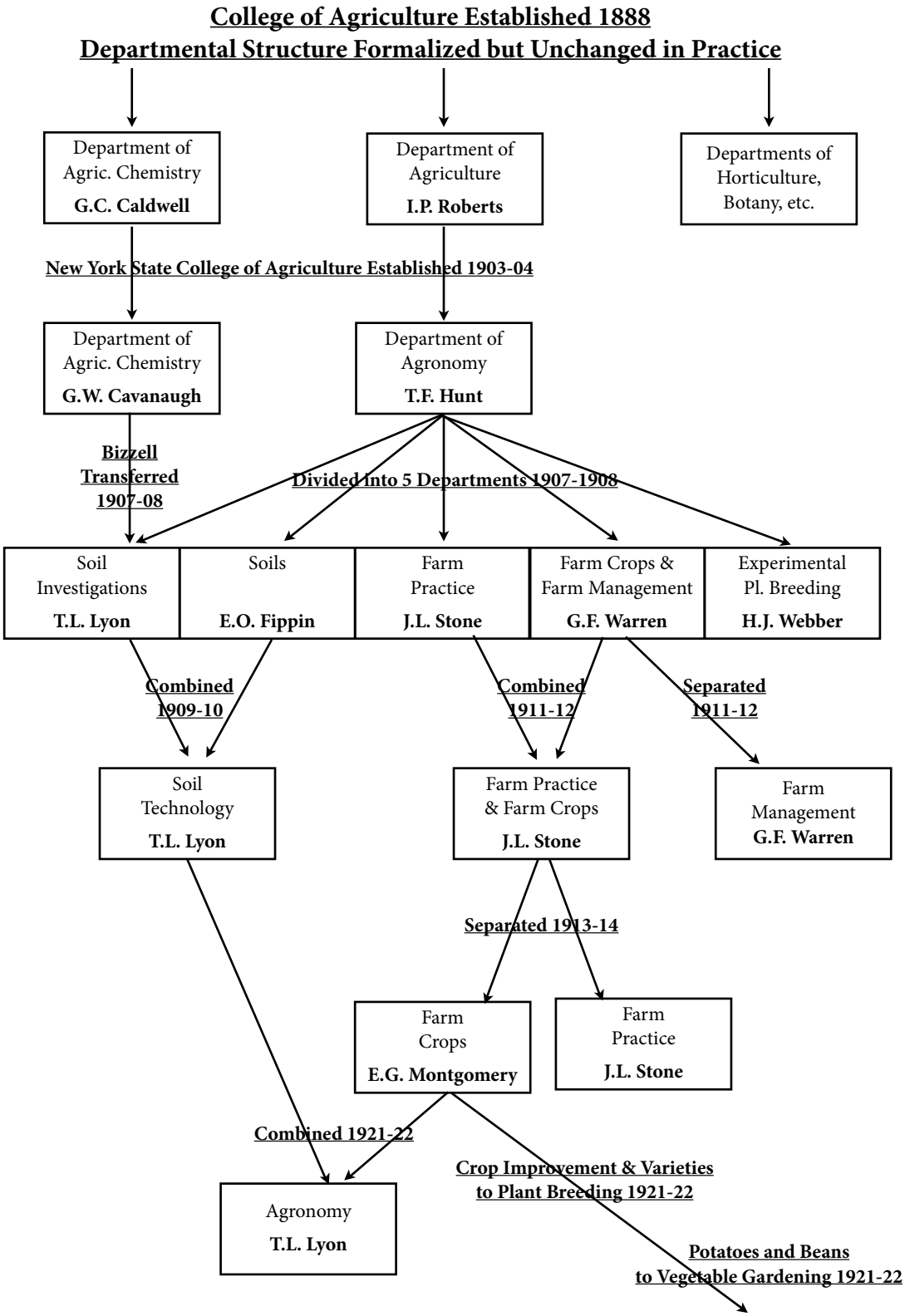
At the Geneva station, extension of research findings continued along the lines established earlier. In 1897, Director Jordan started a new series of popular bulletins for the general public, as distinguished from publications called "complete bulletins". By 1900 the mailing of popular bulletins was 35,000 and of complete bulletins, 2,500. News releases to magazines and newspapers continued to be major extension vehicles. Relatively few of these devices dealt with agronomic subject matter, however, except those that reported the results of fertilizer analyses and inspections.

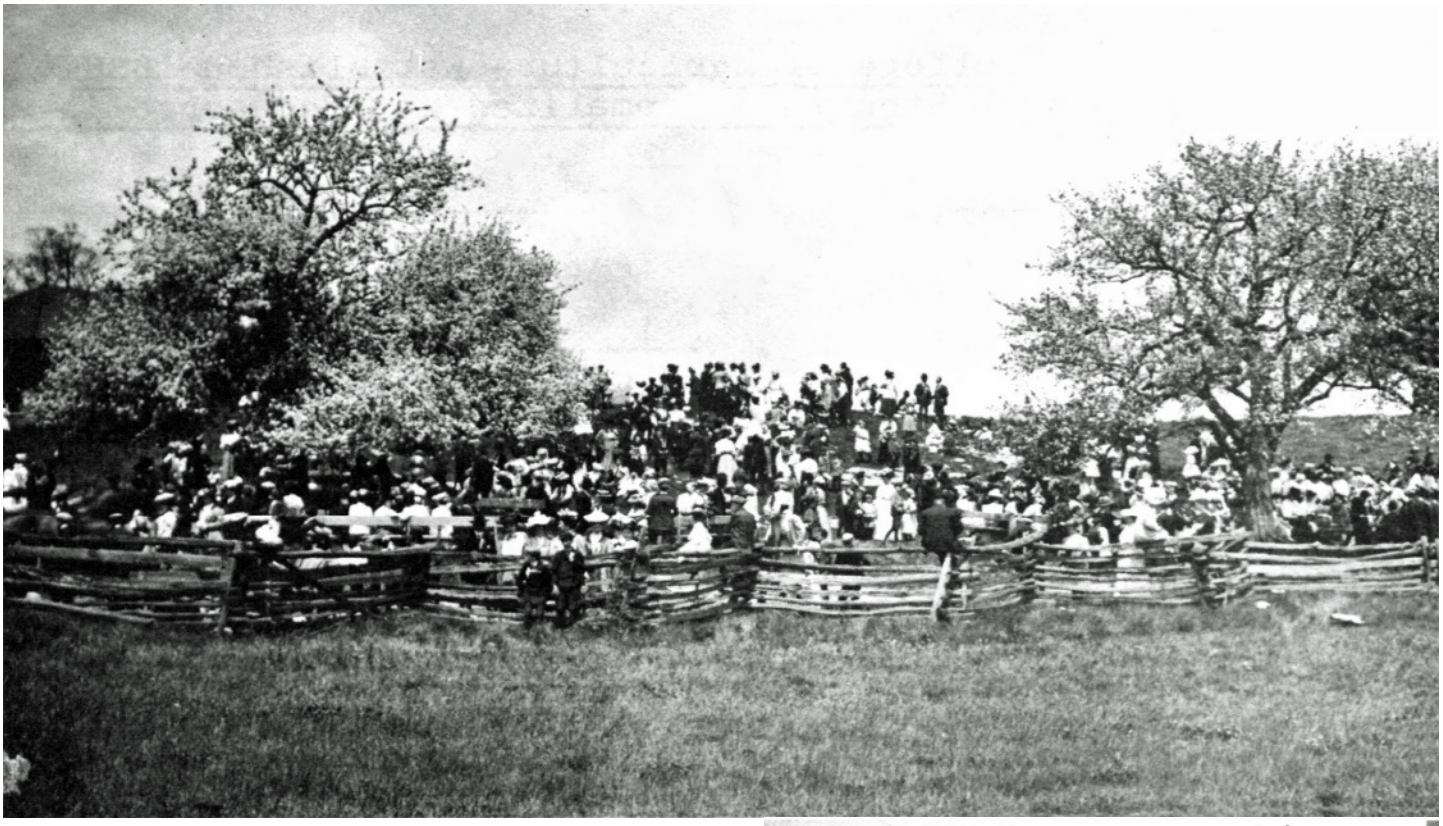
The Geneva station also provided service functions that may more properly be discussed under extension than research, although they had a research component. In 1890, the New York legislature enacted a fertilizer control law that mandated fertilizer guarantees by manufacturers and dealers. Inspection and analysis for enforcement were assigned to the Geneva station. In 1898, a feed control law setting standards for dealers was passed, and the Geneva station was made responsible for inspection of feeding stuffs for enforcement. Both of these functions were supported by license fees, which amounted to $14,000 by 1901. The analytical work required two or three special assistant chemists at the Geneva station.

G. From Establishment of the New York State College of Agriculture and the First Department of Agronomy in 1903-04 to Segregation of the Departments of Soil Technology and Farm Crops in 1913-14.

Legislation establishing a New York State College of Agriculture at Cornell passed the State legislature and was signed by the governor in May, 1904. The act also appropriated funds for operation and for an agriculture building. The legislation passed in spite of violent opposition and intense lobbying led by Chancellor Day of Syracuse University acting for Syracuse and six other universities and colleges in New York. Colman (pp. 161-63) infers that the legislation was the result of intense political bargaining.

Liberty Hyde Bailey had succeeded I. P. Roberts as Dean of the Cornell College of Agriculture when the latter retired in 1903. He continued as Dean of the State College. His dean-ship is marked by a remarkable series of departmental realignments. His policies for internal organization focused on creation of departments to enhance the potential of strong faculty members of specific subject matter areas. Departments were formed, subdivided, and


College of Agriculture Established 1888
Departmental Structure Formalized but Unchanged in Practice
Department of Agric. Chemistry
G.C. Caldwell
Department of Agriculture
I.P. Roberts
Departments of Horticulture, Botany, etc.
New York State College of Agriculture Established 1903-04
Department of Agric. Chemistry
G.W. Cavanaugh
Department of Agronomy
T.F. Hunt
Bizzell Transferred 1907-08
Divided into 5 Departments 1907-1908
Soil Investigations
T.L. Lyon
Soils
E.O. Fippin
Farm Practice
J.L. Stone
Farm Crops & Farm Management
G.F. Warren
Experimental Pl. Breeding
H.J. Webber
Combined 1909-10
Combined 1911-12
Separated 1911-12
Soil Technology
T.L. Lyon
Farm Practice & Farm Crops
J.L. Stone
Farm Management
G.F. Warren
Separated 1913-14
Farm Crops
E.G. Montgomery
Farm Practice
J.L. Stone
Combined 1921-22
Crop Improvement & Varieties to Plant Breeding 1921-22
Agronomy
T.L. Lyon
Potatoes and Beans to Vegetable Gardening 1921-22



The school picnic in Robert's pasture in May, 1907.

Professor Hunt (on the left), Head of the first Department of Agronomy, at a farm meeting on the farm of H. B. Winter at Smithboro, New York, in 1907.

and combined as the faculty changed. The diagram on page 19 shows graphically the amazing sequence of realignments in the areas that are related to agronomic subject matter, beginning with establishment of the first Department of Agronomy in 1903-04, continuing with successive divisions and combinations throughout Bailey's tenure to 1913-14, ending after 8 years of relative stability with the creation of the current Department of Agronomy in 1921-22. Bailey recruited T. P. Hunt, Dean of the College of Agriculture and Domestic Science at Ohio State University, in 1903-04 to head a new Department of Agronomy and assume control of the finances of Agronomy, Animal Husbandry, Dairy Industry, and the University farm. The Department of Agronomy consisted of the crops and soils subject matter areas of the former Department of Agriculture under Roberts. With State appropriations available to the College, the faculty and staff were increased substantially. By 1906, the faculty of Agronomy consisted of the following:

T. F. Hunt (D. Agr.) . . . . . Professor of Agronomy and Department Head
T. L. Lyon (Ph.D.) . . . . . Professor of Experimental Agronomy
J. Bonsteel (Ph.D.) . . . . . Professor of Soil Investigations
J. L. Stone (B. Agr.) . . . . . Assistant Professor of Agronomy
E. O. Fippin (B.S.) . . . . . Assistant Professor of Agronomy (Soils)
G. F. Warren (Ph.D.) . . . . . Assistant Professor of Agronomy
J. W. Gilmore (M.S.) . . . . . Assistant Professor of Agronomy
S. Fraser (B.S.) . . . . . Assistant in Agronomy (Experiment Station)

Lyon had been Associate Director of the Nebraska Agricultural Experiment Station before he took leave for graduate studies in Agricultural Chemistry under Caldwell at Cornell. On completion of the Ph.D. degree, Bailey prevailed on him to accept a professorship in Agronomy. Bonsteel was on leave from the Bureau of Soils of U.S.D.A. and returned to that agency in 1906-07. Fippin had also been with the Bureau of Soils before joining the Cornell faculty and retained part time relationships with the Bureau for some time after coming to Cornell. G. P. Warren had spent one year at the New Jersey Agricultural Experiment Station after completing his Ph.D. under Bailey at Cornell. He was to become the father of Agricultural Economics at Cornell. Gilmore had been Agriculturalist of the Cornell University Agricultural Experiment Station after completing his B.S. degree under Roberts. Stone had joined the Department of Agriculture at Cornell in 1897 to assume responsibility for the work on sugar beets.

The Department of Agricultural Chemistry still contributed to agronomic subject matter. In 1906, its staff consisted of the following:

G.W. Cavanaugh (B.S.), Assistant Professor of Agricultural Chemistry
J.A. Bizzell (Ph.D.), Assistant Chemist (Experiment Station)
C.C. Cleveland (B.S.), Assistant in Agricultural Chemistry (Experiment Station)

Cavanaugh had earned his B.S. degree under Caldwell and served as Caldwell's Assistant (Experiment Station) from 1891-92 through 1897-98. He was promoted to Assistant Professor in the 1899-1900 academic year and succeeded Professor Caldwell as Head of Agricultural Chemistry when the latter retired in 1903. Bizzell joined the Experiment Station staff in Agricultural Chemistry as Assistant Chemist after completing his Ph.D. under Professor Caldwell. Cleveland was succeeded by S.M. Herrick in 1907. Both had been Cornell students and were chemical analysts who had little impact on agronomic subject matter. Cavanaugh taught the Agricultural Chemistry courses concerned with soils and fertilizers. Bizzell had little to do with agronomic subject matter until he transferred to the Department of Soil Investigations when it was formed in 1907-08.

Meteorology as a Cornell-sponsored subject matter area originated at the University in 1905-06, when William Charles Devereaux was detailed to Cornell by the U.S. Weather Bureau as a lecturer in return for housing and services provided by Cornell for his Weather Bureau functions. Fuertes' efforts for Meteorology described in the preceding section had not brought Federal Weather Bureau cooperation nor instruction for students. Devereaux established a federal weather station at the University and introduced "Miscellaneous Course" 103 - *Agricultural Meteorology and Climatology* for 2 credits.

In 1906-07, the Weather Bureau replaced Devereaux with Wilford Murry Wilson, M.D., as resident meteorologist. He too held the title of Lecturer under arrangements like those for Devereaux. Wilson had earned the M.D. degree at the Memphis Hospital Medical College in 1895. For reasons that are not known, he joined the Weather Bureau as Meteorologist in 1896. He had served the Detroit, Michigan, weather station from that time until he was detailed to Cornell. The Cornell University Agricultural Experiment Station annual report for 1910-11 describes the arrangement with the Weather Bureau and reports an enrollment of 105 students in Course 103, which Wilson had increased from 2 to 3 credits.

The sources consulted are inconsistent about the date of establishment of a formal Department of Meteorology. The fortieth annual report of the Cornell Station (p. 48) states that the Department was formalized in 1912, though Wilson had taught since 1909-10. He had, in fact, taught since 1906-07, and Colman (p. 194) gives 1909 as the year the Department was formed. This corresponds with the date of Wilson's appointment as Professor and is believed to be correct.

When Professor Hunt retired in 1907-08, Dean Bailey divided Agronomy into the five departments shown in the diagram on page 19. Bailey justified his action in the Annual Report for 1907-08 on the grounds that Agronomy had been a completely artificial combination of disciplines having no commonality of interests. It was at this time that Plant Breeding was separated permanently from Farm Crops. H. J. Webber, former director of Plant Breeding for USDA was brought in to head that department.

The other four departments carved out of Agronomy, and their staffs in 1907-08 follow:

Farm Crops & Farm Management

G. F. Warren (Ph.D.), Assistant Professor & Head
P. J. White (M.S.), Assistant Professor

Farm Practice

J. L. Stone (B. Agr.), Professor & Head
E. R. Minns (B.S.), Instructor

Soil Investigations

T. L. Lyon (Ph.D.), Professor & Head
J. A. Bizzell (Ph.D.), Assistant Professor (from Agr. Chem.)

Soils

E. O. Fippin (B.S.), Assistant Professor & Head
G. A. Crabb (B.S.A.), Instructor

Among the three new names in this list, White had joined the staff in 1906-07; information about his origins and about his career beyond 1912 has not been found. The record for Minns is also incomplete except that he taught Farm Practice as late as 1908-09 and was associated with Farm Crops as Assistant Extension Professor from 1909 to 1912. G. A. Crabb remained an instructor in soils for five years. Hunt, Bonsteel, and Gilmore of the original Agronomy Department had all left by 1907-08.

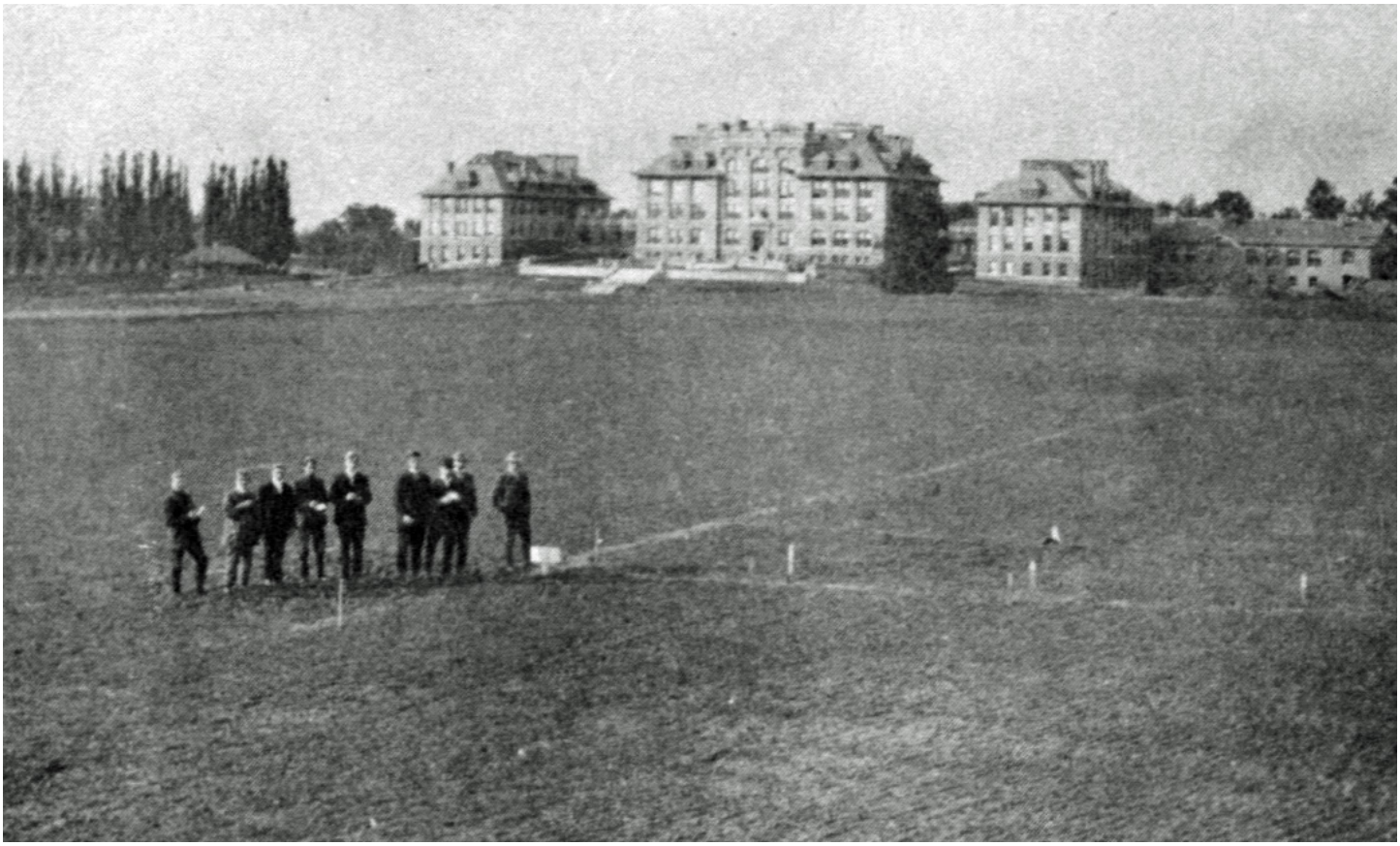
The "Soils Department" was responsible for all soils instruction; the Department of Soil Investigations was primarily a research unit. Fippin of Soils was also involved in some applied research. This unique division of responsibilities lasted only three years.

In 1909-10, the departments of Soils and Soil Investigations were combined to form a new Department of Soil Technology, which was to remain intact until it was combined with Farm Crops to form the current Department of Agronomy in 1921. The staff of the new Department of Soil Technology in 1909-10 consisted of:

T. L. Lyon, Professor and Head
E. O. Fippin, Professor
J. A. Bizzell, Assistant Professor
G. A. Crabb, Instructor
H. J. Conn, Assistant
F. S. Harris, Assistant
H. O. Buckman, Assistant
J. H. Phillips, Assistant

Conn, Harris, Buckman, and Phillips were graduate assistants working toward advanced degrees. Conn was to become soil microbiologist at the Geneva Station and for many years held a joint appointment at Cornell. Buckman was to become the dean of instructors of elementary soils in the nation and co-author with Lyon of the standard text, *Nature and Properties of Soils*.

In 1911-12, a Department of Farm Management was separated from Farm Crops, with G. F. Warren as Head. The new department was to become Agricultural Economics in later years. At the same time, the departments of Farm Practice and Farm Crops were combined under Professor Stone. That combination lasted only two years; in 1913-14, Farm Practice was made an independent department again under Professor Stone. E. G. Montgomery, who had been recruited from his professorship at the University of Nebraska in 1911-12, was named Head of the residual Department of Farm Crops. Indeed, Professor Montgomery *was* the Department of Farm Crops immediately after removal of Farm Practice, for it was not until later in the year that E. V. Hardenburg and O. W. Dynes were appointed Instructors in his department.



The new New York State College of Agriculture buildings in 1907, a year after their occupation. The "Agronomy Building", later named Stone Hall, is at the left. In the foreground, Agronomy students examine experiments on exposed subsoil of the athletic field.

Preparing the College lawn for seeding in 1908. The model rural school is in the background. This was used as the broadcast studio for College programs in later years.

The legislation of 1903-04 establishing the New York State College of Agriculture at Cornell also appropriated $250,000 for construction of buildings to house the College. The buildings, currently known as Stone, Roberts, and East Roberts Halls, were completed in 1906-07. The current Stone Hall was originally designated "the Agronomy Building" as it was assigned to the new Agronomy Department. By 1907-08, of course, the Agronomy Department had ceased to exist, and the "Agronomy Building" was occupied by the five separate departments that had been created from it. The administrative separation of soils from crops became physical as well when a new "Soil Technology Building" was completed in 1913-14. That building, later renamed Caldwell Hall, housed the Department of Soil Technology until 1921 when it was combined with Farm Crops to form the second Department of Agronomy. This Department of Agronomy occupied Caldwell Hall until 1968.

The US Bureau of Soils began soil surveys in 1901, and one of the first areas mapped in 1901 was the Westfield Area, approximately the northern 1/3 of Chautauqua County. That survey was made specifically to locate soils suitable for grapes. This was followed in 1902 by a survey of the Big Flats Area in Chemung County for tobacco. These surveys did not involve direct Cornell participation, though they were followed with interest by Roberts and Caldwell. In 1903, however, Professor Hunt arranged for the loan of J. Bonsteel from the Bureau of Soils to initiate instruction in soil survey methods and soil study in the field and to provide Experiment Station liaison with the project. E. O. Fippin was loaned to the Department on a similar basis in 1905-06. Professor Bonsteel returned to the Bureau in 1906, but Fippin remained, and eventually resigned from the Bureau. He served as soil survey leader for the Experiment Station and the primary teacher of soils. In 1913, he became extension specialist for the Department of Soil Technology.

Resident Instruction

The course offerings relevant to the subject matter of the current Department of Agronomy and the faculty responsible for them are tabulated in Appendix I separately for soils, crops, and meteorology from 1906-07 to 1979-80. The course offerings for the period 1903-04 to 1913-14 are also described here to show their relationships to the rapidly changing departmental structure.

In 1906-07, the last year of the first Department of Agronomy, that department's offerings consisted of:

Agronomy

1. Agricultural soils, 3 cr., spring term. Fippin.
2. Soils of the U.S., 3 cr., fall term. Fippin.
3. Soil mapping, 2 cr., fall term. Fippin.
4. Adv. soil lecture, 1 cr., spring term. Fippin.
5. Adv. soil laboratory, 1 cr., both terms. Fippin.

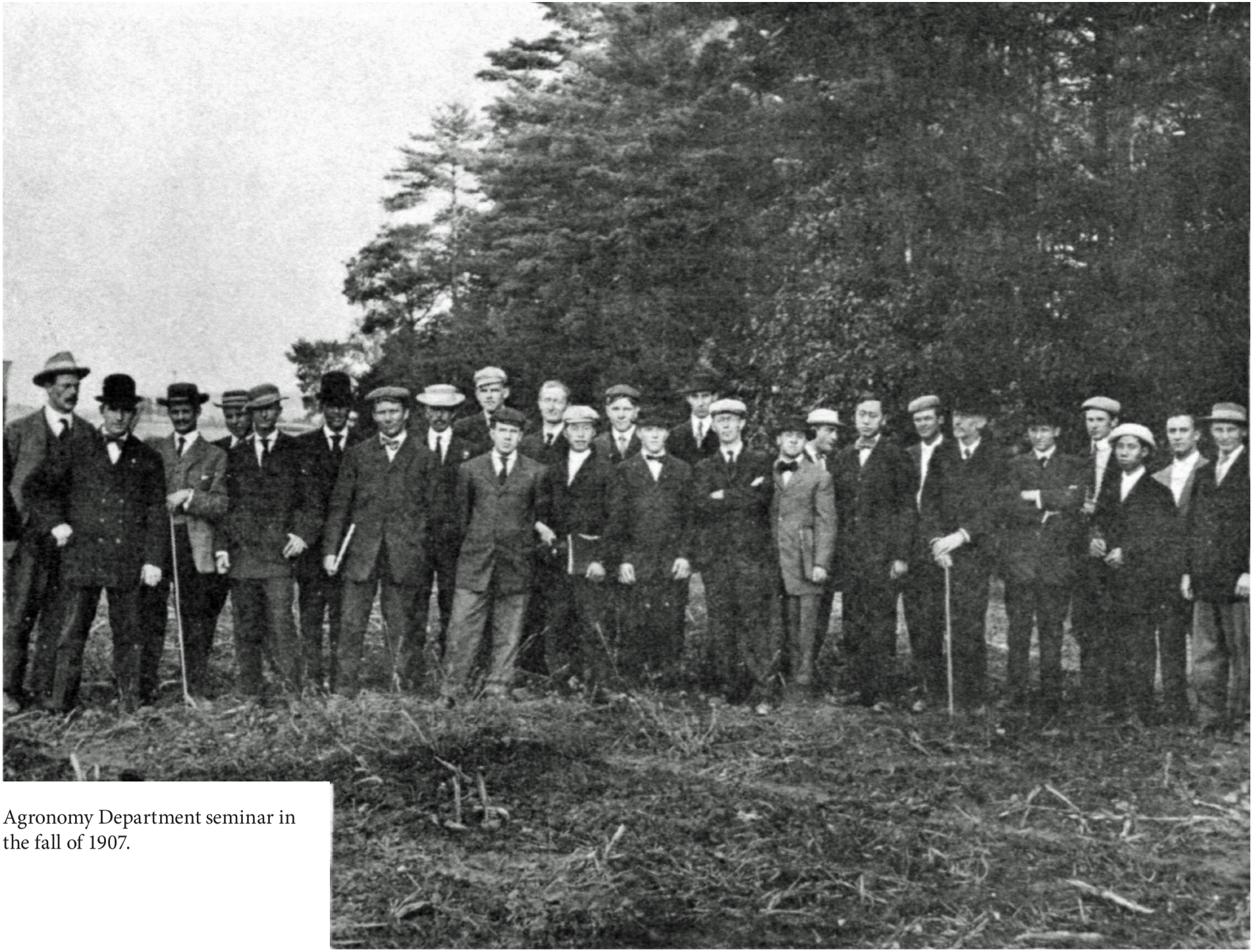
11. Field crops, 4 cr., fall term. Gilmore.
12. Farm Management, 4 cr., spring term. Hunt.
13. Adv. Agronomy, 2 cr., fall term. Hunt.
14. Adv. Agronomy, 2 cr., spring term. Hunt.
15. Crops seminary, 1 cr., both terms. Faculty.
16. Tropical agriculture, 3 cr., fall term. Gilmore.
19. Farm Practice, 1 cr., both terms. Stone.

111. Field crops, 4 cr., spring term. Gilmore.

Wilson taught a single course in meteorology throughout the period, Meteorology 103, *Meteorology and Climatology*, 3 cr., spring term.

In 1908-09 after the Agronomy Department had been fragmented, the new Department of Soils maintained courses 1 through 5 listed above as Soils course numbers and added:

Soils teaching laboratory in the fall term, 1906, in Morse Hall, room 14. Assistant Professor of Agronomy (Soils), E. O. Fippin, was in charge. This was one year before the Department of Soils under Fippin was separated from the Department of Agronomy.



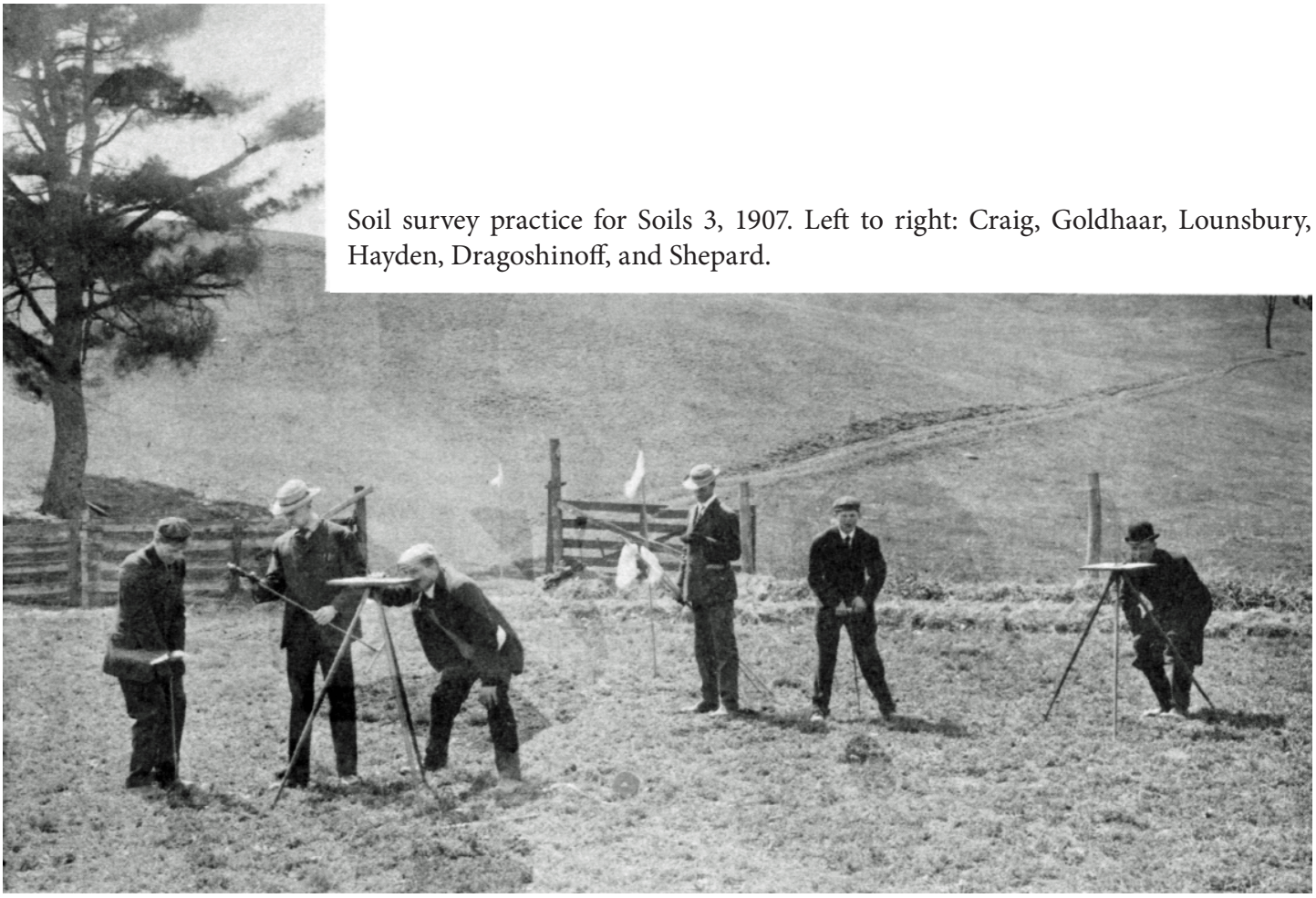
Agronomy Department seminar in the fall of 1907.

Field laboratory of Soils 2 in the fall of 1907. Note the women students.

Laboratory section of Soils 101 studying erosion at the edge of the athletic field in the fall of 1907.

Student plowing practice and judging quality by score card, 1911.

Field drainage practice for Soils 8, 1911.



Soil survey practice for Soils 3, 1907. Left to right: Craig, Goldhaar, Lounsbury, Hayden, Dragoshinoff, and Shepard.

Soils

6. Soil research, no credit, both terms. Crabb.
7. Soil seminary, 1 cr., both terms. Crabb.
10. Soil investigations, no credit, both terms. Lyon.
101. Agricultural soils, 3 cr., fall term. Crabb.

Crabb assisted Fippin in all of the courses listed; Fippin was primarily responsible for all teaching except for the course by Lyon. During the same year, the new Department of Farm Crops and Farm Management under G. F. Warren offered only courses 11, 12, 13, and 14 from the list of the former Department of Agronomy. G. F. Warren was responsible for all of them.

After the departments of Soils and Soil Investigations were combined in 1909-10, the new Department of Soil Technology offered mainly courses like those of the former Soil Department but under new numbers and some new titles:

Soil Tech.

1. Principles of soil management I, 3 cr., spring term.
2. Principles of soil management II, 3 cr., fall term.
4. Soils of the U.S., 3 cr., spring term.
5. Soil survey, 2 cr., summer.
6. Adv. soils, 2 cr., spring term.
7. Manures and fertilizers, 1 cr., fall term.
8. Drainage and irrigation, 2 cr., fall term.
10. Adv. soils laboratory, 1 cr., spring term.
11. Soil research, no credit, both terms.
14. Soil seminary, no credit, both terms.

Courses 7 and 8 were new. Fippin alone or Fippin and Crabb were responsible for all courses except No. 11 by Bizzell and No. 14 by the faculty. The change in title from "Agricultural Soils" of 1906-07 to "Principles of Soil Management" coincided with publication of the text by that title authored by Lyon and Fippin. In 1912-13, Fippin shifted his primary responsibilities from teaching to extension, and H. O. Buckman assumed most of the teaching. He made a few relatively minor changes in the courses at that time, the most important of which was addition of a separate non-credit course in soils for the Special Students in Agriculture.

With the separation of Farm Management from Farm Crops in 1911-12, Professor Montgomery made major changes in the crops courses:

Farm Crops

1. Cereals, forage, and miscellaneous crops, 4 cr., both terms. Montgomery.
2. Cereal crops, 4 cr., fall term. Montgomery.
3. Forage crops, 4 cr., spring term. Montgomery.
4. Special cash crops, 3 cr., fall term. Hardenburg. (Started 1913-14.)
*5. Crops research, no credit, both terms. Faculty.
*6. Crops seminary, no credit, both terms. Faculty.

* numbers reversed and Montgomery in charge after 1913-14.

By 1913-14, College enrollment had increased to 1,328 four-year; 135 special, 555 winter, 388 summer, and 151 graduate students. Of the 555 winter students, 269 were in the General Agriculture course, which involved faculty of Soil Technology and Farm Crops. In that year the Department of Farm crops reported enrollment of 351 students in 4 undergraduate courses, and nine graduate students were candidates for advanced degrees. Eight others had completed degrees of Master of Science in Agriculture with majors in Farm Crops subjects from 1903-04 to 1913-14.

In 1913-14, the Department of Soil Technology reported an enrollment of 481 regular and special students in all courses offered. (These numbers are not strictly comparable to those reported by Farm Crops.) The Department also reported teaching of 196 winter-course students and 19 graduate students in residence. During the period from 1903-04 to 1913-14, 17 graduate students completed degrees of Master of Science in Agriculture and 11 completed Ph.D. degrees with majors in soils. During the same period, one A.M. and one Ph.D. degree with theses on subject matter of meteorology were awarded by the University.

A number of graduate students who later attained distinction in their fields completed degrees in agronomic subjects at Cornell during this period. M. F. Miller, father of Robert D. Miller of the current Agronomy Department at Cornell and Dean of Agriculture at the University of Missouri, completed his M.S.A. degree in 1901. G. J. Bouyoucos, who became soil physicist at Michigan State, completed the Ph.D. in 1911 as did H. J. Conn, who went to the Geneva station. O. D. von Engeln, who became a highly respected geomorphologist at Cornell, completed his Ph.D. with a minor in soils in 1911. Others who earned Cornell degrees and joined the Cornell faculty in soils or crops include: John Barron (B.S., 1906); E. L. Worthen (M.S.A., 1908); H. O. Buckman (Ph.D., 1912); J. K. Wilson (Ph.D., 1914); T. L. Lyon (Ph.D., 1904); J. W. Gilmore (M.S.A., 1905); and G. F. Warren (M.S.A., 1904 and Ph.D., 1906). L. F. Gieseker who later served Montana State College completed his M.S.A. at Cornell in 1914. O. S. Morgan completed the Ph.D. in 1909 during his tenure as Director of the New York State School of Agriculture at Alfred, New York.

Research

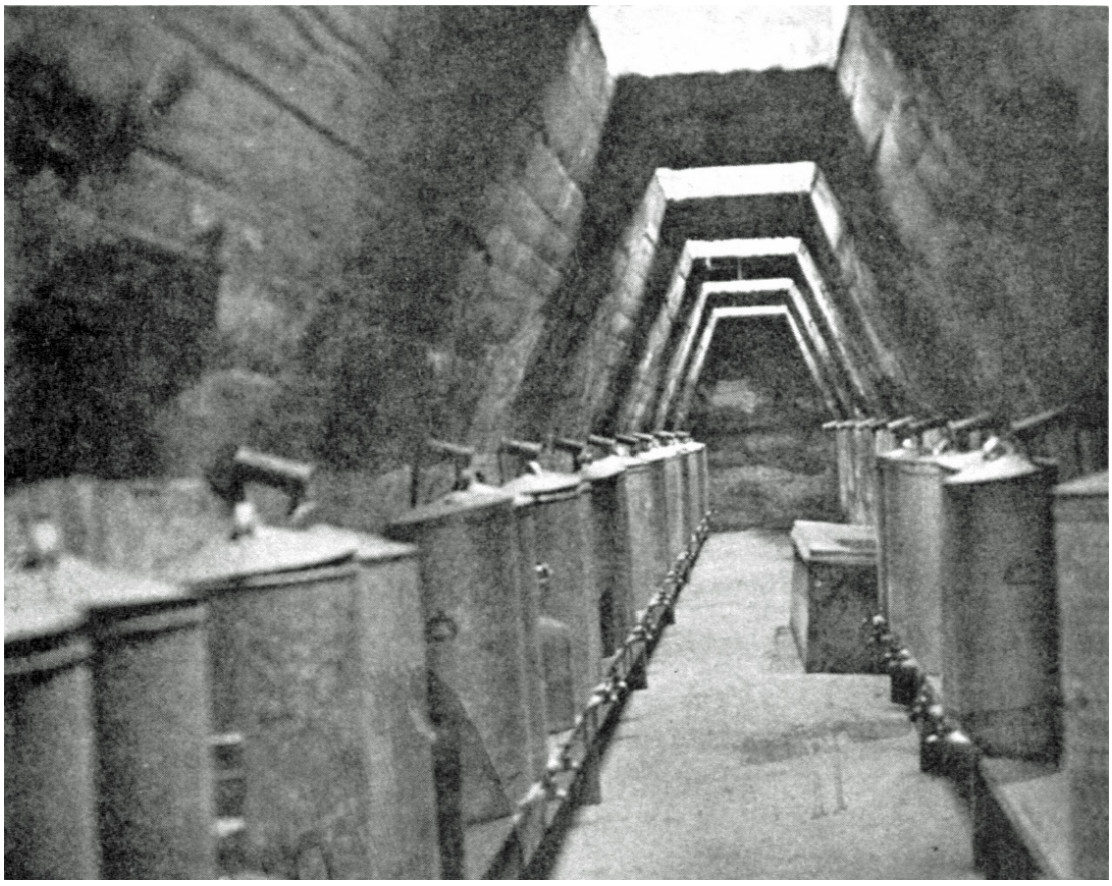
In 1903, the University acquired the Mitchell farm, which adjoined Cornell property on the east. The western most forty-five acres of that tract were fenced and set aside for field experiments of the Department of Agronomy. As late as 1907, diagrams of the field and analytical data cards for soil samples from it identify the area as the "Experimental Field" or the "Mitchell Farm." Shortly thereafter, *probably* when the Department of Agronomy was fragmented in 1907-08, the experimental area was named "Caldwell Field" and has been identified by that name to the present. In 1908, it was divided into two parts. The northern half was assigned to the Department of Soil Technology; the southern half, to the Department of Plant Breeding. The departments of Farm Crops and Farm Practice were left to find experimental areas on other University land. Apparently soils faculty of the Agronomy Department used other land at times after 1903, as photographs of the new Agriculture buildings in 1906 by Fippin show soil experimental plots on what is now Alumni Field in the foreground. This was three years after purchase of the Mitchell Farm and the year before the Agronomy Department was broken up.

Initially Caldwell Field was used for experiments on unreplicated plots 1/10 acre in size. Professor Lyon was concerned with the effects of field variability on reliability of the results , perhaps as a consequence of Director Sturtevant's scathing criticism of field experiments in the annual report of the Geneva station in 1887. He reported in the Cornell Countryman for October, 1913, that early work showed that four 1/100 acre replicates not only conserved land area but also produced more reliable results. This became standard experimental design, initially without randomization.

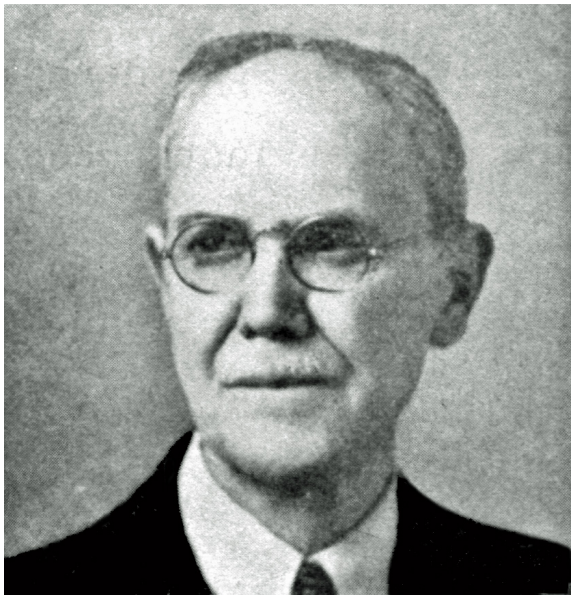
With the establishment of the Department of Soil Investigations in 1907-08, Professor Lyon began construction of the Cornell lysimeters. These were to become the focus of his experimental work for the next 20 years. The lysimeters consisted of 24 concrete tanks 4 feet 2 inches square and 4 to 4 1/2 feet deep. They were arranged in two rows on either side of a tunnel in which workers could stand upright. Tubes from the bottoms of the lysimeter tanks carried leachate to galvanized iron containers in the tunnel for measurement of the volume of leachate and sampling for analysis. Sand was placed in the bottom of each tank to facilitate drainage. The tanks were then filled with soil from the fourth, third, second, and first foot of depth, consecutively, of soil columns in the field. The lysimeters were used to determine the losses of inorganic plant nutrients in drainage water and in crops under various treatments for different crops. Duplicate sets of treatments were applied to a series of field plots to determine the effects, if any, of the tanks themselves on soil changes over time. Later concrete frames were constructed around the field plots to protect them from surface erosion and the effects of treatments on adjacent plots. An article by T. L. Lyon

in the *Cornell Countryman* for October, 1913, describes the lysimeters and the experiments on Caldwell Field in some detail. The same issue carries an article on work by the Plant Breeding Department.

The annual report of the Cornell University Agricultural Experiment Station for 1903-04 reports experiments of the new Department of Agronomy on timothy, pastures, alfalfa, wheat, oats, corn, buckwheat, field beans, soybeans, cowpeas, sugar beets, potatoes, other root crops, ginseng, rotations, and cover crops. Lyon was soon to initiate three major projects:



The Cornell Lysimeters: Tunnel under soil tanks showing the galvanized cylinders into which the drainage from the soil tanks is received.



Thomas Littleton Lyon

1. Methods for determining fertilizer requirements of soils.
2. Composition of soil solutions under different soil treatments.
3. Soil conditions detrimental to crop production.

After separation of Plant Breeding from the other crops work in 1907-08, the two-man Department of Farm Crops and Farm Management that remained had little opportunity for research after fulfilling commitments to teaching and extension. Most of the work under Warren consisted of farm surveys to determine the nature and extent of cropping practices and problems. There were 229 crop trials with cooperating farmers in 1907-08, which were classified as extension. After Farm Management under Warren was separated from Farm Crops and Farm Practice was combined with Crops in 1911-12, E. G. Montgomery and J. L. Stone had a modest research program, including small projects on lime for alfalfa, pasture renovation, improvement of depleted land, cutting management for hay, and the effects of companion crops on new seedlings. When Farm Practice was separated from Farm Crops in 1913-14 Montgomery was left with a teaching load of at least two courses each semester and little time for research.

The Department of Soil Technology faced no such problems. Funds made available by the Adams Act doubled federal appropriations formerly available from the Hatch Act and were allocated mainly to Plant Breeding and Soil Technology. Fippin (later Buckman) absorbed most of the teaching responsibilities. The research team of Lyon and Bizzell came together in 1907-08 and by 1916 had published 25 research papers. Their work was enhanced greatly by the appointment of E. W. Leland as Field Superintendent in 1912; he was the operational prime mover for all of their field work from that time until Bizzell's retirement in the 1940s. The research with the Cornell lysimeters attracted the greatest attention but was by no means the sole effort of Lyon and Bizzell. The Experiment Station Report for 1909-10 lists four projects that were continued from the former Department of Agronomy and the following ten which were initiated that year:

1. Effect of soil moisture and temperature on the availability of plant nutrients.
2. Influence of atmospheric conditions on absorption of nutrients.
3. Character and concentrations of solutes in aqueous extracts of soil under different treatments.
4. Influence of soil treatments on the loss of calcium in drainage water.
5. Loss of potassium and other substances due to manuring and liming.
6. Renewal of soil by incorporating subsoil in the plowed layer.
7. Influence of different crops on the formation and loss of nitrates.
8. Rate of fixation of nitrogen as affected by liming and sod.
9. Changes in soil as it deteriorates or improves.
10. Effects of continuous fertilization on soil properties and soil microflora.

In 1910-11, seven additional projects were added:

1. Chemical and physical properties of soil types of New York.
2. Fertilization for hay or for the nurse crop.
3. Effectiveness of different liming materials.
4. Topdressing old alfalfa stands.
5. Continuous cropping with corn and hay.
6. Lime and fertilizer needs of muck.
7. Fertilizers for nurse crops.

Eight of the ten projects initiated in 1909-10 were conducted in the lysimeters, some with supplemental field plot or pot experiments. The seven started in 1910-11 were independent of the lysimeters.

The annual report of the New York Agricultural Experiment Station at Geneva for 1907 is devoted entirely to the exercises in celebration of the twenty-fifth anniversary of the Station and a summary of its work to that date. It documents the fact that most of the work on "agronomic" field crops was done under Sturtevant prior to 1888. F. H. Hall, reporting for field crops (pp. 267-291), justifies the minimal attention given these crops on the grounds

that New York had ceased to rank as a leading wheat and corn state and that "New York lands yield much greater profits when devoted to producing fruit, dairy products, vegetables, and other more perishable crops --". Hall's statement is symptomatic of an attitude which became prevalent in State agricultural circles, including influential individuals and departments at Cornell as well as Geneva, namely, that crops grown in support of New York's animal enterprises merit only minor attention in relation to livestock and crop enterprises from which farmers derive income directly.

The fertilizer inspection function of the Geneva station remained a major activity throughout this period. Almost 12,000 samples had been analyzed by 1907, and the results had been published in 25 bulletins. After 1904, the control aspects of the program were assumed by the State Department of Agriculture; the Geneva station was responsible mainly for the analytical work. While this enterprise was primarily a service function, it did have research implications that led to major adjustments in fertilizer marketing and use in New York.

The Department of Chemistry at the Geneva station conducted some other agronomically related work. The availability of phosphorus in various carriers was investigated during this period. The minimum of phosphorus and potassium required for maximum growth of specific crops was also studied. The Department of Horticulture also conducted some studies that had implications for soil fertility. In 1911, the Station established a new Department of Soils to provide for research on aspects of soils for the major programs. Joseph F. Barker was employed as the soils specialist, but he did not report on his work in the annual reports through 1913.

Extension

Cornell had an Extension Department during this period. It had been organized initially under the leadership of J. W. Spencer and was reorganized in 1907 under Charles H. Tuck. One of its major functions was to coordinate the extension activities of the subject matter departments in college-wide programs, but the departments also conducted many extension activities quite independently. Among the college-wide programs to which the Department of Agronomy, and later the Departments of Farm Crops and Soil Technology, contributed, the following deserve special mention:

1. Farmers' Institutes. These had been started in 1877. After a period of inactivity in the mid-1880s, they were reestablished in 1885 and reached their height during the period from 1900 to 1910. They declined after 1910.

2. Special trains. These were trains carrying Cornell faculty and exhibits that toured various regions of the state with stops, commonly one hour, for lectures. Vast quantities of pamphlets were distributed to the audiences. During 1909-10, the College ran 5 such trains over 4 railroads and reached an estimated 30,000 people.

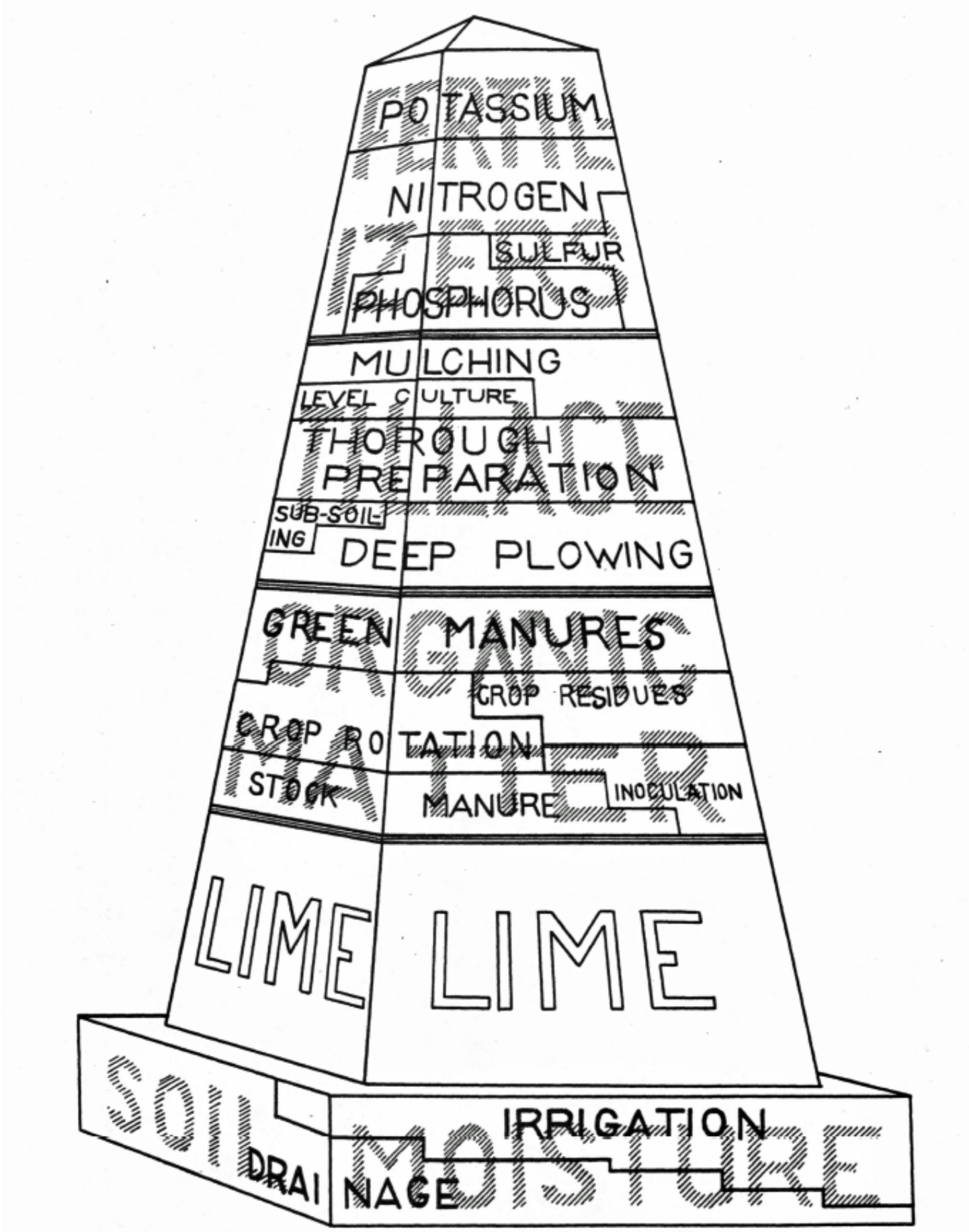
3. Exhibits at fairs and meetings. The State Fair at Syracuse was the largest of these, and the College exhibit required major effort for design, construction, transportation, and servicing over the 6 days. This activity continues to the present.

4. Farmer's Week. The first Farmer's Week was organized in 1908. It combined lectures, demonstrations, and exhibits by each department and lasted for a week. It brought a few thousand people to the campus in the early years but grew to tens of thousands by the 1940s.

5. Press releases. The Extension Department had issued general press releases for some time, but in 1910, Dean Bailey urged Professor Tuck to organize a program of systematic technical news releases to the agricultural press from each department.

The independent efforts of the individual departments were large. They included the extension aspects of the cooperative farm experiments mentioned under research, talks to farm groups, surveys and release of their findings, organization and servicing of special subject matter clubs and associations, on-farm site visits, and correspondence. In 1907-08, G. F. Warren reported that 53% of the expenditures for salaries and "expenses" of the

Meeting of the New York State Drainage Association in Roberts Hall, February, 1911. E. O. Fippin, standing at the left rear, was the principal organizer of the Association.



The package of soil management elements as visualized by the Department of Soil Technology in 1912. It was probably designed deliberately to show soil moisture relationships as the foundation.

new Department of Farm Crops went for extension activities and that he spent ¼ of his time answering farmers' letters. That year, the Department of Farm Crops reported 229 cooperative experiments with farmers; the Department of Farm Practice, 126; and the Department of Soil Technology, 55. In 1909, Fippin organized the New York State Drainage Association, which concerned itself with promotion of artificial soil drainage and development of guidelines and public support for it.

One of the most frustrating problems of extension faced by the departments was the rapidly increasing demand for on-farm consultation on a wide-ranging variety of problems. The college and departmental staffs could not begin to satisfy the demand, and until 1911 there was no other authority to which most farmers could turn. In 1911, the Binghamton Chamber of Commerce and the Delaware, Lackawanna, and Western Railroad in cooperation with the USDA Office of Farm Management formed a "Farm Bureau" to offer advice to farmers. John Barron, a graduate of the College, was hired as the first Farm Bureau "Agent". (Later he was to become Extension Specialist and Project Leader for the Department of Farm Crops and its successor, the Department of Agronomy; see Barron, 1938).

The Broome County Farm Bureau was followed in 1912 by a similar arrangement in Chemung County. Dean Bailey became concerned about possible USDA domination of these kinds of organizations and embarked on a campaign to organize county Farm Bureaus independently of USDA participation. He was successful in 7 counties in 1912. The federal funds which accompanied USDA participation proved too potent an inducement for many counties to resist, however, and Bailey was unable to compete effectively. He finally was forced to accept USDA participation, but in the negotiations that led to a final agreement, he did succeed in getting a State Farm Bureau organization headed by a single State Leader located at Cornell. This was the origin of the Farm Bureau network that was to become the vehicle for College to farmer extension. Bailey remained critical of the Farm Bureaus as a potentially dangerous political force. His concerns were justified; in later sections, it will be noted how the College was finally forced to reorganize its extension service independently of the politically powerful National Farm Bureau Federation.

The extension effort of the Geneva station was less than at Cornell, but it was significant, especially for horticulture. During the first decade of the 1900s, the station normally had 30 to 40 cooperative trials with farmers, mainly on horticultural problems. The principal extension activities within the scope of "agronomy" were promotion of alfalfa and its inoculation and the analyses concerned with the fertilizer control law. The "popular bulletin" series and press releases continued to be the primary media for dissemination of information, but few of these dealt with agronomic subject matter.

H. From Segregation of the Department of Farm Crops in 1913-14 to its Combination with Soil Technology to Form the Department of Agronomy in 1921-22.

Throughout Bailey's administration, freedom of action of individual departments was the cornerstone of his policies. As a consequence, varying degrees of duplication of effort, fragmentation, and contention among the multiplicity of departments he had created were common. No effective central administrative structure existed for coordination of research, and the coordinating functions of the Department of Extension were largely ignored. This was the atmosphere in 1913-14. The departments of Soil Technology and Farm Crops had been separate and independent administrative units since 1909-10 (see Colman, pp. 237-239) but they were housed together in Stone Hall. The two departments were separated physically as well in 1914-15 when Soil Technology moved from Stone Hall to the new "Soil Technology Building", which it shared with Rural Engineering and Rural Education for a time.

Dean Bailey resigned the deanship in 1913 and was replaced by Acting Director (Dean) W. A. Stocking, Jr. until Beverly T. Galloway was appointed in 1914. Before he relinquished the deanship, however, Bailey continued his policy of creating departments around strong men by separating Farm Crops under E. G. Montgomery from

Farm Practice under J. L. Stone. This occurred in 1913. (A year previously, he had divided Horticulture into the departments of Pomology, Floriculture, and Vegetable Gardening.) Thus, the scope of current agronomic subject matter, other than Atmospheric Sciences, was divided mainly between the departments of Soil Technology and Farm Crops throughout this period. With Soil Technology a strong, fully staffed department and Farm Crops a grossly understaffed and poorly financed unit, much of the research on field crop production fell to Soil Technology by default. Soil Technology's work with crops was mainly soil-related, leaving much of the potential work on the strictly crops aspects of production unattended by either of the two departments.

Farm Crops still retained responsibility for crop improvement and variety testing, on paper, as these were not transferred to Plant Breeding officially until 1921-22. At the time of his retirement from the deanship, Bailey had intended to make the Department of "Experimental Plant Breeding" a department of genetics, but according to Colman (p. 235) he had been unable to secure the leader he wanted. Under these circumstances, it was inevitable that crop improvement by breeding under the Department of Experimental Plant Breeding would gradually encroach on Farm Crops' nominal responsibility for variety testing.

With the separation of Farm Practice in 1913-14, Farm Crops was left with Professor Montgomery and Bailey's promise of support to develop a department "second to none". That first year, E. V. Hardenburg and O. W. Dynes were appointed Instructors. The following year, John H. Barron, who had been Farm Bureau Agent in Broome County, was appointed Assistant Extension Professor of Farm Crops. Montgomery was moved to comment in his annual report that "For the first time the Department can take part in extension activities of the College". Two graduate assistants were also provided in 1914-15, one of whom, R. G. Wiggans, was hired as a third instructor in 1915-16.

The table on page 40 shows the staffing until Farm Crops was combined with Soil Technology in 1921-22. When Hardenburg was transferred to Vegetable Gardening and Wiggans to Plant Breeding that year, only Instructor Cooper and Extension Professor Barron were left to represent field crops in the new Agronomy Department. Professor Montgomery had resigned in disillusionment in 1919.

Faculty and staff of the Department of Soil Technology are given on page 43 for this period. Professional staff, though not large by present standards, continued to increase. Lyon and Bizzell concentrated on research, with strong technical support from E. W. Leland. Their research was augmented in 1918-19 when B. D. Wilson was hired as an Instructor after completing his Ph.D. under Lyon. E. O. Fippin was departmental extension specialist until his resignation in 1920, when E. L. Worthen replaced him. W.W. Warsaw served as a very effective subordinate to Fippin in extension from 1914 to 1919, especially on soil drainage. A. F. Gustafson, who had completed his Ph.D. in 1920 under Lyon, joined the faculty that year as Assistant Extension Professor to promote extension on physical problems of soils, replacing W.W. Warsaw. J. K. Wilson, who had completed his Ph.D. in 1914 under Bizzell, specialized in soil microbiology research and teaching. H. O. Buckman had been a member of the faculty since 1912 after completing his Ph.D. under Lyon. He carried most of the resident teaching load throughout the period. A soil survey specialist was added in 1919-20, and F. B. Howe, who replaced him in 1920-21, continued as a non-academic employee for soil surveys until 1936-37, when he was promoted to Professor. Throughout the period, at least two and as many as four graduate assistants were available for teaching and research.

With completion of the "Soil Technology Building" (Caldwell Hall) in 1914-15, that Department had facilities second to none in the University. The 1912 legislative appropriation of $100,000 for the building had been supplemented by an appropriation of $20,000 for equipment. Laboratory facilities in support of the large research program of Lyon and Bizzell were provided. In addition to the Caldwell Field facilities described in the preceding section, the Department had greenhouse space and an outlying field at Virgil in Cortland County.

Farm Crops had limited facilities, and with its restricted manpower, had little time for research. Professor Montgomery reported on some research, which was almost entirely on applied problems. Professor Barron relied mainly on cooperative field trials with farmers. These had research value but a much larger extension component. The Department continued to be housed in Stone Hall and may have had access to some of the laboratory space

Titles of Faculty and Staff of the Departments of Farm Crops and Meteorology, 1914-15 to 1920-21

	1914-15	1915-16	1916-17	1917-18	1918-19	1919-20	1920-21
FARM CROPS							
Montgomery, E.G.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	
Barron, J.H.	Asst. Ext. Prof.	Asst. Ext. Prof.	Asst. Ext. Prof.	Asst. Ext. Prof.	Asst. Ext. Prof.	Asst. Ext. Prof.	Ext. Prof.***
Hardenburg, E.V.	Instr.	Instr.	Instr.	Instr.	Instr.	Asst. Prof.	Asst. Prof.*
Wiggans, R.G.	Asst.	Instr.		Instr.	Instr.	Asst. Prof.	Asst. Prof.**
Vorhees, J.H.					Asst. Ext. Prof.	Asst. Ext. Prof.	
Dynes, O.W.	Instr.	Instr.	Instr.	Instr.	Instr.	Instr.	
Smith, F.C.						Ext. Instr.	
Cooper, H.P.							Instr.***
Etheridge, W.C.	Asst.	Asst.					
Peacock, W.M.	Asst.	Asst.					
Blackwell, C.P.			Asst.	Asst.			
Middleton, G.K.						Asst.	

* Transferred to Vegetable Crops in 1921-22
** Transferred to Plant Breeding in 1921-22
*** Transferred to new Department of Agronomy in 1921-22

METEOROLOGY							
Wilson, W.M.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.
Hausman, L.A.	Instr.	Instr.					
Mordoff, R.A.			Instr.	Instr.	Instr.	Instr.	Instr.

Few photographs of the faculty of the Department of Farm Crops are available. Above: Professor E. G. Montgomery, Head of the Department from 1913 to 1920, examines the experimental plots at Virgil in 1918.

TALKING IT OVER The first county agent outside the Southern States, John Barron, confers with the first Farm Bureau president in the country, James Quinn, in the Quinn home, Broome County, New York, 1911.

Extension Professor John H. Barron, who served as extension specialist for Field Crops throughout its existence and on into the 1940s for the current Agronomy Department.

John H. Barron

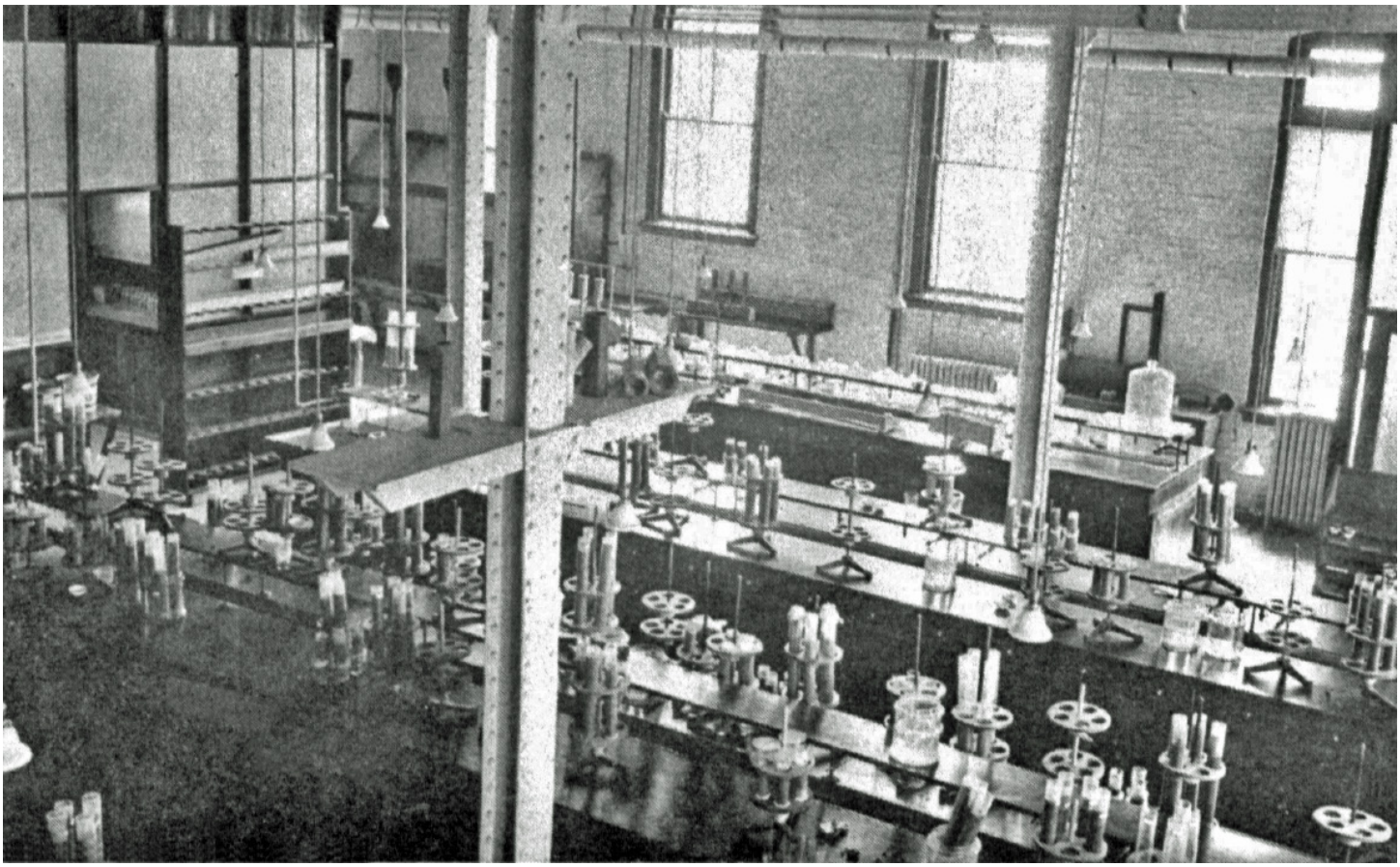
Titles of Faculty and Staff of the Department of Soil Technology, 1914-15 to 1920-21

	1914-15	1915-16	1916-17	1917-18	1918-19	1919-20	1920-21
Lyon, T. L.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.
Fippin, E. O.	Ext. Prof.	Ext. Prof.	Ext. Prof.	Ext. Prof.	Ext. Prof.	Ext. Prof.	
Bizzell, J. A.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.
Buckman, H. O.	Asst. Prof.	Asst. Prof.	Prof.	Prof.	Prof.	Prof.	Prof.
Wilson, J. K.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Prof.	Prof.
Warsaw, W. W.	Ext. Instr.	Ext. Instr.	Asst. Ext. Prof.	Asst. Ext. Prof.	Asst. Ext. Prof.		
Wilson, B. D.					Instr.	Asst. Prof.	Asst. Prof.
Worthen, E. L.						Ext. Prof.	Ext. Prof.
Gustafson, A. F.							Asst. Ext. Prof.
Collison, R. C.*						Prof.	Prof.
Leland, E. W.	Field Supt.	Field Supt.	Field Supt.	Field Supt.	Field Supt.	Field Supt.	Exp'ist
Sherwood, F. B.			Analyst	Analyst			
Seltzer, W. J.						Soil Surv.	
Howe, F. B.							Soil Surv.
Fink, G. J.	Asst.	Asst.					
Jennings, D. S.	Asst.	Asst.					
Beaumont, A. B.	Asst.						
Deatrick, E. P.	Asst.	Asst.					

	1914-15	1915-16	1916-17	1917-18	1918-19	1919-20	1920-21
Smith, R. S.			Asst.	Asst.	Asst.		
Morgan, R. J.			Asst.	Asst.			
Martin, T. L.			Asst.	Asst.	Asst.	Asst.	
Carlson, F. A.						Asst.	
McTaggart, A.						Asst.	
Kinsman, D. F.							Asst.
Cubbon, M.H.							Asst.
Engle, E. B.							
	* Cooperative appointment with Geneva						

Soil Technology faculty and graduate students, 1916:

1. R.W. Ruprecht, student
2. D.S. Jennings, student
3. A.B. Beaumont, student
4. J.H. Bromley, student
5. I. Weisbein, student
6. E.P. Deatrick, student
7. Paul Work, student - joined Vegetable Crops faculty
8. T.L. Martin, student
9. J.P. duBuisson, student
10. W.H. McIntire, student
11. B.D. Wilson, student - joined faculty in 1918
12. R.S. Snyder, student
13. Mr. Frost, student
14. A.F. Vass, student
15. W.W. Warsaw, Assistant Extension Professor
16. J.A. Bizzell, Professor of Soil Technology
17. E.O. Fippin, Ext. Prof.
18. T.L Lyon, Professor of Soil Technology and Head
19. J.K. Wilson, Assistant Professor of Soil Technology
20. H.O. Buckman, Professor of Soil Technology



The chemical research laboratory (above) in Stone Hall and the greenhouse facility (below) of the Department of Soil Technology in 1912.

The new Soil Technology building, later named Caldwell Hall, at its occupancy in 1915 (above). The new Home Economics building, later named Comstock Hall and occupied by Entomology, completed the same year (below). Rural Education and Rural Engineering shared the Soil Technology building at first. The small elms grew to beautiful shade trees before succumbing to Dutch elm disease in the 1960s.

vacated by Soil Technology in 1914-15. No record of laboratory research has been found. Teaching and extension preempted most of the faculty's time throughout this period.

Professor W. M. Wilson continued as Head of Meteorology throughout this period. His teaching load in addition to duties for the Weather Bureau was extremely heavy, and in 1915-16, L. A. Hausman was appointed Instructor in Meteorology to relieve him. Hausman stayed only one year and was replaced by Richard Allan Mordoff in 1916-17. From 1919-20 onward, Mordoff was listed as the instructor in charge of all Meteorology courses in University Announcements, but he remained an Instructor until 1921-22. By that time he had been employed by the University at least eleven years. He had served as Assistant Registrar from 1910 to 1911 and from 1913 to 1916. During the years 1911 to 1913, he had been Assistant in Physical Geography. He had completed the M.A. degree in Physical Geography and Meteorology in 1918 while serving as Instructor under Wilson.

Resident Instruction

Student enrollment in the College reached a maximum near the beginning of this period, dropped sharply during the years of World War I, and had not fully recovered by 1920-21:

	Program				
Year	4-year	Special	Winter	Summer	Graduate
1913-14	1,328	135	555	388	151
1918-19	871	43	83	493	100
1920-21	1,142	75	326	530	215

The graduate and summer programs were exceptions in that their rapid rate of growth resumed quickly after the war. By 1913, the College had the largest enrollment of any unit of the University, and by far the largest enrollments of regular and graduate students of any College of Agriculture in the nation (Colman, p. 294).

Enrollment in courses offered by Farm Crops and Soil Technology followed the general trends. In 1915-16, the last year unaffected by World War I, Farm Crops reported 341 registrations in four courses and had 20 graduate students. Soil Technology had 455 registrations in six courses and also had 20 graduate students. Meteorology reported 252 registrations in its single course in 1916-17.

Course offerings and the faculty in charge are tabulated in Appendix I for Soil Technology, Farm Crops, and Meteorology, respectively. In each department, one man carried the major part of the teaching load.

In Soil Technology, H. O. Buckman had succeeded E. O. Fippin as the principal teacher in 1912-13, when Fippin assumed extension responsibilities for the Department. Throughout this period, Buckman taught the 3-credit elementary course each semester and the elementary soils course without credit for Special Students in the fall. At various times, he also taught courses in Soil Survey, Manures and Fertilizers, and Drainage and Irrigation. Professor Bizzell taught a 2-credit course in Advanced Soils in the spring. In 1918-19, the pattern of teaching faculty serving as subject matter generalists was broken with the appointment of J. K. Wilson as a subject matter specialist for both research and teaching in soil bacteriology. Bizzell's course in Advanced Soils also became increasingly oriented toward his primary research interests in soil chemistry and fertility. And in 1920-21, E. L. Worthen, who had succeeded Fippin, introduced a 2-credit course in practical soil management parallel to his primary extension interest. Only Buckman retained the role of teaching generalist within the discipline.

At the beginning of the period, Professor Montgomery taught all but one of the seven courses offered in Farm Crops:

The 4-credit elementary course both semesters.
A 4-credit course in cereal crops in the fall.
A 4-credit course in forage crops in the spring.

A 2-credit summer course in systematics of field crops.
Crops research advising both semesters.
Crops seminary both semesters.

Hardenburg introduced his course in special cash crops in 1913-14, which was the single instance of specialization in subject matter in the Department.

After 1915-16, Dynes relieved Montgomery of the elementary Farm Crops teaching, and Montgomery replaced the two 4-credit courses on cereals and forages with a single 3-credit course called "Advanced Crops". By 1920-21, Dynes carried a teaching load of 8 semester credits; Montgomery, 3; and Hardenburg, 2—for a total of 13. In 1913-14, the department had offered 19 semester credits of instruction.

Professor Wilson taught the single 3-credit course offered in Meteorology until 1919-20. It's enrollment had increased to 252 students by 1916-17, and in 1917-18, Wilson offered the course both semesters for the first time. When Mordoff assumed full responsibility for teaching in 1919-20, he divided the course into a 2-course sequence, Meteorology in the fall and Climatology in the spring. He continued a course on Climate of the United States he had started under Wilson in 1918-19 and introduced an advanced course in Meteorology and Climatology in 1919-20. Mordoff was teaching eleven semester credits and advising students in research as the period drew to a close.

Research

During the period from 1913 to 1920, research at the College not only increased enormously but also shifted conspicuously from work on immediately practical problems to investigations oriented toward more fundamental understanding of nature and its processes. The Adams funds for basic research were assigned exclusively to the departments of Soil Technology and Plant Breeding. Although these two departments probably led in the reorientation of research objectives as a result, they were by no means the only ones to change.

The research team of Lyon, Bizzell, and Leland was approaching its most productive years by the end of this period. During the nine years from 1913 through 1921, Lyon was sole author of eight publications, including the 255-page text, "Soils and Fertilizers". He was senior author with Bizzell of fifteen others, two of which involved a third co-author. The classic 764-page text, *Soils, Their Properties and Management,* by Lyon, Fippin, and Buckman, was published in 1915. Lyon had one additional paper as senior author, with J. K. Wilson, and two for which he was junior author with Bizzell. In all, Lyon was senior or sole author of 23 research papers and 2 books, and junior author of 2 research papers during this period. It should be noted that traditionally at this time the senior man of a research team was given senior authorship whether or not he was, in fact, the principal investigator. And he was traditionally junior author even if the actual work was almost totally that of the other partner as long as it was under his general leadership. Among Bizzell's publications, for example, Lyon's name did not appear as senior or junior author on only 5 of 41 from the time he joined Lyons until Lyons retired in 1937.

In addition to the publications by Lyon and Bizzell, there were 11 publications based on graduate student theses and one by J. K. Wilson as sole author. Thirty-nine publications came from the Department in nine years. It was a productive period that firmly established Cornell as one of the two leading institutions in the United States for the study of soils.

Nitrogen fixation and nitrification ranked high among the subjects researched. The fate of soil chemical constituents and of nutrients added in fertilizers in relation to cropping and management practices was co-equal. The program included a broad spectrum of experiments focused on soil-crop relationships, many prompted by immediately practical farming problems.

E. O. Fippin in his role as departmental extension specialist was deeply involved in applied studies, as well as with the cooperative on-farm trials and demonstrations discussed under extension.

Lyon repeatedly noted in his annual reports from 1913 to 1918 that experimental areas on soils representative of the diverse variety found in the State would be highly desirable, not only for Soil Technology but also for Farm Crops. The experimental field at Virgil, noted earlier, was used to represent problem soils of the Allegheny Plateau. Photograph albums kept by Professor Fippin show field plots at that site in 1914, 1916, 1918, and 1919; although the work is not mentioned in the annual reports, it was certainly continuous. The State Normal School at Cortland cooperated during at least part of the period. A publication by Worthen in 1941 documents the start of a new experiment at that site in 1920.

Arrangements had also been made with the State School of Agriculture at Alfred in Allegheny County in 1912 for field experiments parallel to those at Virgil. No reference to the early work on this field has been found, but a summary of work at the site from 1925 to 1941 has been published. Whether or not the work was continuous from 1912 throughout the period reviewed here is not known. In 1918-19, an experimental field was purchased at Churchville, Monroe County, to represent environmental and soil conditions of the Ontario Plain. Although the published record of Soil Technology research during this period focuses almost exclusively on that on Caldwell Field and in the departmental laboratories, it is evident that a great deal of applied work was also under way at different sites.

The Department of Farm Crops lacked the staff and resources to do much beyond fulfilling its commitments to resident instruction and extension. Dean Mann complained in the 1916-17 annual report that "With increasing funds for extension, the insufficiency of funds for research become increasingly apparent." His statement applied to the entire College, but it was especially relevant to the circumstances of Farm Crops. In that year, a pasture survey of the State was the principal investigation by the Department, though some work was also under way on crop rotations, longevity of grass sods, production of barley, tests of corn for silage, and classification of American barleys. In that year also, John Barron of Farm Crops was the advisor to Farm Bureau Agents who conducted more than 3,000 on-farm trials of field crops. Most of this work was more nearly extension than research. Only one publication from Farm Crops between 1913 and 1921 can be classified strictly as a research report. The Department's extension publications, by contrast, are a significant contribution in terms of both numbers and content.

At the New York State Agricultural Experiment Station at Geneva, L.L. VanSlyke, Chemist, and J. F. Barker, Soil Investigations, were the principals concerned with agronomic subject matter at the beginning of this period. In 1914, Barker became "Agronomist" of a new Department of Agronomy and was joined by R. C. Collison as Associate Agronomist. Collison succeeded Barker as Agronomist in 1918. The Agronomy Department was supported by an Assistant Agronomist and one to three Assistant Chemists (Soils) from 1915 to the end of this period.

In 1915, officials of the Geneva Station and Cornell began discussions to improve relationships between the two institutions. These culminated in an agreement whereby the Geneva station's responsibilities for extension were transferred to Cornell, joint research projects were approved, and selected faculty and staff might hold joint appointments, subject to approval of both institutions. In 1920, R. C. Collison of Geneva was appointed Professor in the Cornell Department of Soil Technology, and T. L. Lyon of Cornell was appointed Chemist (Agronomy) at Geneva. Also in that year, James D. Luckett was appointed Editor and Librarian at the Geneva station. He later contributed his services, as an extracurricular activity, to the American Society of Agronomy as Editor of its Journal for 20 years - from 1928 to 1948.

The Department of Chemistry at Geneva continued its analysis of fertilizers in support of the New York Fertilizer Control Law throughout the period. The station also assumed responsibility for seed testing under the Seed Control Law, reporting the percentages of pure and foreign seed and inert matter. It also did seed testing for farmers and in 1919 reported 287 tests for purity and 396 tests for viability, in addition to 179 official seed tests.

In 1914, the Agronomy Department at Geneva began installation of a major lysimeter facility somewhat similar to that at Cornell. This is described in detail in the annual report for 1917. It consisted of 20 cylinders 4 feet 8 ½ inches in diameter and 2 to 8 feet deep equipped for collecting leachate. Ninety-eight cylinders 2 feet in diameter and 4 feet deep without provision for collecting leachate were also installed for supplementary work.

The annual reports and most bulletins of the Geneva station contain relatively little on new research that was strictly agronomic. Several major bulletins on agronomic subjects were issued, including information on fertilizer use and effectiveness, the use and benefits of lime, and sources and neutralizing power of New York limestones. Bulletins on alfalfa, soybeans, and cowpeas also appeared. All of these were mainly reviews of information from many sources, though results of work at Geneva were included.

In 1913, the Department of Chemistry at Geneva reported the results of experiments on the availability of phosphates of different forms and fineness and on the variation in the abilities of different plants to use the various kinds tested. In 1919, the Department of Agronomy reported results from a non-replicated large-scale rotation-fertilizer experiment that ran from 1897 to 1913. It had involved 8 treatments in single plots, each 1 1/2 acres in size. In 1920, the Department of Agronomy began greenhouse studies with 9 soils collected to represent major soil types of the State.

Extension

The Smith-Lever Act of 1914 organized extension education nationwide. The extension activities of the US Department of Agriculture, county Farm Bureaus, and agricultural colleges had previously been largely uncoordinated (see Colman, pp. 262-283). In New York, the local Farm Bureau agents, who numbered 25 by 1914, became the local representatives of a cooperative federal-state Extension Service. John Barron was the College Farm Crops specialist who worked with the agents; E. O. Fippin represented Soil Technology. It is relevant to note here that the Cornell Trustees excluded the extension specialists from the Cornell faculty for 35 years beginning in 1916, in spite of repeated protests by the College faculty.

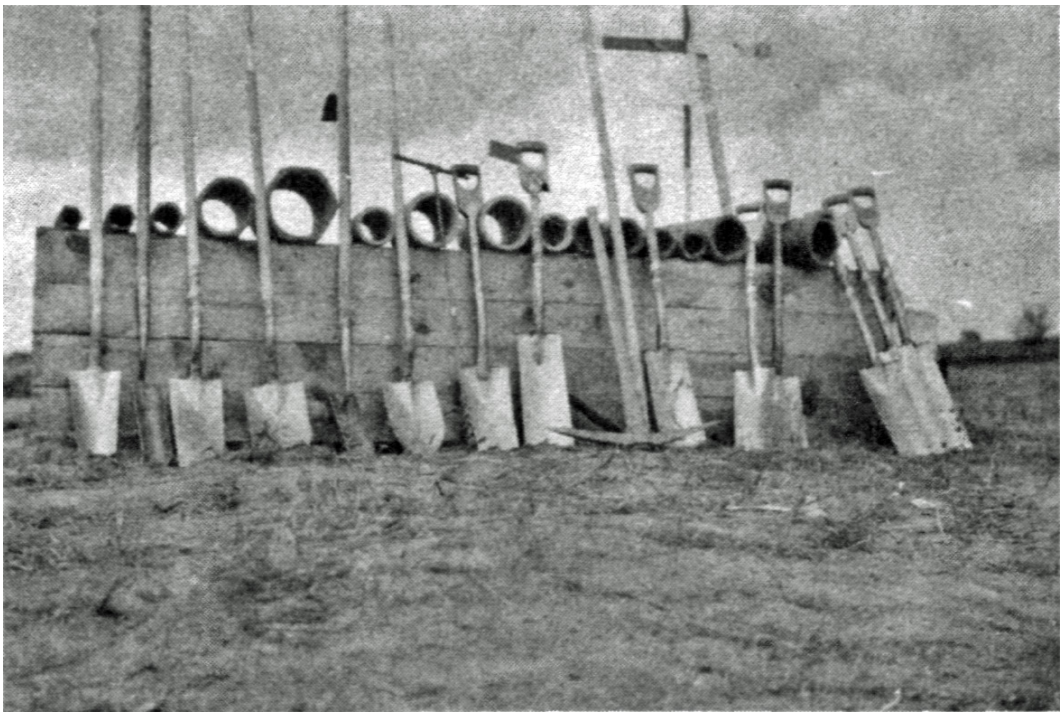
The Smith-Lever Act provided $10,000 of federal funds annually to each state for extension, and additional funds based on rural population if they were matched by the state. Central administration of the Extension Service in New York was vested in the Director of the Cornell University Agricultural Experiment Station, who appointed a Vice-director for Extension. Although the machinery for coordinating extension activities in the State existed, however, the departments had long been accustomed to acting independently and continued to do so for most of this period. They were influenced greatly, however, by the Farm Bureau agents' initiatives in defining local problems and requesting assistance in finding solutions for them.

Potential conflicts of interest between the Farm Bureau Federation as a politically sensitive organization and the College Extension Service as a public institution were apparent even during this period. Farm Bureau Agents spent substantial amounts of time on membership drives, for at least part of their support depended on dues. Service to farmers, while not restricted to dues-paying members of the local Farm Bureau, was certainly influenced by membership, or lack of it. Farm Bureau agents under pressure from their local constituents became involved in commercial functions for farmers, though that was frowned upon by the College administration. The latter problem was solved in 1920 by organization of the GLF Exchange (Grange-Dairymen's League-Farm Bureau) as a farmers' cooperative under the leadership of H. E. Babcock, who had been County Agent Leader at the College. The underlying conflict was not resolved, however, until the Secretary of Agriculture mandated separation of the public and private agencies by executive order in 1954.

This was the environment in which Fippin and Barron served as extension specialists during this period. In spite of the shortcomings of the system it was effective at the local level for a large proportion of farmers able to benefit from extension. Fippin and Warsaw concentrated on physical soil problems, especially drainage, though they by no means ignored the problems of soil fertility and liming. Fippin was the prime mover in organization of Drainage Associations for promotion of soil drainage locally and organized drainage demonstrations throughout the State. He used printed media extensively. From 1914 to 1920, he authored 24 articles in the agricultural press, 2 College extension publications, and 4 Cornell Reading Course lessons. He mainly, but with contributions by other Soil Technology staff, was also active in person-to-person contacts. For 1915-16, for example, the Department reported staff service to 20 demonstration schools of 5 days each, 47 lectures to other farm audiences, development

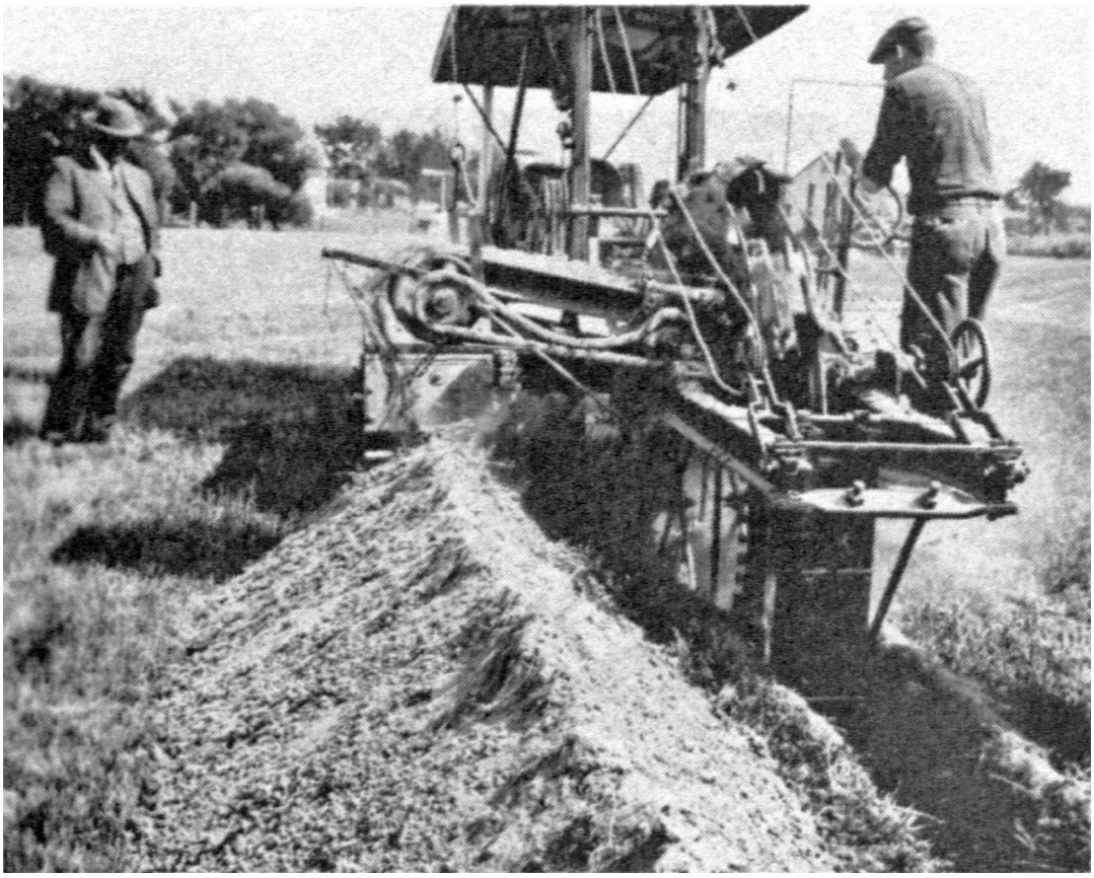
Professor Fippin addressing a soil drainage meeting, Niagara County, 1916.

Demonstrating construction of a stone drain, St. Lawrence County, 1916.



Above: Exhibit of types of drain tile and hand ditching tools, Webster, N.Y., 1914.

Below: Demonstration of the Buckeye ditcher, Gouverneur, N.Y., 1914.



After Professor Fippin relinquished the teaching to H. O. Buckman in 1912, he devoted full time to extension. He and W. W. Warsaw emphasized soil drainage as the most important single soil problem at drainage meetings and demonstrations like those illustrated above. Attendance was consistently good. Other demonstrations included ditching with dynamite, ditching plows, construction of mains with a dragline, tile outlets, tile joints, tiling systems.

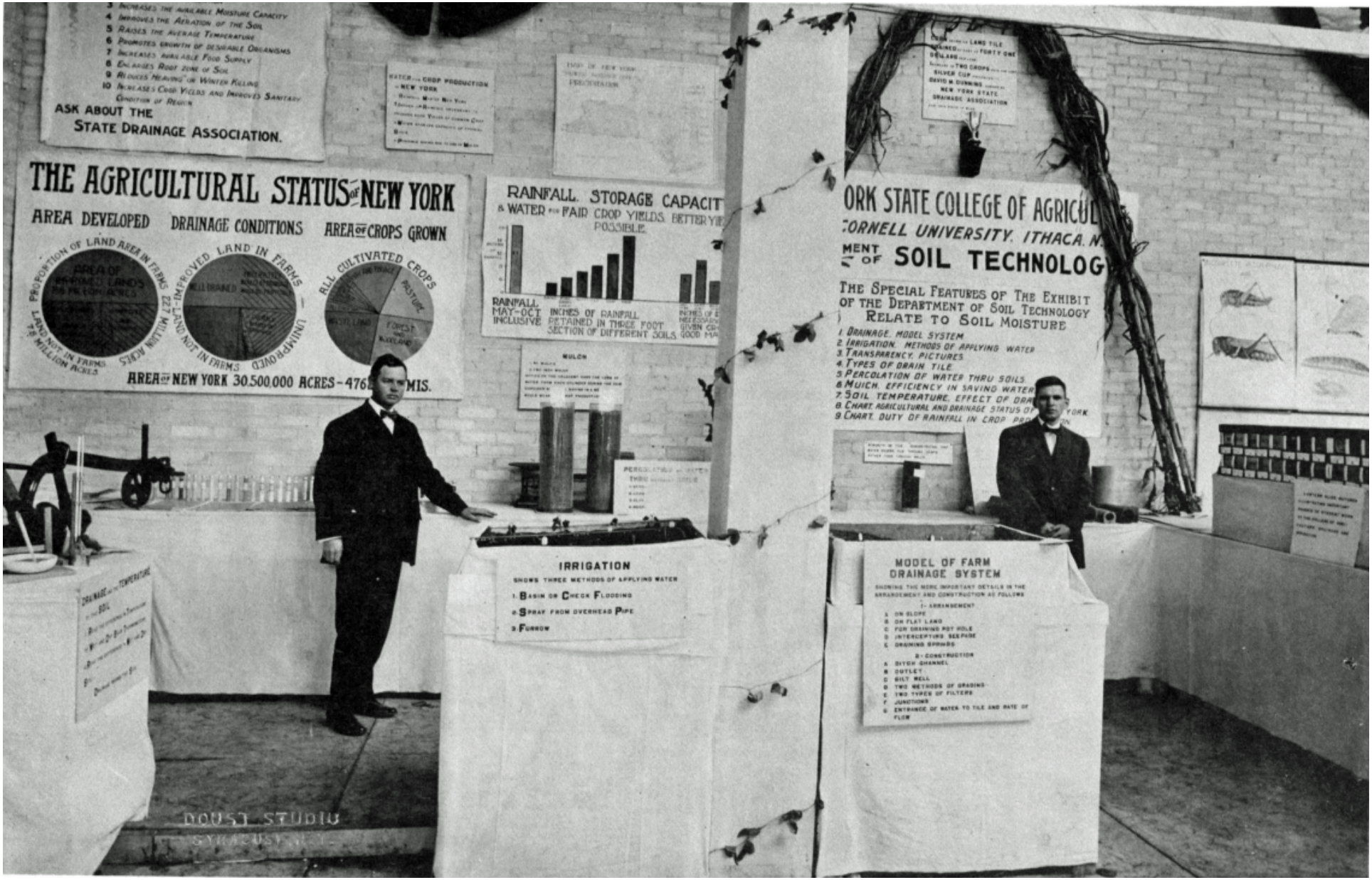
U.S. Bureau of Soils soil survey inspectors in Oneida County, 1913. Left to right: C.F. Marbut, Chief; T.D. Rice, later authority on soils of the Great Plains; W.E. McLenden.

Below: Extension train, 1914. Fippin second from the right.

One of 437 farm demonstration trials, 1917. Soil Technology.

Check plot, Virgil experimental field, 1913.

Litmus test for soil acidity, using KNO_3 solution.



Soil Technology's exhibit at the State fair, 1918. E. O. Fippin, left; probably W. W. Warsaw, right.

The State fair exhibit of 1919 illustrates the scope of the extension program of the Department of Soil Technology and the generalist perspective of H.O. Buckman, in charge.

of an exhibit for the State Fair and its staffing for a week, 24 trips on soil drainage installations, distribution of 9 circular letters, and 2952 replies to queries in letters. For 1917-18, the war years, the Department reported 22 demonstration schools, 44 special lectures, 51 farm visits, 17 visits to local Farm Bureaus, 67 samples of soil examined, 44 soil acidity kits distributed, 10 fertilizer kits distributed, 437 cooperative field demonstrations of drainage, liming, fertilization, and organic matter maintenance, and 4,000 letters.

In the Department of Farm Crops, Barron spent his energies largely on work through the county Farm Bureau agents, with whom he was on intimate terms as a former agent himself. In 1916-17, for example, Farm Bureau agents with supervision and assistance from Barron ran more than 3,000 farm crops trials and demonstrations of various kinds, including more than 600 on corn and 400 on alfalfa. In 1917-18, the Department reported an equal number of agent trials and demonstrations and 60 wheat fields inspected for harvesting as seed. Barron concentrated on crops of dairy and cash grain farmers while Hardenburg worked actively with potato and bean growers. Montgomery produced most of the extension publications for Farm Crops: 5 extension circulars and 2 lessons for the Cornell Reading Course. Hardenburg produced 2 Reading Course lessons, one on beans and the other on potatoes. (The work of the staff of the former Department of Vegetable Gardening is not reported here, although they were combined with Farm Crops from 1917-18 to 1921-22.)

Although the extension functions of the New York Agricultural Experiment Station at Geneva were formally transferred to Cornell about midway through this period, some activities that had a large extension component necessarily remained. The fertilizer and seed testing reported under research, for example, was a service function, if not the conventional type of extension. Popular bulletins that presented research results in lay terms continued to be published; 43,000 copies were distributed in 1913-14. Cooperative experiments with farmers were continued. With few exceptions, however, the publications and cooperative experiments were not concerned directly with agronomic subject matter.

I. From Formation of the Modern Department of Agronomy in 1921-22 to Retirement of Professor Lyon and Arrival of Professor Bradfield in 1936-37.

In July, 1921, the Department of Farm Crops was dismantled. Over the years, its activities and those of the departments of Plant Breeding and Soil Technology had overlapped increasingly. It had been, in effect, confined by the two departments, each of which had aggressive leadership that attracted attention and support. The support promised Professor Montgomery by Dean Bailey in 1913 had not materialized. By 1920-21, the year after Montgomery resigned, the staff concerned with Farm Crops consisted of only John Barron as Extension Professor, E. V. Hardenburg for potatoes and beans, R. G. Wiggans for variety testing, and H. P. Cooper as a new Instructor for resident teaching. There were no assistants.

In 1921-22, Dean Mann concluded that the programs of Farm Crops were not adequate to justify the duplication that had developed. Vegetable Gardening was re-established as a separate department under Homer C. Thompson, a strong young scientist and potential leader. E. V. Hardenburg went to that department, and with him went the work on potatoes and beans. The work on variety testing and crop improvement was transferred to Plant Breeding with R. G. Wiggans, who had been responsible for it.

The work on crop production was combined with Soil Technology, and the combined unit was renamed the Department of Agronomy. Only H. P. Cooper for teaching and John Barron for extension remained for crops faculty in Agronomy.

Much of the agronomic work in Agricultural Chemistry had gone to Soil Technology with the transfer of J. A. Bizzell in 1907-08. That which remained was eliminated when Cavanaugh retired in 1923, and what remained of agricultural chemistry was incorporated in the Department of Chemistry of the College of Arts and Sciences.

The Department of Meteorology was incorporated in the Department of Agronomy in 1930. Although Colman (p. 393) reports that Meteorology was abolished as a department, it retained identity in College announcements and, to a considerable extent, continued to function as if the arrangement were primarily one of administrative convenience. That arrangement was short-lived. In 1934 Professor Mordoff and Meteorology were placed under the Department of Pomology, again largely for administrative purposes. Mordoff was housed in the new Plant Sciences Building near his new administrative department.

Relations between the College of Agriculture and the Cornell administration and trustees were much improved during this period. Tower Road was extended through the College grounds in 1918 and was lined with red oaks that now extend from Garden Avenue to Stocking Hall. Central purchasing for the College was vested in a new University Purchasing Department in 1921 with substantial savings for the Department of Agronomy. H. E. Babcock as member, and later Chairman, of the Board of Trustees, became a forceful champion of Agriculture. Later he was to work very closely with Professor Bradfield in advancement of the Department's goals.

Collison and Conn of Geneva and Lyon of Cornell continued to hold joint appointments in Agronomy and the Geneva station. The Geneva station was placed under Cornell authority in 1923. At that time, R. W. Thatcher, Director of the Geneva station, was also made Director of the Cornell University Agricultural Experiment Station. Those arrangements did much to consolidate relationships. When Director Thatcher retired in 1927, F. B. Morrison was brought to Cornell from the University of Wisconsin as Director of both stations, and he continued Thatcher's unifying policies. Morrison, however, was convinced by Dean Mann to leave the directorship in 1928 to assume the headship of Animal Husbandry and revitalize that department. Thereafter, the directorships were again divided, between U. P. Hedrick at Geneva and the Dean, himself, at Cornell. Cooperation between the two stations again deteriorated, but it appears that the joint appointments of Collison, Conn, and Lyons did much to maintain relationships between Geneva and the Department of Agronomy. Institution-wide, however, a commitment to cooperation was not reestablished until Percival Parrott succeeded to the directorship of the Geneva station in 1938.

During the period from 1921 to 1929, relationships between Cornell and the State were strained and affected appropriations for the College, including Agronomy. The State Education Department was given authority over the College by State legislation in violation of earlier agreements. As the Education Department had little appreciation of the role of research and extension, the Department did well to maintain a constant number of faculty positions and an essentially static program during this time. Although relationships improved markedly with the election of Franklin D. Roosevelt as Governor in 1928, some contention remained well into his administration. The great economic depression of the early 1930s brought sharply decreased State appropriations, which curtailed some of the Department's activities.

The annual report of the Cornell University Agricultural Experiment Station for 1930-31 contains a summary of State appropriations for capital construction at the College. Those relevant to Agronomy were the following:

1904 - $250,000 for the original State College buildings, including Stone Hall which housed the first Department of Agronomy and housed Farm Crops after Caldwell Hall was constructed.

1912 - $100,000 for Caldwell Hall, which housed the Department of Soil Technology and, after 1921, the new Department of Agronomy.

1913 - $20,000 to equip Caldwell Hall.

The 1930-31 report also gives the salary schedule for the College of Agriculture as agreed upon with the State Education Department:

Rank	Annual Salary		Annual
	Minimum	Maximum	Increment
Professors	$5,000	$7,500	$250
Assistant Professors	$3,500	$5,000	$250
Instructors	$2,000	$3,500	$250

These were probably 12-month stipends.

The conflict between Cornell and Syracuse Universities about jurisdiction over agriculture and forestry continued through the 1920s. The State Education Department supported Syracuse's claim for forestry and in 1930 began the move to eliminate instruction in professional forestry at Cornell. This was finalized when the entering freshman class of 1931-32 graduated in 1935-36. Thereafter activities in forestry at Cornell were restricted to farm forestry and extension, though a Department of Forestry remained until 1948. Syracuse University, in turn, discontinued its Joseph Slocum College of Agriculture in 1934. H.B. Hartwig had served that college as Associate Professor of Crops before joining the Agronomy faculty in 1927.

Although confirmation has not been found, one may speculate that the State's support of forestry at Syracuse may have prompted the Charles Lathrop Pack Forestry Trust to endow a professorship in Forest Soils in the Agronomy Department rather than in the College of Forestry at Cornell in 1927. This was the first endowed chair in the College. The endowment of $130,000 produced income adequate for the salary and part of the operating expenses of the professor at that time. An original supplemental allocation of $3,000 for operation was increased to $5,000 per year in 1929-30. Professor Lars-Gunnar Romell from the Swedish Forest Experiment Station in Stockholm was the first incumbent. He was succeeded in 1935 by Dr. Robert Chandler, Jr., who later became President of the University of New Hampshire.

The election of Franklin D. Roosevelt to the presidency in 1932 and the "New Deal" which followed had enormous consequences for the College of Agriculture generally and the Department of Agronomy in particular. The impact on the Department was not great until after 1937 and is discussed under the next period, for the agencies and their functions that affected Agronomy were initiated as this period drew to a close. These included the Soil Conservation Service (SCS) and the Agricultural Adjustment Administration (AAA), both chartered in 1936.

The Bankhead-Jones Act of 1935 not only increased federal appropriations for research and extension but also created a special research fund under which the U.S. Plant, Soil, and Nutrition Laboratory was established. It was located on the Cornell campus in spite of lukewarm if not antagonistic attitudes of some Cornell trustees and administrators. Its relationships with the Department of Agronomy became very close after Professor Bradfield succeeded to the headship in 1937.

This was also the period during which the College of Agriculture began international service on a scale broader than contacts of individual professors and the education of foreign students. From 1925 to 1931, professors of Plant Breeding and Agricultural Economics served at the University of Nanking. Cornell faculty became involved in development of a Graduate School of Tropical Agriculture in Puerto Rico. This effort was poorly financed and became a casualty of World War II. None of the Agronomy faculty was directly involved in these efforts, but a pattern of international service was established which evolved into the major College program to which Agronomy was to be a major contributor in later years.

Grants from commercial concerns and public associations or agencies began in a small way during this period. Annual reports of the College list 10 to 20 small grants of a few hundred to a few thousand dollars in individual years for research on specified problems or for scholarships for students in specific fields. Only one is listed for Agronomy. N. V. Potash Export My granted funds to investigate the use of potassium on muck soils in 1928-29. It

provided $2,400 for 1928 and $1,700 per year for 1929 and 1930. Stipends for graduate assistants were about $600 per year at that time.

The faculty and certain key staff of the new Department of Agronomy are given by titles in the tables on pages 61 to 62. Titles of professorial rank were all designated "of Soil Technology", "of Field Crops", or "of Meteorology", maintaining the conventions of the earlier departments. Faculty assigned wholly to extension had the term "Extension" added to the title as they were not voting members of the University Faculty.

In soils, Professors Lyon and Bizzell with Experimentalist Leland continued to devote most of their efforts to their research program. J. K. Wilson specialized in soil bacteriology and divided his efforts between research and teaching.

Titles, Appointments, Leaves of Absence, and Resignations for Faculty and Selected Staff
Soils, Department of Agronomy, 1921-22 to 1936-37

Soils, Part 1 (1921–22 to 1929-30)

	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30
Lyon, T.L., Head	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.
Bizzell, J.A.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.
Buckman, H.O.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.
Wilson, J.K.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.
Worthen, E.L.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.
Wilson, B.D.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Asst. Prof.
Gustafson, A.F.	Ext. Prof.	Ext. Prof.	Ext. Prof.	Ext. Prof.	Ext. Prof.	Ext. Prof.	Ext. Prof.	Ext. Prof.	Ext. Prof.
Howe, F.B.	Soil Survey	Soil Survey	Soil Survey	Soil Survey	Soil Survey	Soil Survey	Soil Survey	Soil Survey	Soil Survey
Leland, E.W.	Exp'alist	Exp'alist	Exp'alist	Exp'alist	Exp'alist	Exp'alist	Exp'alist	Exp'alist	Exp'alist
Romell, L.G.							Prof.	Prof.	Prof.
Staker, E.V.								Instr.	Instr.
Collison, R.C.*	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.
Conn, H.J.*		Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.

Soils, Part 2 (1930-31 to 1936–1937)

	1930-31	1931-32	1932-33	1933-34	1934-35	1935-36	1936-37
Lyon, T.L., Head	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Retired
Bizzell, J.A.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.
Buckman, H.O.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.
Wilson, J.K.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.
Worthen, E.L.	Prof.	Prof.	Prof.	Prof.	Leave (2)**	Prof.	Prof.
Wilson, B.D.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Leave (2)**	Prof.	Prof.
Gustafson, A.F.	Ext. Prof.	Prof.	Prof.	Prof.	Prof.	Leave (2)**	Prof.
VanAlstine, E.		Ext. Prof.	Ext. Prof.	Ext. Prof.	Ext. Prof.	Ext. Prof.	Ext. Prof.
Howe, F.B.	Soil Survey	Soil Survey	Soil Survey	Soil Survey	Leave (yr)**	Leave (yr)**	Prof.
Leland, E.W.	Exp'alist	Exp'alist	Exp'alist	Exp'alist	Exp'alist	Exp'alist	Exp'alist
Romell, L.G.	Prof.	Prof.	Prof.	Resigned			
Staker, E.V.	Instr.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Asst. Prof.
Chandler, R.F., Jr.						Asst. Prof.	Asst. Prof.
Collison, R.C.*	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.
Conn, H.J.*	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.

* Professional staff member of the New York Agricultural Experiment Station at Geneva holding joint appointment in the Department of Agronomy at Cornell.
** Leaves: (2) - second semester; (yr) - full year.

Titles, Appointments, Resignations, and Leaves of Absence for Faculty and Selected Staff
Field Crops and Meteorology, Departments of Agronomy and Meteorology, 1921-22 to 1936-37

Field Crops & Meteorology, Part 1 (1921-22 to 1927–30)

	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	1927-30
Field Crops							
Barron, J.H.	Ext. Prof.	Ext. Prof.	Ext. Prof.	Ext. Prof.	Ext. Prof.	Ext. Prof.	Ext. Prof.
Cooper, H.P.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Asst. Prof.
Dalton, L.A.	Ext. Instr.	Ext. Instr.	Ext. Instr.	Ext. Instr.	Asst. Ext. Prof.	Resigned	
Hartwig, H.B.			Ext. Spec.			Asst. Ext. Prof.	Asst. Ext. Prof.
***Meteorology**							
Wilson, W.M.	Prof.	Prof.	Prof.	Retired			
Mordoff, R.A.	Asst. Prof.	Asst. Prof.	Asst. Prof.	Prof.	Prof.	Prof.	Prof.

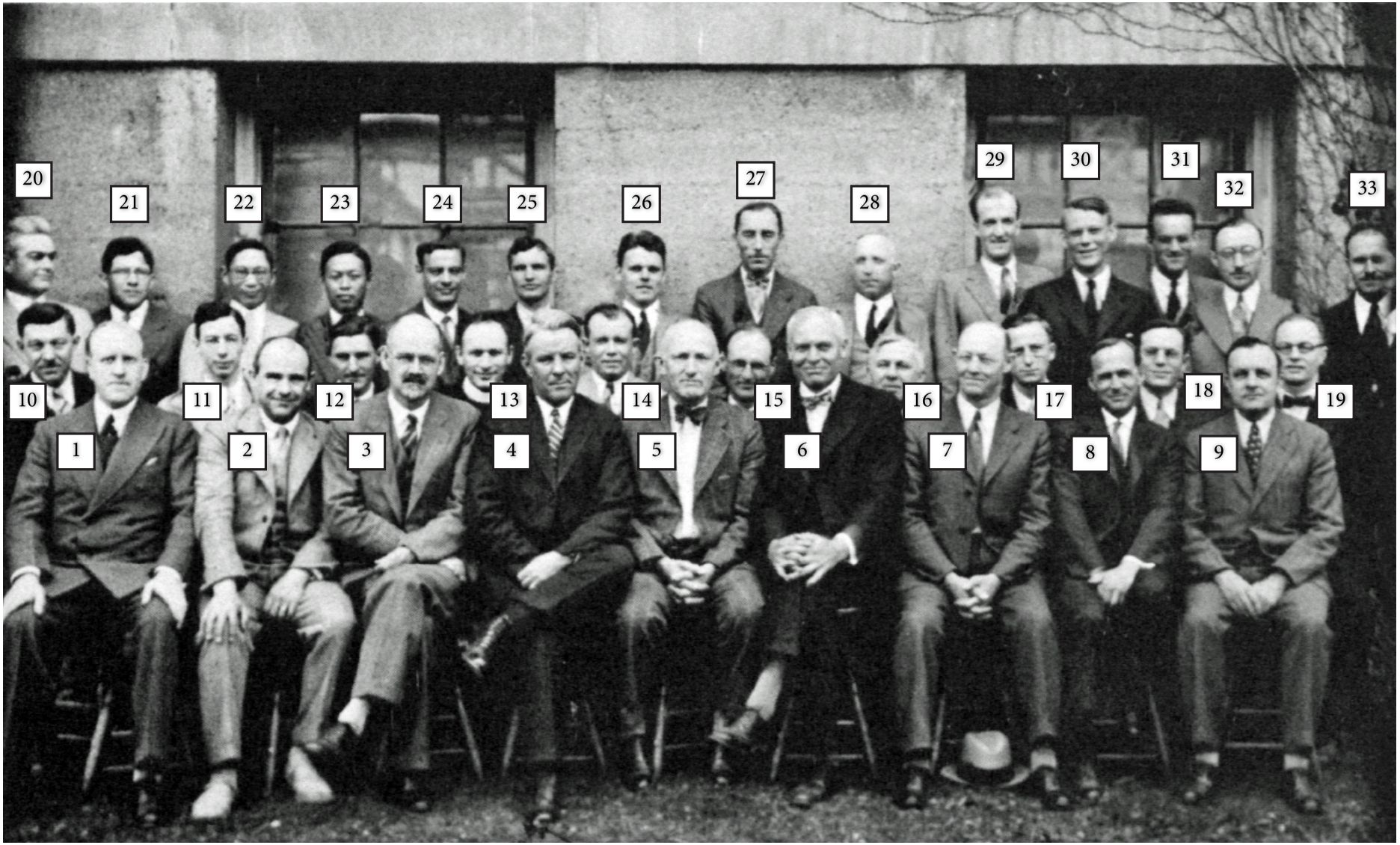
Field Crops & Meteorology, Part 2 (1930–31 to 1936–37)

	1930-31	1931-32	1932-33	1933-34	1934-35	1935-36	1936-37
Field Crops							
Barron, J.H.	Ext. Prof.	Ext. Prof.	Leave(2)**	Ext. Prof.	Ext. Prof.	Ext. Prof.	Ext. Prof.
Cooper, H.P.	Resigned						
Hartwig, H.B.	Asst. Ext. Prof.	Asst. Ext. Prof.	Asst. Ext. Prof.	Asst. Ext. Prof.	Asst. Ext. Prof.	Leave (yr)**	Asst. Ext. Prof.
Johnstone-Wallace, D.B.	Agrostologist	Agrostologist	Agrostologist	Agrostologist	Agrostologist	Asst. Prof.	Asst. Prof.
Serviss, G.H.					Asst. Ext. Prof.	Asst. Ext. Prof.	Asst. Ext. Prof.
Gooding	Instr.	Instr.	Instr.	Resigned			
***Meteorology**							
Mordoff, R.A.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.	Prof.

* Department of Meteorology 1921 to 1930; Department of Agronomy 1930 to 1934; Department of Pomology 1934 to 1940.
** Leaves: (2) - second semester; (yr) - full year.

B. D. Wilson initially supported the research of Lyon and Bizzell and of J. K. Wilson, but by 1929-30, he had developed his own research program on organic soils. E. L. Worthen was leader for extension, concentrating on soil fertility and management. He also supervised the applied research on the outlying fields at Churchville, Alfred, and Virgil and taught a 2-credit course in practical soil management. A. F. Gustafson was responsible for extension concerned with drainage, tillage, and irrigation. After 1935 he increasingly focused on soil conservation. F. B. Howe was responsible for soil surveys in cooperation with USDA and did not achieve professorial status until after he had spent 2 years on leave as Regional Director of the new federal Soil Erosion Service of the Department of Interior (later Soil Conservation Service of USDA) from 1934 to 1936. Collison was research leader for Agronomy at the Geneva station and held a joint appointment in the Department of Agronomy. Conn was research leader for Bacteriology at Geneva and also held a joint appointment.

The soils faculty remained unchanged until 1928-29, when L. G. Romell was appointed the first Professor of Forest Soils under the new Pack endowment: He resigned in 1934-35 to return to Sweden and was replaced in 1935-36 by R. F. Chandler, Jr., a Ph.D. in horticulture from the University of Maryland. E. V. Staker joined the staff as instructor in 1928-29 and by 1930-31 had become co-investigator with B. D. Wilson on studies of organic soils. In 1931-32, Ernest Van Alstine was recruited from the University of Vermont to reinforce extension. Over this 15-year period, the resident professorial staff in soils increased from 7 to 10.



Faculty and graduate students of the Department of Agronomy, 1931. (Professor Lyon took the picture.)

1. Johnstone-Wallace, faculty
2. Romell, faculty
3. Worthen, faculty
4. Barron, faculty
5. Bizzell, faculty
6. J.K. Wilson, faculty
7. Gustafson, faculty
8. Buckman, faculty
9. B.D. Wilson, faculty
10. VanAlstine, faculty
11. Baur, student
12. Peele, student
13. Proule, student
14. Rodriguez, student
15. Hartwig, faculty
16. Cavetz, analyst
17. Moser, student
18. Staker, faculty
19. Hersman, student
20. Gooding, student
21. Warren, student
22. Shen, student
23. Ru, student
24. Heimburger, student
25. Macy, student
26. Palmquist, student
27. Plice, student
28. Geyer, student
29. Harlen, student
30. Knealy, student
31. Tate, student
32. Hopper, student
33. DeFrance, student

The faculty of Field Crops incorporated in Agronomy in 1921-22 consisted of Assistant Professor Cooper, Extension Professor Barron, and Instructor Dalton. Cooper taught the single course offered. Barron and Dalton handled the heavy load of extension. When Dalton resigned in 1926-27, H. B. Hartwig, who had served briefly as extension specialist in 1923-24, was recruited from his associate professorship at Syracuse University to serve as Assistant Extension Professor. When Cooper's resignation in 1930-31 left the teaching position vacant, Gooding was employed as Instructor to teach the course. (Documentation has not been found for Mr. Gooding.) After Gooding's departure in 1933-34, Professor Hartwig assumed the teaching responsibilities for field crops. Over the next 12 years, he served in that capacity and became a legend in his own right as a Cornell undergraduate teacher.

The 3-man field crops faculty was not increased until 1930-31 when D. B. Johnstone-Wallace was recruited as "Agrostologist" from England to develop a pasture and forage crops program. When Hartwig left extension for resident teaching in 1933-34, George H. Serviss, with four years experience as Agronomist for USDA, was employed to assume Hartwig's extension responsibilities. After 15 years, the field crops faculty had been increased from 3 to 4.

W. M. Wilson, the grand old man of early Cornell Meteorology retired in 1924-25, and the title of Professor was conferred on R. A. Mordoff. Mordoff had been Wilson's understudy since 1916, first as Instructor and, after 1924, as Assistant Professor. He had taught the meteorology courses since 1919-20. Teaching remained his primary responsibility throughout his tenure to 1949, but he also maintained the Cornell weather records and published a standard reference bulletin on the "Climate of New York State".

Resident Instruction

Aside from some changes in course numbers and short-lived experiments with speciality courses, offerings in all three subject matter areas changed little until near the end of this period. Buckman's 5-credit elementary course in soils offered both semesters had 3 lectures, a laboratory, and a recitation period. Worthen taught a 2-credit elementary lecture course in practical soil management one semester in alternate years. J. K. Wilson taught a 3-credit lecture course in soil bacteriology one semester each year. Bizzell offered a 3-credit lecture course for graduate students, with or without an additional laboratory at various times, one semester each year. Seminary and research for graduate students completed the continuing offerings in soils. In addition, a special elementary course for 2-year students was begun in 1930-31 by Buckman, and F. B. Howe introduced a new 3-credit course in soil conservation in 1936-37 after returning from his work with the Soil Erosion Service. R. F. Chandler began a new 2-credit course in forest soils the same year. These were forerunners of more rapid expansion of course offerings during the next period.

A single 4-credit elementary course, consisting of 3 lectures and one laboratory each week, was the sole offering in field crops throughout this period. Meteorology offered a 3-credit elementary course in the fall semester followed by a 3-credit climatology course in the spring.

College enrollment, which had increased markedly just prior to 1920, declined during the 1920s but resumed its upward trend after 1928-29.

	Program					
Year	Regular	Special	Winter	Summer	2-year	Graduate
1921-22	852	55	329	930		250
1928-29	652	31	157	725		286
1930-31	753	33	131	771	43	387
1936-37	1,105	47	123	920	211	445

The 2-year certificate program was introduced in 1929-30 for those graduates of high school vocational agriculture programs who were unable or unwilling to meet the demands of the regular 4-year degree program. This prompt-

ed Professor Buckman to introduce a special 3-credit elementary soils course for them. The 2-year students took the regular elementary crops course with 4-year students. Agronomy had no formal major for undergraduates, and its offerings at the elementary level were primarily service courses for interested students of all specialties. Consequently, enrollment in Agronomy courses tended to follow the College trends. In 1929-30 near the low point of college enrollment, Agronomy taught 757 undergraduate student-credit hours, all but six from the College of Agriculture. By 1931-32, this had increased to 936, and by 1936-37, to 1808.

The Department of Agronomy at Cornell was by far the leader in graduate education for its disciplines among colleges and universities of the United States. Fifty-one students earned Ph.D. degrees in the Department from 1926 through 1930. The next largest number was 18 at Iowa State. Between 5 and 8 graduate students held assistantships during this period, at least 3 of which were assigned teaching duties in the elementary courses. Others were dependent on their own resources.

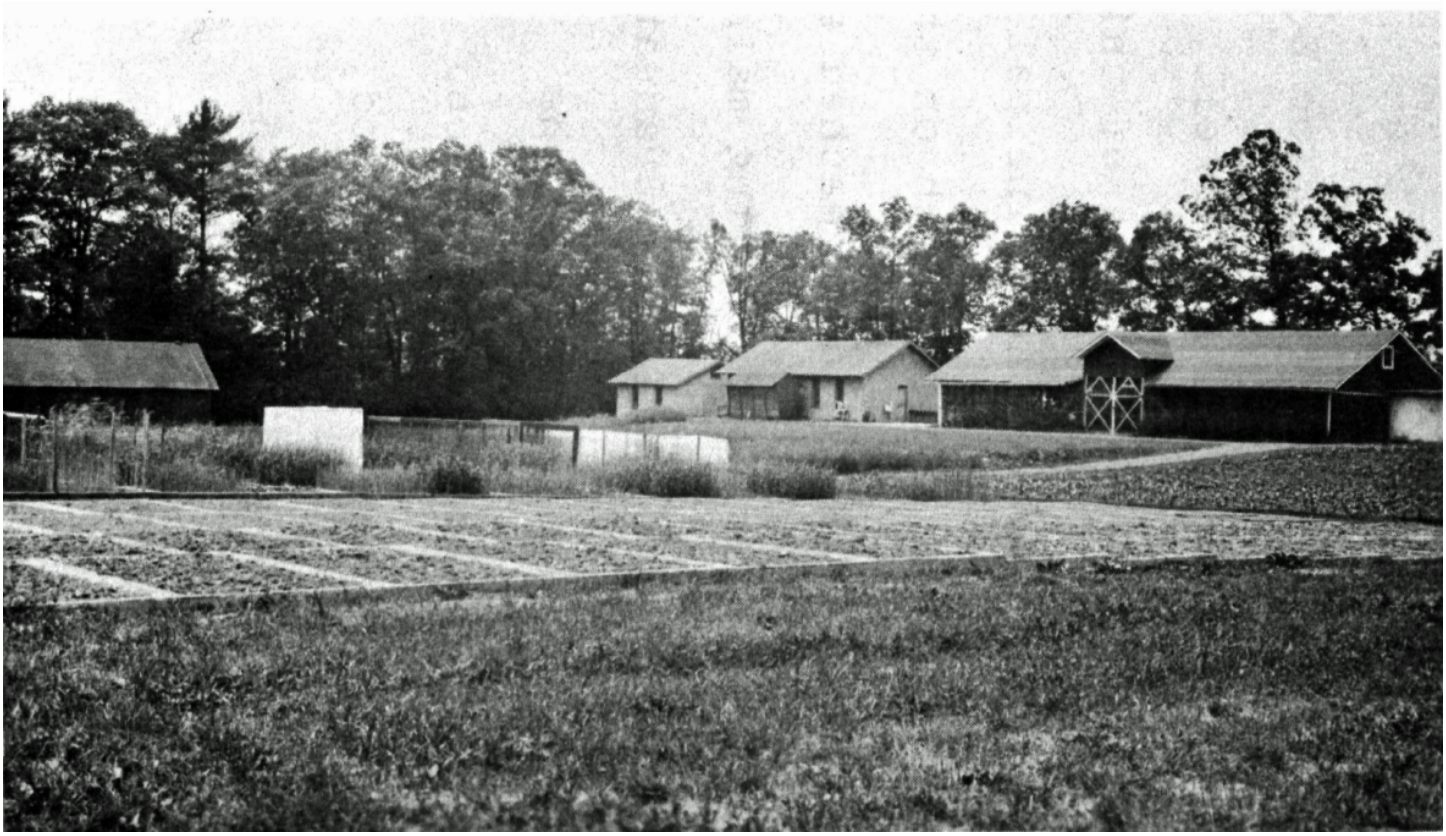
Research

At the beginning of this period, the research of the Department continued mainly along the lines described for Soil Technology in the preceding period. Work with the Cornell lysimeters reached its maximum during the first years of this period. Lyon, Bizzell, and J. K. Wilson were the principal researchers. Worthen had started his applied research on the Virgil, Churchville, and Alfred fields but had not reached a stage to report results. B. D. Wilson was contributing mainly to the programs of Lyon, Bizzell, and J. K. Wilson. Graduate theses dealt mainly with specific problems related to the programs of their major professors. Research publications ranged from 4 to 9 during the first 5 years of the period, 1 to 4 of which represented the research of graduate students.

The arrival of Professor Romell for forest soils in 1927-28 added a new dimension to the research program. In 1928-29, he inaugurated a forest soils research project in a large tract of virgin timber on an estate known as "Heart's Content" in Pennsylvania. In 1931-32, Finch Pruyn & Company deeded a tract of 624 acres of forest land in the Adirondacks to Cornell for research jointly by the Company, USDA, and Cornell. Romell also started work in this area. During most of his tenure at Cornell, he concentrated his efforts on the humus layers of forest soils.

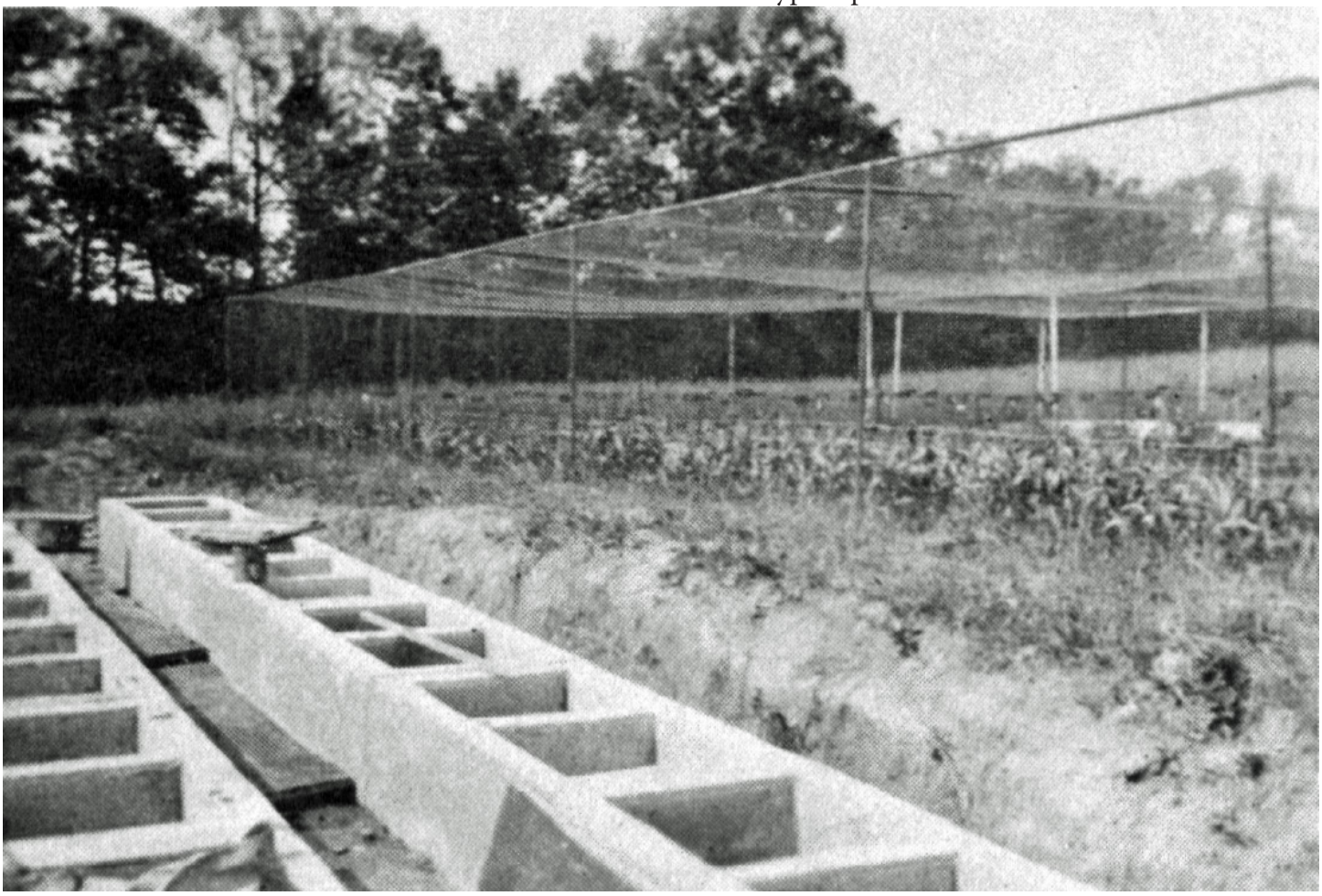
By the mid-twenties, B. D. Wilson had begun to specialize on the organic soils of the State. He expanded the work rapidly into studies of the chemical properties of the soils and later was joined in the work by E. V. Staker.

The arrival of Johnstone-Wallace in 1930-31 gave the field crops faculty a viable research capability for the first time in many years. He quickly established a large program on pastures, partly in cooperation with the Department of Animal Husbandry. Lyon and Bizzell and Worthen continued to conduct most of the work on forage crops in rotations, emphasizing fertilization especially. It was also about 1930 that faculty of Agronomy began cooperation with Pomology on investigations of soils for fruit. Oskamp and Batzer of Pomology provided the leadership and handled the subject matter concerned with the plants themselves. Later Boynton of Pomology also became involved. Through relationships of the Department of Agronomy with the Soil Survey Division of USDA, A. T. Sweet of the latter was detailed to Cornell to provide expertise on the field aspects of soils, and Michael Peech and Richard Bradfield were engaged as short-term consultants on soil chemistry and physics. This was some time before they joined the Agronomy Department faculty, and they continued their interests in the project after taking permanent appointments. Ralph Cummings of Agronomy also contributed during his tenure at Cornell. Out of these studies came 12 Experiment Station Bulletins under the covering title, "Soils in Relation to Fruit Growing in New York" and 4 other publications outside of that series. These were to provide guidelines for orchard plantings over the next 50 years.



Above: Caldwell Field buildings and the concrete frames used to supplement lysimeter studies, 1921.

Below: Small concrete frames under construction in 1922 for soil type experiments.



E.W. Leland, guardian and husbandman of Caldwell Field and its records, insuring that forage harvest will meet his standards. The current field house was named in his honor.

The following projects illustrate the scope of the departmental research effort by 1935-36:

Lyon and Bizzell

1. Effects of overliming
2. Use of straw with ammonium sulfate as manure
3. Manganese and copper needs of soils
4. Nitrogen and sulfur in precipitation
5. Preparation of greenhouse soil
6. Nitrogen carriers for timothy
7. Use of nitrogen by timothy
8. Farm supplies of nitrogen
9. Nitrogen content of soil and forage with wild white clover
10. Timing of nitrogen fertilization for Kentucky bluegrass
11. Longevity of alfalfa
12. Composition of fertilized grasses
13. Soil temperature and moisture as affected by sward
14. Potassium and plant growth

J. K. Wilson

1. Growth of *Azotobacter*
2. Soil algae and soil fertility
3. Cross inoculation of legumes
4. Specificity of *Rhizobium*
5. Effect of fertilization on populations of microorganisms
6. Relation of root nodule bacteria to hosts in soil
7. Biological assays for soil fertility
8. Silage production

B. D. Wilson

1. Tillage and properties of muck
2. Absorption and loss of nutrients from muck
3. Ion exchange properties of muck
4. Identification of plant remains in peat
5. Nature of acidity in peats

A. F. Gustafson

1. Soil and crop management
2. Greenhouse soil studies
3. Erosion control studies

E. L. Worthen - Applied research at Virgil, Churchville, and Alfred

1. Crop rotations
2. Phosphorus fertilization and needs for nitrogen or potassium
3. Forage crops not used commonly
4. Corn and soybeans mixed for silage

F. B. Howe

1. Soil survey of New York
2. Interpretations of soil surveys

L. G. Romell - Romell had left Cornell; Chandler inherited the following**:**

1. Forest humus layers
2. Forest types of the Adirondacks

D. B. Johnstone-Wallace

1. A survey of pastures in New York
2. The role of superphosphate in pasture improvement
3. Fertilization and management of pastures
4. Grazing trials with pastures (with Animal Husbandry)
5. Pastures for sheep (with Animal Husbandry)
6. Phosphorus and calcium content of herbage
7. Varieties of grasses and clovers
8. Soil erosion in pastures

By 1936-37, Chandler had established his own research program, terminating most of the work that Romell had been conducting. He had seven projects:

1. Influence of soil drainage on growth of a beech-maple forest
2. Calcium requirements of trees and their relationships to the distribution of trees among contrasting soils
3. Nutrient contents of the foliage of forest trees
4. Factors affecting the power of tree seedlings to absorb nutrients
5. Effects of mineral fertilizers on the composition and growth of trees
6. Soil-improving value of forest types and the effects of species on the growth of others associated
7. Base exchange studies under different forest types

The projects listed above constituted the program on which Professor Bradfield was to build when he succeeded to the headship in 1937-38.

Research at the Geneva Station

The New York Agricultural Experiment Station at Geneva had the following staff and major projects concerned with agronomic subject matter in 1921:

Division of Agronomy

R. C. Collison, Chief in Research
J. E. Mensching, Associate in Research
T. L. Lyon, Chemist (joint appointment with Cornell)

Projects:

1. Tobacco experiments (cooperative with USDA)
2. Fertilizer experiments with fruit - apples, cherries, grapes, and pears (cooperative with farmers)
3. Sources of liming materials
4. Soil fertility experiments - 104 1/10 acre plots with emphasis on the importance of soil variability
5. Soils of the Chautauqua grape belt - largely characterization chemically
6. Lysimeter experiments - much like Cornell work
7. Liming experiments - conducted in cylinders filled with soil material from important soils of the State
8. Nitrogen transformations in farm manure (cooperative with Division of Bacteriology)

Division of Bacteriology

H. J. Conn, Chief in Research (Conn had been J. K. Wilson's student and was appointed Professor of Soil Technology in the Agronomy Department in 1922-23)

Projects:

1. A general study of soil flora - kinds and numbers
2. Decomposition and preservation of farm manure (cooperative with Division of Agronomy)
3. Effects of one plant on another when grown together in soil

Division of Chemistry

L. I. VanSlyke, Chief in Research (and a staff of seven)

Relevant Projects:

1. Inspection of fertilizers
2. Inspection of feeding stuffs

Roscoe W. Thatcher, who had succeeded W. H. Jordan as the Director of the Station in 1921, published a proposal for reorganization of research in 1922. Among the projects to which he gave high priority were:

1. Soil physics - soil, water, and air and their effects on plant nutrients and plant growth
2. Crop physiology - especially the physiology of growth and development
3. Phenological studies

Personnel concerned with agronomic subject matter at Geneva remained unchanged until 1927-28 except for addition of P. V. Traphagen as a second Assistant for Research in 1925-26. Research projects changed some. Studies of unproductive muck were initiated in 1924-25 by the Agronomy Division. The cooperative work on fertilization of fruit trees was terminated in 1923-24; both the Agronomy and Bacteriology Divisions began investigation of the effects of straw when incorporated in soil. This was later expanded into studies of composting. In 1927-28, the Agronomy Department at Cornell and the Division of Agronomy at Geneva started two cooperative projects:

1. Studies of oats, barley, and peas
2. Cutting stages of alfalfa in relation to yield and quality

In 1928-29, not only were the directorships of the Geneva and Cornell stations separated again but also the divisions at Geneva were reorganized by U. P. Hedrick. The Division of Agronomy was abolished, and Collison became the Chief of Research for a new Division of Pomology. Work with field crops was made the responsibility of the Departments of Agronomy and Plant Breeding at Cornell, except for seed testing. Traphagen resigned that year. Collison and Harlan continued work with soils in the new Division of Pomology, but it was mainly in relation to fruit production. That work was emphasized enough that Collison's annual reports contained a separate section on Orchard Soil Investigations. In 1930-31, the Division had 8 projects on orchard soils, including a new project on study of soil profiles for tree fruits. This was the same year that Oskamp, Batjer, and Sweet at Cornell began similar studies in conjunction with the Soil Survey Division of USDA. There is no indication in the documents consulted that the two projects were related, but it seems likely that there was some consultation considering that Collison held a joint appointment at Cornell. By 1931-32, Geneva's orchard soils investigations included the following:

1. Fertilizer materials
2. Fertilizer selection for orchards
3. Soil management for young orchards
4. Methods for studies of orchard soils
5. Direct injection of nutrients in fruit trees
6. Soil requirements for different varieties of fruit
7. Characteristics of unproductive orchard soils

Conn had begun to phase out his work on the microbiology of soils in 1925-26 when he discontinued the work on soil flora and decomposition of manure. The work on straw continued with the Division of Agronomy until that Division was abolished. Thereafter the annual reports contain little on microbiology related to soils.

J.J. Willaman replaced VanSlyke as Chief in Research for the Division of Chemistry in 1927-28. The analytical work on fertilizers for the fertilizer control law continued to be the principal effort related to agronomy in that Division.

Seed testing had been a service provided by the Geneva Station for many years, and (1935-36) it was formalized in a new Division of Seed Investigations under M.T. Munn. The new Division was conceived to have considerably broader scope than testing for purity and germination as in the past.

Extension

The annual report of the Cornell University Agricultural Experiment Station for 1921-22, Part II, gives a comprehensive review of the rise and significance of the College extension program from 1894 to 1922. By 1922, county Farm Bureaus were the local institutions through which most of the College extension teaching was transmitted to farmers. Farm Bureau membership had reached 49,000. Although the local Farm Bureau agents were obligated under their relationships with the Extension Service to extend service to all farmers, it was a recognized fact that Farm Bureau members, who paid a membership fee, received attention first. It was argued, however, that non-members were largely farmers who would not, or could not, make use of the information.

In 1921-22, the Department of Agronomy reorganized its extension program under 12 topics:

1. Lime and liming
2. Fertilizers and their use
3. Production, preservation, and use of farm manure
4. Organic matter maintenance and green manures
5. Tillage and cultivation
6. Crop rotations
7. Pasture improvement
8. Silage crop production
9. Alfalfa production
10. Forage crop production
11. Small grain production
12. Weed control

A manuscript left by John Barron listed items 9 and 10 as a single topic and added soil erosion control. Not all of these topics were emphasized equally. Alfalfa production was emphasized by the crops faculty; liming and fertilization, by soils.

Although Worthen, Gustafson, and VanAlstine were the faculty who concentrated their efforts on extension, all of the soils faculty took some part in farmer meetings, advice through correspondence, and, to a lesser degree, farm visits. Similarly, Barron and Dalton were the primary extension specialists for field crops, but Cooper participated to the extent his teaching permitted. The departmental extension effort was large for the faculty available. The 1921-22 annual report lists activities aggregating about **12,000 personal contacts**, plus:

Count	Activity
27	circular letters mailed to 1,704 individuals
3,891	personal letters
80	articles for Farm Bureau News and general news services
3	extension leaflets
360	soil samples examined at the College for solution of specific problems

Meteorology was not in the Agronomy Department in 1921-22, but its extension effort is mentioned here for continuity of the record. Wilson and Mordoff were both active at that time. They were able to find time outside

their teaching responsibilities to begin weather forecasting on a localized basis, for fruit growers especially and to some extent for farmers in general. That activity was especially valuable at the time of fruit set, but it was continued through the spraying season. The service was well received, and demand for it mounted over the next several years. When Wilson retired in 1924-25, the service was gradually phased out for lack of manpower. Meteorology also began summarizing weather records in New York, and by 1924-25, Mordoff was able to publish Experiment Station Bulletin 444, "The Climate of New York State", which was to stand as the principal reference on the subject for the next 40 years. The Department also began a study of the local variations of precipitation and temperature within College farms for the benefit of researchers of other disciplines.

With the arrival of Johnstone-Wallace in 1930-31, the extension program on pastures increased enormously. Johnstone-Wallace was a dynamic individual with a mission. He quickly established a clientele, especially among the wealthy owners of estates in the Hudson Valley. Lime, phosphorus, and wild white clover were the heart of his prescription for permanent pastures. Later, in the next period to be discussed, his teaching was to conflict with that of other agronomists as farmers began to shift from permanent pastures to rotation and aftermath grazing and other more intensive sources of summer feed.

The growth of activities of Agronomy extension is illustrated by the following:

Activity	1921-22	1936-37
Man-days in the field	420	567
Farm visits	445	1,056
Lectures - Number	159	308
Lectures - Audience	7,300	16,000
Conferences	88	25
Program planning meetings		5
Agent and leader training		53
Demonstration meetings	24	66
Teaching contacts	12,000	20,000

The Department's contributions to Farmers' Week, the State Fair, and related activities are not reflected in these numbers.

Farmers' Week, which started in 1908 with 800 registered, had grown to 3,800 registrants by 1921-22 and to 11,000 by 1936-37. Agronomy prepared an exhibit occupying all of the classroom which then existed at the west end of the first floor of Caldwell Hall. The faculty prepared a series of lectures on timely agronomic topics, commonly one-hour or half-day programs, each usually presented more than once during the week. The State Fair at Syracuse brought elaborate exhibits from the College. Agronomy had an exhibit and staffed it for the duration of the fair most of the years during this period. Photographs of the exhibits are in Agronomy albums held by the University Archives. The State Fair also had judging and prizes for hay and crop exhibits. Hartwig was the hay judging official during the latter part of this period and on into the 1950s.

In 1928-29, Cornell established a 1000 watt radio station, WEAI, which carried short talks on timely topics by College personnel. Agronomy faculty gave 30 of these in 1928-29, some of which were also carried by WGY Schenectady and other New York stations. The number by Agronomy varied widely from year to year, depending on the subjects emphasized by the College. Agronomy gave 86 talks in 1932-33, but only 4 in 1936-37.

The Department contributed to the Cornell Extension Bulletin series. These were popular but comprehensive bulletins, commonly 24 pages or more, on major subjects. Extension Bulletin 136, "Fertilization and Management of Meadows" by A. F. Gustafson is an example. None by Agronomy were issued in some years, but as many as 4, in others. The Department also contributed Extension Leaflets published in a college-wide series. These were short articles, usually 2 to 8 pages. Written material was also released in the form of circular letters for direct mailing to

a limited audience as well as articles for publication in the Farm Bureau News, farm papers, and for release to the general news services. After 1928-29, radio talks were also commonly released to the news services.

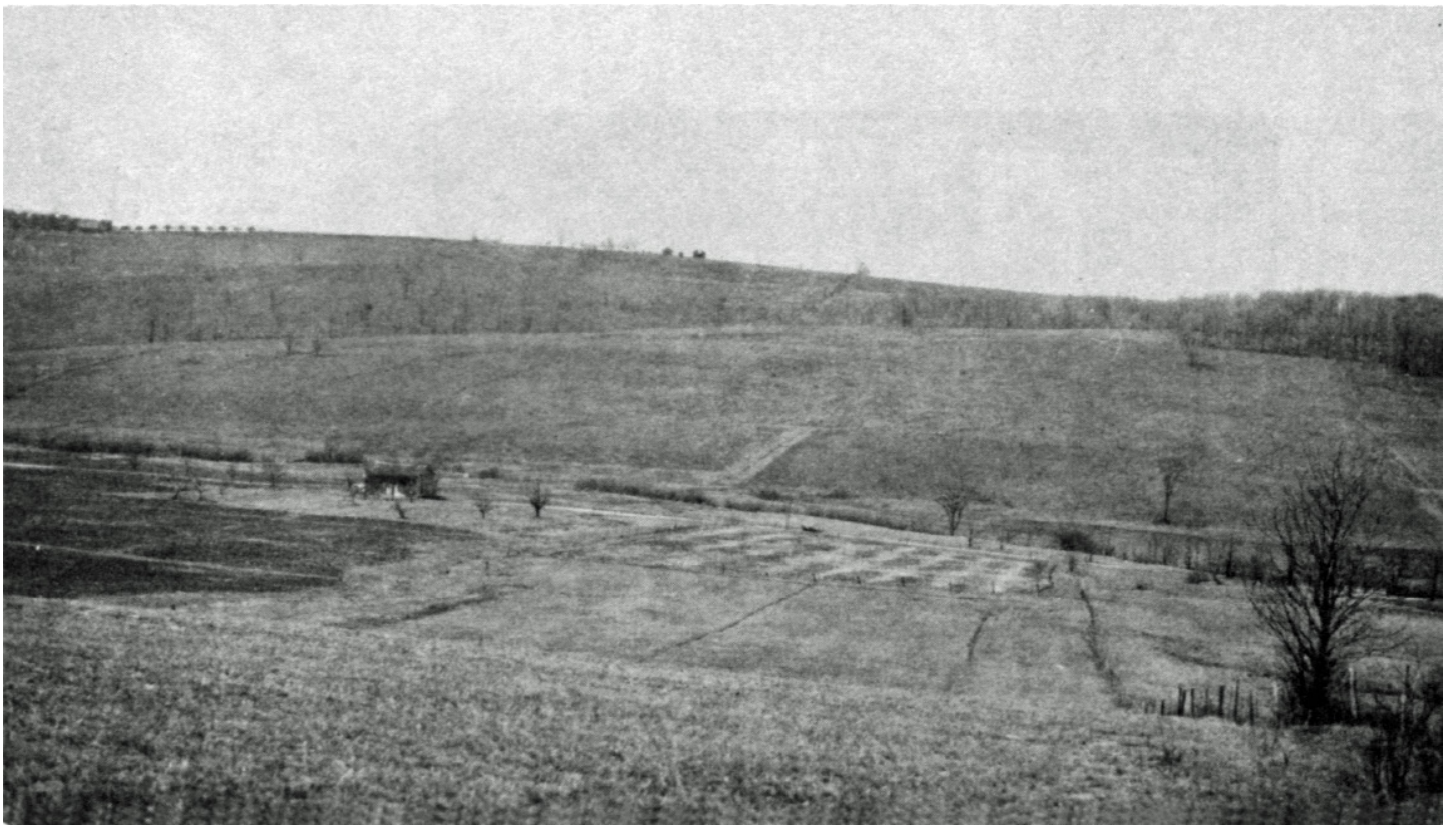
The "great depression" and its problems had an enormous impact on the entire extension program of the College, and that of Agronomy was no exception, though the Department of Agricultural Economics was most affected. Agronomy managed to maintain most of its extension activities in the face of reduced State appropriations but it emphasized adjustments of crop production, production in-puts, and soil maintenance and conservation practices in the depressed economy. Practical men, like Barron and Worthen, tempered their advice to farmers according to the economic conditions of the times. Barron and Johnstone-Wallace pitched their extension efforts toward efficiency in production of feed for the dairy industry. Worthen was a central figure in problems of efficient kinds and use of fertilizers, working not only with farmers but also with the fertilizer industry and the new Tennessee Valley Authority and Agricultural Adjustment Administration during the last years of this period. Gustafson and Howe became deeply involved in the expanding soil conservation movement. Prior to Howe's leave of absence during 1934 & '35, he and the soil survey staff had developed an extensive series of interpretive maps of the State as a contribution to the College efforts related to abandonment of farm land.

J. From the Arrival of Professor Richard Bradfield in 1937 to His Retirement from the Department Headship in 1955.

With Professor Lyon approaching retirement, Dean Ladd began a search for a worthy successor in 1935. He was deeply disappointed at his failure to secure Dr. Richard Bradfield from Ohio State University, whom he considered a "most excellent young scientist". Ladd was persistent, and in spite of Ohio State's efforts to hold Dr. Bradfield, Ladd finally convinced him to accept the headship as of July 1, 1937 (see Colman, p. 442).

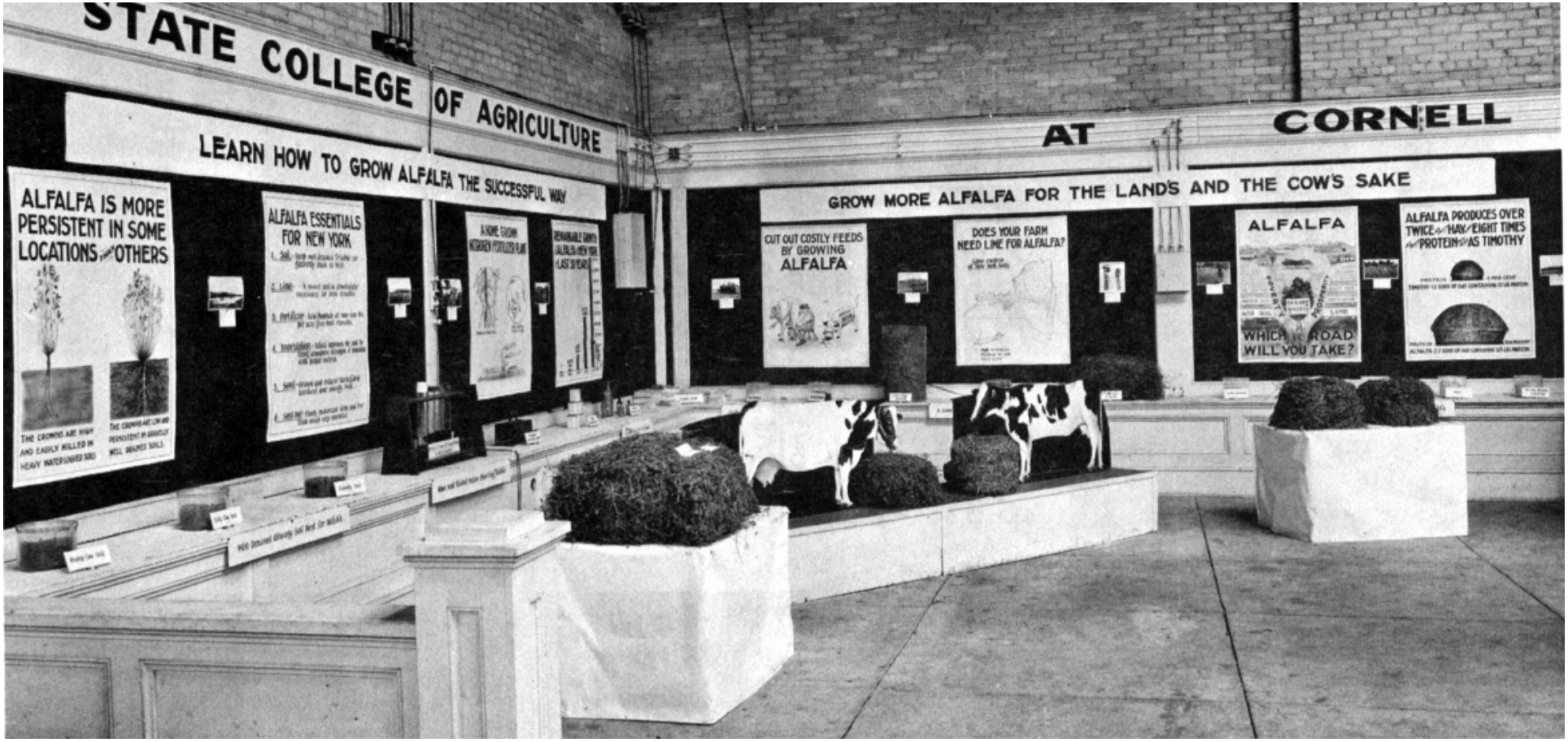
Dr. Bradfield had established an enviable reputation at Missouri and Ohio State Universities, building on strong instincts not only for the potential of basic sciences applied to soils but also for practical application of his theoretical training with H. Freundlich in Berlin and George Weigner in Zurich. He had already introduced new concepts of inorganic colloid chemistry of soils. He was becoming a prominent figure in the American Society of Agronomy and in the American Soil Survey Association, which was the parent organization of the Soil Science Society of America. Dean Ladd was faced with replacement of Dr. Lyon at a time when the agricultural sciences were changing rapidly. He searched for a man who could not only modernize the Department's long-established methods of operation and philosophies but also overcome the almost certain antagonisms toward change inherent in the faculty and in the constituencies which the Department had developed. His persistence to obtain Dr. Bradfield was based on his belief that he had found such a man.

By the time the writer joined the faculty (1942), there was little evidence of anything but respect for Dr. Bradfield. Among the older faculty, one heard occasional complaints directed more toward "The Chief's" dominating character than toward his policies as such. It was obvious that he was respected, and it was equally obvious that he, in turn, respected and deferred to the central figures remaining from Dr. Lyon's administration - men like J. A. Bizzell, J. K. Wilson, H. O. Buckman, E. L. Worthen, H. B. Hartwig, and John Barron. This is not to say that there was complete agreement on all questions. The one notable exception was D. B. Johnstone-Wallace, in charge of pasture work. He was at cross purposes not only with Dr. Bradfield but also with several of the crops faculty over his policies for pastures in New York. It was a time when emphasis of the extension staff was shifting from permanent pastures to aftermath and rotational grazing, stored forage, and other sources of summer feed. Dr. Johnstone-Wallace was the high priest of a doctrine of lime, phosphorus, and bluegrass with white clover for pastures for summer feed. Dr. Bradfield finally proposed stationing Dr. Johnstone-Wallace in the Hudson Valley, where he had a clientele of wealthy owners of estates committed to his program. Dr. Johnstone-Wallace refused the assignment, an attempt was made to terminate him, and the American Association of University Professors came to his defense. Dr. Bradfield became a defendant, in fact if not in name. The issue was solved when Dr. Johnstone-Wallace requested leave to return to England in 1944 to assume a leadership role in the food production program of that beleaguered country during World War II.



Outlying experimental fields were used extensively for extension information.
Above: The Virgil field, 1922.
Below: The Churchville field, 1922.

The barn and setting of the Alfred field, 1922.
The Virgil and Alfred fields were intended to represent the soils and environment of the Allegheny Plateau; Churchville, the Ontario plain, but its soils were atypical.



The impact of the field crops faculty on the extension program of the Department of Agronomy was conspicuous soon after the Department was formed by combining Farm Crops and Soil Technology in 1921. Compare this exhibit at the State fair in 1925 with those of 1918 and 1919 on pages 56 and 57. Professor Barron was in charge of the 1925 exhibit.

With sound foresight, Dean Ladd involved his new Department Head in extension activities, lectures to farm and business organizations, and College committees, not only to indoctrinate him in his new environment but also to demonstrate his competencies before potentially critical groups. By 1942, Dr. Bradfield was firmly established as a respected agronomist among farm leaders. He had firm relationships within the College with such leaders as Ladd himself, C. E. F. Guterman, L. R. Simons, and A. W. Gibson of the College administration and with most of the department heads of the College of Agriculture. As an active member of the American Chemical Society, he had strong ties with the Department of Chemistry, especially with Professor Laubengayer, and with his longtime friend from Ohio, Professor Cole of Geology.

By 1942, Dr. Bradfield had established many of the contacts outside the University that were to serve him and the Department so well in the years to come. He was firmly established with the Rockefeller Foundation, having served as a member of the three-man team that designed the agricultural program for Mexico in 1941. He was an advisor to the U.S. Department of Agriculture. The quartet of Bradfield, Pierre of Iowa State College, Salter of Ohio State University, and Kellogg of USDA was emerging in a leadership role for agronomic affairs and policies in the United States. These relationships are described in some detail because they had a profound impact on the stature of the Department of Agronomy both within and outside the University.

Growth and Functions of the Faculty

Dr. Bradfield arrived at Cornell at a time when subject matter specialization was increasing rapidly. During the 1920s Professors Lyon, Bizzell, Buckman, B. D. Wilson, and Worthen had been substantially generalists, though each had focused to some degree on some aspect of soil science. Similarly, Professors Barron, Cooper, Dalton, and Hartwig had covered broad segments of the field crops area. By 1937-38, Howe in soil survey, J. K. Wilson in soil microbiology, B. D. Wilson in organic soils, Chandler in forest soils, Gustafson in soil conservation, Johnstone-Wallace in pastures, and Mordoff in meteorology represented distinctly definable subject matter specialties. Bizzell had reduced the scope of his interests, concentrating increasingly on soil fertility, Bradfield covered soil chemistry and physics, with a liberal addition of their applications to soil management when he first arrived. The two elementary teachers, Buckman and Hartwig, and the four extension specialists, Worthen, VanAlstine, Barron, and Serviss, remained subject matter generalists.

The faculty of the Department during this period is given by functions and years in the table on pages 78, 79, and 80. The changes of faculty with time are described in the text that follows according to the functions listed in the first column of the table.

Professor Bradfield was Department Head throughout the period. He once confided to the writer that he believed his most important function as Head to be relieving his faculty of the onerous detail of financial matters, leaving them free to pursue their academic duties. Budgets of the time allowed great flexibility in the expenditure of funds, which Professor Bradfield and his secretary and accountant exploited fully. Generally the faculty was not aware of all of the sources of their support nor exactly how the funds of the Department were used. It was not until after Bradfield's time that some members of the faculty became concerned about this somewhat autocratic method of operation.

Professor Howe's training in the basic sciences was inadequate for fundamental studies of soil genesis, and M. G. Cline was added to the faculty in 1942 to fill that void. He had completed the Ph.D. degree under Professor Brad-

field at Cornell and came from a background of soil survey experience in North Dakota, Hawaii, and Tennessee. The position he held was a newly created State line item, and when Professor Howe retired in 1950, his salary was used to create three graduate assistantships for the subject matter area.

Faculty of the Department of Agronomy according to subject matter or function, 1937-38 to 1954-55. (Names of those serving more than one function appear on more than one line.)

Part 1, 1937-38 to 1942-43

Subject or Function	1937-38	1938-39	1939-40	1940-41	1941-42	1942-43
Department Head	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield
SOILS						
Genesis & Class.	Howe	Howe	Howe	Howe	Howe	Howe/Cline
Chemistry	Bradfield	Cummings	Cummings	Cummings	Peech	Peech
Physics	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield
Microbiology	J.K. Wilson	J.K. Wilson	J.K. Wilson	J.K. Wilson	J.K. Wilson	J.K. Wilson
Fertility	Bizzell	Bizzell	Bizzell	Bizzell	Bizzell	Bizzell
Forest Soils	Chandler	Chandler	Chandler	Chandler	Chandler	Chandler
Organic Soils	B.D. Wilson Staker	B.D. Wilson Staker	B.D. Wilson Staker	Staker	Staker	Staker
Conservation	Gustafson	Gustafson	Gustafson	Gustafson	Gustafson	Gustafson
Elem. Teaching	Buckman	Buckman	Buckman	Buckman	Buckman	Buckman
Extension	Worthen VanAlstine	Worthen VanAlstine	Worthen VanAlstine	Worthen VanAlstine	Worthen VanAlstine	Worthen VanAlstine
Extracurricular						
Advisory Service				Bradfield	Bradfield	Bradfield
International					Bradfield	Bradfield
FIELD CROPS						
Ecology-Physiology				Musgrave	Musgrave	Musgrave
Pastures	Johnstone-Wallace	Johnstone-Wallace	Johnstone-Wallace	Johnstone-Wallace	Johnstone-Wallace	Johnstone-Wallace
Elem. Teaching	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig Saltonstal
Extension	Barron Serviss	Barron Serviss	Barron Serviss	Barron Serviss	Barron Serviss	Barron Serviss /Aldrich
METEOROLOGY	Mordoff	Mordoff	Mordoff	Mordoff	Mordoff	Mordoff

Faculty of the Department of Agronomy, 1937-38 to 1954-55
Part 2, 1943-44 to 1948-49

Subject or Function	1943-44	1944-45	1945-46	1946-47	1947-48	1948-49
Department Head	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield
SOILS						
Genesis & Class.	Howe/Cline	Howe/Cline	Howe/Cline	Howe/Cline	Howe/Cline	Howe/Cline
Chemistry	Peech	Peech	Peech	Peech	Peech	Peech
Physics	Bradfield	Bradfield	Russell	Russell	Russell	Russell
Microbiology	J.K. Wilson	J.K. Wilson	J.K. Wilson	J.K. Wilson	J.K. Wilson	J.K. Wilson
Fertility	Bizzell	Bizzell	Bradfield	Bradfield	Bradfield	Bradfield
Soil Testing				Kroth	Kroth	Stanford
Forest Soils	Chandler	Chandler	Chandler	Chandler	Chandler	Stone

Subject or Function	1943-44	1944-45	1945-46	1946-47	1947-48	1948-49
Organic Soils	Staker	Staker	Staker	Dawson	Dawson	Dawson
Conservation	Gustafson	Gustafson	Gustafson	Gustafson	Gustafson	Gustafson
Elem. Teaching, 4-yr.	Buckman	Buckman	Buckman	Buckman	Buckman	Buckman
2-yr.	Gustafson	Gustafson	Gustafson	Gustafson	Brady	Brady
Extension	Worthen VanAlstine	Worthen VanAlstine	Worthen VanAlstine	Worthen VanAlstine	Worthen VanAlstine	Kroth VanAlstine
Extracurricular						
Advisory Service	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield
International				Bradfield	Bradfield	Bradfield
FIELD CROPS						
Ecology-Physiology	Musgrave	Musgrave	Musgrave	Musgrave	Musgrave	Musgrave
Pastures-Forage	Johnstone-Wallace	MacDonald	MacDonald	MacDonald	MacDonald	MacDonald
Forage & Feed	Fink	Fink	Fink	Blaser	Blaser	Blaser
Elem. Teaching	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig Saltonstall
Extension	Serviss Aldrich	Serviss Aldrich	Aldrich	Aldrich	Aldrich	Saltonstall Aldrich
***METEOROLOGY**	Mordoff	Mordoff	Mordoff	Mordoff	Mordoff	Mordoff

* Meteorology was administered in the Department of Pomology during this period.

Faculty of the Department of Agronomy, 1937-38 to 1954-55
Part 3, 1949-50 to 1954-55

Subject or Function	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55
Department Head	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield
SOILS						
Genesis & Class.	Howe Cline	Cline	Cline	Cline	Cline	Johnsgard
Chemistry	Peech	Peech	Peech	Peech	Peech	Peech
Physics	Russell	Russell	Russell	Miller	Miller	Miller
Microbiology		Broadbent	Broadbent	Broadbent	Broadbent	Broadbent
Fertility	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield
Soil Testing	Stanford	Lathwell	Lathwell	Lathwell	Lathwell	Lathwell
Forest Soils	Stone	Stone	Stone	Stone	Stone	Stone
Organic Soils	Dawson	Dawson	Dawson	Dawson	Dawson	Dawson
Conservation		Zwerman	Zwerman	Zwerman	Zwerman	Zwerman
Elem. Teaching, 4-yr.	Buckman	Brady	Brady	Brady	Johnsgard	Brady
2-yr.	Brady		Hiltbolt	Hiltbolt	Hiltbolt	Hiltbolt
Extension	Kroth VanAlstine	Garman	Garman	Garman	Garman	Garman Wilson
Extracurricular						
Advisory Service	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield
International	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield Brady	Bradfield Cline
Courtesy Appointments						
U.S. Nutrition Lab	Beeson/Brandt	Beeson/Brandt	Beeson/Brandt	Beeson/Brandt	Beeson/Brandt	Beeson/Brandt
U.S.D.A., ARS	Lamb	Lamb	Lamb	Lamb	Lamb	Lamb

Subject or Function	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55
FIELD CROPS						
Ecology-Physiology	Musgrave	Musgrave	Musgrave	Musgrave	Musgrave	Musgrave
Pastures-Forage	MacDonald	MacDonald	MacDonald	MacDonald	MacDonald	MacDonald
Forage & Feed	Kennedy	Kennedy	Kennedy	Kennedy	Kennedy	Kennedy
Weeds		Fertig	Fertig	Fertig	Fertig	Schreiber
Elem. Teaching	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig
Extension	Saltonstall Aldrich	Saltonstall Aldrich	Saltonstall Aldrich	Saltonstall Aldrich	Austenson Aldrich	Austenson Aldrich
Extracurricular						
International						Fertig
METEOROLOGY	Widger	Widger	Widger	Widger		Johnson

In 1938, Professor Bradfield brought R. W. Cummings to Cornell to assume research responsibilities in soil chemistry. Bradfield taught a course covering both soil chemistry and physics when he first arrived but was unable to do justice to research in the two areas in addition to his many other responsibilities. He was able to obtain a new State line position for Cummings, who had been Bradfield's graduate student at Ohio State. When Cummings resigned in 1941 to assume a department headship at North Carolina State College, he was replaced by Michael Peech. Peech had also been Bradfield's student at Ohio State and had served as soil chemist at the University of Idaho and at the Florida Citrus Experiment Station. He had also served briefly as a consultant to the Cornell Pomology Department on a major project concerning soils for fruit.

Professor Bradfield remained nominally responsible for soil physics until 1945, when M. B. Russell was recruited from Iowa State College. This was the first time that a well trained physicist had given that subject his undivided attention at Cornell, and Russell quickly established a strong research program with heavy applied bias. By 1951 he had established a reputation as a potential leader, and he was enticed from Cornell with the offer of headship of the Department of Agronomy at the University of Illinois. The vacancy at Cornell was filled by R. D. Miller. His father had completed a Masters degree under Caldwell at Cornell in 1901 and had advanced in his career to be Dean of Agriculture at the University of Missouri, where Bradfield had become a close personal friend of the family. Robert Miller came to Cornell just before World War II to study under Professor Bradfield. His graduate work was interrupted by military service, but he returned after the war to complete it. Although his major professor was Bradfield, he worked closely with Professor Russell as well.

J. K. Wilson continued as the grand old man of Cornell soil microbiology, and faculty tennis champion, until his retirement in 1948. In spite of intensive efforts to fill that void during 1949-50, the position remained vacant until Francis Broadbent was recruited from his position as Junior Chemist at the California Citrus Experiment Station. When he left for a faculty position in soil microbiology at the University of California (Davis) in 1955, he was replaced by Martin Alexander, a new Ph.D. from the University of Wisconsin. He had received his undergraduate training at Rutgers University where Waksman had built the strongest soil microbiology program in the country.

Professor Bizzell continued to represent soil fertility until his retirement in 1945 after 40 years on the Cornell faculty, initially in the Department of Agricultural Chemistry with Caldwell. It was his State line position that was used for M. B. Russell in soil physics, Bradfield assuming Bizzell's responsibilities for soil fertility. Beyond teaching an advanced course in soil fertility, however, Bradfield relied heavily on other faculty, especially R. B. Musgrave, for field research on fertility problems.

Soil testing had been gaining support as an adjunct of soil fertility extension for several years prior to 1946-47, when the State legislature approved a special appropriation to expand the project. Earl Kroth, an Ohio State Ph.D., was added to the faculty under that appropriation. When Kroth shifted his program to extension in 1948 to fill the gap left by E. L. Worthen's retirement, George Stanford, a mature scientist from the Tennessee Valley Authority, was persuaded to fill the soil-testing vacancy. He resigned only a year later, however, to join the soil research staff

of the Bureau of Plant Industry, Soils, and Agricultural Engineering of USDA. D. J. Lathwell had just completed his Ph.D. at Ohio State after undergraduate work at Michigan State College and was hired to fill the soil testing position in 1950.

R. F. Chandler, Jr. held the endowed chair in forest soils until 1948, when he left for the presidency of the University of New Hampshire. Earl Stone was just completing his Ph.D. under Chandler at that time and was appointed to the position immediately. B. D. Wilson in the parallel specialty of organic soils was killed in an automobile accident in 1940. E. V. Staker, who had been working closely with Wilson, assumed responsibility for leadership in organic soils until he resigned in 1945. J. E. Dawson was appointed to the position in 1946 after he had completed his Ph.D. at Cornell. Dawson had majored with Professor Bradfield and had strong minors in chemistry. He proved to be one of the most skilled and productive scientists to serve under Bradfield, in spite of steadily advancing diabetes.

A. F. Gustafson, who had joined the faculty for extension in the area of soil physical conditions and water, had gradually accommodated his program to the soil conservation movement of the 1930s. By 1938-39, he had incorporated resident instruction and applied research in his program. He was killed in an automobile accident less than a year after retirement. His position remained vacant through 1949-50 before it was filled by P. J. Zwerman. Zwerman was an Ohio State Ph.D. who had worked with the Soil Conservation Service and the Ohio Agricultural Experiment Station.

H. O. Buckman remained the teacher of the 5-credit elementary soils course, "Nature and Properties of Soils", using his book by the same title as the text. He had also taught the 3-credit soils course for 2-year students until 1938-39, when Professor Gustafson assumed responsibility for it. In anticipation of Buckman's retirement, N. C. Brady, a North Carolina State Ph.D., was added to the faculty in 1947-48 as Buckman's understudy. He relieved Gustafson of the 2-year course in 1948-49, the latter's last year on the faculty, and then in 1949-50, he was given responsibility for the 4-year course following Buckman's retirement. He helped Buckman revise his text over the next two years and was listed as co-author of the new edition. After Buckman's death, he became sole author of subsequent editions.

After two years during which Brady taught both elementary soils courses, Arthur Hiltbolt was assigned to the 2-year course. At that time, Hiltbolt was a Ph.D. candidate working under Professor Lathwell, and Lathwell taught the 2-year course after Hiltbolt completed his degree and left in 1955.

E. L. Worthen and Ernest VanAlstine handled soils extension until 1947-48, when Professor Worthen retired. Worthen was author of an elementary soils text, *Farm Soils*, which he had used in a 3-credit applied course called "Practical Soil Management" prior to 1937. Earl Kroth filled Worthen's former position for two years. When he resigned in 1950, William Garman, an Assistant Professor at Oklahoma A & M College was persuaded to fill the vacancy. Garman conducted thesis research concurrently with his extension duties under special arrangements with Dr. Bradfield for Ph.D. candidacy at Ohio State. He left after completion of that degree in 1954 and was replaced by Ellsworth Dunkle. Dunkle was a Pennsylvania State University Ph.D. (1940) who had served on that faculty after graduation until 1945. He left Pennsylvania to become Professor and Head of Department at the University of Delaware but left that position in 1946 to go into farming. He sold his farm in 1955 to accept the position vacated by Garman. Farming was apparently in his blood, for he left Cornell to go into farming again only a few years later.

Professor VanAlstine, the other soils extension specialist, retired in 1950 and was not replaced during this period. S. R. Aldrich, listed under field crops, had a strong background in soils as well as crops and helped to relieve the deficiency left by VanAlstine's retirement.

To complete the record of soils faculty, the table shows certain "extracurricular" activities that occupied a significant part of a faculty member's time. Some of these were performed while the individual maintained the normal functions of his position on campus, and the individual's name is listed for more than one function in these instances. Others occupied all of a faculty member's time off campus, and the line position is shown in the table as vacant or occupied by a replacement.

Professor Bradfield was in great demand for extracurricular activities. He served continually as a consultant with USDA after 1940 and, beginning in 1941, became very active in international work with the Rockefeller Foundation, as described earlier. He was active in the College negotiations for the contract with the International Cooperation Administration for rehabilitation of the College of Agriculture of the University of the Philippines and was scheduled to be the first advisor in soils on that contract. This was in the days of the "Joe" McCarthy witch-hunts, and Dr. Bradfield was one of the victims. He was denied security clearance because he had once contributed to an organization that later made the McCarthy subversive list. Though Dr. Bradfield forced a full investigation and was fully cleared, it was too late to serve in the Philippines. Professor Brady served in his place during 1953-54. G. A. Johnsgard was engaged to assume his teaching duties during this period. M. G. Cline followed Brady as soils advisor from 1954 to 1956, and Johnsgard filled his position at Cornell for that time.

Scientists of federal agencies headquartered on campus had contributed significantly to departmental programs since the 1930s. In 1949-50, the University Trustees agreed to recognition of their status by professorial appointments. These joint, or "courtesy", appointments implied no financial obligations on the part of the University but permitted those who held them to advise graduate students if elected to the Graduate Faculty. The appointments formalized relationships through which the Department could extend financial support, voting privileges, committee assignments, and the like. Kenneth Beeson, Chief of the U.S. Plant, Soil, and Nutrition Laboratory, and Carl Brandt, soil chemist of the Laboratory were appointed in 1949-50. Brandt subsequently taught a graduate course in isotopic techniques. The same year, John Lamb who was then senior researcher and project leader for research of the Soil Conservation Service, was also appointed. With the reorganization of the Soil Conservation Service discussed later, Lamb was transferred to the Soil and Water Research Division of the Bureau of Plant Industry, Soils, and Agricultural Engineering, continuing to hold his Cornell appointment as well.

The field crops area of the Department had remained woefully deficient in personnel free to conduct research since the Department was formed in 1921. In 1940, Dr. Bradfield was successful in his request for a faculty position to begin to fill the void. R. B. Musgrave, a recent Ph.D. of the University of Illinois, filled the position and became the central figure in work on field crop production. He was concerned with all aspects of cropping systems, including crop rotations, fertilization, liming, and tillage, which the soils faculty had previously covered. His area was known as crop ecology.

D. B. Johnstone-Wallace, who was responsible for pasture work, remained a somewhat controversial figure until he returned to England in 1943 to assist that beleaguered country in wartime food production. His position necessarily remained available to him until his official retirement in 1946-47, and he was listed as nominally in charge of his course and three research projects until 1945. His essential duties were, in fact, assumed by various members of the faculty, especially by H. A. MacDonald who had been an Instructor responsible for birdsfoot trefoil investigations since 1941. MacDonald had conducted his Ph.D. thesis research on the plant under Johnstone-Wallace after it was recognized as a promising legume when John Barron found it growing wild near Albany. MacDonald succeeded to the Johnstone-Wallace position in 1944-45, two years before the latter retired officially.

The work on forage crops was augmented substantially in 1943 with the appointment of Delmar S. Fink, who had been Biologist with the Maine Agricultural Experiment Station. That position became available through a special State appropriation of $10,000 for work on forage crops, with emphasis on northern New York. Farmers in that region had been alienated by College policies favoring commercial farming in more prosperous regions that had better physical resources. They had appealed directly to their legislators, emphasizing forage crops, because at that time it was generally accepted that other crops had little potential in the region. When Fink resigned in 1945 to accept a position with the American Cyanamid Company, the vacancy was filled by Roy Blaser who had established a reputation as a competent forage crops specialist. The long distances to northern New York and consequent periods the person in this position was forced to spend away from home made the assignment difficult, and Blaser resigned in 1948-49 to accept a position at Virginia Polytechnic Institute. W. K. Kennedy replaced him. Kennedy's graduate work under Johnstone-Wallace had been interrupted by military service during World War II. He had completed the Ph.D. at Cornell after the war and was well established in a position at Washington State University.

After seemingly fruitless efforts, Bradfield, using all of his persuasive talents, was finally able to convince him to return to Cornell.

Weed control had been covered, among other subjects, by the field crop generalists over the years. About 1946, Professor VanAlstine of soils extension had begun to give the new chemical control methods attention. By the time ValAlstine retired in 1949-50, the subject had advanced to the point that Dr. Bradfield was able to secure a new faculty position for S. N. Fertig to concentrate solely on the weed problem. Fertig had completed his degree at Cornell under Professor Hartwig, with chemical weed control the subject of his thesis. In 1954-55, Fertig was assigned to the Cornell project in the Philippines, and M. M. Schreiber, Fertig's former student, substituted during his absence.

Herbert Hartwig continued as the elementary field crops teacher throughout the period. John Barron and George Serviss continued as field crops extension specialists for the first several years. S. R. Aldrich, a Michigan native who had completed his Ph.D. degree at Ohio State, was added to the extension staff in 1942-43 in anticipation of Barron's retirement the following year. He played a leading role well into the next period, becoming Agronomy extension project leader after Worthen's retirement.

Serviss resigned in 1944-45 to accept employment with GLF. He was not replaced until 1948-49, when the vacancy was filled by Leverett Saltonstall, Jr. Saltonstall was the son of the well-known senator from Massachusetts. He had completed his graduate work under Professor Kennedy at Cornell, where his unique personality made him a favorite among a wide range of the College community. He was a highly successful extension specialist, but he was not content merely to advise. In 1952-53 he resigned to farm for himself. The position was filled temporarily by H. M. Austenson of Washington State University, followed in 1955 by W. L. Griffeth from the Virginia Agricultural Experiment Station.

With Professor Mordoff's retirement and the transfer of Meteorology to Agronomy in 1949, the Department began a long and frustrating search for a worthy successor, which continued into the next period. W. K. Widger, a 1949 D.Sc. from MIT, filled the vacancy as Assistant Professor in September, 1949, but he did not begin teaching the meteorology courses until 1950-51. Although the correspondence indicates that he exhibited some enthusiasm for meteorological aspects of agronomic problems, he soon rejected the judgement of the faculty that this should be the focus of his attention. The resulting conflict was serious even before he was called to active duty by the Air Force in September, 1951. The elementary meteorology course was taught by Curtis, a temporary employee, during 1951-52 and 1952-53. Widger resigned May 30, 1953, without returning to Cornell. Harry McClure Johnson filled the vacancy. Dr. Johnson was a Cornell Ph.D. trained mainly in physics, mathematics, and zoology. He had had a year of meteorological experience with the U.S. Naval Reserve, and he had spent three years studying the microclimates inhabited by small animals in the Alaskan environment for his thesis. It was hoped that he could bridge the gap between meteorology and the biological aspects of Agronomy. He carried the meteorology teaching load through the end of this period. Like his predecessors, he had little time left for research and extension. As time went on, complaints about his teaching increased, and at the end of his 3-year appointment, he was given a 1-year terminal extension, ending in 1957.

Of the 29 faculty appointments made during this period, seven were former students of Dr. Bradfield, six were students of professors serving under Bradfield at Cornell, and four were students of Bradfield's former associates at Ohio State.

The Impact of National and World Events

The emergence of massive national agricultural programs and strong agencies to administer them under the Franklin D. Roosevelt administration has been mentioned under the 1921-37 period. Their impact on Agronomy was not significant until after 1937. Colman (pp. 414-429 and 472-478) has described the conflicts that developed between the federal agencies and the College. The Agricultural Adjustment Administration (AAA, later ASCS) and the Soil Conservation Service (SCS) emerged with policies of strong central administrative control. The Land

Grant Colleges had equally strong commitments to local decision making, only partly for protection of their own vested interests. Controversy and antagonism were inevitable until each had achieved enough strength and stature in the public eye to feel unthreatened by the other.

Professors Bradfield and Worthen were the agronomists most involved in the controversy with AAA. Departmental lime and fertilizer recommendations disseminated through the county agent network frequently conflicted with AAA programs for subsidy of these materials for farmers. Worthen was a central figure in his work with county agents at the local level. Bradfield was involved in policy formulation at the administrative level, both at the College and in councils of the Department of Agriculture. These controversies persisted until 1948, when the planning committees with local, State, and federal representation, established in 1938, became truly effective.

The relationships between the Department and SCS were more troublesome. Professor Howe took [a] leave of absence from the University during 1934 and 1935 to serve as Northeastern Regional Director of the Soil Erosion Service of the United States Department of the Interior. When that agency was transferred to the Department of Agriculture and renamed the Soil Conservation Service, Professor Howe remained as New York State Coordinator during 1935-36. His disappointment when he was bypassed in favor of a federal line officer for permanent appointment in 1936 effectively destroyed his professional career. Though he did not retire until 1950, he increasingly devoted his energies to his avocation in real estate.

In an attempt to improve communication between the College and the SCS farm planning personnel, Hugh Wilson, a successful District Conservationist for SCS, was employed as Extension Soil Conservationist attached to the central extension administration in 1943. In 1954-55, he was assigned to the Agronomy Department.

At the same time Harry Kerr, as Executive Secretary of the State Soil and Water Conservation Committee, had been attached to extension administration and was transferred with the Committee's budget to Agronomy in 1954-55. With overcrowding in Caldwell Hall, both Kerr and Wilson were housed in Bailey Hall.

During the early years, SCS had a large research arm and established experimental facilities at Marcellus, in the Arnot Forest, and at the New York State Agricultural Experiment Station at Geneva. The work at Marcellus involved a broad range of agronomic experiments related to soil conservation. Those at the Arnot Forest and at Geneva were designed to determine the factors contributing to soil erosion. Data from the three ultimately contributed to the Wischmeyer equation. Although there was some lack of communication with agronomists during the early planning stages of the research, John Lamb, the senior researcher, maintained good relationships with the Department and in 1948 was appointed Professor (courtesy) in the Department. The SCS also maintained a plant materials nursery at Big Flats, in which Professor MacDonald had interests. Except for John Lamb's friendly personality, there could have been conflicts, for the SCS work overlapped that of Agronomy.

The SCS Land Use Capability system of interpretive soil classification was in direct conflict with the Economic Land Classification of the Department of Agricultural Economics at Cornell, and both were inconsistent with the Cooperative Soil Survey's emphasis on potential soil productivity. Although the Land Capability system had been designed originally to characterize the magnitude of erosion problems of different soils, the SCS soon began to use it as an index of soil quality for agriculture. Both Professors Bradfield and Cline were involved in the three-way controversy that resulted when questions of land quality became factors in the determination of policy for land use.

The most troublesome controversy between Agronomy and SCS, however, revolved about the design and conduct of soil surveys. The soils faculty had participated in the National Cooperative Soil Survey ever since Bonsteel and Fippin were detailed to Cornell in 1903. During the 1940s it was cooperating with the federal Soil Survey Division on the same national inventory, which classified and mapped natural genetic soil bodies. The SCS had no interest in the scientific aspects of the survey and introduced a "utilitarian" soil survey that attempted to map single soil properties, presumed to be important for conservation, in unrestricted combinations. Thousands of these combinations, each presumably representing a discrete kind of soil, would appear on maps of a single county. By admin-

istrative decree, the "utilitarian" surveys were expected to contribute to the national inventory, for which the Soil Survey Division was responsible by federal legislation. Cornell was involved because each survey work plan had to be approved by the Experiment Station under a three-way memorandum of understanding.

In New York and in other states having strong soil survey programs, the representatives of the Experiment Stations refused to approve the work plans of utilitarian surveys unless they were modified to provide reasonable correlation of mapping units in the national system. With each new survey initiated by SCS from 1942 to 1954, the Department of Agronomy was visited by a contingent of 3 to 7 SCS administrators, who came in force to exert pressure on Professors Bradfield and Cline to approve a utilitarian legend. These meetings were not pleasant.

The issue was resolved in 1954 by reorganization of the two federal mapping agencies. That reorganization was based on the recommendation of a national committee composed of Bradfield of Cornell, R. M. Salter formerly associated with Bradfield at Ohio State before going to USDA, and William Pierre of Iowa State College. The soil surveys of the two federal agencies were combined *within SCS*, but Charles E. Kellogg who was Chief of the Soil Survey Division was made Assistant Administrator of SCS in charge of the combined survey. R. M. Salter who had been Chief of the Bureau of Plant Industry, Soils, and Agricultural Engineering of USDA became Administrator of SCS, succeeding H.H. Benett, its founder. And the research branch of SCS was transferred to BPI, S, & AE, a research rather than an action agency. The result was a unified federal soil survey modified to accommodate needs of the SCS action program but based on the traditional procedures and standards of the former Soil Survey Division.

Relationships between the Department and SCS were cemented by appointment of A. J. Baur as State Soil Scientist for SCS. He was housed with M. G. Cline in Caldwell Hall and was appointed Professor (courtesy) in the Department. Baur had completed requirements for a Ph.D. degree under Bizzell at Cornell in 1933. John Lamb's good relationships with the Department were augmented by his transfer to BPI, S, & AE, with which the Department had a long history of cooperation. Professor Cline had been a joint employee of the former Soil Survey Division and became a joint employee of SCS after the reorganization, which further strengthened relationships. He played a leading role in training of SCS soil survey personnel, many of whom had minimal background in basic soil science at the time of reorganization.

The Tennessee Valley Authority, a product of the Roosevelt presidency, sponsored a fertilizer test demonstration program in New York. In 1939, it made the first of a series of grants to the Experiment Station to cover half of the salary of a person in extension to supervise the program. R. B. Child, who was studying for a Master's degree under Professor Howe, served as a half-time employee of the Department in that capacity from 1939 to 1943. He was succeeded by S. R. Aldrich as a full-time faculty extension specialist responsible for the test demonstration program after 1943.

The Mount Pleasant tract was purchased by the federal government in 1928 and was administered by the Bureau of Agricultural Economics of USDA as a demonstration area for pasture improvement on the marginal lands of the Allegheny Plateau. Later TVA provided its new calcium metaphosphate fertilizer in carload lots for the demonstration. When R. B. Musgrave arrived in 1940, he and Bradfield began their field research on cropping systems for the acid soils of the Plateau on that part of the tract that was to become the Mount Pleasant Agronomy research farm. The work was designed to demonstrate the potential of the "hill lands" for farming. Bradfield was an advocate of good agronomic practice as the solution to farm abandonment in these areas. In this, he was in direct opposition to the Agricultural Economics Department and general College policies, which catered to the more prosperous farming communities on the better soils of the State. Although Musgrave was the primary researcher on the Mount Pleasant tract during this period, it became the primary field research area of other faculty of the Department for the 1940s. It was operated at first from the Caldwell Field base, but it was gradually equipped to be a nearly self sufficient field research unit by the early 1950s. Ultimately the entire Mount Pleasant tract was deeded to Cornell.

The festering controversy about the conflict of interest inherent in the Farm Bureau-Extension Service relationship became more intense following World War II. By 1950, only New York and Illinois maintained that marriage. In November of 1954, the Extension Service was separated officially from the Farm Bureau by executive order of the Secretary of Agriculture. The action had been anticipated, and administrative adjustments were under way in New York. The separation had far-reaching consequences for county agents, but it had little impact on Agronomy extension beyond some adjustment in their perception of their clientele and responsibilities. Bradfield's concerns for farming on the poorer soil resources of the State had initiated that change some time earlier.

World War II brought major adjustments in the departmental program. Food for the war effort was a major concern nationwide. The College initiated a large program of "Maximum Wartime Production" in which Agronomy was an active participant. Professors Worthen and Aldrich devoted a major part of their combined efforts to insuring adequate supplies and distribution of fertilizers and lime. Nitrogen, especially, was in short supply due to its use in munitions. Cline produced interpretive soil maps to help county agents locate soils suitable for crops expected to be in short supply. Extension specialists produced special war-time bulletins and leaflets on ways for farmers to maximize production in the face of short supplies of labor, fertilizers, lime, and other production inputs. Bradfield was deeply involved in formulation of policies affecting war-time agriculture at both the College and national levels. Cline was departmental collaborator with the U.S. Forest Service in an abortive attempt to produce "Russian dandelion" for rubber after natural rubber supplies of Malaysia were cut off by the Japanese. Dawson was involved with plant physiologists in methods of processing the plant. Fortunately, synthetic rubber replaced natural sources.

The College made every effort to maintain the research and teaching programs. Labor was in desperately short supply. Faculty members, including the writer, spent significant amounts of time as laborers during plot harvest. By the end of the war, student numbers had decreased to 1/2 those of 1942, and teaching loads were greatly reduced. A number of graduate students already well into their programs went into the armed services. Among these were W. K. Kennedy and R. D. Miller, who returned to complete their degrees after the war and later joined the faculty. Among the faculty, Johnstone-Wallace's extended leave has already been mentioned. Cline took leave of absence in 1945 to join the Military Geology Unit of the U.S. Geological Survey for strategic intelligence work. Herbert Greene, a British soil scientist with long experience in the Sudan, served in Cline's position for part of his absence.

The Department's involvement in international programs was largely confined to Professor Bradfield's work with the Rockefeller Foundation until after World War II. After the war, he was consulted frequently about agricultural aspects of the foreign aid programs initiated under the Marshall Plan. In 1949, Cline was granted leave to participate in a 3-man team's studies in British Colonial Africa for recommendations to the British Colonial Office about potential U.S. contributions for agricultural development in those regions. This was the second agricultural mission under the Marshall Plan. In 1950, he was U.S. Representative to an international conference in Paris on agricultural development south of the Sahara. Faculty participation in the Philippine Project of the College has been discussed earlier. Professor Stone was granted leave for studies of the resources of some of the Pacific Islands that had come under United States jurisdiction after World War II. Later he was sent to Philippine College of Forestry under a federal contract with the College of Forestry of Syracuse University.

Internal Adjustments

As World War II drew to a close, the College was responsible for the New York portion of a massive nationwide Post-War Planning exercise, conceived to predict the pattern of post-war recovery and development to 1960. Concrete results from the enormous effort expended were small at best. Assumptions were defined at the national level, among them the (now) ludicrous prediction that the nation's population would stabilize **at a low level**. Although the College project was led by Agricultural Economics, Agronomy was responsible for assessment of soil resources and prediction of inputs for soil management and for crops and cropping patterns of the State during the coming

years. The task was not made easier by differences of judgement between Agronomy and Agricultural Economics about the potential of some of the relatively poorer soils of the State. (In fact, neither has been proven entirely correct. Certainly, Bradfield's confidence that good agronomic practice would be a general panacea for the poor competitive position of farms on these areas has not been borne out in many parts of the State. Farm abandonment has continued. Northern New York, however, stands as vindication of Bradfield's confidence, and one can point to parts of Cayuga County, a section of Livingston County, and small areas of the Allegheny Plateau which have defied the predictions of the Economic Land Classification of the Department of Agricultural Economics.)

By 1940, State appropriations, which had decreased during the depression of the 1930s, had equalled the level of 1931. Thereafter appropriations increased gradually, and Professor Bradfield slowly increased the Department faculty. By 1955, the crops faculty had grown from 4 in 1937-38 to 7; the soils faculty, from 11 to 13. Some of these positions were obtained by special legislative appropriations outside the regular budget. This was a device which Dean Ladd had started with support from the Conference Board of Farm Organizations at a time when the Cornell trustees commonly disapproved items in the regular budget to maintain a balance with the endowed part of the University. Bills for new projects were submitted by influential legislators at the urging of the Conference Board, and some contained funds for new positions. Among the positions obtained in that way were the soil-testing position filled by Kroth in 1946 and the forage crops position filled by Blaser in the same year.

At the end of World War II, the State had a large budgetary surplus. In 1943, the State Public Works Commission and the Board of Regents had approved construction of seven buildings at Cornell and Geneva, including a new building for Agronomy. In 1946-47, planning money for the Agronomy building was appropriated. Space was allocated facing Tower Road west of Rice Hall by the Trustees, and plans proceeded through space-use studies, schematic and design phases, and working drawings. Construction proceeded on buildings for a library, Agricultural Engineering, Food Science at Geneva, and Animal Husbandry. When the Animal Husbandry building was completed in 1961, plans for the Agronomy building were reappraised, and it was found that the original estimate of $2,000,000 had more than doubled. The project was abandoned, as well as those for Entomology and greenhouses (see Colman, pp. 484-486).

It was during this period that grants and contracts first became important sources of funding. Small grants for graduate student fellowships had been made early in the period, but the first major commercial grant was made in 1944. Funds from grants and contracts totaled only $34,700 from 1939 to 1950 but $126,700 from 1951 through 1955. Although the sums were not large by standards of the 1970s, they were highly significant in the economy of the time. In 1937-38, for example, the State appropriation for Agronomy was $96,769 and was augmented by $20,369 in federal research, extension, and teaching funds. The highest professorial salary in the Department was $7,000 and the highest graduate assistant stipend, $750. By the end of this period (1955), State appropriations provided $295,470 and federal funds, $58,150. The Department Head's salary had increased to $13,854 and graduate assistant stipends were $1,600. Under these circumstances, a grant of $2,000 provided opportunities not otherwise available.

Resident Instruction

Course offerings by Agronomy are tabulated in Appendix I, showing professors in charge by years. The year following Bradfield's arrival, the College Announcement listed the following:

Agronomy

1. Nature and properties of soils. 5 credits, both semesters. Buckman.
6. Soils for 2-year students. 3 credits, spring. Gustafson.
101. Soil classification & survey. 3 credits, spring. Howe.
102. Soil conservation. 2 credits, spring. Gustafson.
103. Organic soils. 2 credits, fall, alt. years. B. D. Wilson.
104. Forest Soils. 2 credits, fall, alt. years. Chandler.
106. Soil microbiology. 3 credits, spring. J. K. Wilson.
205. Soil fertility. 3 credits, fall. Bizzell.

207. Soil physics lecture. 3 credits, spring. Bradfield.
208. Soil physics laboratory. 3 credits, spring. Bradfield.
11. Production of field crops. 4 credits, both semesters. Hartwig.
212. Pastures. 3 credits, spring. Johnstone-Wallace.
A departmental seminar and research were also listed.

By 1954-55, all of those above were still listed and the following had been added:
105. Soil and crop management. 3 credits, fall. Feuer.
106. Physical Edaphology. 3 credits, fall. Miller.
201. Soil chemistry. 3 credits, spring. Peech.
202. Soil analytical methods. 3 credits, spring. Peech.
203. Soil genesis & classification. 3 credits, fall. Cline.
204. Isotopic techniques. 2 credits, fall. Brandt.
2. Introduction to field crops. 3 credits, spring. Hartwig.
112. Hay and pasture. 3 credits, spring. Kennedy.
213. Crop ecology. 3 credits, fall. Musgrave.
214. Grasslands. 3 credits, fall. MacDonald.
Agronomy 11 was offered only in the fall and the 3-credit Agronomy 2 had replaced it in the spring by 1954-55.

Throughout the period, courses numbered below 100 were intended for sophomores and second-semester freshmen who had had chemistry (for soils) or botany (for crops). There was concern among the faculty that undergraduates who might become oriented to Agronomy were excluded from these courses by their prerequisites until so late that they had become committed to other disciplines. Agronomy 2, with less rigid prerequisites, was initiated in the spring of 1946 to permit their introduction to Agronomy as second-semester freshmen.

Courses numbered in the 100 series were second courses intended for juniors and seniors. The three courses of that series added during the period were intended to fill conspicuous gaps for students with more than passing interest in the field, among them relatively large numbers identified with "general agriculture". Several of the newer faculty visualized a formal sequence of courses for undergraduate majors, such as those to which they had been accustomed during their student days at other institutions. Near the end of this period a curriculum for undergraduate majors was formalized. All of these changes were marked departures from the Department's earlier concepts of undergraduate instruction as primarily a service function. The departmental focus had been, and continued to be, on graduate training.

Courses of the 200 series were intended primarily for graduate majors, though undergraduates and graduate students from other disciplines took them if they could satisfy prerequisites. The six courses of that series added during the period represent expansion of subject matter specialization introduced with the new faculty acquired under Bradfield's headship.

Although the series of three course levels was logical and fully understood, student enrollment under Cornell's traditional freedom of choice rarely followed the pattern. While prerequisites dictated that second courses follow certain first courses, or their equivalents, students entered the sequence at all levels in their college careers. Agronomy 1 and 11 enrolled sophomores, juniors, seniors, and graduate students, though sophomores and juniors predominated. Most graduate student majors and many from other disciplines took several, if not all, of the courses of the 100 series. Except for courses of the 200 series, the majority of students enrolled were from disciplines other than soils or crops. Agronomy undergraduate majors by the end of the period numbered less than 15.

In 1937-38, the Department taught 2,580 student-credit hours. Of these, 270 were from the Graduate School and only 5 were from the endowed undergraduate colleges. The writer has not compiled data on course enrollments throughout the period, but they almost certainly followed College enrollments closely:

	Program				
Year	4-year	2-year	Special	Summer	Graduate
1937-38	1,236	234	43	878	468
1940-41	1,324	212	32	1,038	439
1943-44	553	128	21	640	276
1946-47	1,284	234	138	624	672
1949-50	1,484	223	69	799	760
1954-55	1,371	184	69	395	780

Student numbers fell drastically during World War II but recovered quickly at the end of hostilities. Following the war, large numbers of returning service men took advantage of the "GI" bill granting support for education. They not only contributed student numbers but also invested the student body with a corps of mature individuals who knew what they wanted and did not hesitate to make their wants known. It was the consensus among Agronomy faculty that the students from 1947 to 1951 constituted the "best", most inspiring group they had ever taught.

Graduate students majoring in Agronomy numbered between 25 and 30 at the beginning of this period, of whom 8 or 10 were assistants. Two teaching assistants were assigned to Professor Buckman for Agronomy 1. Each assistant was normally responsible for two recitation sections and one or two laboratories. One assistant was assigned to Professor Hartwig for the laboratories of Agronomy 11. Other assistants were assigned to various professors, mainly for research.

By 1948-49, the Department had 36 graduate majors of whom 14 held assistantships, 11 on State funds. For several years the number of majors was restricted by a quota imposed by the University, but by 1954-55, the number had increased to 59. Thirty-six of these were assistants.

The large influx of foreign students did not begin until after 1950 when the U.S. foreign aid programs began full-scale operations. One notable exception was the accommodation of 56 Chinese students in 1945-46. These were selected by the Chinese government and supported by the International Training Administration for studies in soils, crops, entomology, and plant pathology. Those specializing in soils and crops were housed in a large room that had been a laboratory at the east end of the fourth floor of Caldwell Hall, which later became the departmental library. For years afterward, that space was known as the "Chinese Room". A number of these students became prominent in the scientific community of Taiwan in later years. That same year, a special course for 30 missionaries was provided by the College, and Agronomy participated. Special groups swelled the number of special students enrolled in the College to 236 in 1945-46 and to 138 in 1946-47.

Teaching space in Caldwell Hall was adequate for regularly scheduled classes, but space for graduate students was at a premium. Buckman's elementary soils laboratory at the west end of the basement and Hartwig's elementary crops laboratory two floors above were fully committed to teaching during the academic year. A large lecture room for more than 100 at the east end and a classroom for 25 or 30 at the west end of the first floor were also in nearly continuous use in the mornings. Bizzell had a small research laboratory on the second floor, which accommodated his graduate students while they were engaged in research. Bradfield housed his assistants in a 3-bench wet laboratory at the east end of the same floor, which he equipped the first year after he arrived. J. K. Wilson's students were provided space in his research laboratory on the third floor. Howe's students, soil survey personnel, and some others were crowded into the "drafting room" at the west end of the fourth floor, which was a veritable oven during mid-summer. This left a number of students without wet laboratory facilities for their thesis research, and the Department remodeled a room in the southwest corner of the third floor into cubicles with desks, water,

gas, and electricity for them. Soil testing and some of Professor Peech's research used part of that space also. Until graduate students reached the point where they required laboratory space for thesis research, they were housed in various nooks and crannies about the building, in the departmental library, and in the later years, in other buildings.

Research

The formal research projects of the Department are tabulated by subject (not title) on pages 90 through 93. Many of the abrupt changes with time are related to changes of faculty. Anticipation of Bizzell's retirement in 1944-45, for example, is marked by termination of his projects in soil fertility in 1942-43 so he could devote his last two years to summary of his research. B. D. Wilson's death in 1940 is marked by termination of his projects on organic soils. In some instances, an incoming faculty member retained the formal projects of his predecessor, though he may have modified the character of the work.

The number of projects listed under a given heading is not necessarily indicative of the activity or scope of the research program. During the late 1930s and early 1940s, formal research projects were quite specific and narrow in scope. The Office of Experiment Stations Inspectors, who reviewed the program annually, rightly pointed out that considerable paper work could be eliminated if project statements were written to cover relatively broad areas of closely related research. A trend in that direction is evident in the decrease of project numbers during the early 1940s. By the late 1940s, however, this practice began to affect the perception of accomplishment by legislators responsible for appropriations. It appeared that little was being accomplished as the broadly defined projects were seldom terminated. To meet this criticism, the faculty defined subprojects of narrow scope and short duration within the broad master projects• Subprojects were terminated and new ones started without major changes in the master. By 1953-54, the Department had 31 active projects, of which 9 were master projects with an aggregate of 28 subprojects comparable in scope to the projects of 1937-38. Some measure of the increase in research activity may be seen from the fact that journal articles, Experiment Station Bulletins, and Memoirs averaged 13 per year for the first 5 years and 21 per year for the last 5 years of the period.

Research Projects of the Department of Agronomy by Functions of the Faculty, 1937-38 to 1954-55

Project Subject	'37	'38	'39	'40	'41	'42	'43	'44	'45	'46	'47	'48	'49	'50	'51	'52	'53	'54
SOILS																		
Genesis & Survey																		
Survey of New York	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Genesis & Classification.							•	•	•	•	•	•	•	•	•	•	•	•
Microbial. Processes															•	•	•	•
Chemistry																		
Fixation of Phosphor.	•	•	•	•	•													
Redox systems	•	•	•	•														
Properties NY Soils				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Cation Exch., Org. Mat.													•	•	•	•	•	
Physics																		
Properties NY Soils	•	•	•	•	•													
Soil Structure								•	•	•	•	•	•	•	•	•	•	•
Soil Water															•	•	•	•
Microbiology																		
Longevity N Fixers	•	•	•	•	•	•												
Legume Inoculants	•	•	•	•														

Project Subject	'37	'38	'39	'40	'41	'42	'43	'44	'45	'46	'47	'48	'49	'50	'51	'52	'53	'54
Effect of Legumes on Non-legumes	•																	
Rhizobium Efficiency							•	•	•	•	•							
Effect of Fumigation on Soil Solution								•										
Nitrification													•	•	•	•	•	
Processes in Genesis															•	•	•	
Fertility																		
Nutrient Losses	•																	
Accretion of Nitrogen	•	•	•	•	•	•												
N Fertilization Timothy	•	•	•	•	•	•												
C/N & Plant Growth	•	•	•	•	•													
Fate of N, Cropped Soil	•	•	•	•	•	•												
Zinc Toxicity			•															
Manure Supplement			•															
K Requirements, NY		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Fertility Assay in Pots					•	•												
Boron Relationships									•	•	•	•	•	•	•	•		
Liming												•						
Chemical Soil Tests												•	•	•	•	•	•	•
Divided Root Studies												•	•	•	•	•	•	•
Forest Soils																		
Ca Requirements, Trees	•	•	•															
Tree Fertilization	•	•	•	•														
Soils for Black Locust	•	•	•															
Drainage Relations	•																	
Absorption, Seedlings	•																	
Soil Improvement by Forest Types	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Effect of Forest Type on Base Exchange	•	•																
Forest Productivity, Adirondack Soils	•	•	•	•														
Critical Soil Properties for Trees				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Mycorrhizae									•	•	•	•	•	•	•	•	•	•
Earthworm Relations									•									
Chemical Comp. Plants									•									
Organic Soils																		
Water Relations	•	•	•															
Green Manures for	•																	
Phosphorus Fixation	•	•	•															
Organic Nitrogen in	•	•	•															

Project Subject	'37	'38	'39	'40	'41	'42	'43	'44	'45	'46	'47	'48	'49	'50	'51	'52	'53	'54
Organic Acids of	•	•																
Zinc Toxicity in			•															
Sterilization of			•															
Bacteria of Drainage		•	•															
Unproductive Peats		•	•						•	•	•	•						
Properties of				•	•	•	•	•						•	•	•	•	•
Study by Quick Tests & Cu Electrode													•	•				
Conservation																		
Tillage & Phys. Cond.									•	•	•	•	•	•	•	•	•	
Drainage													•	•	•	•	•	•
Phys. Prop. & diseases								•	•	•								
FIELD CROPS																		
Ecology-Physiology																		
Field Crop Survey	•	•	•	•	•	•												
Grassland Farming		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Environment & Yield															•	•	•	•
Feed Crop Rotations		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Pastures																		
Pasture Mixtures	•	•	•	•	•	•	•	•	•				•	•	•	•	•	•
Pasture Survey	•	•	•	•	•	•												
Pasture Fertilization			•	•	•	•	•	•	•									
Grazing Management			•	•	•	•	•	•	•									
Feeding Value of			•	•														
Palatability, by species				•	•													
Poultry Pastures				•	•													
Grazing Patterns									•									
Milk Production from											•	•	•	•	•	•	•	
Compared to Green Chop																		•
Forage Crops																		
Protein in	•	•	•	•	•	•												
Silage from	•	•	•	•	•	•	•	•	•	•	•							
Hay Prod. & Preservation	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
Birdsfoot Trefoil			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Millets for Forage					•													
Emergency Hay Crops					•													
Emergency Hay Making					•													
Topdressing Old Alfalfa					•													
Border Effect, Plots of					•													
In Northern NY						•	•	•	•				•	•	•	•	•	
Cutting Management							•	•	•	•	•	•	•	•	•	•	•	•
Preservation of Hay							•	•	•	•	•	•	•	•	•	•	•	•
Effects of Environment										•	•	•	•					
Ladino Clover											•						•	•

Project Subject	'37	'38	'39	'40	'41	'42	'43	'44	'45	'46	'47	'48	'49	'50	'51	'52	'53	'54
Hay Quality on Farms												•						
Seeding Mixtures for													•	•	•	•	•	•
Weeds																		
Chemical Control of											•	•	•	•	•	•	•	•
Effect of Soil on Herbicide Action																		•
Other																		
Preservation Moist Grain																		•
METEOROLOGY																		
Frequency of Meteorological Events													•	•	•	•	•	

The Mt. Pleasant farm, discussed earlier, became the primary field research facility after 1940. Musgrave's "Grassland farming" and "Feed-crop rotation" projects listed under "Ecology-Physiology" were the major experiments in the beginning, but other faculty gradually moved their field work to Mt. Pleasant as the available experimental area at Caldwell Field became limiting. A "hillside experiment" on a strongly sloping area of the north field tested the effectiveness of rotations with a high proportion of sod in controlling erosion. Much of the graduate student field research for theses was conducted on Mt. Pleasant, some without formal project statements. Russell's work on tillage and soil structure after 1946, the liming work of Bradfield and Peech and their students after 1948, part of MacDonald's birdsfoot trefoil studies from 1942 onward, and forage cutting-management studies are examples. The field was the source of samples for laboratory studies of acid soils. The field was used for studies of soil variability and fragipans by Cline's students. Musgrave, Russell, and others experimented with soil drainage, tillage, and soil improvement on a field scale, the produce from which was sold to Animal Husbandry.

In 1940, a tract of 65 acres on the Palmyra soil at Tully was made available to the Agronomy and Vegetable Crops Departments by the New York State Department of Conservation. For several years Musgrave used that site. Chandler used a tract on Turkey Hill, which had been acquired while Romell was at Cornell. He conducted much of his work at the Pack Forest and other locations in the Adirondacks. Hartwig, MacDonald, and several others continued to use the land available at Caldwell Field.

As the decade of the 1940s progressed, the Department became increasingly concerned that it had no experimental field on the high-lime soils representative of the highly productive areas of the Ontario Plain. Mt. Pleasant, Virgil, and Alfred fields were all on soils of the Allegheny Plateau. The soils of the Churchville field were not representative of the region. In 1948-49 after an intensive search for suitable soil as near Ithaca as possible, the University purchased a farm of 220 acres on Lima and related soils between Poplar Ridge and Aurora for $21,000. It was a farm that had been cropped intensively to wheat and beans with minimum attention to soil maintenance. Several years were required to restore productivity, and considerable effort and resources had to be expended for improvement of drainage, field roads, and facilities before the farm was fully functional. After the purchase agreement had been executed, the former owner attempted to cancel the sale, and the transaction was held up for a year by litigation. Nevertheless, field experimentation began in 1950, and as time passed the Department's field research was gradually shifted from Mt. Pleasant to the "Aurora Farm". In 1951-52, the John Mullaby Farm of 40 acres adjoining the Aurora Farm became available, and the University purchased it for $4,000.

Grants and contracts as sources of funding have been mentioned earlier. More specifically, contracts with the Tennessee Valley Authority for fertilizer test demonstrations on farmers' fields amounted to almost $98,000 from 1939 to 1954. An interdepartmental grant by the Aviation Corporation of America in 1944 provided Agronomy with $22,000 for studies of hay and hay-making over a 4-year period. Various smaller grants ranging from $1,000 to $9,000 were received for work on ladino clover, grass silage, molybdenum for crops, birdsfoot trefoil, soil conditioners, and other subjects.

Relatively little strictly agronomic work was conducted by the New York Agricultural Experiment Station at Geneva during this period. A Seed Investigations Division was established, and while much of its early work was seed testing, some research on seed technology having agronomic implications was started. The Pomology and Vegetable Crops Divisions continued fertilizer studies for their respective crops, which had implications for soil science. The Chemistry Division continued fertilizer inspections and analyses under the State mandate.

The Division of Bacteriology resumed work on soil bacteriology, principally on *Rhizobium*, in 1939-40 and continued throughout the period. The testing of legume inoculants, started in 1931, was continued. In 1938-39, the Station began cooperative work with the research division of SCS on soil erosion at the Station farm and at Hammondsport.

In 1945-46, Collison retired after 33 years of service, and M. T. Vittum was employed as a soil scientist in the Division of Vegetable Crops. He quickly initiated work on fertilization, irrigation, physical soil conditions, and rotations for vegetables, most of which had important implications for the soils discipline within Agronomy. The emphasis of the Station is indicated by the staffing of certain divisions in 1946-47, half-way through the period:

Food Science	21	professionals
Pomology	14	
Entomology	13	
Vegetable Crops	5	
Seed Investigations	5	

Extension

The period from 1937 to 1955 saw major changes in Agronomy extension in terms of programs, activities, and personnel. As the period opened, Worthen and VanAlstine in soils and Barron and Serviss in field crops were emphasizing lime, fertilizers, forage crops, pastures, and legumes in the rotation, following the pattern established earlier. Farm and Home Week and the State Fair were major events. The programs were organized on a subject matter basis, not only in Agronomy but throughout the College. Extension specialists concentrated on their subject matter specialties and covered the entire State. Most other members of the faculty participated in extension activities to some degree throughout the 1940s even though their primary responsibilities were research and teaching. Professor Peech, for example, lectured about fertilization to potato growers in Steuben County; Hartwig spoke at farmer meetings about hay and hay making. Gustafson and Johnstone-Wallace were especially active in extension; Bizzell and Buckman were least involved.

Prior to World War II, Agronomy extension reported 500 to 800 days in the field annually; 1,000 to 1,400 farm visits; 25 to 50 demonstration meetings on farms; 225 to 300 lectures reaching 12,000 to 14,000 people; 60 to 100 conferences involving 2,000 to 5,000 participants; and 25 to 50 radio talks. By 1950, there had been a complete change in personnel, and College programs were organized by commodities. The annual report for that year showed only 290 days in the field, no demonstration meetings, only 158 lectures, less than 300 farm visits, and only 17 conferences. Audiences targeted had shifted markedly from farmers to county agents as intermediaries and to industry and other groups that had impact on farmer practices. That which follows highlights the more important programs and events that marked the transition.

During the late 1930s, the College extension administration reorganized program planning according to type of farming. Commodity committees were formed as program planning bodies for dairy, livestock, poultry, vegetables, fruit, and other commodities that constituted major sources of farm income in New York. There was no commodity committee for field crops, as their sales accounted for less than 5% of farm gross income. There was no program planning body for soils. At first, Agronomy had little representation on any planning group and continued to operate on a subject matter project basis somewhat outside the mainstream of College planning.

These circumstances became a major concern of the Department from the standpoint of both effectiveness of its extension effort and visibility as a factor in financial support. During the 1940s, Professor Aldrich, with cooperation of other faculty, assembled data showing that, although 86% of gross farm income came from livestock and livestock products, field crops and pastures provided 77% of the nutrients on which that income was based and should be credited with a major portion of it. Beyond that, it was pointed out that the soils of the State were the basic natural resource from which not only the field crops but also the vegetables and fruit were derived. Finally in 1948-49, Agronomy was given formal representation on the dairy, livestock, and vegetable crops commodity committees. In 1949-50, a subcommittee for forages was organized under the dairy committee. It was not until much later, in the late 1960s, that a complete reorganization of College extension established program planning bodies for field crops and aspects of natural resources and the environment involving soils.

The fertilizer test demonstration program sponsored by the Tennessee Valley Authority in 1938-39 has been mentioned earlier. It was a major Agronomy extension project until 1948. Initially it consisted of demonstrations of new fertilizer materials on individual fields of farmer cooperators, numbering 200 or more annually. In 1943-44, the project was modified to demonstrate the impact of fertilization in combination with other soil and crop management practices on about 120 whole farm units.

Beginning about 1938, the Department intensified work with the fertilizer industry to reduce the multiplicity of fertilizer formulae on the market, limiting them to a relatively small number of standard analyses of relatively high plant nutrient concentration and lower cost per unit. This marked the beginning of continuing work with industries that serve farmers. The purpose was not only to influence the efficiency of the goods and services they offered but also to educate industry representatives as agents for dissemination of sound information to farmers. By 1952-53 industry conferences were regularly scheduled events. In that year, conferences were held for the lime industry (18 companies), fertilizer manufacturers (29 companies), seed and fertilizer dealers, and custom spray operators.

Soil testing had begun in a small way in 1938. At first the service was confined to small numbers of samples from problem soils, with the analytical work done in a small space in the graduate student laboratory on the third floor of Caldwell Hall. Extension took the leadership but did not emphasize the service initially. As farmer interest increased, extension gave the service greater emphasis, and in 1947-48, the State legislature passed a special bill to finance expansion of the work. Professor Peech and Leah English of his laboratory developed methods of analyses. By 1953-54, the facilities could no longer accommodate the numbers of samples, and new and larger facilities were developed in the basement of Fernow Hall. That year, the laboratory analyzed 15,500 samples. Results were reported to county agents, who interpreted them for the farmers.

Weed control was mentioned for the first time as an important extension subject in the Annual Report for 1939-40, though it had been an incidental topic in the departmental program for many years. Following World War II, Professor VanAlstine took special interest in the new chemical herbicide, 2,4-D, and developed chemical weed control as a major extension subject. With establishment of a new faculty position for weed control in 1950-51, S. N. Fertig not only introduced a major research program on weeds, but also developed a strong and highly effective extension project.

Birdsfoot trefoil and ladino clover were new promising legumes at the beginning of the period. By 1941, Agronomy extension had 400 birdsfoot trefoil and 200 ladino clover demonstrations on farms, mainly on the Allegheny Plateau and on farms bordering the Adirondacks. That year, Agronomy extension specialists were also cooperating with Animal Husbandry on pasture demonstrations for the experimental Kenwood Sheep Farm in Livingston County.

World War II brought many of the Agronomy extension activities to an abrupt end and changed not only the program but also the manner of operation. Most demonstrations with lime, fertilizers, weed control, forage crops and pastures were discontinued. Only the TVA and birdsfoot trefoil demonstrations were continued with little reduction. Due to gasoline and other shortages, travel by extension specialists was severely restricted. If they could get to a county by public carrier, the county agent could usually provide local transportation.

The staff produced "War Emergency Bulletins" on topics dealing with ways to accommodate shortages and other problems created by the war. Radio talks increased from 37 in 1938-39 to 70 in 1943-44 as a means of communicating with farmers. Nitrogen especially, but other fertilizer nutrients as well, were in short supply. Worthen worked closely with the War Food Administration and with industry to find alternative ways to maintain soil fertility and to achieve equitable distribution of the supplies available. A major effort was made to improve the quality and feeding value of forage for dairy cattle in the face of uncertain supplies and distribution of midwestern grains and sharply increased demand for dairy products.

Immediately following the war, it was necessary to readjust the Agronomy extension program to a new and different economic environment than had existed pre-war. All vestiges of the depression of the 1930s had disappeared. Farm inputs were again in good supply. The county agent network became the vehicle for farmer teaching as never before. Farm demonstrations were reestablished but with much greater reliance on the agents to conduct them and use them as teaching tools. In 1947-48, for example, Agronomy specialists conducted only 3 demonstration meetings, compared with about 50 pre-war. The number of lectures to farmer audiences only once reached 200 in the post-war period, though numbers in the audiences were about as great as when 200 to 300 had been given pre-war. Farm visits were less than half the numbers before the war. Radio talks decreased to about pre-war levels.

In 1947-48, Agronomy extension revised its mode of operation. Instead of working within each specialty throughout the State, each specialist worked mainly within one region and covered the entire scope of agronomic subject matter. Only when a problem was especially difficult was an individual called upon in the role of subject matter specialist. The regional mode of operation was modified for a few years following 1948-49 to accommodate the lack of experience of new faculty members Kroth, Saltonstall, and Garman.

Beginning shortly after the end of the war and continuing through the end of this period, the Department was literally inundated by foreign visitors sponsored by foreign governments, foundations, federal agencies, and corporations. Although the entire faculty was called upon to accommodate them, the extension staff was involved with those who came to study extension methods or to see modern farming. Most came after arrangements had been made in advance, but some came unannounced. Some came for only a day or two; others, for a month or more. Some came singly; others, in groups ranging from 2 to 20.

1948-49 saw the initiation of several new programs. A Bankers' School to acquaint people responsible for credit to farmers began under College auspices and was continued beyond the end of this period by popular demand. Agronomy participated on subject matter concerning soils and field crop production, using both extension personnel and subject matter specialists of the research and teaching faculty. The missionary short course mentioned earlier became a continuing event to which Agronomy contributed. A Canners' School was conducted for several years with Agronomy participation. County agent training schools sponsored by individual departments became regular events in support of the trend for greater dependence on agents for specialized subject matter teaching. In 1948-49, Agronomy conducted 3 two-day schools and cooperated with Animal Husbandry on a 3-day livestock school. Agronomy also cooperated on 47 seed schools, 10 seed and fertilizer dealer meetings, and 17 community extension schools that year.

As a direct consequence of Agronomy's new involvement in the dairy and livestock commodity committees, a major extension project called "Green Acres" was initiated in 1948-49. It involved cooperation of 240 farmers as demonstrators of pasture and forage crop management in support of dairy and livestock enterprises. Leadership was in the Agronomy Department. This project was the focus of much of the Department's extension effort through 1953-54. The activity reached its maximum in 1951-52.

In 1951-52, the Department released a soil pH test kit for use by county agents and others. More than 6,000 kits were sold the first year. In 1953-54, the Department began field days for farmers, industry representatives, and county agents to acquaint them with the on-going research at its experimental farms. These have since developed into regular events in which other departments participate. "Land Judging" as an exercise for youth was also begun that year under the leadership of Professor Hugh Wilson. Over a period of years, this has evolved into College

soil judging teams that compete regionally and, if successful, nationally. In 1954-55, Agronomy extension began teaching about "plow-plant" systems of culture, which has developed into the current "minimum tillage" systems utilizing special equipment and herbicides.

Agronomy's contributions to the traditional College Farm and Home Week reached a maximum during this period. Registered attendance was 14,000 in 1937-38. The event was cancelled in 1943-44 due to the war and was not resumed until 1947-48, when attendance was only 9,000. In 1949-50, however, attendance reached an all-time high of 16,000. The Agronomy exhibit in the classroom at the west end of the first floor of Caldwell Hall was a progressively more elaborate display during the years following the war, involving coordinated tape recordings and visual aids or animation depicting timely topics. Professor Miller was the technical architect of the electronic systems. In 1953-54, the exhibit's central attraction was a "Limatronic Milk Maker" promoting the use of lime for forages. The machine dispensed some 3,000 cartons of milk to visitors. At the other end of Caldwell Hall's first floor in the large lecture room, continuous series of lectures and panel discussions were presented morning and afternoon, Monday through Friday, by faculty of various departments, including Agronomy.

The State Fair exhibit continued to be a major College enterprise each year except during the war years from 1942 through 1945. Different departments were responsible for subject matter each year. Agronomy was responsible in 1940-41 for an exhibit on land use and soil erosion. Professor Hartwig participated in the Fair annually as judge of farmers' hay exhibits.

Prior to 1949, recommendations for fertilizers, lime, weed control, varieties, and the like had appeared as mimeographed material, printed circulars, or other media, issued or revised on an irregular basis. In 1949-50, Professor Aldrich spearheaded publication of the first issue of *Cornell Recommends* as an interdepartmental publication that consolidated the recommendations for field crops under one set of covers. The text included discussion of new findings and bases for the recommendations. In that and succeeding years it was the goal to release the publication at the fall seed and fertilizer dealer meetings. By 1952, an issue of 20,000 copies was required to meet the demand.

Agronomic extension and service at the New York Agricultural Experiment Station at Geneva continued to focus on the fertilizer and feed analyses for the State control laws. The Seed Technology Division was the principal source of information on seed quality and purity. Publications and news releases of series established earlier were the primary media for dissemination of information. Work directly with vegetable and fruit growers continued to extend information about soils and their management for those crops.

K. Changing Perspectives from 1955-56 to 1969-70.

This was a period of general prosperity. Departmental funding from State appropriations and federal funds almost quadrupled from 1955 to 1970 while salaries approximately doubled. Though the increase in faculty and staff was small for the first five years, four "line" faculty positions were added over the 15-year period; support staff increased from 74 to 125. The total roster, including joint appointments and graduate students, grew from 155 to 230.

One-hundred-sixty acres were added to the Aurora farm, the Bradfield-Emerson complex was completed, and new facilities at Caldwell Field were authorized. The Cornell ponds for aquatic studies were completed.

It was also a period during which the public's perception of State and national problems underwent a major change. With an abundance of food and fiber at costs small in relation to consumer incomes, the position of farm production in public priorities began to erode. Social problems, concerns for the environment, public health, and international affairs grew steadily in the public's consciousness. Student interests began to reflect the general public concerns early in the 1960s.

The Viet Nam war created an atmosphere of antagonism on the part of some students toward essentially any individual in a position of authority during the late 1960s. This, in some instances, was reflected in the classroom at the

time of massive student unrest toward the end of this period. Adversary relationships were common. Some of the faculty were personally involved in the turmoil, and one in Agronomy was a professional casualty as a result. This was also the period when social injustice toward minorities and women began to rank high in public consciousness. That began to have an impact on policies affecting Agronomy toward the end of this period, though their greatest effects were not felt until after 1970.

The period was marked by high research productivity during the 1950s and early 1960s. Changing sources of funding and an aging faculty from the Bradfield era, however, had begun to affect productivity by the end of the period.

It cannot be claimed that the Department consciously adjusted its programs to satisfy the changing priorities of society, but circumstances dictated change. International involvement of the College drew Agronomy faculty into that area, and some developed international interests independently as grants and contracts became available. Availability of grant and contract funds also fostered expansion of the Department's programs into the areas of environmental quality and health-related problems. New continuing faculty positions for international work with soils and for aquatic studies developed from these beginnings. The full impact of the changing priorities of society was not established until after 1970, but this period initiated adjustments that changed the Department radically.

Grants and Contracts

Funds committed under grants and contracts executed in a given year exceeded $100,000 for the first time in 1955 and reached $1,362,000 in 1969. As the periods covered by individual commitments were mainly more than one year, however, estimates of funds available to the Department from these sources by periods are more indicative of their continuing impact. For the five-year period from 1956 to 1960, funds available to the Department from grants and contracts averaged about $100,000 per year. These increased to slightly more than $300,000 per year for the period from 1960 to 1970 (see p. 226, Appendix III). Prior to 1955, the largest sum available from these sources in any given year was $20,000 in 1954 and before that had not exceeded $12,000. State and federal funds also increased dramatically over this 15-year period:

	State	Federal
1955-56	$295,000	58,000
1970-71	$1,030,000	213,000

During the same period, the maximum professor's salary increased from $13,800 to $25,800, and graduate student stipends, from $2,200 to $3,600.

Grants and contracts added a new dimension, largely for research dictated to some degree by the purposes of the grantors and contractors. Although those purposes were consistent with the mission and functions of the Department, this period marks a transition from departmental programs of research determined almost exclusively by internal judgements of the faculty to programs determined increasingly by objectives of external sources of funding. Those which deviated most from the traditional work of the faculty involved are discussed later as extracurricular functions under Research.

Personnel

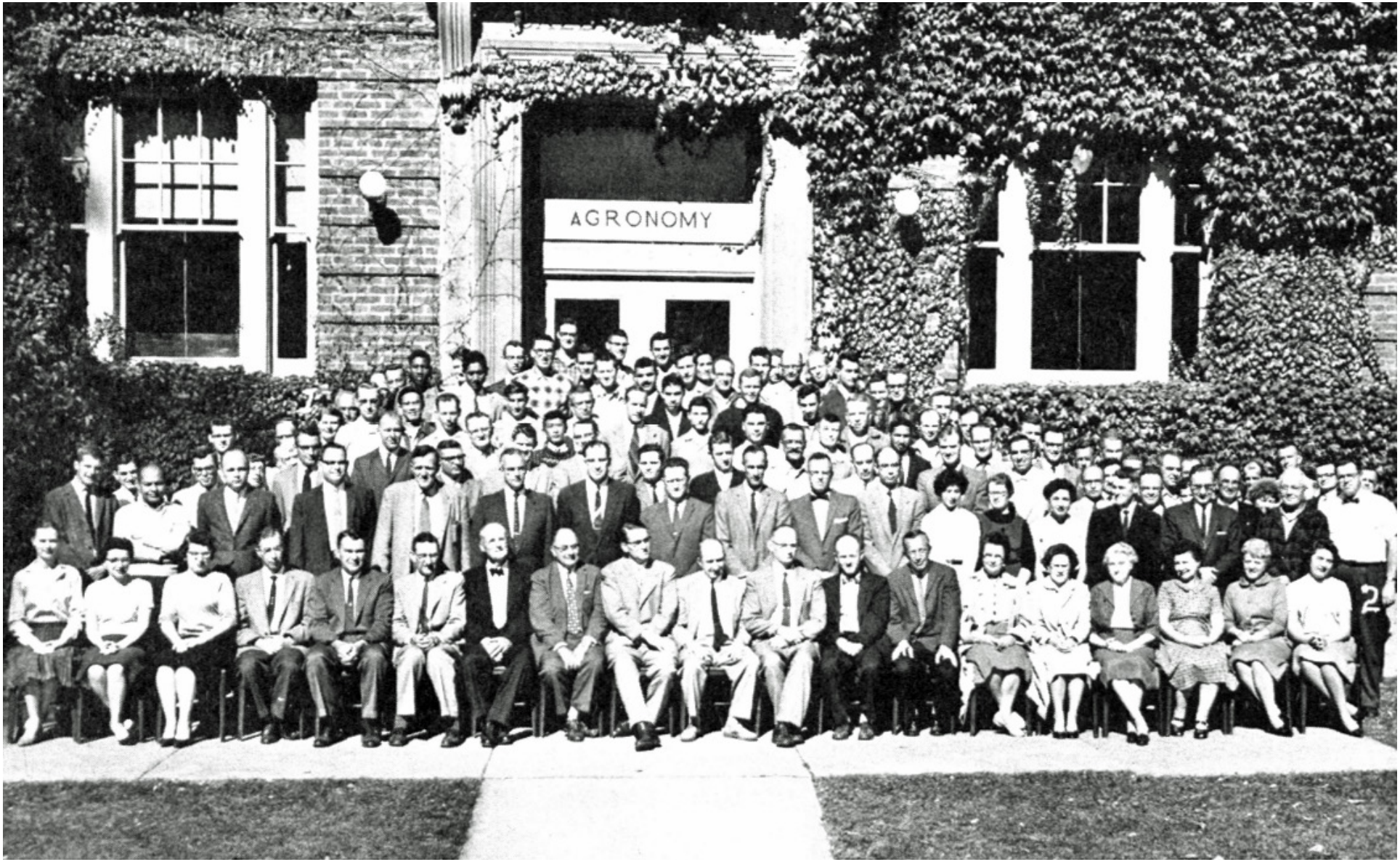
Generally, this period and the latter part of the preceding one were times when financial resources increased more rapidly than costs of operation, and the numbers of people on the departmental payroll increased accordingly. For historical perspective, the total roster of the departmental directory in 1951-52 was 114, consisting of 27 faculty including emeriti, 28 graduate students of whom 19 were assistants, and 59 non-academic full-time employees. The table on page 108 gives changes in staff from 1955 to 1970, during which the total roster increased 48%.

The tables on pages 108 through 112 list the faculty of the Department by years and by subject matter areas or functions. Elements of staffing that are not obvious from these two tables are discussed in the pages that follow.

The State "line" faculty positions remained essentially constant from 1955-56 to 1961-62, though the number of faculty on campus fluctuated with vacancies and extended leaves. In 1961-62, a special position was created for a new research and extension program for Northern New York. This was filled by R. F. Lucey who had served as Assistant Professor of field crops at the University of New Hampshire from 1957 to 1961. The State "line" positions again remained unchanged until 1966-67 when a new position was obtained for aquatic studies. That area had been introduced into the department by S. N. Fertig, who had developed 100 research ponds for expansion of his herbicide work in 1963-64. Fertig resigned in 1966-67, and the new position for aquatic weed control was filled by Hugh Mulligan. He had just completed the Ph.D. in Psychology at Cornell. William Duke, a recent Ph.D. from the University of Illinois, was employed for Fertig's work with upland weeds in crops and pastures. That same year, 1966-67, Gerald Olson, who had been a Soil Technologist at Cornell since 1962, was promoted to a new faculty position for soil survey interpretation, bringing the number of State "line" faculty positions to 26 from 23 in 1955-56. A 27th faculty position, not a State line, had been created in 1965-66 on grant funds for international work in soils. This was filled temporarily by Armand Van Wambeke of the University of Ghent, Belgium, followed in 1966-67 by M. Drosdoff. Drosdoff had had a long career in international work with federal agencies and retired early to accept this position.

Changes in personnel on long-term line positions occurred, of course, as faculty vacated them for various reasons. The change in Department Headship in 1965 created a vacancy in Soil Genesis and Classification. This was filled by Richard Arnold, who held a Cornell M.S. degree, an Iowa State Ph.D., and a faculty position at the University of Guelph. Bradfield's retirement in 1962 created a vacancy in soil fertility, which was filled by D. R. Bouldin, an Iowa State Ph.D. who had been employed by the Tennessee Valley Authority. Kennedy's advancement to Director of Research in 1959-60 vacated the line position for forage crops. Merle Teel of Purdue served temporarily in 1959-60, but the position was not filled permanently until 1960-61 when M. J. Wright from the University of Wisconsin was appointed. Dunkle's decision to return to farming in 1958-59 left a line soils extension position vacant, which was filled by T. R. Scott, a recent Ph.D. from Michigan State University. Aldrich's acceptance of a position at the University of Illinois in 1957-58 left crops extension short of manpower. That line position was filled by Ralph Krenzen, an experienced extension agronomist from Iowa State College, in 1959-60 after Harley Otto of Minnesota had served for one year.

Nielsen's death in 1965-66 left elementary soils teaching in serious trouble. Nielsen had won the College Professor of Merit Award in 1960 after only 4 years on the faculty. The Department was fortunate to fill that position promptly with Murray Milford from the University of Wisconsin. After 1965-66, he taught the course only in the second semester, however, to be able to develop his own specialty, soil mineralogy. Lathwell taught the course the first semester and Milford the second thereafter. When Milford returned to his undergraduate Alma Mater, Texas A&M University, to rehabilitate its undergraduate program in soils in 1968, Scott teamed with Lathwell to teach the elementary course, as the sugar beet project he had been serving was terminated. Scott had been assigned to that project in 1964-65 when the College was called upon to determine feasibility of sugar beet production in New York in support of an attempt to reestablish the industry. As Scott could no longer do justice to his extension responsibilities under these circumstances, the Department obtained Martin Weeks on leave from the University of Massachusetts to fill that role temporarily. In 1966-67, W. S. Reid of Mississippi State, who had just completed Air Force service, filled it permanently. Reid also brought a high degree of competence in computer science to the Department.



Agronomy Department faculty, staff, and graduate students, 1960. At the front entrance to Caldwell Hall.

Two of the nonprofessional staff who were characters to be remembered are identified by numbers on the photograph:
No. 1, four rows back under the right side of the left window, ***Ethel Tyler***, for many years secretary and accountant for Professor Bradfield, authority on all departmental matters, organizer of departmental functions, softball enthusiast, unofficial counsellor and critic, nonconformist, friend.

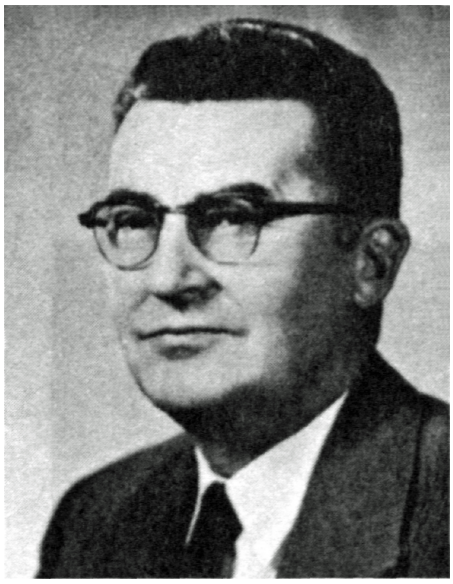
No. 2, second row extreme right, ***Gordon MacCaskill***, officially the laboratory technician for the elementary soils course; unofficially student tutor and advisor, Scottish piper, philosopher, teller of tall tales, gun enthusiast, Justice of the Peace, individualist.

SAMUEL R. ALDRICH
Cereal Crops & Soil Mgt.
Extension
Home State—Michigan
Joined Staff—1942

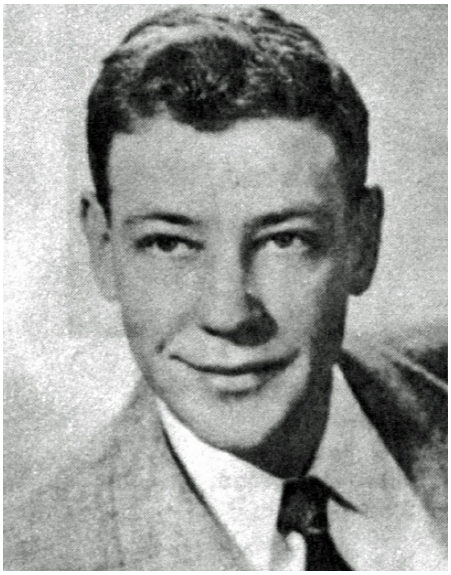
ELLSWORTH C. DUNKLE
Soil Fertility & Testing
Extension
Home State—Pennsylvania
Joined Staff—1955

H. McCLURE JOHNSON
Meteorology
Teaching & Research
Home State—Colorado
Joined Staff—1954

WILEY C. JOHNSON
Pasture & Hay
Research
Home State—North Carolina
Joined Staff—1956

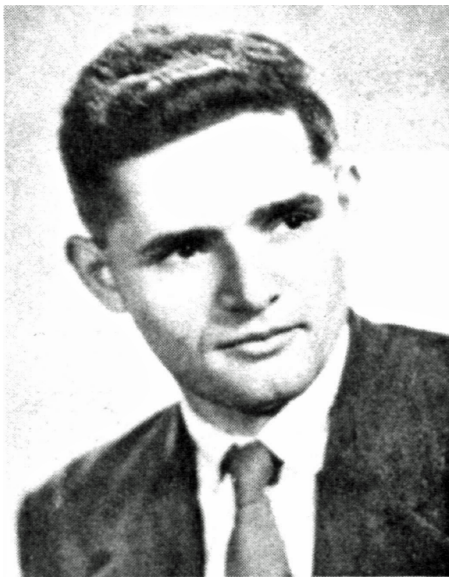


GORDON A. JOHNSGARD
Soil Morphology
Teaching & Research
Home State—N. Dakota
Joined Staff—1953



HAROLD F. KREIZINGER
Soil Fertility
Research
Home State—Nebraska
Joined Staff—1955

Department of Agronomy faculty members who left between 1957 and 1959. Wiley Johnson, Gordon Johnsgard, and Harold Kreizinger were temporary employees serving for faculty on leave of absence.

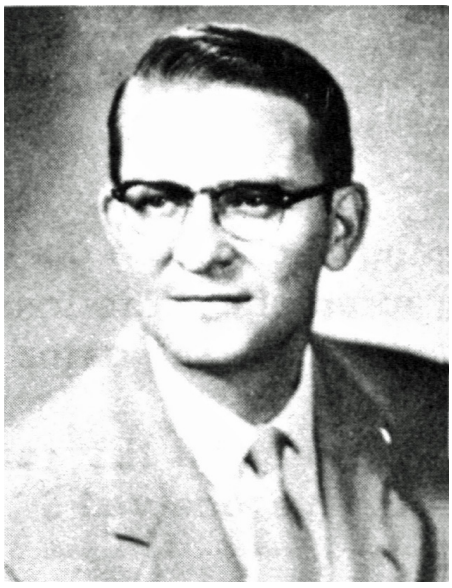


MARTIN ALEXANDER
Soil Microbiology
Teaching & Research
Home State—New Jersey
Joined Staff—1955

ARNOLD BAUR
Soil Survey Correlation
Soil Conservation Service
Home State—Michigan
Joined Staff—1946

KENNETH C. BEESON
Soil, Plant, & Animal Nutrition
Director, Federal Laboratory
Home State—Iowa
Joined Staff—1949

RICHARD BRADFIELD
Soil Fertility
Research & Teaching
Home State—Ohio
Joined Staff—1937

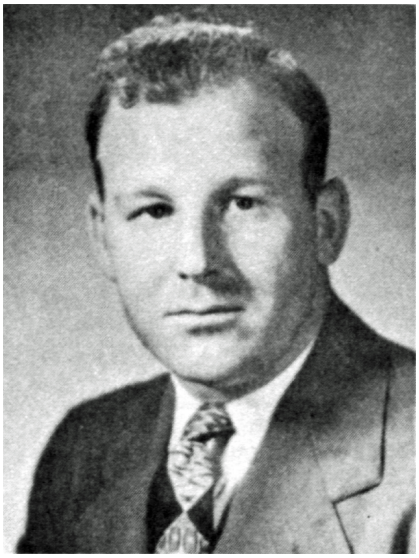


NYLE C. BRADY
Head, Agronomy Dept.
Home State—Colorado
Joined Staff—1947

MARLIN G. CLINE
Soil Survey
Research & Teaching
Home State—Minnesota
Joined Staff—1942

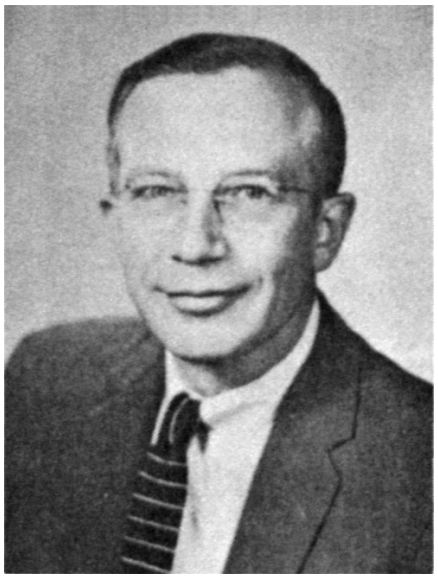
JEFFREY E. DAWSON
Organic Soils
Research & Teaching
Home State—Florida
Joined Staff—1946

BERNARD E. DETHIER
Meteorology
Teaching and Research
Home State—Massachusetts
Joined Staff—1958



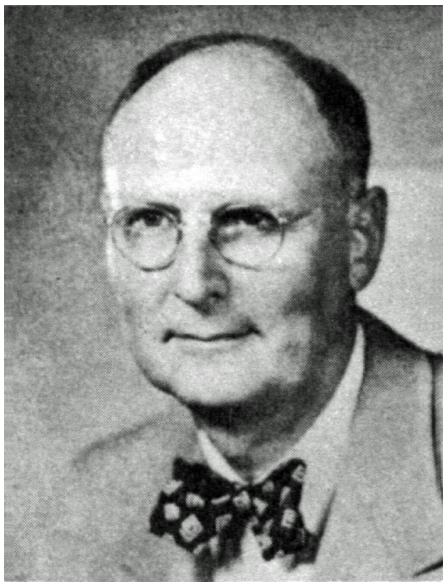
STANFORD N. FERTIG
Weed Control
Research, Teaching, Extension
Home State—West Virginia
Joined Staff—1950

REESHON FEUER
Soil Classification & Mapping
Extension
Home State—New Hampshire
Joined Staff—1955

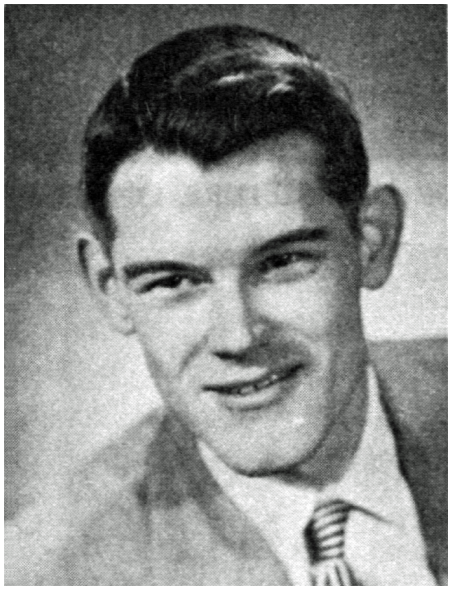


GEORGE R. FREE
Soil Conservation & Management
Agri. Research Service
Home State—Iowa
Joined Staff—1936

WALTER L. GRIFFETH
Forage Crops
Extension
Home State—Michigan
Joined Staff—1955



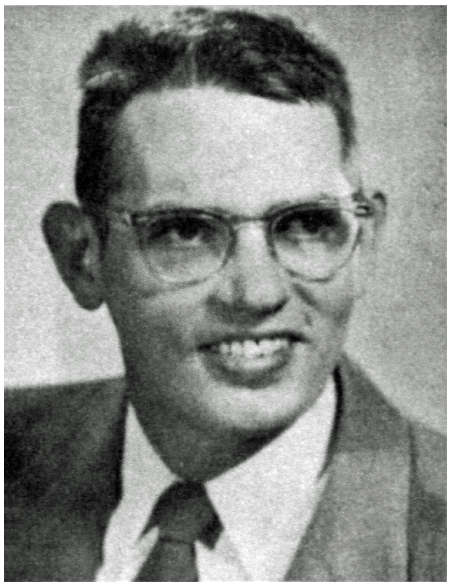
HERBERT B. HARTWIG
Field Crops
Teaching & Research
Home State—Michigan
Joined Staff—1923



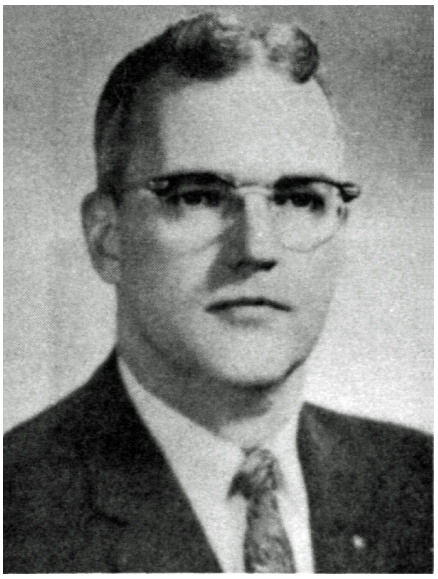
JOSEPH F. HODGSON
Soil Chemistry
Research, Federal Laboratory
Home State—Maryland
Joined Staff—1957

W. KEITH KENNEDY
Forage Crops
Teaching & Research
Home State—Washington
Joined Staff—1949

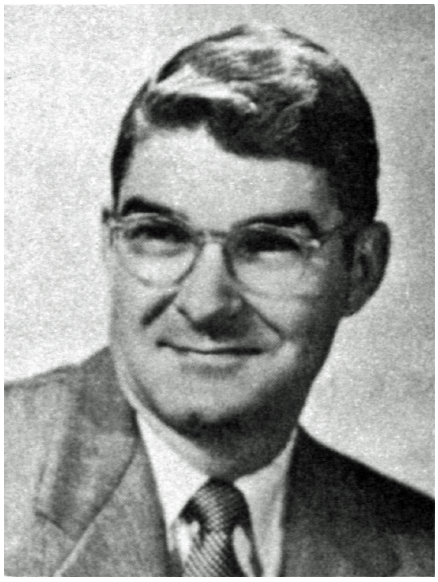
HARRY A. KERR
Soil Conservation Districts
Extension
Home State—New York
Joined Staff—1946



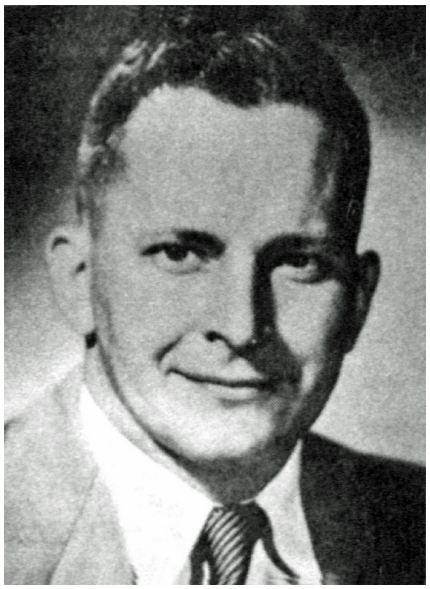
EDWARD J. KINBACHER
Small Grains
Research
Home State—New York
Joined Staff—1956



RALPH E. KRENZIN
Corn and Small Grains
Extension
Home State—Kansas
Joined Staff—1959



DOUGLAS J. LATHWELL
Soil Testing
Teaching, Research & Soil Test Lab.
Home State—Michigan
Joined Staff—1950



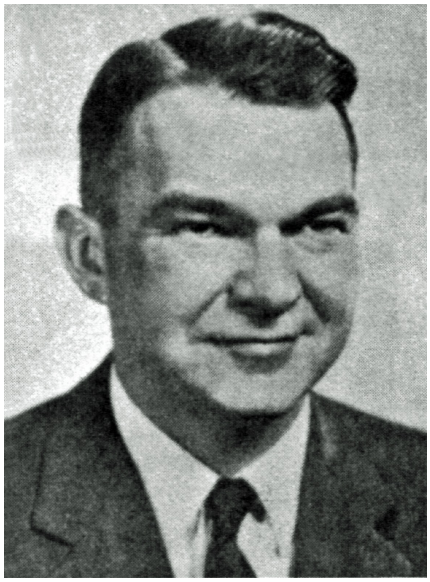
EDGAR R. LEMON
Soil-Plant Relationships
Agri. Research Service
Home State—New York
Joined Staff—1956

KUO C. LU
Soil Microbiology
Research
Home—Malaya
Joined Staff—1957

HARRY A. MacDONALD
Crop Ecology and Forage Breeding
Teaching and Research
Home State—Nova Scotia
Joined Staff—1940

ROBERT D. MILLER
Soil Physics
Research & Teaching
Home State—Missouri
Joined Staff—1952

WARREN MONSON
Pastures and Forage
Agri. Research Service
Home State—Nebraska
Joined Staff—1958



ROBERT B. MUSGRAVE
Crop Production & Ecology
Research & Teaching
Home State—Illinois
Joined Staff—1940

THOMAS R. NIELSEN
Soil Science
Teaching and Student Advisor
Home State—Oklahoma
Joined Staff—1956

MICHAEL H. PEECH
Soil Chemistry
Teaching & Research
Home State—Manitoba, Canada
Joined Staff—1941

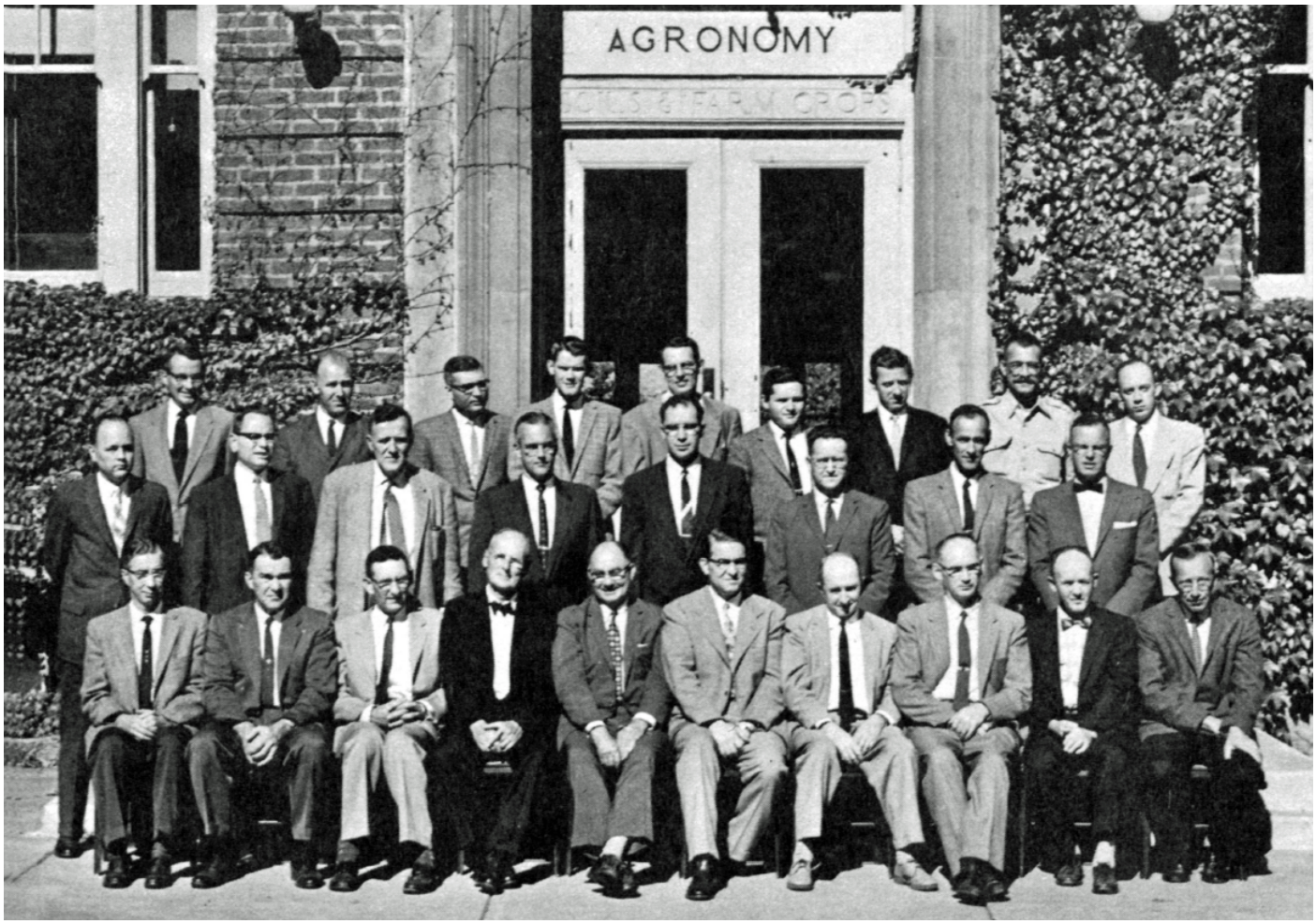
MARVIN M. SCHREIBER
Weed Control
Agri. Research Service
Home State—Massachusetts
Joined Staff—1954

ROBERT R. SEANEY
Birdsfoot Trefoil Breeding
Agri. Research Service
Home State—Indiana
Joined Staff—1955

EARL L. STONE, JR.
Forest Soils
Research & Teaching
Home State—New York
Joined Staff—1948

HUGH M. WILSON
Soil Conservation & Tillage
Extension
Home State—New York
Joined Staff—1943

PAUL J. ZWERMAN
Soil Conservation, Drainage
Research & Teaching
Home State—Ohio
Joined Staff—1950



Agronomy Department faculty, 1960

Summary of Faculty, Staff, and Graduate Student Numbers, Department of Agronomy, 1955-56 to 1969-70

		Faculty						Graduate Students		
Year	Total Roster	Total	On Campus	Joint & Courtesy	Emeriti	Admin. Leave	Extended Leave	Total	Assts	Other
1955-56	155	34	23	4	4		3	47	36	74
1956-57	177	37	24	9	4			54	32	86
1957-58	183	36	22	9	4		1	62	38	85
1958-59	170	34	21	8	4		1	56	30	80
1959-60	176	37	22	8	4	1	2	52	27	87
1960-61	174	38	22	10	4	1	1	54	27	82
1961-62	180	39	24	10	4	1		53	29	88
1962-63	197	39	24	9	5	1		58	40	100
1963-64	198	39	22	10	5	1	1	52	43	107
1964-65	198	39	22	10	5	1	1	53	43	106
1965-66	214	38	24	7	4	2	1	54	44	122
1966-67	217	39	26	8	3	2		52	34	126
1967-68	234	42	27	8	4	2	1	66	44	126
1968-69	233	42	27	8	3	3	1	63	37	128
1969-70	230	41	27	7	3	3	1	64	38	125

Faculty of the Department of Agronomy according to subject matter area or function, 1955-56 to 1969-70

Part 1, 1955-56 to 1959-60

Subject or Function	1955-56	1956-57	1957-58	1958-59	1959-60
Department Head	Brady	Brady	Brady	Brady	Brady
SOILS					
Genesis & Class.	Johnsgard	Cline	Cline	Cline	Cline
Chemistry	Clark	Peech	Peech	Peech	Peech
Physics	Miller	Miller	Miller	Miller	Miller
Microbiology	Alexander	Alexander	Alexander	Alexander	Alexander
Fertility		Bradfield	Bradfield	Bradfield	
	Lathwell	Lathwell	Lathwell	Lathwell	Lathwell
Forest Soils	Stone	Stone	Stone	Stone	Stone
Organic Soils	Dawson	Dawson	Dawson	Dawson	Dawson
Conservation	Zwerman	Zwerman	Zwerman	Zwerman	Zwerman
Teaching, 4-year	Weed	Weed	Nielsen	Nielsen	Nielsen
2-year	Lathwell	Lathwell	Lathwell	Lathwell	Lathwell
Extension	Dunkle	Dunkle	Dunkle		Scott
	Wilson	Wilson	Wilson	Wilson	Wilson
	Feuer	Feuer	Feuer	Feuer	Feuer
State Committee	Kerr	Kerr	Kerr	Kerr	Kerr
Extracurricular					
International	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield
	Cline	Johnsgard	Dawson	Dawson	Dawson
			Alexander	Alexander	Alexander

Subject or Function	1955-56	1956-57	1957-58	1958-59	1959-60
Joint Appointments					
US Nutrition Lab.	Beeson	Beeson	Beeson	Beeson	Beeson
	Brandt	Brandt	Brandt		Hodgson
USDA, ARS					
Soil Conserv.	Lamb	Lamb	Lamb	Lamb	Lamb
	Free	Free	Free	Free	Free
Microclimatol.		Lemon	Lemon	Lemon	Lemon
USDA, SCS	Baur	Baur	Baur	Baur	Baur
FIELD CROPS					
Ecology-Physiology	Musgrave	Musgrave			Musgrave
Pastures-Forage	MacDonald	MacDonald	MacDonald	MacDonald	
Forage & Feed	Kennedy	Kreizinger	Kennedy	Kennedy	Teel
Weeds	Schreiber	Fertig	Fertig	Fertig	Fertig
Teaching	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig
Extension	Griffeth	Griffeth	Griffeth	Griffeth	Griffeth
	Aldrich	Aldrich	Otto		Krenzin
			Fertig	Fertig	Fertig
Extracurricular					
Administration					Kennedy
International	Fertig		Musgrave	Musgrave	MacDonald
Joint Appointments					
USDA, ARS					
Weeds		Schreiber	Schreiber	Schreiber	
Cereals		Kinbacher	Kinbacher	Kinbacher	Kinbacher
Forage	Seaney	Seaney	Seaney	Seaney	Seaney
METEOROLOGY	Johnson	Johnson		Dethier	Dethier

Part 2, 1960-61 to 1964-65

Subject or Function	1960-61	1961-62	1962-63	1963-64	1964-65
Department Head	Brady	Brady	Brady	Cline (Acting)	Cline, Stone (Acting)
SOILS					
Genesis & Class.	Cline	Cline	Cline	Cline	Cline
Chemistry	Peech	Peech	Peech	Peech	Peech
Physics	Miller	Miller	Miller	Miller	Miller
Microbiology	Alexander	Alexander	Alexander	Alexander	Alexander
Fertility	Bradfield	Bradfield	Bouldin	Bouldin	Bouldin
Forest Soils	Stone	Stone	Stone	Stone	Stone
Organic Soils	Dawson	Dawson	Dawson	Dawson	Dawson
Conservation	Zwerman	Zwerman	Zwerman	Zwerman	Zwerman
Elem. Teaching, 4-year	Neilson	Neilson	Neilson	Milford	Milford
2-year	Lathwell	Lathwell	Lathwell	Lathwell	Lathwell
Extension	Scott	Scott	Scott	Scott	Scott
	Wilson	Wilson	Wilson	Wilson	Wilson
	Feuer	Feuer	Feuer	Feuer	Feuer
State Conser. Committee	Kerr	Kerr	Kerr	Kerr	Kerr

Subject or Function	1960-61	1961-62	1962-63	1963-64	1964-65
Extracurricular					
Administration				Brady	Brady
International	Bradfield	Bradfield			
Health-Related			Dawson	Dawson	Dawson
Sugar Beets					Scott
Joint Appointments					
US Nutrition Lab.	Beeson	Allaway	Allaway	Allaway	Allaway
	Hodgson	Hodgson	Hodgson	Hodgson	Hodgson
USDA, ARS					
Soil Conservation	Lamb				
	Free	Free	Free	Free	Free
Microclimatology	Lemon	Lemon	Lemon	Lemon	Lemon
	Covey	Covey	Covey	Covey	Covey
USDA, SCS: Survey	Baur	Baur	Baur	Baur	Baur
Nutrition	Kubota	Kubota	Kubota	Kubota	Kubota
FIELD CROPS					
Ecology-Physiology	Musgrave	Musgrave	Musgrave	Musgrave	
Pastures-Forage		MacDonald	MacDonald	MacDonald	MacDonald
Forage & Feed	Wright	Wright	Wright	Wright	Wright
Weeds	Fertig	Fertig	Fertig	Fertig	Fertig
Elem. Teaching	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig
Northern New York		Lucey	Lucey	Lucey	Lucey
Extension	Griffeth	Griffeth	Griffeth	Griffeth	Griffeth
	Krenzin	Krenzin	Krenzin	Krenzin	Krenzin
	Fertig	Fertig	Fertig	Fertig	Fertig
Extracurricular					
Administration	Kennedy	Kennedy	Kennedy	Kennedy	Kennedy
International	MacDonald				Musgrave
Aquatic Studies	Fertig			Feritg	Feritg
Health-Related	Wright	Wright	Wright	Wright	
Joint Appointments					
USDA, ARS					
Weeds				Linscott	Linscott
Cereals	Kinbacher	Kinbacher			
Forage	Seaney	Seaney	Seaney	Seaney	Seaney
		Monson	Monson	Monson	Monson
METEOROLOGY	Dethier	Dethier	Dethier	Dethier	Dethier

Part 3, 1965-66 to 1969-70

Subject or Function	1965-66	1966-67	1967-68	1968-69	1969-70
Department Head	Cline	Cline	Cline	Cline	Cline
SOILS					
Genesis & Class.	Cline	Arnold	Arnold	Arnold	Arnold
Chemistry	Peech	Peech	Peech	Peech	Peech
Physics	Miller	Miller	Miller	Fritton	Fritton

Subject or Function	1965-66	1966-67	1967-68	1968-69	1969-70
Microbiology	Alexander	Alexander	Alexander	Hubble	Alexander
Fertility	Bouldin	Bouldin	Bouldin	Bouldin	Bouldin
Forest Soils	Stone	Stone	Stone	Stone	Stone
Organic Soils	Dawson	Dawson	Dawson	Dawson	
Conservation	Zwerman	Zwerman	Zwerman	Zwerman	Zwerman
Elem. Teaching	Milford	Milford &	Milford &	Scott &	Scott &
		Lathwell	Lathwell	Lathwell	Lathwell
Extension	Weeks	Reid	Reid	Reid	Reid
	Wilson	Wilson			
	Feuer	Feuer	Swader	Swader	Swader
		Olson	Olson	Olson	Olson
State Conser. Committee	Kerr	Kerr	Kerr	Kerr	Kerr
International	VanWambeke	Drosdoff	Drosdoff	Drosdoff	Drosdoff
					Fox
Extracurricular					
Administration	Brady	Brady	Brady	Brady	Brady
				Miller	Miller
International			Feuer	Feuer	Feuer
					Scott
Aquatic Studies	Lathwell	Lathwell	Lathwell	Lathwell	Lathwell
Sugar Beets	Scott	Scott	Scott		
Health-Related	Dawson	Dawson	Dawson		
Environmental Qual.					Zwerman
Joint Appointments					
US Nutrition Lab.	Allaway	Allaway	Allaway	Allaway	Allaway
			Grunes	Grunes	Grunes
USDA, ARS					
Soil Conserv.	Free	Free	Free	Free	
Microclimatology	Lemon	Lemon	Lemon	Lemon	Lemon
USDA, SCS: Survey	Gardiner	Gardiner			
Nutrition	Kubota	Kubota	Kubota	Kubota	Kubota
Geneva Station		Vittum	Vittum	Vittum	Vittum
FIELD CROPS					
Ecology-Physiology		Musgrave	Musgrave	Musgrave	Musgrave
Pastures-Forage	MacDonald	MacDonald	MacDonald	MacDonald	MacDonald
Forage & Feed	Wright	Wright	Wright	Wright	Wright
Weeds	Fertig		Duke	Duke	Duke
Aquatic Studies		Mulligan	Mulligan	Mulligan	Mulligan
Elem. Teaching	Hartwig		Lucey &	Lucey &	Lucey &
	Obendorf	Obendorf	Obendorf	Obendorf	Obendorf
Northern New York	Lucey	Lucey	Lucey	Lucey	Lucey
Extension	Griffeth		Seaney	Seaney	Seaney
	Erdman	Krenzin	Krenzin	Krenzin	Krenzin
	Fertig	Lucey	Lucey	Lucey	Lucey
Extracurricular					
Administration	Kennedy	Kennedy	Kennedy	Kennedy	Kennedy

Subject or Function	1965-66	1966-67	1967-68	1968-69	1969-70
International	Musgrave				
Aquatic Studies	Fertig				
Joint Appointments					
USDA, ARS: Weeds	Linscott	Linscott	Linscott	Linscott	Linscott
Forage	Seaney	Seaney			
	Monson				
Plant Breeding Dept		Pardee	Pardee	Pardee	Pardee
METEOROLOGY	Dethier	Dethier	Dethier	Dethier	Dethier
	Covey	Covey	Covey	Knapp	Knapp
Joint Appointment					
US Weather Service		Pack	Pack	Pack	Pack

Dawson's death in 1968-69 left an enormous void in the Department. In the writer's judgement, he was probably the best scientist in terms of basic talents, breadth, and perspective of fundamental science in the Department at the time. A replacement had not been found by the end of the period.

It will be noted in the roster of faculty that some served more than one subject or function at the same time. The names are listed twice if the individuals maintained the functions associated with their line item positions but also contributed major effort to others, either for extracurricular activities or to fulfill obligations of the Department for which no faculty member was available full-time. Fertig, for example, was primarily responsible for research and teaching in the area of upland weeds. He also had considerable responsibility for extension in the weeds area throughout his tenure, but he is not listed under extension until 1957-58 when he assumed project leadership for Agronomy extension after Aldrich left. As he became increasingly involved with aquatic weeds after 1963-64, his name appears in three places. When Fertig left in 1965-66, Lucey was named extension project leader, and his name appears in two places thereafter. The Northern New York project, which was Lucey's primary responsibility, always involved a significant component properly classed as extension, though his name does not appear under that function until 1966-67.

Joint and courtesy faculty appointments fluctuated from a low of four in 1955-56 to a high of ten in 1960-62 and in 1963-64. Although their primary responsibilities were with other agencies, mainly USDA, they were voting members of the Agronomy faculty and participated actively in departmental affairs. Most were members of the graduate faculty and advised graduate students. Most also received support in terms of facilities, equipment, graduate assistants, or direct operational funding from the Department. In 1966-67, William Pardee of the Plant Breeding Department and M. T. Vittum of the Vegetable Crops Division at Geneva were given joint appointments in the Department in view of their commonality of subject matter interests with those of the Department. The individuals involved and the agencies they represented are given by years in the tables on pages 108 through 112.

Emeritus Professors ranged from 3 to 5 during the period. With the crowded facilities available, none were intimately associated with the Department during this period. Buckman, Worthen, Howe, and Hartwig continued to live in Ithaca until their deaths. Van Alstine and Bradfield left the Ithaca area soon after retirement.

Several faculty members advanced to administrative positions in the University but retained their departmental faculty status. The numbers of these are indicated by years in the summary table; they are identified in the listing of faculty by function under the heading "Extracurricular, Administrative". W. K. Kennedy became Director of Research for the College in 1959-60, advancing to Associate Dean, Dean, and later Provost of the University. N. C. Brady became Director of Research in 1965-66 following two years leave to serve as Director of Science and Education for USDA in Washington. Cline succeeded him as Departmental acting Head while Brady was on leave. R. D. Miller retained minor responsibilities in the Department while he was Dean of the University Faculty from 1968 to 1970, but he is listed in the tables as on Administrative leave. His primary departmental duties were assumed by D. D. Fritton.

The numbers of faculty listed under extended leave in the summary table represent individuals who had accepted assignments away from the University on projects other than sabbatical leave. They are included in the faculty listing under "Extracurricular, International" with others who retained local departmental functions. They include Cline and Fertig (1955-56), Musgrave (1957-59 and 1964-66), MacDonald (1959-61) and Feuer (1967-70). All were assigned to the Philippines. Replacements were hired for the local Cornell duties of Cline (Johnsgard), Fertig (Schreiber), and Feuer (Swader), but the positions of Musgrave and MacDonald remained vacant during their absences. Bradfield was on extended leave with the Rockefeller Foundation in 1955-56 and 1959-60 without replacement.

A number of faculty members who remained on campus and served their normal departmental functions also became involved in projects which were not strictly characteristic of the traditional activities of their subject matter areas. These, too, are listed under "Extracurricular" functions in the table, but their names also appear on the lines of their normal subject areas. Bradfield, for example, continued to serve the Rockefeller Foundation while not on leave and also maintained his Departmental functions in soil fertility until he retired. From 1957-58 to 1961-62, Dawson and Alexander conducted research in their subject matter areas relevant to "Panama Disease" of bananas under a grant from the United Fruit Company. Dawson also worked on health-related aspects of effects of air pollution on plants during 1962-63 and 1963-64 under a grant from the U.S. Air Force, on detection of microorganisms from 1964-65 to 1969-70 under a grant from the General Electric Company, and on degradation of herbicides from 1964 to 1968 under a grant from the National Institutes of Health while maintaining his departmental functions with organic soils. Scott diverted part of his energies to studies of sugar beet production from 1964-65 to 1968-69 under grants from Empire Sugar Company and the International Salt Company. M. J. Wright led a major cooperative study of nitrate poisoning of animals fed nitrate-rich forage from 1960-61 to 1963-64 under a grant from the National Institutes of Health. Fertig expanded his upland weed studies to the aquatic environment under federal funds from 1962-63 until he left in 1965-66 and to marsh ecology from 1963-64 to 1965-66 under auspices of the New York State Department of Conservation. Lathwell continued the latter project beyond 1970. Zwerman began a major study of water pollution resulting from agricultural practices in 1969-70 under a grant from the Federal Water Pollution Control Administration. All of these represented a significant departure from the traditional roles of the faculty involved and are listed under "Extracurricular" functions in the table, though the work was based on their subject matter specialties.

Graduate student numbers fluctuated mainly between 52 and 58 under a quota established by the University from 1956-57 to 1967-68. The increase in 1967-68 reflects an increase in quota authorized in anticipation of expanded facilities in Bradfield-Emerson Halls scheduled for occupancy in September 1968. The number of assistantships largely reflects availability of funds from year to year, partly related to variation in grant and contract sources, until 1968-69. In that year, a drastic reduction in State funds made it necessary to hold several vacant assistantships unfilled.

With increasing funds, support positions increased almost 70%, from 74 in 1955-56 to 125 in 1969-70. Although several existing positions were left unfilled under the restricted budget of 1968-69, these were offset by new positions authorized for special functions of spaces in the new building.

The result of all of the foregoing increases of personnel and students was a net increase of 75 people on the departmental roster, from 155 in 1955-56 to 230 in 1969-70. About 2/3 of this was in support positions. This reflects a deliberate policy to provide the faculty with research and teaching support. Under Professor Bradfield's headship, graduate assistants more than doubled under a philosophy that they would contribute to both the educational and research functions of the Department. As the Department expanded, some of its activities demanded full-time personnel. This became especially critical in field operations at the two farms and on research projects supported by grant and contract funds. Both non-professional and post-doctoral research staff contributed to the increased numbers.

Facilities

As this period opened, the Department had nearly reached the capacity of Caldwell Hall. Even then the courtesy

Professors of the Agricultural Research Service were housed in the basement of Bailey Hall, and fortunately, those of the U.S. Nutrition Laboratory had relatively new facilities at the east end of the campus. Meteorology was housed in the Plant Science building. Soil Testing had been moved to the basement of Fernow Hall. The plans developed during the 1940s for a new Agronomy building facing Tower Road were abandoned about 1960 when increased costs during the long delay were found unacceptable by the State.

As activities and personnel increased, crowding became a serious problem, both in Caldwell Hall and at Caldwell Field. Facilities at the Mount Pleasant and Aurora Farms had been expanded and improved gradually, mainly with departmental labor and resources. As field work shifted to the Aurora Farm, land there became limiting.

In 1956-57, the Department purchased a relict building left at the Sampson Naval Base from World War II. It was taken down and rebuilt at Caldwell Field, largely with departmental labor, at a cost of $32,000. This was known as the "Gun Shed" and later, due to a name plate attached to it by some prankster, as MacDonald Hall. The same year, a greenhouse for herbicide studies was constructed adjoining the "Gun Shed" on the south at a cost of $12,000. The following year a new laboratory for research on forage utilization was started near Morrison Hall. While it was under the jurisdiction of the Animal Husbandry Department, it was built to serve their cooperative work with forage specialists in Agronomy. It was completed in 1958-59 at a cost of $30,000.

In 1955-56, the Purcell farm of 75 acres adjacent to the Aurora farm was purchased by the University for $7800. In 1958-59, an additional adjacent 85 acres became available and was purchased by the University for expansion of work on pastures and soil fertility. This brought the total area at Aurora to about 420 acres. During the mid-60s a large pond was constructed on the farm and equipped with irrigation equipment. This enterprise, financed mainly from departmental funds, became financially embarrassing when costs tripled over the original estimate.

By 1962-63, Agronomy staff and students on campus had far exceeded the capacity of Caldwell Hall in spite of multiple occupancy of some offices and use of corridors and stairway landings for student and stenographers' desks. Agronomy was using assigned space in addition to Caldwell Hall in Bailey, Fernow, Warren, Riley Robb, and Morrison Halls, and in the Plant Science Building, the Federal Nutrition Laboratory, a pesticide laboratory, and a seed laboratory. The latter two were small frame buildings near Morrison Hall. The sequence of events leading to construction of Bradfield-Emerson Halls is described here in some detail in the belief that readers may appreciate preservation of that part which is not recorded and would otherwise be lost.

The Department under Brady's leadership had repeatedly requested consideration of a new and larger building that would house all of those people and activities of Agronomy on campus, and provide potential for future expansion. An Agronomy advisory committee, composed of prominent agriculturalists, legislators, and business representatives, was enlisted to support the request. A well illustrated brochure documenting the Department's functions and their restrictions due to limited space was presented in 1960-61. This was followed by a departmental space-use study completed in 1962.

On very short notice, the Department was asked by College authorities to prepare a tentative floor plan that would show relationships among the spaces defined by the space-use study. This request came, as the writer recalls, on a Wednesday, probably early in 1962. The floor plan was to be ready as a line drawing the following Monday for drafting as part of a presentation requesting funds. The faculty worked on Thursday and Friday in the small classroom of Caldwell Hall, which had tables on which to arrange material. The space-use study merely defined functions and floor areas of rooms, but guided by the working drawings of the building plans prepared during the 1940s, these were converted into room dimensions, standardizing for rooms of similar functions. Cardboard pieces were cut to scale to represent the floor space and dimensions of these rooms, and the faculty arranged and rearranged them until satisfied that the organization of spaces represented reasonable operational relationships among rooms serving common functions, i.e. Soil Chemistry. This was completed late Friday afternoon, and the writer, who had had some drafting experience, was assigned the task of putting the functional units together in an integrated floor plan over the weekend.

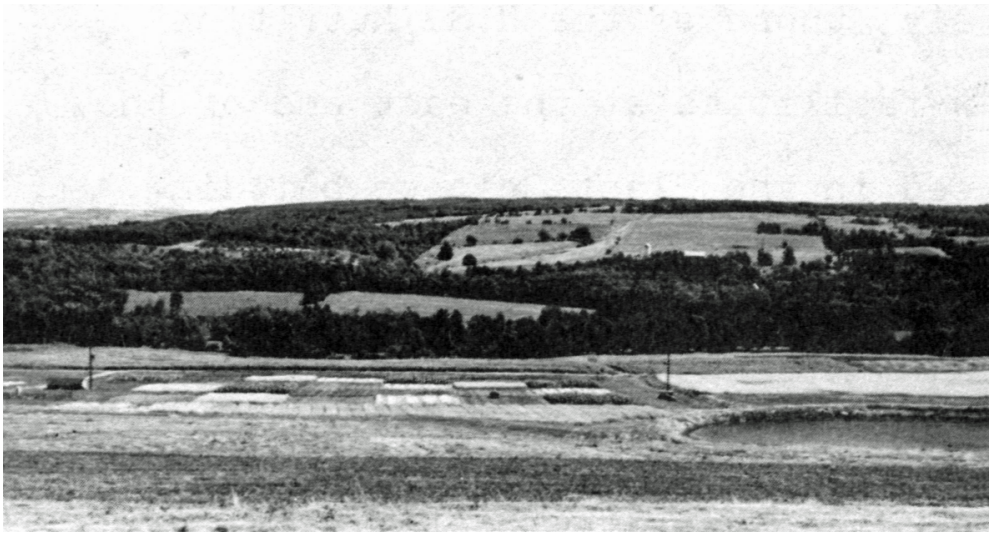
This proved no small task. It was assumed that the site facing Tower Road in front of Fernow Hall approved by the Trustees for the earlier building plans would still be the location. It was also assumed, in lieu of any other obvious alternatives, that the new plans would conform in building outline to the earlier plans for a long four-story structure oriented east-west facing Tower Road. Those plans had shown a hall down the center of each floor and rooms on either side. The new space-use study, however, required considerably more floor area than the earlier plans. After many trials the writer arbitrarily filled the space of a 4-story building facing Tower Road between the then-existing greenhouses on the west and Rice Hall on the east. With space still unaccounted for, he then drew a wing at the Rice Hall end north-ward toward Fernow Hall to accommodate it. The idea that the line drawing, prepared on sheets of wrapping paper on the dining room floor of his home, would ever be considered anything but a schematic diagram did not enter his mind. With a sigh of great relief, he finished inking the sketch about 1:00 A.M. on Monday and delivered it Monday morning. The floor plan was redrawn in respectable draftsmanship by the University.

The writer is not sure of the precise order of events at this stage. At about this time, or possibly earlier, the idea was conceived that federal grant funds might be obtained for construction. The Departments of Plant Breeding and Conservation were also limited by lack of space, and their participation in an attempt to obtain a joint facility was solicited. The three departments included substantial components of both basic and health-related research, which the National Science Foundation and the National Institutes of Health, respectively, were then supporting by grants for facilities that would enhance such research programs. The floor plans for Agronomy, described above, were used in presentations to the State and to the federal granting agencies prior to April 1, 1962. The response from the federal agencies was encouraging, and the 1962-63 State budget included planning money for a $6,000,000 "Agronomy-Conservation-Plant Breeding" building. (See the Annual Report of the College for 1962-63.) The floor plans caused some confusion in the presentation to the federal agencies, as they apparently assumed that the line drawings, drafted professionally but designed by an amateur, represented firm plans for the project. They failed to find all of the basic and health-related research space described in the presentation and raised serious questions about the project. It was not until 1963 that a space-use study including spaces for the three departments was completed.

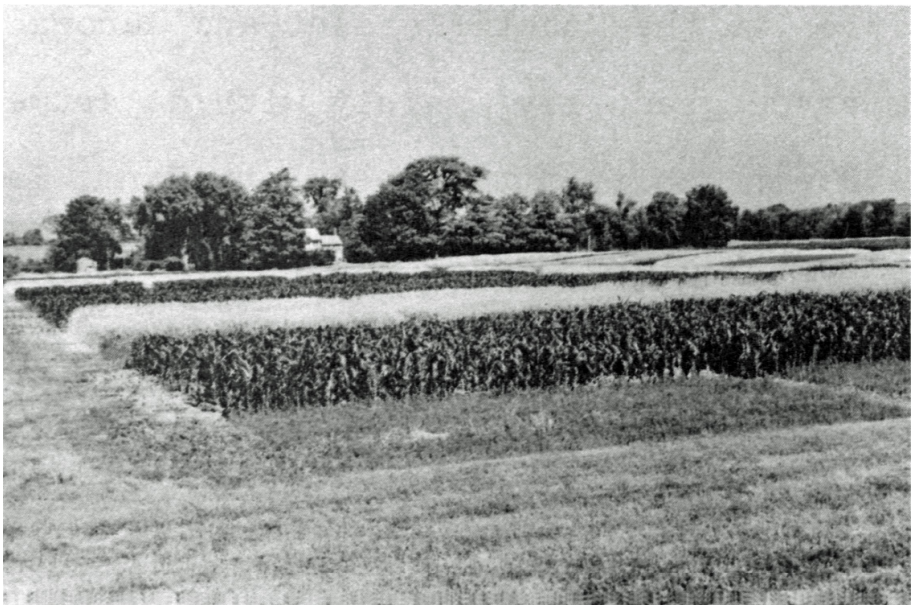
With funds for planning committed, the project proceeded rapidly. The State University Construction Fund was authorized to proceed with plans and hired Ulrich Franzen Associates as architect. M. G. Cline was appointed faculty representative to work with the architect. The program phase began January 1, 1964. This was an architectural review of the spaces requested, services, probable costs, and the allocation of spaces among basic research supported by the National Science Foundation, health-related research supported by the National Institutes of Health, and other functions supported by the State. Tentative estimates placed gross space at slightly more than 200,000 square feet, yielding 120,905 square feet of net usable space. Within this net space, that for basic research was estimated at 53,146 square feet; for health-related research, at 13,973 square feet.

The schematic phase of architectural plans began May 1, 1964. This involved development of purely schematic diagrams which showed functional relationships among rooms. It was during this time that the architect began to think in terms of a fully air-conditioned research tower without windows. He pointed out that it would cost more to provide individual units for the 20% of the research space that required air-conditioning than to concentrate the research spaces and associated offices in a compact structure and air-condition it all with University chilled water. A compact tower for that space was also cheaper to construct and air-condition than a lower structure spread over greater area. Further, there would be substantial savings not only in construction but also in air-conditioning and heating by omitting windows.

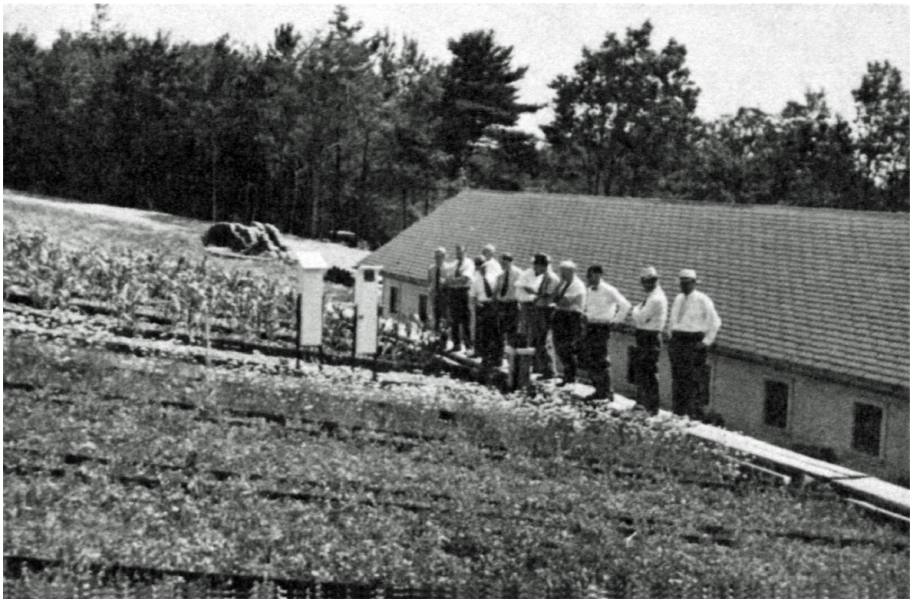
The last of these proposals caused considerable consternation among faculty and staff. Faculty members were sent to inspect both windowless and conventional research facilities in New Jersey and Ohio. Their reports encouraged the faculty to approve the window-less tower. The architect deliberately did much to prevent claustrophobia by designing windows at the ends of the corridors, light colored walls in rooms, high intensity lighting, and choice of furniture that would obscure minimal wall space. He also followed the Department's suggestion that access from



Left: Setting of the Mt. Pleasant experimental farm representing the soils and environment of the Allegheny Plateau.



Right: Part of the Aurora experimental farm representing the soils and environment of the Ontario Plain.



Left: The Arnot Forest erosion experiment of the Soil Conservation Service in 1936. John Lamb, the project leader, held a courtesy appointment in the Agronomy Department.

outside be so arranged that the first floor corridor would not become a traffic lane for students going from Mann Library to buildings east of the site.

Development of the architectural design manual began in June 1964. Test borings for footings were taken in July. The basic design principles had been completed by September, 1964, and the faculty representative was notified that preparation of the final construction document would begin about September 1 with a conference on campus. Then for a period of about three weeks nothing happened. The faculty representative could get no satisfaction from the architect or others beyond the fact that plans were being held in abeyance for reasons that could not be revealed. Rumors eventually began to circulate that there was a movement to reassign the funds for the building to construction for Cornell's newly formed Biological Sciences Division. On the surface, there appeared to be a rationale for that, as over the period of work with the federal granting agencies, the term "biological science" building had been used, not only because it was less cumbersome than "Agronomy-Conservation-Plant Breeding" but also probably deliberately to influence the granting agencies. Furthermore, most of the faculty of Conservation and several of those of Plant Breeding who would have space in the new structure had been transferred to the Biological Sciences Division from their former departments.

The matter finally came to a decision when Provost Corson invited the faculty representative to meet with him and other officers. When the history of the project and the probable reaction of the Agronomy faculty to a "hijacking" were explained in detail, the decision came promptly to proceed as planned.

Thereafter, plans proceeded without delay to final working drawings and specifications in March of 1965. The contract was bid and let at a final cost of $6.2 million. Only one other temporary problem arose before construction began in June 1965. The Planning Office suddenly awoke to the fact that the new building was sited precisely where a road planned to run on the north and east sides of Mann Library would have joined Tower Road. No space would remain between the building and either Fernow Hall on the east or Mann Library-Plant Science on the west for relocation of the road. The Director of Planning berated the faculty representative for allowing the project to proceed without consultation with Planning about the site. It was pointed out, however, that Planning should have been aware of authorization of the Board of Trustees about 1950 for construction for Agronomy in an area that included the site of the new building.

Construction proceeded with what were probably normal problems and delays. Initially, tests of the footings showed inadequate bearing capacity and redesign was necessary. When piling began, boulders caused failure of some piles, which had to be relocated; one whole winter was spent in a quagmire of mud before the footings were in place. During construction, specifications were prepared by the Department for furnishings and equipment costing about $2,000,000 and were sent out for bids by the University Purchasing Department. The building was occupied in late August and early September, 1968, utilizing departmental trucks and manpower to accomplish the move. Concurrently, Phase II of the Gutterman Bioclimatic Laboratory at the southwest corner of Caldwell Field was nearing completion. It provided laboratory, greenhouse, and growth chamber facilities for Agronomy. Both structures were dedicated on December 5, 1968. Professor Bradfield attended the dedication of the research tower named in his honor. The connecting 3-story structure was named for Professor Emerson, the famous Plant Breeder. The large lecture hall was named Buckman Auditorium in honor of his long career as an extraordinary teacher.

In 1967-68, just before Bradfield-Emerson Halls was completed, fire destroyed the "Gun Shed" at Caldwell Field. Equipment, records, and a collection of reference soil samples were lost. The adjacent herbicide greenhouse was severely damaged. In 1969-70 construction of a new modern field house and a herbicide research laboratory at Caldwell Field was authorized.

In 1961-62, national concerns about environmental quality were beginning to affect the kinds of research of experimental stations. Weed control in lakes and ponds had high priority. S. N. Fertig was successful in obtaining a major allocation from the federal Central Research Fund for construction of experimental ponds for such studies. These were completed in 1963-64, providing 100 1/10 acre ponds at two sites north of the campus. While

these were intended as interdepartmental facilities, their operation and maintenance were the responsibility of Agronomy. Fertig was the primary user until he left in 1965-66, after which Mulligan concentrated his efforts on research in them to the end of this period. It turned out that the facility was not utilized fully at any time, and its use decreased sharply after Mulligan left in 1969-70.

Student Unrest

The Viet Nam war created student turmoil at Cornell as at most universities, reaching its height during the period from 1968 to 1970. The Department was not affected to the same extent as other parts of the University, but the impact on it was significant. Students demanded a greater voice in departmental affairs, and in 1969 the faculty voted to hold two kinds of meetings for consideration of policies and actions. One, called "departmental meetings", included the faculty and elected representatives from graduate students, undergraduates, and non-academic staff. These meetings were to discuss budgets and general policies and activities. The second, called "faculty meetings", included only the faculty for consideration of such matters as reappointment and tenure, matters involving peer judgements regarding the faculty itself. Graduate students had requested representation at departmental meetings much earlier under Bradfield's headship in the 1950s, which had been granted. The student representatives at that time discovered to their surprise that the meetings were usually quite dull affairs from their standpoint, and attendance quickly declined and eventually stopped entirely. Much the same experience resulted in 1969, though enough student participation continued to make the arrangement worth continuing. Graduate students are still involved (1982) in interviews with candidates for faculty positions and similar matters, and their judgements are valued.

In the emotional environment of 1968-70, suspicion of the motives and actions of any individual or group in authority appeared to govern many student actions. In the matter of representation at departmental meetings, for example, a plan discussed with the students stipulated that student representatives must be responsible to some identifiable source of their authority. This was belligerently assumed to imply responsibility to the faculty rather than to a body of their peers as intended. One teaching assistant berated the Department Head roundly as autocratic for assigning that student to assist in a crops course when he wanted to assist in soils. As it had happened, that graduate student had asked for a teaching assistantship, which he had not held previously, because teaching assistants were exempt from the military draft. His request had been honored, and he had been assigned to a crops course because all soils teaching assistantships were filled at that time. The assistant was a serious and thoughtful young man under normal circumstances. He, like many, was caught in the intense emotional turmoil of the time and acted completely out of character.

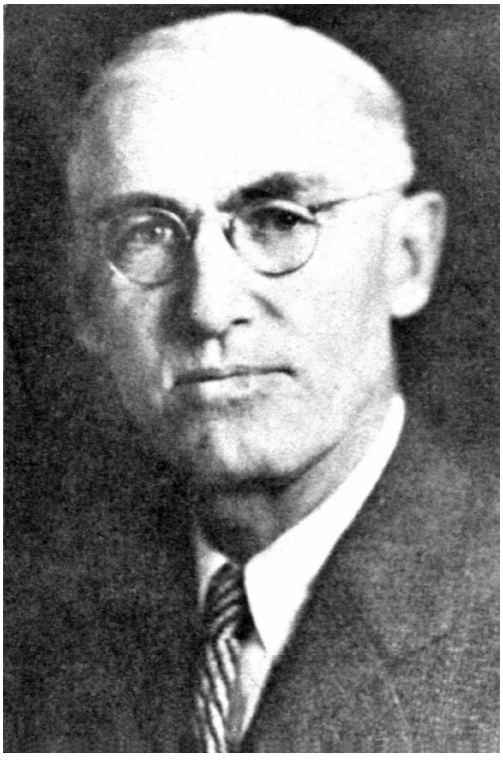
At no time was the Department directly involved in the violence that shook the campus during this period. There was some fear at the height of campus demonstrations following the Kent State shootings that the newly completed Bradfield-Emerson complex could have been the target of destructive violence, such as had occurred elsewhere. Teams of faculty patrolled the building from dark to daylight for three nights until the campus was relatively quiet again, but nothing occurred to suggest that any action had been contemplated. One fear had been that toxic substances might have been introduced into the building's air intake, which was completely accessible at ground level outside the building at that time. Fire was another potential hazard, for arson had been attempted elsewhere on campus.

International Commitment

Beginning in 1952, three years prior to the start of this period, faculty other than Dr. Bradfield became directly involved with long-term overseas commitments. From 1955-56 to 1969-70, four faculty members spent a total of 8 man-years in the Philippines as Visiting Professors on the two Cornell projects, and one other spent three years on assignment to the International Rice Research Institute. Meanwhile, participation of faculty in on-campus international activities also increased dramatically. About 170 foreign graduate students studied in the Department during this period, about 19% of all graduate students. In 1958-59 and 1959-60, foreign graduate students reached a maximum of 17 and 15 respectively out of about 55 graduate students in the Department. Numbers declined

An imposing structure confronts the visitor to Bradfield and Emerson Halls. Bradfield Hall (tower) and Emerson Hall (right) at their occupancy in 1968.

Richard Bradfield



Rollins Adams Emerson

sharply to less than 10 during the early 1960s but increased again to 15 by 1969-70. Numbers in Agronomy were not unique within the College. Agriculture had 1/3 of all the foreign students enrolled in the University in 1960-61.

During 1962-63, the College added a new office of International Agricultural Development parallel to the offices of Research, Extension, and Resident Instruction. Kenneth L. Turk, the first Director, reported directly to the Dean and was advised by a committee composed of departmental representatives chosen by department heads to coordinate international activities within their jurisdictions. Creation of the International office was the result of study by a College committee appointed to recommend policies for the growing international commitment. Dr. Bradfield had been Chairman of that committee.

Among its many functions, the Office of International Agricultural Development arranged programs for the many foreign visitors. There were more than 300 during 1962-63, and Agronomy had its full share. New IAD major and minor graduate programs were approved, and an undergraduate IAD area of specialization was recognized. To serve the students of these programs, new courses were introduced, mainly under departmental course numbers. Some were identified as special IAD courses. In 1965-66, the Department introduced a course on soils of the tropics (401) and a course on tropical agriculture (422). A course on special studies of soils of the tropics was initiated in 1968-69, which included a field trip to Puerto Rico during the winter break. To provide breadth, the Department invited participation by faculty of Agricultural Economics, Animal Science, and Plant Pathology. This ultimately grew into a full interdepartmental effort, and in 1972 the offering was listed as an International Agricultural Development course (IAD 602). In 1970, the Department introduced a graduate level course in "Special Studies of Tropical Agriculture" (522).

The Office of International Agricultural Development found the College program weighted heavily by work in, and support for, the social sciences. In an effort to achieve balance, the Office approached the Rockefeller Foundation for support to initiate an equivalent international program for the agricultural sciences. Funds from that source became available to Agronomy in 1965-66. Armand Van Wambeke of the University of Ghent, Belgium, was brought to the campus as International Professor of Soils for six months of the first year. At that time, he was not in a position to make a continuing commitment to Cornell, and in 1966-67, Matthew Drosdoff was appointed to that position on grant funds. He retired early from the International Development Service of USDA to accept the position. When the Rockefeller grant ended, salaries were accommodated by new line-item State positions, but Agronomy was not allocated one of these by College Administration. Thus, the Agronomy position was maintained on other grant funds until Cline retired in 1974. His position was then used for Professor Drosdoff.

As Departmental interest and commitment to international work increased, the need for overseas bases of operation for both faculty and graduate students became critical. Puerto Rico offered a convenient location in the tropics, and the Department solicited cooperation from the University of Puerto Rico. The two institutions approached the Agency for International Development for funding of a joint research project on soil fertility of the humid tropics, which resulted in a contract authorizing about $225,000 per year for five years starting in 1969. The work was initially concentrated in Puerto Rico but was later extended to an experimental station at Planaltina near Brasilia, Brazil, under a separate agreement with authorities of that country.

While negotiations were under way for the AID research contract, section 211(d) of the foreign aid act of 1961 authorized grants to Universities for development of faculty expertise in subjects important to the federal foreign aid program. Authorities of AID, especially Omar Kelley, invited the Department to collaborate with other institutions and submit a joint proposal for developing their competencies in soils of the tropics. Initially the Department worked with North Carolina State University and the University of Puerto Rico. At the same time, the University of Hawaii was negotiating for a similar grant, and at AID's suggestion, Hawaii was invited to participate in a four-institution consortium. Somewhat later AID suggested inviting one of the "1897" "black" colleges to participate, and Prairie View A&M University joined the group. A document detailing the bases of collaboration of the five institutions was prepared at Cornell, revised several times to accommodate input from the other four institutions, and finally issued as the charter of a "University Consortium on Soils of the Tropics". Under the provisions of that

charter, a grant proposal was submitted to AID and was approved in 1970, granting funds to each of the Universities for enhancement of their respective programs. The initial grant to Cornell was for $500,000 for the period 1970 to 1975.

At the close of the period discussed in this chapter, the Department was initiating activities in response to the mandate of the 211(d) grant. Faculty and graduate students were actively engaged in research in Puerto Rico in cooperation with that University. T. W. Scott was stationed there temporarily. R. H. Fox had been appointed Assistant Professor and was stationed at Rio Piedras, Puerto Rico. Fox was an Arizona State Ph.D. who had served on a North Carolina State research project in Peru from 1966 to 1969. Most of the work resulting from the two AID projects came during the period to be discussed in the next chapter.

Resident Instruction

Student enrollment college-wide increased dramatically during the period:

Year	Undergraduates			Graduate Students in:	
	4-year	2-year	Special	Agriculture	Agronomy
1955-56	1329	200	67	805	47
1960-61	1448	195	57	943	54
1965-66	1982	146	51	1007	54
1969-70	2253	-	35	1146	64

Soils and crops undergraduate areas of specialization had been initiated under Professor Brady's leadership, and an Agronomy Club had been formed. The numbers of undergraduates participating were small compared to those in similar programs in the Middle West, where crops are important commercial commodities, but the groups were enthusiastic and added a new dimension to departmental activities. Numbers of students taught in departmental courses followed the college trends closely, most of the time. The College had begun to phase out the 2-year program by 1965-66 and had terminated it by 1968-69.

The College began preferential admission of transfer students with advanced standing to achieve a 60:40 ratio of upper to lower division students during the late 1960s. The intent was to maximize efficiency of college teaching faculty and facilities, minimize the predominantly lower division accessory instruction provided by the College of Arts and Sciences, and serve a greater total number of students over a given period of time. Simultaneously, the farm practice requirement was made less stringent, and advanced standing credit was increased for transfer students from the State's 2-year Agricultural and Technical Colleges. The 60:40 ratio was not achieved until 1972, when 331 out of 897 students admitted were transfer students. Their numbers increased from 122 in 1965 to 263 in 1970. By 1972, transfer students accounted for 44% of the students specializing in Environmental Studies, which included Soil Science, and 51% of those in the Plant Sciences, including field crops. Those in soils and field crops were predominantly from the SUNY Agricultural and Technical Colleges, whose Scholastic Aptitude Test scores averaged 20% below the mean of entering freshmen in both verbal and mathematical skills. Transfer student mean grades in Agronomy classes were conspicuously lower than those of students who entered as freshmen. In the elementary field crops course (111), especially, the instructor had problems with some who resisted instruction in basic field crop botany and physiology, expecting the course to emphasize empirical practical crop husbandry. Problems were less in elementary soils (200), though correction of deficiencies in preparation required considerable extra effort of the instructors.

Deficiencies of transfer students were offset to some degree by increased numbers of women. The numbers of women admitted to the University had traditionally been restricted by the amount of approved housing available for them, and those admitted were, consequently, the best of the applicants. With relaxation of criteria for female housing in the late 1960s, the numbers of women admitted increased rapidly, though women were still a select group academically. In 1965, 21% of all applicants were women, but only 17% and 11%, respectively, were women

among entering freshmen and transfer students. By 1972, 32% of all applicants were women; 36% of entering freshmen and 23% of transfer students were female. Their mean verbal scores were consistently higher than those of men of the same class, though there was little difference in mathematics. Instructors of the beginning soils course noticed not only superior performance of women as a group but also an apparent increase in the diligence of the men when faced with competition from the women. (Most of the statistical information in the foregoing paragraphs are from a special report by the writer to Dean Kennedy on Undergraduate Programs of the College, 1973.)

Although the Department offered both Soils and Field Crops as undergraduate areas of specialization, its undergraduate instruction remained primarily a service function for students of other specialties. Course offerings (see Appendix I), with few exceptions, remained the same until the mid-1960s, and undergraduate student numbers changed little. After agronomic undergraduate areas of specialization were initiated by Professor Brady about 1955, an undergraduate seminar (90) and agronomy literature (110) courses were added. Soils for 2-year students (6) was, of course, dropped in 1962-63 when that program was discontinued by the College. For the benefit of undergraduates specializing in the Department, advanced undergraduate courses in crop ecology (113) and soil fertility (124) were added in 1962-63. The undergraduate seminar and Agronomy literature courses were dropped in 1963-64 when Professor Nielsen died and student interest dropped.

In 1964-65, the College renumbered all courses to systematize them according to levels of the offerings. The 100 series was open to freshmen, and the 200 series, to sophomores. Elementary Crops (Agronomy 11) became 111 and Elementary Soils (Agronomy 1) became 200. The latter was reduced from 5 to 4 credits at this time. Courses of the 300 series were intended for upperclassmen; those of the 400 series, for upperclassmen and graduate students. Those of the 500 series were graduate courses, and the 600 series was reserved for graduate seminars. A number of new courses were added at this time, or shortly thereafter:

Agronomy

401 Soils of the Tropics (1965-66)
402 Soil Analytical Methods - a laboratory course (1964-65)
405 Clay Mineralogy - for Milford's specialty (1964-65)
406 Use of Soil Inventories - for Olson's specialty (1969-70)
408 Soil Physics Laboratory - to supplement the lecture (1964-65)
422 Tropical Agriculture (1965-66)
431 Ecology of Aquatic Plants - for Mulligan's speciality (1967-68)
461 Agronomy Regional Studies (1966-67)
481 Special Studies of Soils of the Tropics (1968-69)
506 Advanced Soil Microbiology, a second course (1964-65)
522 Special Studies of Tropical Agriculture (1970-71)
561 Graduate Research, crops (1964-65)
691 Soils Seminars (1969-70)
692 Crops Seminars (1964-65)

Courses 401, 422, 481, and 522 have been mentioned earlier as contributions to the new International Agricultural Development program of the College. Courses 405, 406, and 431 were offerings of new faculty members representing areas not previously staffed. Agronomy 461 was introduced as a special course requiring a 3-week summer field trip to parts of the country foreign to most Cornell students. The writer was instrumental in its development, as he had long been concerned about the provincialism inherent in universities, which necessarily focus on a single agricultural region. Grants were solicited to pay for transportation (bus) and subsidize a few needy students. The course focused in successive years on the Middle West and Great Plains, the Southeast, and the Far West. Personnel of universities and other institutions and agencies of each region were enlisted to instruct the group about relevant aspects of agriculture, industries, resources, and research of the region. Students paid for their food and lodging, which was arranged in advance at minimal cost (mainly about $200 for the 3 weeks). The field study was

followed in the fall semester by classroom lectures and reports of students on topics on which they had chosen to concentrate during the trip. Faculty alternated as leaders (one from soils and one from crops with one or two representatives of other disciplines). The course was highly successful in spite of difficulty attracting students away from summer employment. The course also served as an important experience for the faculty, for it opened their eyes to new perspectives and strongly influenced their subsequent teaching.

This was a period when student interests fluctuated widely according to society's perspective of problems of the times. During the early 1960s, environmental quality was high in public consciousness, and many students gravitated to related areas. Soils courses were among those for a time. During the late-60s, social problems came to the fore. Rural sociology was taxed to its capacity with majors and their courses had large enrollments. Enrollment in Agronomy courses declined slightly. Soils taught about 2000 undergraduate student semester hours in 24 courses, and field crops, about 800 hours in 13 courses per year at that time. It was not until the 1970s of the next period that enrollment in soils and field crops courses reached all-time highs, coinciding with student preoccupation with the environment and world food supplies.

Instruction in meteorology suffered severely after Professor Mordoff retired in 1948-49. As this period began, Johnson was teaching a single 3-credit course both semesters. Poor quality of Johnson's instruction was a continuing complaint of students, and the enrollment fell. No course was taught in 1958-59 after Johnson left. Professor Dethier reversed the trend after he arrived in 1959-60, and he continued to emphasize teaching and to expand course offerings with a goal of a curriculum that would qualify students who followed it for professional meteorological careers. He added courses in climatology and aeronautical meteorology in 1961-62 but dropped the latter after 2 years. He continued to teach only the two elementary courses, one each semester, until Dr. Covey joined the faculty in 1966-67, but enrollment increased. Dr. Covey added two advanced undergraduate-graduate level courses in 1967-68, and when Dr. Knapp succeeded him in 1969-70, a third course at that level was introduced. In addition, Dethier and Knapp offered special topics, undergraduate and graduate research, and a seminar.

The new facilities in Bradfield Hall, with equipment for following weather reports and forecasts, proved an enormous attraction to students, and numbers multiplied until Knapp and Dethier were almost completely occupied with teaching. It was not until the beginning of the next period (1970-71), however, that the 2-man section began full-scale offerings for a meteorology specialization for undergraduates.

At the request of the Soil Conservation Service of USDA, the Department initiated a special 6-weeks short course for Soil Survey employees of SCS under the Extramural Division of the University in 1960. The course known as the Soil Science Institute enrolled 30 students selected by SCS as its more promising employees for instruction in basic soil science, including the fundamental principles of the basic sciences that contribute to it. Although the content varied somewhat from year to year, the course consisted mainly of sections on soil chemistry, soil physics, soil fertility, soil mineralogy, soil classification, geomorphology, and plant physiology, each involving between 18 and 30 contact hours.

The course was taught annually for the first three years at Cornell. By 1964, the extra faculty time and effort involved had encroached on regular duties so much that the faculty requested relief. Thereafter, the course was taught in alternate years by Iowa State University. It continued on that basis until 1976. Usually 2 or 3 employees of the U.S. Forest Service were included.

The students were mature individuals mainly with academic training to the Bachelors Degree level and mainly at least 10 years removed from formal university training. Most were weak in basic mathematics, chemistry, physics, and botany either because of weaknesses of undergraduate studies or because of long periods during which those subjects were used little. On firm instructions from SCS, the applications of the basic sciences to soils were emphasized, for it was the intent to create a corps of scientifically oriented personnel as leaders for the National Cooperative Soil Survey.

It was obviously impossible to train the group to a high level of even elementary scientific proficiency in the breadth of subject matter included. That was not the intent. The faculty's strategy was to present the fundamental principles and ideas of their subjects in the simplest form possible with examples of their applications and references for self-study after the students returned to their respective positions.

The pressures on the students were enormous. Few had anticipated the intensity of the course. The fact that they were examined and graded, in contrast to the usual in-service training courses to which they had been accustomed, hung heavily over their heads. They were in class for 5 50-minute periods 5 days a week for six weeks with problems and library assignments for evenings and weekends. There were, in fact, a few who became physically ill under the stress during the life of the project. Nevertheless, once the individuals returned to their jobs, most looked back on the Soil Science Institute as one of the most rewarding experiences of their professional careers. Currently there are few of the more responsible positions of the SCS Soil Survey that are not staffed by graduates of this program.

Research

Most of the faculty who had been recruited under Professor Bradfield's headship were at the height of their research productivity during this period. Research articles in refereed journals and Experimental Station bulletins were published at the rate of about 20 per year for the first five years. For the last five years of the period, the mean annual rate was about 40. Graduate student Ph.D. theses ranged from 4 to 16 per year, averaging about 7. Productivity had become static, however, by 1970.

Formal research projects catalogued in the Office of Experiment Stations of USDA are tabulated by subject matter areas on pages 124, 126 through 128. The subjects listed in the table are only abstracts of actual titles but are intended to identify the primary focus of the research. In some instances, projects having slightly different titles have been combined under one subject.

Projects of the Department of Agronomy by Subject Matter Area and Years, 1955-56 to 1969-70

Subject Matter Area and Project Year, 19-	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
SOILS															
Genesis and Survey															
Genesis and classification	•	•	•	•	•	•	•								
Soil survey of New York	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Quantitative landform description							•								
Soil texture criteria								•	•	•					
Clay mineral weathering										•	•	•			
Soil-landscape relationships												•	•	•	•
Use of soil surveys as resource inventories														•	•
Soil Chemistry															
Chemistry of New York soils and fertility	•	•	•	•	•										
Phosphate equilibria							•	•	•	•	•	•	•	•	
Soil Physics															
Soil structure	•	•	•	•	•	•	•	•	•	•	•				
Soil water	•	•	•	•	•	•	•								
Frost heaving							•	•	•	•	•	•	•	•	•
Soil water measurement								•	•	•	•				
Modification of soil for water relations															•

The first Soil Science Institute, 1960. Faculty, kneeling, left to right: Dawson, Cline, Peech, Miller, Zwerman, Lemon, Hodgson.

Part of the participants of Tour I of the Seventh International Congress of Soil Science at a soil profile by Ellis Hollow Road, Ithaca, August 6, 1960.

Subject Matter Area and Project Year, 19-	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
Soil Microbiology															
Biochemical transformations soil nitrogen	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Soil microflora and herbicide action	•	•	•	•											
Characterizing biochemically active organisms	•	•	•	•	•										
Mineral transformations by microflora	•	•	•	•	•										
Conversion of ammonia to nitrates		•	•	•	•										
Biological processes and nitrogen availability				•	•	•	•	•	•	•	•	•	•	•	•
Decomposition of pesticide residues					•				•	•	•	•	•	•	•
Microbial ecology							•	•	•	•	•	•	•	•	•
Structure of organic molecules & biodegradability												•	•	•	•
Detection of microorganisms by their products												•	•	•	•
Soil Fertility															
Soil testing	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Potassium needs of New York soils		•	•	•	•	•	•	•	•	•					
Divided root technique, study soil fertility	•														
Uptake of soil potassium									•	•	•	•			
Nitrogen fertilization of corn											•	•	•	•	•
Economic returns to soil fertility							•	•							
Forest Soils															
Soil improvement by forest types	•	•	•	•	•	•	•	•	•	•	•	•			
Effects of soil on forest type and growth	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Mycorrhizae	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Soil fertility and forest ecology												•	•	•	•
Organic Soils															
Properties of peat soils	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Soil Conservation and Applied Soil Physics															
Soil drainage	•	•	•	•	•	•	•	•	•	•	•	•			
Effects of tillage on soil conditions								•	•	•	•				
Soil moisture balance									•	•	•	•	•	•	
Land forming										•	•	•			
Soil compaction							•	•							
Environmental Quality and Health-related Topics															
Degradation of pesticides in soils										•	•	•	•	•	•
Agricultural contributions to nutrients in water															•
International Projects															
Tropical soil investigations														•	•
FIELD CROPS															
Ecology-Physiology															

Subject Matter Area and Project Year, 19-	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
Grassland farming	•	•	•	•	•	•	•								
Feed crop rotations	•	•	•	•	•	•	•								
Crop microclimates	•	•	•	•											
Maximum yields									•	•	•	•	•	•	•
Crop rotations for dairy farms									•	•	•	•	•	•	•
Net photosynthesis of corn strains												•	•	•	•
Secretions from plant roots												•	•	•	•
Sweet corn physiology and efficiency															•
Cool season stress														•	•
Pastures															
Pasture mixtures	•	•	•	•											
Grazing versus green-chop forage	•	•	•	•	•										
Forage Crops															
Nutritional losses from hay	•	•	•	•	•	•	•	•	•	•	•				
Forage crop seeding mixtures	•	•	•	•											
Birdsfoot trefoil breeding	•	•	•	•	•	•	•	•	•	•	•	•			
Birdsfoot trefoil culture	•	•	•	•	•	•	•	•	•	•	•				
Ladino clover	•	•													
Cutting management	•	•													
Management of perennial grasses					•										
Nitrogen carriers for forage		•	•	•	•										
Agronomic factors and nutritive value of forage		•	•	•	•	•	•	•	•	•	•	•	•	•	•
Solar heat for hay drying							•	•	•	•	•				
Alfalfa management											•	•	•	•	•
Alfalfa weevil control												•	•	•	•
Summer annuals for forage							•	•	•	•					
Weeds															
Chemical weed control	•	•	•	•	•	•	•	•	•	•					
Herbicide residues	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Annual and perennial weed control	•	•	•	•	•	•	•	•	•	•	•	•			
Weed life histories					•	•	•	•	•	•	•	•	•	•	•
Weed control in forage crops					•										
Perennial weed habits							•	•	•	•	•				
Yellow rocket							•	•	•	•	•				
Weed control in agronomic crops											•	•	•	•	•
Cereals and Oil Crops															
Preservation of moist grain	•	•													
Adverse temperatures for oats							•	•	•	•					
Protein and oil crops for New York											•	•	•	•	•
Cropping Systems (see also **Ecology-Physiology**)															
Remote sensing to record cropping events									•	•	•				

Subject Matter Area and Project Year, 19-	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
Regional research and extension									•	•	•	•	•	•	•
Crop production in the Champlain Valley												•	•	•	•
AQUATIC STUDIES															
Marsh ecology							•	•	•	•	•	•	•	•	•
Diffusion of oxygen in aquatic systems														•	•
Aquatic weed control							•	•	•	•	•	•			
Ecology of aquatic weeds												•	•	•	•
METEOROLOGY															
Relationships between micro- and macroclimates					•	•	•	•	•	•	•	•			
Land as a factor in weather											•	•			
Air pollution												•	•	•	•

In some subject matter areas, it will be noticed that the number of projects listed increased after 1961. This is due partly to policies of the Office of Experiment Stations. It was noted in the previous chapter that the Department began to report the details of research under subprojects within broad master projects at the suggestion of the Office of Experiment Stations during the 1940s. Only the master projects are listed in the table of pages 124, 126-128. This was the policy from 1955 to 1961 of this period, some of the projects listed having as many as five active subprojects at a given time. In 1961, however, the Office of Experiment Stations requested that the subproject format be discontinued. From that time onward, with some exceptions, the individual projects were narrowly defined and of relatively short duration. Consequently, numbers increased.

By no means all of the research of the Department is identifiable in the table. Especially in the earlier part of this period, the research cataloging and reporting was quite flexible except for projects involving public funds. Projects supported by grant and contract funds were reported directly to the donor and sometimes were not covered by either "Hatch" or "State" projects unless funds other than salaries from those sources were also used. In the pages that follow, only that research which is not self-evident within the context of projects listed in the table is mentioned.

In the area of Soil Genesis and Survey, grants from Seneca County (1964-69), Oswego County (1965-74), Steuben County (1965-70), Erie County (1966-75), Schenectady County (1968-69), and Westchester County (1969-72) in amounts ranging from $7,000 to $125,000 accelerated the Soil Survey of New York and were reported under a State Project, "Soil Survey of New York". Graduate student research is represented by the other subjects listed, including six sub-projects under "Genesis and Classification".

In soil chemistry, the first project listed covered a broad range of investigations. Parts supported by grants included reactions of anhydrous ammonia, potassium-supplying power, and liming. After 1959, there were no formal projects for graduate student theses completed on ionic equilibria, aluminum equilibria, sorption of heavy metals, exchangeable hydrogen, cation exchange, adsorption of nutrients by roots, and analytical methods. The project on phosphate equilibrium listed was supported by the Tennessee Valley Authority and produced several theses.

Under soil physics, the projects listed were primarily basic studies. The project on frost heaving started with a large 7-year grant from the U.S. Army Corps of Engineers in 1956, but a formal project statement was not catalogued until 1961. Dr. Miller concentrated most of his efforts on that subject thereafter, with a subsequent contract in 1965 for continuation of this work.

Soil microbiology became the most active research unit in the Department during this period. Through 1959, the projects listed were supported by relatively small allocations of Hatch funds and were mainly the subjects of graduate student theses. In 1957, however, Professors Dawson and Alexander collaborated on studies of soil and

microbiological aspects of "Panama disease" of bananas under a 5-year $135,000 grant from the United Fruit Company. This was the first example of a major project whose objectives were "extracurricular" in the sense used in the discussion of grants and of faculty. No formal project statement was catalogued by the Office of Experiment Stations for this work. It marked the beginning of research funds adequate for employment of post doctoral personnel, which has characterized Dr. Alexander's work over the years. In 1959 a grant of $12,500 by the National Science Foundation started Dr. Alexander on the project listed as "Biological Processes and Nitrogen Availability". This was followed in 1961 with a renewal providing $68,800 through 1967. In 1962, a 7-year grant of $145,700 by the National Science Foundation supported work on microbial lysis of fungi, which was one subject covered under "Microbial Ecology". That same year the National Science Foundation provided a 6-year grant of $114,000 for extension of nitrogen-related work to *Rhizobium*. From 1959 to 1970, Dr. Alexander received grants and contracts totaling more than $500,000, which severely taxed the limited space and facilities available in Caldwell Hall.

Much of the field research in soil fertility was conducted by Professor Musgrave, first in his studies of grassland farming and feed crop rotations on Mount Pleasant prior to 1961, and then in his projects on crop rotations and maximum yields at Aurora after 1963 (see Field Crops, Ecology-Physiology). In 1955, a 3-year grant of $150,000 to Professor Bradfield from the Sun Oil Company initiated a massive study of nitrogen fertilization at widely scattered sites on farmers' fields as well as on the experimental farms. A number of the faculty besides Bradfield contributed to this. That work was not catalogued as a formal project for the Office of Experiment Stations. Small commercial grants to Griffeth (1956), Brady (1957), Lathwell (1959), Scott (1960), Lathwell (1961), Scott (1964), Griffeth (1965), and Reid (1967, 1968) also contributed to research on soil fertility, none of which was represented by a formal project statement. After the arrival of Professor Bouldin in 1962, he revitalized soil fertility field research, especially with nitrogen on corn, in cooperation with Professor Reid.

Professor Stone continued his well established research on forest soils with the projects listed. These were long-term projects supported by the Pack endowment and federal MacIntire-Stennis funds. Dawson continued his long-term effort on characterization of organic soils, including a substantial contribution to the Soil Conservation Service's project on taxonomic classification of soils. He also diverted a major part of his energies to a variety of research supported by grants and contracts. His collaboration with Alexander on "Panama disease" of banana has been mentioned earlier. In 1962, he initiated studies of the effects of atmospheric contamination on plants under a $28,000 contract with the U.S. Air Force. In 1964, a 5-year contract for $83,000 supported the project on detection of microorganisms by their products, listed under Soil Microbiology. That same year, he negotiated a 4-year contract for $117,000 with the National Institutes of Health for studies of herbicide degradation. This is listed under Environmental Quality and Health-related Research. Dawson had earlier (1955-58) initiated microbiological studies of herbicide action and of nitrogen transformations under federal Hatch allocations. These are listed under Soil Microbiology.

In the area of Soil Conservation and Applied Physics, Professor Zwerman had catalogued a single project on soil drainage but had confined himself largely to demonstrations and assistance with drainage of experimental fields until about 1963. At that time, he developed a surface drainage experiment in Jefferson County in conjunction with Professor Lucey's "Northern New York" project (see Field Crops, Cropping Systems). This was expanded to a much larger program of "land forming" at several sites in Northern New York, which Professor Lucey credits with a significant contribution to the revitalization of agriculture in that region. The drainage work was a major undertaking in terms of both time and funds. The farmers on whose land the drainage was installed did part of the land-forming operation with their equipment, under the direction of Professor Zwerman and his experimentalist. The other work listed was by Professor Wilson and consisted of relatively small projects conducted in cooperation with Agricultural Engineering.

Of the two projects listed under Environmental Quality and Health-related Research, that on degradation of pesticides by Dawson has been described. The other by Professor Zwerman was installed at the Aurora research farm under a 2-year $147,000 grant by the federal Water Pollution Control Administration. It consisted of cropping

experiments on a tract equipped to measure and sample both runoff and subsurface drainage water. The question of how much normal agricultural practices contribute to nutrients in water was a burning issue at that time.

The project listed under Tropical Soils was catalogued in 1968, but did not begin until execution of a 5-year $1,134,000 contract in 1969 with the U.S. Agency for International Development for studies of soil fertility in the humid tropics. This has been mentioned earlier. The work had barely been initiated in Puerto Rico as this period drew to a close.

Most of the projects listed prior to 1966 under Field Crops, Ecology-Physiology, represent the research program of Professor Musgrave, though Bradfield contributed ideas from his philosophy. Professor Musgrave was responsible for their execution. Those that ran from 1955 to 1961 were continuations of long-term experiments initiated on the Mount Pleasant Farm in the preceding period. The rotation and maximum yield projects first catalogued in 1963 were, in fact, begun prior to Professor Bradfield's retirement in 1962. As was mentioned earlier, these five projects included a major soil fertility component. All were very large field experiments. The installation of the maximum yield experiment was supported by a 5-year grant of $75,000 in 1958 by the Rockefeller Foundation. It was conducted at both the Aurora and Mount Pleasant farms to determine the maximum yield that could be produced with the best known management. The second rotation experiment was initiated at the Aurora Farm about 1960. It consisted of a very large field plot experiment testing rotations, fertilization, and crop management practices in combinations.

In 1961, Professor Musgrave's research began to shift toward fundamental studies of photosynthesis under field conditions, beginning with a small grant of $4,000 from the Rockefeller Foundation. In 1962, a 6-year grant of $125,700 permitted instrumentation and development of the project into a major basic research undertaking. When Professor Musgrave spent 1964 to 1966 on the Cornell Project in the Philippines, he took his critical equipment and two graduate assistants with him to test his findings in a different environment. He also conducted similar research in Mexico for one summer. Until 1966, this work was not catalogued as a formal project of the Office of Experiment Stations, but it occupied much of Professor Musgrave's time from 1962 onward.

The microclimatology project conducted by Professor Lemon after 1955 was in fact a project of the Agricultural Research Service of USDA. It was not catalogued as an Agronomy project for that reason, though the Department contributed some facilities, office space, graduate assistants, and certain other costs. This became one of the most productive basic studies associated with the Department and attracted national and international attention. It and Musgrave's work were complimentary.

Pasture research effectively stopped after the two projects from the preceding period were terminated. Forage Crops occupied the attention pastures formerly had been given. The landmark studies of nutritional losses from hay from 1955 to 1965 by Musgrave and Kennedy, with assistance from Dawson, established principles of the energy relationships involved. The study of preservation of moist grain by Kennedy, listed under Cereals and Oil Crops, followed a similar pattern. The other forage projects listed prior to 1961 were continuations of work started mainly during the preceding period by Kennedy, MacDonald, and Seaney. When Professor Wright succeeded Kennedy in 1960, he was successful in obtaining a 4-year contract of $186,000 for cooperative work with Animal Science on accumulation of nitrates in plants and their subsequent effects as poisons for animals. That project occupied most of his time until it was terminated. This work was not catalogued as a formal Experiment Station Project by Agronomy, though it may have appeared as a listing of Animal Science. When it ended, Professor Wright focused on alfalfa management, except for a brief period in 1964 and 1965 when he investigated aerial photography as a means of following events in cropping patterns over the growing season.

Weed control had become a major study area in the Department by the time this period opened. Titles of the projects listed are self-explanatory. Commercial grants for support of experiments with herbicides were very minor sources of funding until 1967, when 9 companies provided an aggregate of $5,250. Thereafter, the aggregate was more than $10,000 per year. There was always some question about the appropriateness of accepting such grants, which were given for testing each company's material. The amount rarely equalled the expenses involved.

As a general policy, the contributions were not accepted unless the investigator intended to use the products in his experiments anyway. The projects listed under Weeds involved much more than mere testing of commercial products.

Little work on cereals, *per se*, was conducted by the Department, as the project list indicates. Much was done with corn, wheat, and oats in the rotation experiments already discussed. No work had been done with oil crops for many years until Professor MacDonald initiated a project in 1965. No project is listed for the major effort that went into research on sugar beet production in New York from 1963 to 1967. The Department was called upon to provide data on production potential, which were used to establish the merits of a sugar allotment to the State. The newly formed Empire Sugar Company provided $20,000 for two years, and support also came from State and federal sources. It was a massive crash program led by Professor Scott, who was beset by conflicting pressures from enthusiasts and pessimists. He demonstrated the feasibility of sugar beet production effectively, but the company failed to provide efficient processing facilities and farmers were forced to abandon the enterprise.

In addition to the research on rotations and grassland farming listed under Ecology-Physiology, two projects of Professor Lucey focus on cropping systems. The State appropriations which brought Lucey to the Northern New York project in 1961 developed a promising project which combined applied research and extension for a natural region. Professor Lucey established a base of operations at the SUNY Agricultural and Technical College at Canton, which provided building space and an experimental field. A satellite experimental site was provided by the W. H. Miner Institute at Chazy, and Zwerman's surface drainage site in Jefferson County served as a third.

By 1963, the results of the Northern New York Project were so promising that Agronomy approached the Plant Breeding Department about establishment of a joint applied research-extension project for the rest of the State. The Department Head of Plant Breeding cooperated enthusiastically. It was proposed that the Hudson and Mohawk Valleys constituted a region in which similarities of agriculture and physical resources justified a comparable sub-project. A farm at Valatie, New York, was available as headquarters and an experimental field. With support from local people, funds for its purchase and operation were obtained from the State, including the salary of a resident experimentalist. Professor Griffeth was in charge. The Allegheny Plateau was the third natural region, for which Mount Pleasant provided a base of operations and land for experiments. Professor Krenzin was designated regional leader. Western New York was the fourth region, based at the Aurora Farm, with a plant breeder suggested as research leader.

In 1964 GLF, which was then being reorganized as AGWAY, provided a grant of $19,000 to begin implementation of the plans. The project was formalized as "Regional Research and Extension" with Professor Lucey as project leader. For various reasons, the Western New York and Allegheny Plateau regions failed to establish fully integrated regional programs, but the base at Valatie became such an important resource, that, when cuts in State appropriations threatened to close it, local people united to assure its continuation. As the Miner Institute increased support for the work at its headquarters, Professor Lucey formalized a separate Champlain Valley project to identify it separately from the original Northern New York program.

Aquatic Studies started in the Department in 1958 with a small contract with the New York Department of Environmental Conservation for analytical work related to the ecology of marshes. When the principal leader of its Marsh Ecology project was unable to continue, the Conservation Department contracted, first with Professor Fertig (1963-65) and then with Professor Lathwell (1965-72), to assume all of the work. The total funds amounted to $127,000 over 9 years. The project was formalized in 1961.

Professor Fertig became interested in the problems of aquatic weeds at about this time, when it was the focus of much attention in the environmental movement. He obtained federal Central Research Funds for construction of the Cornell ponds referred to earlier. The work was organized under the "Aquatic Weed Control" project listed in the table. When Fertig left, Professor Mulligan rewrote the project to fit his training and interests as Ecology of Aquatic Weeds.

The Meteorology faculty had little time for research, but in 1959, Professor Dethier obtained Hatch funds to begin studies of the relationships between micro- and macro-climates. In 1963 he obtained a contract for $14,000 for 2 years to study relationships of meteorological conditions to flight of the European Chafer. This did not appear as a formalized project of the Experiment Station. Finally in 1966, he initiated a Hatch project on the incidence and effects of air pollution in the Ithaca area, with emphasis on ozone. Dr. Covey began a study of the effects of land masses on weather in 1965, but he left before he could complete his work.

The arrival of Professor Vittum at the New York Agricultural Experiment Station (Geneva) substantially increased soil-related work of the Vegetable Crops Division. Faculty of the Agronomy Department collaborated with him on an experiment on the new farm of the Geneva Station. Much of Vittum's work focused on soil fertility, but he also studied soil physical conditions and soil conservation. The Pomology Division continued soil-related work with fruit, mainly with fertilizers and cover crops. Seed Technology increasingly developed research with seeds in addition to their test functions - work which was of interest to Professor MacDonald of the Agronomy Department. The Chemistry Division continued its functions with the State fertilizer and feed control laws.

Extension

S. R. Aldrich had served as Agronomy Extension Project Leader since Professor Worthen's retirement in 1947-48, and his resignation in 1956-57 left the Department with an inexperienced extension staff. Reeshon Feuer in soils and Walter Griffeth in field crops were in their second years. Herbert Dunkle, though experienced elsewhere, was in his second year at Cornell and was thinking of returning to farming. Hugh Wilson was in his third year but lacked the basic training required for a leadership role. S. N. Fertig as Professor of Field Crops specializing in weed control had carried substantial extension responsibility, in addition to research and teaching, and had been outstandingly effective. Professor Brady finally prevailed on him to accept the role of Agronomy Extension Leader. The arrangement was reasonably satisfactory in spite of the fact that the time he could spend on that assignment was limited. Professor Krenzin relieved him for two years, 1963-65.

When Fertig resigned in 1966-67, the Department faced a situation similar to that of 1956-57. W. S. Reid in soils extension had just arrived; Feuer was preparing to leave; Griffeth in crops was preparing to leave; Krenzen was showing signs of the illness that forced his early retirement five years later, though the problem had not been diagnosed. Again the Department turned to a faculty member already carrying a full-time load. Robert Lucey, already responsible for the large Northern New York and the state-wide Research and Extension projects was persuaded to assume extension leadership for Agronomy. Following Hartwig's retirement a year later, he also taught the elementary crops course one semester. With three major responsibilities, he was the most overworked faculty member for the next several years.

The change in Agronomy extension operations from work directly with individual farmers to concentration on groups and on county agents, industry personnel, and others who advise farmers was well under way by the beginning of this period. In 1955-56, Agronomy extension sponsored or participated in the following:

1. Seven 2-day schools for county agents and SCS personnel
2. Eleven seed and fertilizer dealer meetings - 725 participants
3. Demonstrations and trials by county agents
    a. Eighteen "plow-plant" trials
    b. Twenty demonstrations of nitrogen fertilization
    c. Three tillage and subsoil shattering trials
    d. Forage fertility demonstrations - 210 kits distributed
4. Field day at the Aurora Farm - 360 attended
5. Weed days in cooperation with Vegetable Crops
6. Arnot 4-H Camp - Soil and Water Conservation
7. Land judging - 42 schools competed
8. A winter school for farmers on matching crops to soils
9. Forage legume trials to demonstrate the impact of soil drainage

By 1955, soil testing had expanded, though laboratory facilities were limiting. Farm and Home Week remained a major event. Rural Vocational Agriculture teachers were enlisted to cooperate on crop demonstrations by Future Farmers of America; 120 schools participated in 1956-57. Reeshon Feuer, who had just joined the extension faculty, began development of county soil association maps. These were used in an educational program with agents to instruct them on the character of soil resources of their counties in relation to crop adaptation and management.

During the years that followed, the extension faculty worked with:

Farm Managers of State institutions
Soil Conservation Service personnel
Farm and Home Administration personnel
New York Bankers Association
Fertilizer manufacturers
Vocational Agriculture teachers
Agricultural and Technical Institutes
State legislative committees
Federal Agricultural Stabilization and Conservation Service
Soil Conservation District directors
New York State Department of Conservation

Cornell Recommends, started in 1949, became the major vehicle for distribution of agronomic recommendations. By 1962-63, it was printed in an edition of 32,000 copies, and six-page separates from it were printed in editions of 20,000 for distribution. After 1960, *Cornell Recommends* largely replaced the 20 or more popular articles published annually during the late 1950s.

The Northern New York project described under Research was the focus of extension for that region from 1962 onward. The Regional Research and Extension project, also described under Research, was intended to serve Agronomy extension in the same manner for the Hudson Valley, Allegheny Plateau, and Western New York. Among these three regions, the extension phase was notably successful only in the Hudson Valley. The Northern New York project remained by far the most effective of the four, however. By 1968-69, the Department could cite a 40% increase in corn, construction of 550 new silos, feed for 14,000 additional milk cows, and an increase in milk production valued at $7,000,000 per year. Considering the fact that most College faculty, county agents, and the farmers had been convinced that corn, wheat, and alfalfa had little place in Northern New York, substantial credit to the project appeared to be justified.

As extension's role became increasingly complex with more sophisticated technology and complicated economic, social, and environmental problems, its structure inherited from earlier years gradually decreased in effectiveness. A. A. Johnson instituted administrative changes after he succeeded to the directorship in 1962 to provide leadership for the increasing numbers of the county extension staff. The central College administrative extension staff grew rapidly under his Directorship to a bureaucracy of assistant directors and program leaders. While the impact on county operations may have been all that was desired, the Agronomy extension specialists were not always pleased with its effects on their activities. At first, some program leaders of the central office expected the departmental specialists to work exclusively through them in contacts with county agents, though the leaders had no administrative authority over the specialists except through the department head. On a few occasions Agronomy specialists rebelled. At the same time, the leaders were very helpful in organizing agent training schools and interdepartmental programs for agents. As time passed, mutually acceptable relationships developed.

Administrative devices could not correct the primary problem of inadequate technical competence of county agents for the technical agriculture of the 1960s. Complaints of the best commercial farmers were frequent, and the generalist agents found themselves at a disadvantage with some specialists of industry and some farmers. Agronomy's agent training had helped, but except for a handful of agents who concentrated on agronomic subject matter, the broad spectrum of subject matter that the generalist agents were expected to cover prevented them from becoming expert in any one field. In 1963-64, the College assembled a special *ad hoc* committee composed

of representatives from departments as well as from extension administration to study the extension program and recommend solutions for its deficiencies. Its report in 1964-65 recommended a series of specific programs, including not only some that continued the former Commodity Committee functions but also such areas as Community Resource Development and Environmental Quality. A new Field Crops Program was proposed. The report also recommended reorganization of the agent staff to provide for specialization within multi-county units. Four-man teams were recommended, including (1) an extension leader, effectively a generalist; (2) a home economist; (3) a 4-H or youth agent; and (4) an agricultural agent. Depending on the area, one agricultural agent might specialize to accommodate the predominant type of farming, or two or more specialists might serve different subject matter areas across 2 to 4 counties. By 1968-69, the reorganization was well advanced, in most instances representing a compromise between the county staffing considered desirable and that feasible with funds available. Agricultural teams of dairy and field crops specialists had been formed for some multi-county areas in the major dairy regions of the State.

This created a new and much more efficient staffing for agent training. Agronomy subject matter specialists could focus their attention on a small number of agents who not only had time but also incentive for training in depth. Regular in-service training schools of a week or more were held annually on campus, during which agents could select specialized courses. Agronomy drew on the research and teaching faculty as well as extension specialists to present lectures on specialized subjects. Training was not confined to the formal schools. Informal one-on-one training continued throughout the year whenever Agronomy specialists had occasion to work with agents on specific problems. Written material was used in mailings. *Cornell Recommends* was used as a training resource, specialists presenting data on which recommendations were based and explaining reasons for the conclusions that had been drawn. Initially the training had to be reoriented to existing agent staff in new roles as specialists. Many were deficient in scientific background. As new agents were employed, field crops specialists were chosen from applicants with more advanced agronomic background. Special schools were held for new agents. These were not focused so much on specialist training as to provide a broad background on which specialized training could be built.

Under the new extension organization, Agronomy specialists were active in a number of programs besides those of the old commodity committees to which it had contributed. F. N. Swader, who replaced Feuer in 1967-68, shifted the emphasis of that position from soil resources to soil arid water management. Fertig represented Agronomy and its herbicide studies on the College program involving chemical pesticides, for which Professor Dewey of Entomology was leader. After Gerald Olson joined the faculty in 1966-67, he contributed actively to Community Resource Development and regional planning through interpretation of soil survey information. Professor Krenzin was the Department's representative for the Youth (4-H) program.

Although not specifically extension activities, two events of this period are mentioned here, for they are worthy of note. In 1960, Professors Cline, Nielsen, Feuer, and Brady were responsible for Tour 1 of the 7th International Congress of Soil Science held at Madison, Wisconsin. Five bus loads - about 200 participants - were assembled in New York City and conducted on a 9-day tour to Madison, Wisconsin, with appropriate stops en-route. Accommodations were pre-arranged and prepaid. The first night's lodging was at Cornell. The photograph on page 125 shows one of the activities.

In August 1962, the Department and Plant Breeding were hosts to some 3,000 members of the American Society of Agronomy at its 55th annual meeting held at Cornell. The entire faculty devoted an enormous amount of time and energy to the local arrangements, including housing and dining, conference rooms, tours, and the innumerable details necessary in preparation for such an event. Faculty wives were by no means the least involved, as they took major responsibility for activities of the visiting ladies.

L. Agronomy in the 1970s

On July 1, 1971, the name of the College was changed officially from New York State College of Agriculture to "New York State College of Agriculture *and Life Sciences*". The Dean wrote in the 1971-72 annual report that "Without detracting from the college's traditional role in serving commercial agriculture, the words (and Life Sciences) express a new sense of direction for several of its programs". That new sense of direction applies equally to the Department of Agronomy. Service to commercial agriculture of the State and nation remained the centerpiece of Agronomy's program during the 1970s. A highly significant part of the Department's effort, however, was expended on projects that can be characterized as "extracurricular" relative to the traditional role of the faculty prior to 1965.

During the 5-year period from 1973-74 through 1977-78, financial support from all sources for the Department amounted to $13,474,500. Forty-eight percent of this was from State appropriations; 12% from federal formula funds; 10% from College income; and 30% from grants and contracts. The Departmental budget from State appropriations and federal formula funds amounted to $1,242,600 in 1970-71. By 1980, that had grown to $2,206,700, an 80% increase. In 1970-71 grant and contract funds available (see Appendix III) added $519,000 to the public appropriations. By 1980, that had grown to about $1,043,000, approximately a 100% increase. In the same period of time, the consumer price index increased about 115%. Relative to the consumer price index as a measure of inflation, the Department lost real financial support from the public sector but almost held its position in funds from grants and contracts. The consumer price index, however, is obviously not an accurate measure of inflation of departmental costs. During the decade, 23 full-time employees were added to the payroll. Salaries did not keep pace with inflation.

Departmental physical facilities during the decade were probably better than those of any comparable department in the country. The Bradfield-Emerson complex had been completed in 1968. The Leland fieldhouse and new herbicide facilities at Caldwell Field were completed 2 years later. The interdepartmental Guterman controlled environment facilities and new greenhouses were occupied. Facilities at the Aurora and Mount Pleasant farms had been developed over the years and provided excellent working conditions. To be sure, the faulty exterior brick work and undependable elevators of Bradfield Hall became the butt of campus jokesters and were very costly to correct. The fume hoods failed to meet upgraded safety standards. Nevertheless, the Department enjoyed facilities far superior to anything it had had before and could no longer claim that as a cause of any lack of productivity.

Completion of the Bradfield-Emerson complex and the new facilities at Caldwell Field had been expected to catalyze a burst of research productivity. That did not occur immediately, though there were exceptions among the faculty. It seemed as if many were not prepared to make the adjustment from poverty to riches. It is difficult to assign reasons with assurance, but it appears probable that the factors described below contributed.

Public concerns were changing rapidly during the late 1960s and with those changes came shifts in the purposes for which research money was available. Much of that which was potentially available required submission of proposals for competitive grants and contracts within limitations of purpose imposed by the funding agencies. Faculty could no longer rely on the traditional budgetary process, the burden of which had been carried by the Department Head. Faculty initiative and persistence were rapidly becoming the keystone for success in the scramble for competitive grants and contracts on which so much of the research support was to depend during the 1970s. Control of the kinds of research which could be undertaken was shifting from the faculty to the funding agencies. Faculty members could no longer select those problems which they judged to be important with reasonable assurance of support unless their judgements coincided with the goals of the granting and contracting agencies.

These changes were superimposed on a faculty dominated in terms of prestige if not of numbers by aging individuals from the Bradfield era or the years immediately following. During the 12 years from 1968 to 1980, 13 of the senior faculty retired or died:

1968-69.	Dawson, organic soils - died
	Free, USDA soil conservation research - retired
1971-72.	Kerr, State Soil & Water Conservation Committee - retired
	Krenzen, crops extension - retired on disability
1973-74.	Peech, soil chemistry - retired
	Cline, soil genesis & classification - retired
1974-75.	MacDonald, pastures and forage - retired
1975-76.	Zwerman, soil conservation - retired
	Drosdoff, international soils - retired
	Allaway, U.S. Nutrition Laboratory - retired
1977-78.	Musgrave, crop ecology - retired
1978-79.	Stone, forest soils - retired
	Lemon, USDA - microclimatology - retired

Several of the individuals listed remained as productive as ever up to the date of their retirement. Some had passed their most productive years. Most importantly, these individuals had been accustomed to freedom in choice of research and little personal involvement in its financing. They had to learn the art of grantsmanship.

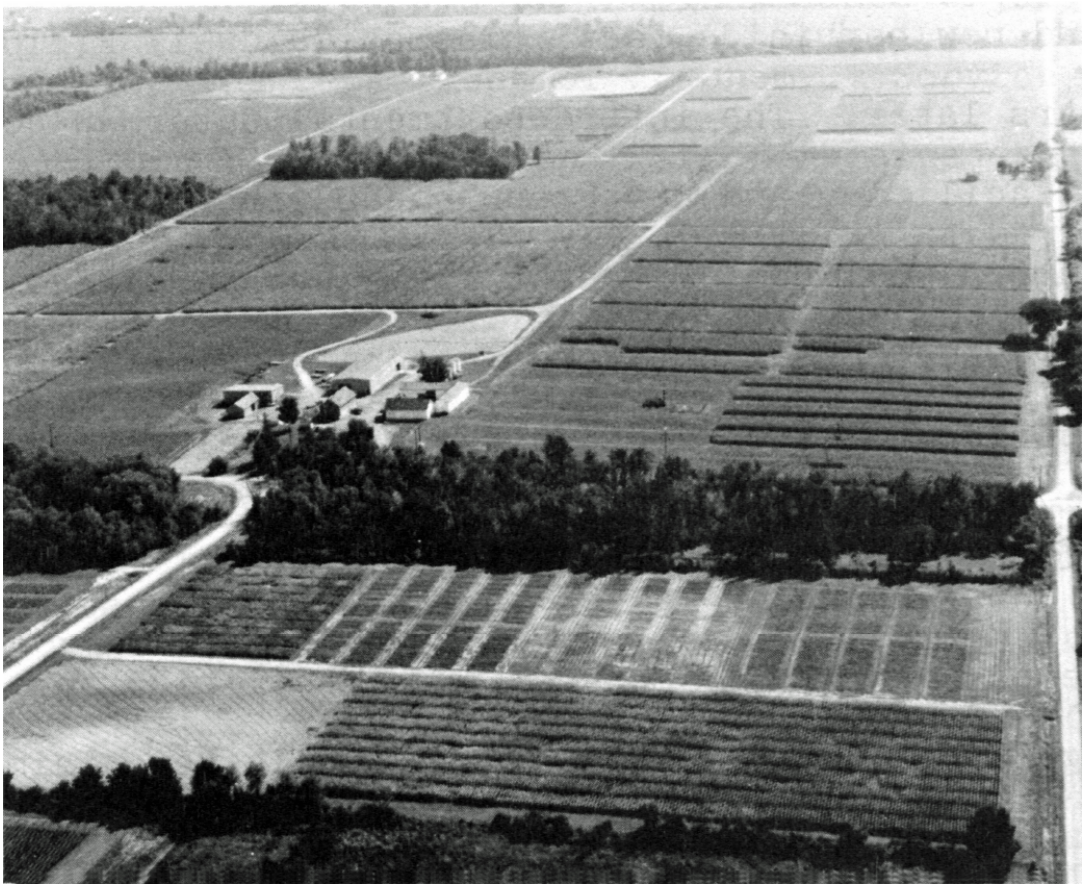
The young faculty, too, had to learn that art and faced the further handicap of lack of established reputations in the scientific community. There was some indication that a degree of discrimination was exercised by review panels independently of the quality of the proposal. It soon became evident that personal contact with representatives of the funding agencies was extremely important in the approval process, especially for the younger faculty.

The Department was, in effect, in a holding pattern for research during the late 1960s prior to completion of the Bradfield-Emerson complex. That status took time to correct when sources of funding had changed during the interval. Lack of facilities had dictated minimal laboratory-dependent research for ten years. Furthermore, the faculty had committed an enormous amount of time to the details of the new building itself and its furnishings and equipment during the planning and construction phases. This largely came from time that would normally have been committed to research. In addition, the on-going programs in several areas were interrupted by extra-curricular faculty assignments: Miller as Dean of the University Faculty, Musgrave to the Philippines for 2 years, Cline as Department Head for 7 years, Scott on the sugar beet project for 4 years. Dawson's death and Fertig's resignation late in the 1960s brought 2 young and inexperienced replacements. All of these factors probably contributed to a faculty largely unprepared to make the necessary adjustments. It was not that productivity decreased; it did not grow at the expected rate.

Acceleration of research productivity during the 1970s can be seen in the history of publications during the decade:

Year	Articles in Professional Publications	Articles in Popular Publications	Books and Contributions to Books	Departmental Publications, Reports	Ph.D. Theses
1970-71	41	31	10	24	11
1971-72	48	10	9	57	9
1972-73	60	23	5	44	10
1973-74	51	8	12	48	11
1974-75	75	29	9	39	15
1975-76	45	27	6	42	13
1976-77	60	25	11	65	8
1977-78	67	30	11	65	8
1978-79	66	26	10	74	9
1979-80	93	17	19	49	1

Mount Pleasant experimental farm, 1971.



Aurora experimental farm, 1971.

Caldwell Field, 1971.

The numbers of publications given above were obtained from lists in the Annual Reports of the College of Agriculture and Life Sciences.

Evidence for the decision to credit some articles to the first or second column was not always obvious in the listing. Those credited in the first column include contributions in refereed scientific journals, published proceedings of scientific meetings, and those articles in non-refereed publications judged to have been reports or reviews of research findings. The latter are the ones whose classification in the table remained in doubt. Many were entered in the second column, which also includes all articles in publications for the general public, including such media as news releases, *Extension News*, and farm papers. The column headed "Departmental Publications and Reports" includes processed materials such as "Agronomy Mimeos" and reports issued in quantity for more than internal distribution. The content of these ranges from preliminary reports of research findings to popular articles. Another individual would probably have classified some articles differently. The large increase in column 1 from 1978-79 to 1979-80 is probably an anomaly like that in 1974-75.

The distribution of research publications among subject matter areas is of interest:

	Soils Faculty			Crops Faculty			Atmos. Sci. Fac.
Year	Total	Payroll Faculty	Joint Appts.	Total	Payroll Faculty	Joint Appts.	Total
1970-71	30	25	5	10	6	4	1
1979-80	55	48	7	36	24	12	2

In soils, the publication output from microbiology remained high throughout the period but was especially large in the later years when funding was at its height. In both soils and crops, however, much of the increase came from young faculty members just reaching their years of high productivity. In the crops area, the number of individuals with major research responsibilities had increased. The addition of Professor Steponkus to faculty on the departmental payroll in 1976-77 and of Leopold as Adjunct Professor in 1977-78, both as mature researchers, contributed a disproportionate share of the increase for crops faculty.

Personnel

The total roster of the Department grew from 238 in 1970-71 to 282 in 1979-80 due mainly to an increase in support personnel and graduate students (see the table, p. 139). This, in turn, was related in part to funds available from grants and contracts for faculty support. The number of full-time faculty on the departmental payroll actually decreased. Part of this reflects completion of projects supported by AID funds, which employed 2 employees at professorial rank from 1970-71 to 1974-75 and one from 1975-76 to 1978-79. Retirement of Professor Kerr as Executive Secretary of the New York State Soil and Water Conservation Committee vacated a position that was filled at a non-professorial level. Retirement of Professor Zwerman in 1975-76 vacated the position in soil conservation,

which the College Administration chose not to fill as part of the State-mandated reduction in staff. The salary was, in fact, used to support Dr. Pack as Senior Research Associate for atmospheric science.

Summary of Faculty, Staff, and Graduate Students, Department of Agronomy, 1970-71 to 1979-80.

		Faculty Professorial						Graduate Students		Other Non-Professorial
Year	Total Roster	Total	Full-time payroll	Joint, Courtesy Adjunct	Emeriti	Admin. Leave	Extended Leave	Total	Asst's	
1970-71	238	43	29	7	3	2	2	67	41	128
1971-72	250	43	30	7	3	2	1	73	37	134
1972-73	242	41	29	7	3	2	0	71	35	130
1973-74	254	42	29	7	4	2	0	76	39	136
1974-75	261	46	29	8	7	2	0	74	39	141
1975-76	262	45	28	7	8	2	0	79	35	138
1976-77	267	45	28	7	9	1	0	80	39	142
1977-78	282	47	28	8	10	1	0	77	34	158
1978-79	289	46	27	8	10	1	0	85	40	158
1979-80	282	47	26	9	11	1	0	81	40	154

Members of the faculty roster are listed by years and subject matter areas in the table on pages 140 through 142. Members who left, were newly appointed, or changed functions during the period are mentioned in the text.

Among the faculty listed under soils, Dr. Murray McBride replaced Professor Peech in soil chemistry in 1975-76 upon completion of his Ph.D. at Michigan State University. Professor Stone's position in forest soils was not filled until shortly after the end of this period, and Susan Riha, his replacement, is not listed in the table. A Ph.D. in soil physics related to forestry from Washington State University, she became the first female faculty member of the Department in 1980-81. John Duxbury, a Ph.D. from the University of Birmingham, England, had served as Professor Dawson's Research Associate from 1967 until his appointment as Dawson's successor for organic soils in 1970-71. John Peverly replaced Professor Mulligan for aquatic studies in 1971-72. He is listed with the soils faculty as his training was in soil chemistry and plant physiology at the University of Illinois. Mulligan is listed with the crops faculty for the preceding period as he was trained in biology. Armand Van Wambeke, a mature soil scientist from the University of Ghent, Belgium, replaced Professor Drosdoff in 1976-77 for the international program in soil science. He had had long experience in the former Belgian Congo and in South America and had served in the international position for 6 months in 1965-66. The AID contract for studies of soil fertility in the humid tropics under Professor Drosdoff had just become effective as this period opened. Richard Fox, who had served North Carolina State University in Peru was given a terminal faculty appointment in 1970 under that contract as the Department's project supervisor in Puerto Rico. Robert M. Weaver, a 1970 Ph.D. from the University of Wisconsin was given a terminal faculty appointment for work in mineralogy of the soil studied under that contract. Hariharan Eswaran was a Visiting Assistant Professor under Professor Van Wambeke from 1976-77 to 1978-79 on a special AID contract for appraisal of soil resource inventories in developing countries. Dr. Eswaran was a Malaysian who had completed the Ph.D. at the University of Ghent.

Members of the faculty roster are listed by years and subject matter areas in the table on pages 140 through 143. Members who left, were newly appointed, or changed functions during the period are mentioned in the text.

Soils Faculty of the Department of Agronomy according to subject matter area or function, 1970-71 to 1979–80.

SOILS Part 1 (1970-71 to 1974-75)

Subject or Function	1970-71	1971-72	1972-73	1973-74	1974-75
Department Chairman	Wright	Wright	Wright	Wright	Wright
SOILS					
Genesis & Class.	Arnold	Arnold	Arnold	Arnold	Arnold
Chemistry	Peech	Peech	Peech	Peech	
Physics	Fritton	Miller	Miller	Miller	Miller
Microbiology	Alexander	Alexander	Alexander	Alexander	Alexander
Fertility	Bouldin	Bouldin	Bouldin	Bouldin	Bouldin
Forest Soils	Stone	Stone	Stone	Stone	Stone
Organic Soils	Duxbury	Duxbury	Duxbury	Duxbury	Duxbury
Conservation	Zwerman	Zwerman	Zwerman	Zwerman	Zwerman
Aquatic Studies		Peverly	Peverly	Peverly	Peverly
Teaching, Elem.	Scott & Lathwell	Scott & Lathwell	Lathwell	Scott & Lathwell	Scott & Lathwell
Extension	Reid Swader Olson	Reid Swader Olson	Reid Swader Olson	Reid Swader Olson	Reid Swader Olson
State Conserv. Comm.	Kerr	Kerr	Croney	Croney	Croney
International	Drosdoff Weaver Fox	Drosdoff Weaver Fox	Drosdoff Weaver Fox	Drosdoff Weaver Fox	Drosdoff Weaver Fox
Extracurricular					
Administration	Brady	Brady	Brady		
International	Feuer Scott Lathwell Bouldin	Feuer Scott Lathwell Bouldin Cline	Scott Lathwell Bouldin Cline	Scott Lathwell Bouldin Cline Brady	Lathwell Bouldin Brady
Environmental Quality & Health	Alexander Duxbury Zwerman Bouldin	Alexander Duxbury Zwerman Bouldin	Alexander Duxbury Bouldin	Alexander Bouldin Swader	Alexander Swader Olson Stone Weaver
Joint Appointments					
US Nutrition Lab.	Allaway Kubota Grunes	Allaway Kubota Grunes	Allaway Kubota Grunes	Allaway Kubota Grunes	Allaway Kubota Grunes
USDA, ARS	Lemon	Lemon	Lemon	Lemon	Lemon
New York State Agr. Exp. Sta. Geneva	Vittum	Vittum	Vittum	Vittum	Vittum

SOILS Part 2 (1975-76 to 1979-80)

Subject or Function	1975-76	1976-77	1977-78	1978-79	1979-80
Department Chairman	Lucey	Lucey	Lucey	Lucey	Lucey
SOILS					
Genesis & Class.	Arnold	Arnold	Arnold	Arnold	Arnold
Chemistry	McBride	McBride	McBride	McBride	McBride
Physics	Miller	Miller	Miller	Miller	Miller
Microbiology	Alexander	Alexander	Alexander	Alexander	Alexander
Fertility	Bouldin	Bouldin	Bouldin	Bouldin	Bouldin
Forest Soils	Stone	Stone	Stone	Stone	
Organic Soils	Duxbury	Duxbury	Duxbury	Duxbury	Duxbury
Conservation	Zwerman				
Teaching		(Allaway)	(Allaway)	(Allaway)	(Allaway)
Aquatic Studies	Peverly	Peverly	Peverly	Peverly	Peverly
Teaching, Elem.	Scott & Lathwell	Scott & Lathwell	Scott & Lathwell	Scott & Lathwell	Scott & Lathwell
Extension	Reid Swader Olson	Reid Swader Olson	Reid Swader Olson	Reid Swader Olson	Reid Swader Olson
State Conserv. Comm.	Croney	Croney	Croney	Croney	Croney
International	Drosdoff Weaver	Van Wambeke Eswarn	Van Wambeke Eswarn	Van Wambeke Eswarn	Van Wambeke
Extracurricular					
International	 Lathwell Brady	Alexander Lathwell	Alexander Lathwell	Alexander Lathwell	Alexander Lathwell
Environmental Quality & Health	Alexander Duxbury Swader Olson Stone	Alexander Duxbury Swader Olson	Alexander Duxbury Swader Scott Croney	Alexander Duxbury Bouldin Swader Croney	Alexander Duxbury Bouldin Croney
Joint Appointments					
US Nutrition Lab.	Allaway Kubota Grunes	Kubota Grunes	Kubota Grunes	Kubota Grunes	Kubota Grunes
USDA, ARS	Lemon	Lemon	Lemon	Lemon	Sinclair
New York State Agr. Exp. Sta	Vittum	Vittum	Vittum	Vittum	Vittum

Field Crops and Atmospheric Sciences Faculties of the Department of Agronomy according to subject matter area or function, 1970-71 to 1979–80.

FIELD CROPS & ATMOSPHERIC SCIENCES Part 1 (1970-71 to 1974-75)					
Subject or Function	1970-71	1971-72	1972-73	1973-74	1974-75
FIELD CROPS					
Ecology-Physiology	Musgrave	Musgrave	Musgrave	Musgrave	Musgrave
Pastures-Forage	MacDonald	MacDonald	MacDonald	MacDonald	MacDonald
Forage-Feed	Fick	Fick	Fick	Fick	Fick
Protein & Oilseeds	MacDonald	MacDonald	MacDonald	MacDonald	MacDonald
Cereals					Knapp
Weeds	Duke	Duke	Duke	Duke	Duke
Seed Physiology	Obendorf	Obendorf	Obendorf	Obendorf	Obendorf
Stress Physiology					
Teaching, Elem.	Lucey & Obendorf	Lucey & Obendorf	Lucey & Obendorf	Lucey & Obendorf	Lucey & Obendorf
Northern New York	Lucey	Lucey	Lucey	Lucey	Lucey
Extension	Seaney Krenzin Lucey	Seaney Krenzin Lucey	Seaney Lucey	Seaney Lucey	Seaney Knapp Lucey Hahn
Extracurricular					
Administration	Kennedy	Kennedy	Kennedy	Kennedy	Kennedy
International					
Joint Appointments					
USDA, ARS	Linscott	Linscott	Linscott	Linscott	Linscott
Plant Breeding	Pardee	Pardee	Pardee	Pardee	Pardee
ATMOSPHERIC SCIENCES					
	Dethier Knapp	Dethier Knapp	Dethier Knapp Paine	Dethier Knapp Paine	Dethier Knapp Paine Pack

FIELD CROPS & ATMOSPHERIC SCIENCES Part 2 (1975-76 to 1979-80)					
Subject or Function	1975-76	1976-77	1977-78	1978-79	1979-80
FIELD CROPS					
Ecology-Physiology	Musgrave	Musgrave	Musgrave		Setter
Pastures-Forage					
Forage-Feed	Fick	Fick	Fick	Fick	Fick
Protein & Oilseeds	Wright	Wright	Wright	Wright	Wright
Cereals	Knapp	Knapp	Knapp	Knapp	Knapp
Weeds	Duke	Duke	Duke	Duke	Duke
Seed Physiology	Obendorf	Obendorf	Obendorf	Obendorf	Obendorf
Stress Physiology		Steponkus	Steponkus	Steponkus	Steponkus

Teaching, Elem.	Lucey & Obendorf	Hahn & Obendorf	Hahn & Obendorf	Lucey & Obendorf	
Northern New York	Lucey	Lucey	Lucey	Lucey	Lucey
Extension	Seaney Knapp Hahn	Seaney Knapp Hahn	Seaney Knapp Hahn	Seaney Knapp Hahn	Seaney Knapp Hahn
Extracurricular					
Administration	Kennedy	Kennedy	Kennedy	Kennedy	Kennedy
International	Wright	Wright	Wright	Wright	Wright
Joint Appointments					
USDA, ARS:					
Weeds	Linscott	Linscott	Linscott	Linscott	Linscott
Crop Physiology				Zobel	Zobel
Plant Breeding	Pardee	Pardee	Pardee	Pardee	Pardee
Boyce Thompson			Leopold	Leopold	Leopold
ATMOSPHERIC SCIENCES					
	Dethier Knapp Paine Pack	Dethier Knapp Paine Pack	Dethier Knapp Paine Pack	Dethier Knapp Paine Pack	Dethier Knapp Paine Pack

Among the soils faculty listed under extracurricular activities, Professors Scott, Bouldin, and Lathwell were major contributors to the AID soil fertility project mentioned above from 1970-71 to 1974-75, and Lathwell continued activities related to the original contract until 1978-79. Scott spent 1972-73 in Puerto Rico. Lathwell assumed the project leadership after Drosdoff's retirement in 1975-76. Lathwell also continued to be responsible for a State contract for studies of Marsh ecology, which had been initiated during the preceding period, until 1971-72.

From 1971-72 until his retirement in 1973-74, Professor Cline managed an AID grant for development of Cornell expertise in soils of the tropics. Among several activities under that project, the following Visiting Professors and Scientists were brought to the Department for lectures and consultation:

F. Jurion	Former Director General of I.N.E.A.C., Belgian Congo
C. E. Kellog	Deputy Administrator, U.S.D.A. Soil Conservation Service
J. K. Coulter	Tropical Soils Advisor, Rothamsted Experimental Station
E. W. Russell	University of Reading
J. A. Silva	University of Hawaii
S. R. DeDatta	International Rice Research Institute
F. Abruna	ARS, USDA, Puerto Rico

M. Dewan	Soil Scientist, FAO
C. Zamora	ONERN, Peru
M. Camargo	EMBRAPA, Brazil
C. S. Ofore	Soil Research Institute, Ghana
C. Charreau,	IRAT, France

Also in the International area, Professor Feuer continued work in the Philippines on extended leave until he retired in 1971-72. Professor Brady continued extended leave as Director of the International Rice Research Institute in the Philippines after resigning as Director of Research at the College. He retired officially in 1975-76. Professor Alexander conducted a major project involving several hundred thousand dollars on nitrogen in the tropics under contract with AID from 1976 through the end of this period.

The nine faculty members in soil science who devoted a major part of their time and energy to environmental quality and health-related problems are listed under extracurricular activities in the table of faculty. They were supported by 28 grants and contracts aggregating about $2,400,000, which are listed in Appendix III by years. More detail is provided about the character of the work by individual faculty members in the section on research.

Among the field crops faculty who continued from the preceding period, only Professors Duke and Obendorf continued to the end of the period without major changes in functions. Professor Musgrave retired in 1977-78 and was replaced in 1979-80 by Dr. Tim L. Setter. Dr. Setter had just completed his Ph.D. at the University of Minnesota. Professor MacDonald retired in 1975. That position was not filled, as an extra position had been created when Professor Wright succeeded to the Department chairmanship (formerly headship) in 1970. Gary Fick, a Ph.D. in plant physiology from the University of California (Davis), filled that position. Professor Wright served as Chairman until 1975. On relinquishing those duties, he accepted responsibilities for international work and studies of oil and protein crops, which Professor MacDonald had covered before his retirement.

In 1976-77, Professor Peter L. Steponkus transferred to Agronomy from the Department of Floriculture and Ornamental Horticulture, where he had served since 1968. He brought with him an ongoing program on stress physiology of plants, supported by grant funds, which he quickly adapted to agronomic crops.

Professor Krenzin was retired on disability in 1971-72. He had been laboring under a severe illness which had not been recognized for several years. His position was not filled, due to existing financial restrictions of the College, until 1974-75. At that time the position was funded and Dr. Wayne Knapp, who had just completed his Ph.D. at Purdue, filled it with 70% extension responsibility. He brought much-needed attention to the cereal crops. At the same time, Dr. Russell Hahn, who had just completed his Ph.D. at Texas A&M University, was appointed to a new Extension Associate position for weeds. The teaching, research, and extension responsibilities for the growing subject had become too great for Professor Duke to handle alone.

When Professor Lucey succeeded Professor Wright as Department Chairman in 1975, he relinquished the extension project leader's role to Professor Seaney. He had been handling that responsibility as well as project leadership for the Northern New York Research and Extension program and teaching one semester of the elementary crops course. He retained the Northern New York leadership role, and in 1975-76 and 1978-79, he taught one semester in emergency situations.

Extracurricular functions of the crops faculty were confined to Professor Kennedy's administrative positions and Professor Wright's international contributions. Professor Kennedy had held various administrative positions of the College and University since 1959 and was Vice Provost of the University when this period began. In 1972, he succeeded Charles Palm as Dean of the College of Agriculture and Life Sciences. In 1978, he left that post to serve as Provost of the University.

Professors Linscott of USDA and Pardee of the Plant Breeding Department continued under joint appointments throughout the period. In 1977, just prior to the opening of the Boyce Thompson Institute on campus, its new head, Dr. Carl A. Leopold, was appointed Adjunct Professor of crop physiology in the Department. He had had a long and distinguished career with the Hawaiian Pineapple Company, Purdue University, the National Science Foundation, and the University of Nebraska. In 1981 at the end of this period, two of Professor Leopold's staff, Doctors Alva App and Thomas La Rue were also given adjunct professorships. Following Professor (courtesy) Lemon's retirement, the character of the ARS project moved further toward plant aspects, and Richard Zobel joined the group as a crop physiologist. He was granted a courtesy assistant professorship in the Department in 1979-80.

It is appropriate to review the events that contributed to staffing of the Meteorology unit here, though some occurred prior to this period. As early as 1959, a "Committee of Seven" appointed by the Department Head was charged with review of the status of meteorology in the Department. That committee recommended a departmental commitment to increasing the meteorology faculty. It was not until 1965, however, that the Department was successful in obtaining a new line position. This was filled by Dr. Winton Covey who had been serving as Research Soil Scientist with Professor Lemon's USDA micrometeorology project on the campus. Professor Covey became deeply disturbed by events associated with the student unrest of 1967-68 and was so disillusioned by the prevailing philosophical atmosphere on campus that he resigned effective August 31, 1968. The position remained vacant during the winter of 1968-69 and was filled by Dr. Warren Knapp from the University of Wisconsin in 1969.

Although a written record has not been found, the writer recalls that the Agronomy faculty agreed at some time, either at the time of the "Committee of Seven" or shortly thereafter, to work for the unit as a separate department. It was agreed by the faculty, including Professor Dethier, however, that new positions for meteorology should not come at the expense of soils or crops positions. Consistent with that policy, Professors Dethier and Knapp embarked on development of a greatly expanded meteorology curriculum which would be recognized as fulfilling requirements for professional atmospheric scientists. This began when the unit occupied its new expanded facilities in Bradfield Hall in the fall of 1968. By 1971-72, the unit taught 857 student-credit hours in 17 courses - more than those taught by 7 recognized departments in the College. A new position was assigned to meteorology that year. It was filled by Dr. Douglas Paine, a 1971 Ph.D. of the Albany unit of SUNY, first as an Instructor but in 1972-73 as Assistant Professor. The following year, 1973-74, the position of the State Climatologist stationed at Cornell was abolished by the National Weather Service, and Dr. Boyd Pack, the incumbent, was appointed Research Associate in Meteorology. His appointment was on College income funds committed only through 1977.

Consistent with the Department's policy for an autonomous meteorology unit, Professor Wright began to delegate leadership for meteorology to Professor Dethier when Professor Wright became Department Chairman in 1970. This included preparation and presentation of the meteorology budget as a section of Agronomy's budget. The positions for Drs. Paine and Pack were the results of their joint efforts. In 1973-74, the unit changed its designation from "meteorology" to "atmospheric sciences", which became established (probably without official College approval) by its use on letterheads, in college announcements, and in various releases.

The agreement that growth of atmospheric sciences should not be at the expense of soils or crops had gradually eroded over the years. With the heavy workload of meteorology staff, some of the services Dr. Pack had performed for the soils and crops sections of the Department as State Climatologist were withheld when Dr. Pack joined the unit in 1973-74. At a faculty meeting of April 19, 1977, the Atmospheric Sciences faculty contended that one of two vacant positions (one in soils and one in crops) should be assigned to Atmospheric Sciences because of their workload. This would have increased the Atmospheric Sciences faculty by two, as another new position had been assigned to the unit in the College budget. At a subsequent meeting (April 28, 1977), however, the faculty voted against that proposal but agreed to work for two new positions instead of one. Nevertheless, when Dr. Pack's funding expired in July 1977, the College assigned the salary of the position in soils vacated by Professor Zwerman on June 30 to support Dr. Pack until 1980, sacrificing the work in soil and water conservation for at least 3 years. (That position is still vacant at this writing, 1982). Temporary funds were allocated by the College to employ an instruc-

tor part-time for Zwerman's 2-credit course in the spring (see Allaway in the table of faculty). Efforts to fill the new atmospheric sciences position that had been authorized failed to attract a candidate suitable for its job description.

To complete the record, events later than 1979-80 and beyond the date covered generally by this document should probably be included. Partly as a consequence of unsuccessful efforts to provide a meteorologist for the College team dealing with integrated pest management, Dean Call, who succeeded Dean Kennedy, has overruled the Department's earlier policy concerning an autonomous Atmospheric Sciences unit. It is possible that an overly zealous letter-writing campaign by parents of meteorology students prompted the Dean's precipitous action. The College policy at this writing is for a unit dedicated to agricultural meteorology and climatology as an integral part of the Department of Agronomy.

As the period involved considerable recruitment of new faculty, the impact of the affirmative action and immigration regulations of the 1970s is worth recording. Prior to the 1970s, it was customary to advertise faculty vacancies, review the records of applicants, interview those most promising, and with approval of the College Administration, offer the position to the qualified individual most favored by the faculty. The writer is not aware of any conscious discrimination against women or minorities during his 40 years of association with the faculty, but neither is he aware of any instance in which a woman or a member of a minority group who was a U.S. citizen was a reasonably viable candidate on professional grounds. Few were trained in the field and very few, if any, normally applied.

With the much-needed affirmative action program of the 1970s, it became necessary to document (a) that a vacancy had been advertised in a manner that would attract the attention of women and minorities, and (b) that the choice of the faculty did not by-pass an applicant from those groups having qualifications equal or superior to those of other applicants. With increasing unemployment in the United States, the Department of Labor also increased restrictions on employment of foreign nationals. The regulations did not change the pattern of employment in the Department, for there were still few qualified applicants from these groups, but it did increase the paper work enormously and extended the time involved in recruitment from a few months to sometimes more than a year. At this writing, the Department still has no faculty member from a minority group. Its one female faculty member was clearly superior among the applicants and would have been hired regardless of regulations.

The problems of recruitment imposed by the new rules can be illustrated with an extreme instance, the recruitment of Professor Van Wambeke. Professor Drosdoff was approaching retirement age when recruitment began for the international soils position. The job description was circulated, but had to be withdrawn, rewritten and re-circulated, because the pronoun "he" had been used according to long established custom that the word may be used for anyone, i.e. the man or person; the fact that "he" is used in that way in statutes of the US by statutory provision not withstanding (Webster's international dictionary). After this delay, credentials of applicants were reviewed, and it was the unanimous judgment of the faculty that no US citizen fully qualified for the position was among them. Dr. Van Wambeke had spent 6 months in the position during the mid-1960s and met all criteria. Informal inquiries established that he would consider coming from Belgium under proper conditions, which could be met. With approval from the College Administration proceedings were started for immigration authorization. At this point the Department of Labor refused approval on grounds that qualified US citizens were available. The Department cited a list, which turned out to be the list of registration for employment assembled by the American Society of Agronomy and had been included in the list the Department had used. It was then necessary to document the fact that the individuals listed had been considered and rejected for valid reasons. With approval of the Labor Department in hand, the Immigration Service then required certification of character from authorities in the several countries where Dr. Van Wambeke had worked - going back to his work in the former Belgian Congo from 1951-1960. That country had become Zaire with its independence from Belgium and the old records were not available. Eventually the problems were solved, but the process took more than 2 years during which Professor Drosdoff continued beyond normal retirement and Dr. Van Wambeke's status at the University of Ghent was in limbo.

Resident Instruction

The numbers of undergraduates in the College increased slowly during the decade, but the composition of the student body changed drastically. Undergraduates in the 4-year degree program increased from slightly less than 2500 in 1970-71 to about 3000 in 1979-80. Where women had been less than 20% of the student body in the 1960s, they accounted for 46.5% by 1979-80. Transfer students with advanced standing from other institutions increased from 16% in 1965 to 40% by 1976, about half of that increase coming during the last 6 years. These changes were reflected in the composition of Agronomy classes. In the fall semester, 1967, 6% of the students in Agronomy 200 were women. By 1977, 40% were female. As transfer students were predominantly from SUNY Agricultural and Technical Colleges, a somewhat larger segment of the enrollment in elementary Agronomy courses was oriented to applied problems than formerly. More significantly, the preparation of these students was generally below the levels of those entering as freshmen.

The mix had varying effects on Agronomy instruction. It was the consensus among instructors of the elementary courses that the presence of large numbers of women increased class quality, not only because they came with better academic credentials but also because they created competition for the men. At the same time, the group of transfer students oriented to applied problems resisted instruction in principles as against applications of technology, especially in the elementary crops course.

The interests of students fluctuated in 2- or 3-year overlapping cycles according to changing concerns of society, affecting both the numbers who enrolled in Agronomy courses and their expectations of the orientation of course content. During the late 1960s social problems had been the focus of attention of a large segment of the College student body. Rural Sociology had been taxed beyond its faculty's capacity with undergraduate majors and course enrollments. Enrollment in Agronomy courses was somewhat reduced, and the instructors were expected to emphasize the social implications of their subject matter. The data that follow illustrates the impact of fluctuating student concerns on Agronomy during the five years in the middle of this period.

Student Enrollment in the First Courses of Soils, Crops, and Atmospheric Sciences, and Undergraduate Advisees of the Department, 1973-74 to 1977-78.

	Student Numbers, First Courses			Undergraduate Advisees		
Year	Soils	Crops	Atmos. Sci.	Soil	Crops	Atmos. Sci.
1973-74	372	131	152	17	17	24
1974-75	339	139	132	17	24	23
1975-76	378	187	142	24	28	34
1976-77	370	179	158	35	32	27
1977-78	300	180	137	30	31	22
Fall '78				25	22	17

During the early 1970s student concerns turned to preservation of natural resources and environmental quality, and student enrollment in soils and atmospheric sciences reached a maximum in 1973-74. Field Crops was not affected. That peak of interest was succeeded by concerns for world food supply, and by 1975-76, enrollment in both soils and field crops courses had reached an all-time high. Other factors may have influenced the values presented above, especially for Atmospheric Sciences and field crops, for which the structure of course offering was changing.

The numbers of undergraduate advisees in the Department given above represent students specializing in the three areas at the time. In addition, Agronomy faculty served as advisors to students of other specialties. In the fall semester, 1978, for example, Agronomy faculty advised 91 students in addition to the 64 majoring in Agronomy specialties.

The courses offered by the Department are listed by years and faculty in charge in Appendix I. Courses were reclassified and renumbered according to level of instruction in 1974-75. The correlations and courses dropped for soils are given below for convenience of reference.

SOILS		
	1970-71	1975-76
Agron.		
200.	Nature & Properties of Soils	same
301.	Identification & Geography	same
306.	Soil Microbiology, lecture	406
307.	Soil Microbiology, laboratory	407
310.	Agronomy Literature	same
321.	Soil & Water Conservation	same
324.	Soil Fertility & Management	same
401.	Geography, Soils of the Tropics	same
402.	Soil Analytical Methods	602
403.	Organic Soils	same
404.	Forest Soils	same
405.	Soil Clay Mineralogy	same, dropped '76
406.	Use of Soil Inventories	506
407.	Soil Physics, lectures	dropped '72
408.	Soil Physics, laboratory	608
410.	Soil Microbial Ecology	same, dropped '76
450.	Special Topics	same
451.	Agronomy Regional Studies	dropped '75
470.	Undergraduate Research	same
480.	Management of Tropical Soils	same
481.	Special studies, Tropical Soils	IAD 602
501.	Soil Chemistry	701
503.	Soil Classification & Genesis	603
506.	Advanced Soil Microbiology	606
507.	Soil Physics	607
524.	Advanced Soil Fertility	724
560.	Graduate Research	760
690.	Departmental Seminar	790
691.	Soils Seminar	791, dropped '76

Course 405, clay mineralogy, was dropped in 1976 because Professor Weaver's departure left the course without an instructor. Much of its subject matter was incorporated in Professor McBride's course 701, Soil Chemistry and Mineralogy. The intermediate level soil physics courses, 407 and 408, were discontinued for low enrollments. Agronomy 461, Regional Studies, was a highly successful course involving a subsidized 3-week field trip. It was dropped for lack of funding to support the trip. Agronomy 481 initiated as a soils course with an intercession trip to the tropics grew into an interdepartmental effort and in 1972-73 was transferred to the International Agricultural Development Office's IAD 602. Separate soils and crops seminars were started in 1969-70 in addition to the departmental seminar. The experiment was not highly successful and course 691 (791) was dropped in 1976-77.

Three courses in soils were added during the decade. The former Agronomy 431, Aquatic Plant Ecology, listed under Crops, emphasized the plant aspects when it was taught by Professor Mulligan. When Professor Peverly replaced Mulligan, his interests and training were in soils and the environment, and he changed the course ac-

cordingly under a new number 331, Aquatic Plant Management. The course is listed under Soils for that reason. In lieu of the poorly attended soil physics laboratory, Professor Miller collaborated with professors of the ARS micrometeorology project to offer a course in "Water in Plants and Soils" under the same number (608) in 1976-77. And in 1975-76 Professor Duxbury started a graduate level course, 609, on "Soil Organic Matter" which could not be treated in depth in his undergraduate 403, Organic Soils.

The changes in field crops course numbers in 1974-75 and courses dropped during the period follow:

FIELD CROPS		
	1970-71	**1975-76**
Agron.		
111.	Introduction to Crop Science	same, dropped '79
312.	Field Crops	same
315.	Weed Science	same
422.	Tropical Agriculture	same, dropped '79
431.	Ecology Aquatic Plants	dropped '74
451.	Special Topics	651
461.	Agronomy Regional Studies	351, dropped '76
471.	Undergraduate Research	371
513.	Crop Ecology	613
514.	Grasslands	614, dropped '75
522.	Special Studies Tropical Agriculture	dropped '74
550.	Research Perspective	650, dropped '75
561.	Graduate Research	761
690.	Departmental Seminar	790
692.	Field Crops Seminar	792, dropped '76

The field crops offerings underwent a major revision during the decade, various reasons contributing. When Professor MacDonald retired, three courses he had offered as subjects of his special interests were dropped: Courses 514, 522, and 550. Courses 461 and 692 were dropped for reasons described for their counterparts under soils. Then in 1979 the crops faculty revised the course offerings resulting in discontinuation of Agronomy 113, the elementary course that had been taught annually either one or both semesters for 57 years. Agronomy 422, "Tropical Agriculture" was also dropped in favor of a course with different orientation for the tropics: Agronomy 314, "Production of Tropical Crops." A new course was added in 1979 to compensate for lack of Agronomy 111: Agronomy 311, "Grain and Cash Crops". Two graduate level courses were added during the period to offer subject matter which new faculty brought to the Department:

Agronomy 610.	Physiology of Environmental Stress	Prof. Steponkus
Agronomy 611.	Crop Limitation Modeling	Prof. Fick

The fate of Atmospheric Sciences courses that were offered in 1970-71 is given below:

ATMOSPHERIC SCIENCES		
	1970-71	**1975-76**
Atmos. Sci.		
201.	Principles of Meteorology	101
201A.	Principles of Meteorology Laboratory	103

331.	Tropical Meteorology	332, dropped ’75
411.	Basic Theoretical Meteorology	same
412.	Basic Theoretical Meteorology	same
417.	Physical Meteorology	same
438.	Atmospheric Pollution	dropped ’76
449.	Physics of Clouds & Rain	dropped ’78
462.	Undergraduate Research	same
550.	Special Topics	650
562.	Graduate Research	962
691.	Seminar	same

The courses listed above, however, represent only part of the unit’s offerings prior to 1974-75, for this was the period during which the curriculum was expanded to satisfy professional standards of the discipline. The additions are listed below with the date of initiation and any subsequent renumbering or disposition:

Course Added	Date	Disposition
Nos. 325, 326, 327, 328. Communications	1973-74	continued
413. Agricultural Meteorology	1976-77	314, 1977-78
431. Synoptic Meteorology, fall	1973-74	430, 1976-77
432. Synoptic Meteorology, spring	1972-73	continued
461. Undergraduate Research, spring	1973-74	continued
571. Numerical Weather Prediction	1973-74	471, 1974-75
		470, 1976-77
		dropped, 1978-79
573. Multiscale Modeling	1973-74	473, 1974-75
		474, 1977-78

By 1979-80, the unit offered 17 courses by 4 faculty members aggregating 3 full-time equivalents, including 3 courses for individually directed research and seminar, and 4 1-credit courses for practice with meteorological communication instrumentation in the facility. The unit taught between 675 and 800 student credit hours during the latter part of this period, about 1/2 that of field crops and 1/4 that of soils. Resident instruction accounted for about 60% of the total faculty effort, compared with 20% for field crops and 34% for soils.

Graduate training remained among the highest priorities of the Department. By 1979-80, 81 graduate students were registered, a 21% increase over 1970-71. Data for the fall semester of 1978 show a total of 77, of whom 32 were women. Twenty-one were foreign students; 11 represent U.S. minority groups. They were distributed among subject matter areas as follows:

3 in Atmospheric Science; 36 in Field Crops; 38 in Soils. Twenty-five were registered for masters programs only; 33 for a masters preliminary to Ph.D. candidacy; and 18 for the Ph.D. only. One was a non-candidate. One of the masters candidates was in the program for Master of Professional Studies.

Research

In 1977-78, 52% of the department’s faculty effort and 67.4% of its expenditures went for research. Out of a total research expenditure of $2,141,000, 44% came from grants and contracts, 38% from State appropriations (largely for salaries), 15% from federal formula funds, and 3% from College income. During the 5 years starting in 1973-74, research expenditures increased $456,000, about $200,000 from increased grant and contract funds. The research expenditures in 1977-78 were larger than the total departmental budget for 1970-71.

The significance of grant and contract funds in terms of both amount and purposes of the departmental research effort merits special attention here. During the 12 years from 1969 through 1980, grants and contracts aggregating $9,788,000 were awarded to the department and its faculty. About 21% of this, some $2,043,000, was for research on problems of environmental quality and health-related subjects. An additional 39%, $3,839,000, was for international studies, all but $500,000 of which was for research. Only 40% was for work characteristic of the traditional functions of the Department prior to 1970, including fundamental research. For the decade of the 1970s almost 1/5 of the total funding of the Department was committed by prior agreement under grants and contracts to activities which can be characterized as "extracurricular" relative to the traditional historical functions of the faculty line positions. This does not imply that these activities were unrelated to the Department's traditional functions. Much of the work on environmental and health-related subjects pertained to the impact of farming or practices associated with farming on natural resources, the environment, and purity of farm products. Most of the international research was focused on agriculture and natural resources of the tropics and arid regions, but it contributed to understanding of natural phenomena and to increased expertise of the faculty for both research and teaching in New York.

It is relevant here to consider the purposes for which grant and contract funds were committed in some detail. Professor Alexander was principal or co-principal investigator for grants and contracts aggregating more than $1,000,000 during the decade. These were for study of such problems as persistence of DDT, organo-metal compounds in water, degradation of organic pollutants, and acid precipitation. Professor Duxbury worked on grants and contracts totaling about $350,000 on such problems as nutrients contributed to water from organic soils, heavy metals from organic soils, and soil as a sink for nitrous oxide. He was also co-investigator with Professor Alexander on a $100,000 project for detection of microorganisms by their metabolic products. Professor Bouldin spent a major part of his time from 1970 to 1974 on an interdepartmental project funded by the Rockefeller Foundation to determine the characteristics of stream pollution from the surrounding watershed, concentrating on Fall Creek. During 1978 and 1979, he concentrated on nitrates in ground water on Long Island under an interdepartmental grant from the Office of Water Resources Research. Professor Zwerman completed his studies of agricultural contributions to nutrients in water on the research site at the Aurora Farm in 1971.

Among others involved in environmental and health-related projects, Professor Swader worked on oil spills on soil and on other pollution resulting from Hurricane Agnes, disposal of fly ash on soil, and extension for pollution control - supported by grants and contracts totaling $66,000. Professor Olson studied disposal of cannery wastes on soil and problems of landfill leachates in soil under grants totaling $47,000. Mr. Croney was responsible for grants aggregating $125,000 to the State Soil and Water Conservation Committee for various aspects of water and land pollution related to agriculture. Professor Scott was principal investigator of a Union Carbide grant of $15,000 for studies of soil disposal of sewage sludge. Professor Stone worked on an educational project about land disposal of wastes under a $16,000 grant. More detail for these and other grants and contracts is given in Appendix III by the years in which the funds were awarded. The faculty involved in such extracurricular activities are identified in the tables of faculty under the section on personnel.

Extracurricular activities in the international field focused on a major research project on soil fertility in the humid tropics during the first 7 years of the decade. This involved Professors Lathwell, Scott, and Bouldin in addition to Professors Drosdoff, Weaver, and Fox whose primary functions were in the international field. Professor Lathwell carried this work to publication during 1977 to 1979. Concurrently, Professor Cline supervised a grant for development of expertise on tropical soils at Cornell, until his retirement in 1974, after which Professor Drosdoff supervised it. After 1977, Professor Van Wambeke was responsible for a $300,000 grant for bases of appraisal of soil resource inventories of developing countries and for a $55,000 contract for a workshop on food production. Professor Alexander began studies on nitrogen in tropical soils under a $375,000 contract with AID in 1979, supplemented by a $42,000 grant from the International Institute of Tropical Agriculture.

The formal research projects of the Department during the 1970s are listed by subject matter area and years on pages 152 through 155. The scope of research had expanded by 1970 and continued to grow during the decade.

The distribution of research effort among soils, field crops, and meteorology also changed significantly. During the 1970s, 28 of the 88 research projects reported to the Office of Experimental Stations were on subjects that would be considered extracurricular by the traditions of the early 1960s. Four of the 11 projects of atmospheric sciences, 22 of the 49 projects of soils, and only 2 of the 28 projects of crops contributed to the 28. These numbers as well as the preceding discussion of grants and contracts and the listing of faculty under "extracurricular" activities in the section on personnel show that most of the shift in research effort toward non-traditional subjects was by faculty in soils. In contrast, most of the applied research directly related to farming in New York was performed by the faculty of field crops. This represents a major shift in emphasis of the soils faculty and a major increase in research by the crops faculty since the beginning of the Bradfield era in 1937. As of 1979-80, only 3 of the 49 projects listed under soils can be considered applied research focused strictly on New York farming. Fifteen of the 28 projects under crops qualify for that characterization.

Research Projects of the Department of Agronomy by Subject Matter Area and Years, 1970-71 to 1979-80.

Subject Matter Area and Project — Year, 19-	70	71	72	73	74	75	76	77	78	79
SOILS										
Genesis & Survey										
Soil-landscape relationships	•	•	•	•	•	•	•	•	•	•
Soils and land-use planning				•	•	•	•	•	•	•
Soil survey of New York	•	•	•	•	•	•	•	•	•	•
Soil Chemistry										
Metal-organic interactions with soil							•	•	•	•
Chemical properties & plant growth	•	•	•	•	•	•				
Soil Physics										
Modification of soil properties	•	•	•							
Soil freezing		•	•	•	•	•	•	•	•	•
Soil Microbiology										
Detection of soil microorganisms	•	•	•	•	•	•				
Nitrogen fixation						•	•	•	•	•
Soil Fertility										
Use of fertilizer & lime	•	•	•	•	•	•	•	•	•	•
Effects of manure on crops & water		•	•	•	•	•	•			
Management of nutrients from manure								•	•	•
Nitrogen from crop residues								•	•	•
Energy used by fertilizer industry & crop fertilization										•
Forest Soils										
Adaptability of forest trees to soils		•	•	•	•					
Genetic adaptability of forest trees						•				
Soil properties & tree growth	•	•	•	•	•	•	•			
Mycorrhizae	•	•	•	•	•	•	•	•		
Soil fertility & forest ecology	•	•	•	•	•	•	•	•	•	•
Element accumulation under forests					•	•	•	•	•	•
Organic Soils & Soil Organic Matter										
Nutrient losses from organic soils					•	•	•	•	•	

Subject Matter Area and Project Year, 19-	70	71	72	73	74	75	76	77	78	79
Chemistry of soil humus			•	•	•	•	•	•	•	•
Conservation & Applied Soil Physics										
Soil & water management							•	•	•	•
Soil tillage systems				•	•	•	•	•	•	
Environmental Quality & Health Problems										
Nitrates in soil, water, & plants	•	•	•	•	•	•	•	•	•	•
Decomposition of pesticide residues	•	•	•	•	•					
Toxic nitrogen & organo-metal complex	•	•	•	•	•	•				
Agriculture's contribution to nutrients in water	•	•	•	•	•	•				
Heavy metals in wastes on soil								•	•	•
Manure, crops, & water quality		•	•	•	•	•	•			
Pollution from irrigation & fertilizers		•	•	•	•	•				
Nutrient management for environmental quality		•	•	•	•	•	•			
Environmental impact of fertilizers and wastes		•	•							
Design for animal waste disposal		•	•	•	•	•	•			
Rehabilitation of oil contaminated soil					•	•				
Nutrients in water from organic soils					•	•	•	•	•	
Acid precipitation						•	•	•	•	•
Sewage sludge on cropland						•	•	•		
Land disposal of cannery wastes						•	•	•	•	
Non-point pollution sources							•	•	•	
Agricultural waste management									•	•
International										
Tropical soil investigations	•	•	•	•	•	•	•	•	•	•
Aquatic Studies										
Ecology of aquatic weeds	•	•	•	•	•					
Alkalinity of water & phosphorus				•	•	•	•	•	•	•
Marsh ecology	•	•	•							
Chemistry of diquot-treated ponds			•	•	•					
Soil-Plant Relations										
Soil-plant-atmosphere relations	•	•	•	•	•	•	•	•	•	•
Nutritional quality of plants	•	•	•	•	•	•	•	•	•	•
FIELD CROPS										
Ecology-Physiology										
Photosynthesis of corn	•	•	•	•	•	•	•	•	•	•
Physiology of cool-season growth	•	•	•	•	•	•	•	•	•	•
Sweet corn photosynthesis	•	•	•	•	•	•	•	•	•	•
Cold hardiness							•	•	•	•
Drought resistance, cereals							•	•	•	•
Cold acclimation								•	•	•
Adaptive drought tolerance									•	•
Seed growth & vigor, soybeans									•	•

Subject Matter Area and Project Year, 19-	70	71	72	73	74	75	76	77	78	79
Pastures										
Pasture renovation					•	•	•	•	•	•
Forage Crops										
Perennial forages	•	•	•	•	•	•	•	•	•	•
Alfalfa weevil control	•	•	•	•	•	•	•	•	•	•
Birdsfoot trefoil seed production				•	•	•	•	•	•	•
Forage production systems							•	•	•	•
Forage-livestock systems under soil limitations								•	•	•
Land use & forage for beef and dairy								•	•	•
Forage-dairy production systems										•
Weeds										
Weed control in agronomic crops	•	•	•	•	•	•	•	•	•	•
Weed ecology & crop competition	•	•	•	•	•	•	•	•	•	•
Herbicide synergistics		•	•	•	•					
Interaction of herbicides with phytotoxic residues					•	•	•	•		
Cereals & Oil Crops										
High-protein crops for the Northeast	•	•	•	•	•	•	•	•	•	•
Small grains					•	•	•	•	•	•
Corn development					•	•	•	•	•	•
Special Crops										
Sugar beet production	•	•	•							
Cropping Systems (See forages also)										
Analysis of crop rotation data					•	•	•	•		
Miner Institute dairy & crop systems	•	•	•	•	•	•	•	•	•	•
Regional soil & crop management	•	•	•	•	•	•	•	•	•	•
Environmental Quality & Health										
Pesticide residues	•	•	•	•	•	•	•	•	•	•
Residues on agricultural products								•	•	•
ATMOSPHERIC SCIENCES										
Meteorology & Climatology										
Multiscaled energy sources			•	•	•					
Kinetic energy cascade equation							•	•		
Energy climate of New York								•	•	•
Weather data for agriculture								•	•	
Environmental Quality & Health										
Atmospheric influences on ecosystems	•	•	•	•	•					
Air pollution	•	•								
Air pollution & plant growth			•	•	•	•	•			
Acid rain, atmospheric deposition									•	•
Plant-Atmosphere Relations										
Weather, phenology, & crop yields						•	•	•	•	•

Subject Matter Area and Project	Year, 19-	70	71	72	73	74	75	76	77	78	79
Weather & alfalfa pest control					•	•	•	•	•	•	
Phenology of shrubs & trees						•	•	•	•	•	•

Extension

The College extension administrative reorganization discussed in the preceding chapter was essentially complete by 1970-71. Annual reports of the College, from which much of the information of preceding chapters was obtained, discontinued accounts of departmental extension activities and reported by interdepartmental program area. The program items by which staff effort was reported were changed in 1974-75, so strictly comparable figures to relate the distribution of effort at the beginning of the 1970s to that at the end of the decade are not available. The comparisons of College extension effort that follow list approximately comparable items, inflated for 1979-80 by distribution of the 4-H and youth programs identified for 1972-73 among the subject matter areas reported.

	1972-73		1979-80	
	Days	%	Days	%
Total Effort (Man-days)	157,000	-	287,000	-
Program Areas:				
Food & Agriculture Industry	**31,400**	**20.0**	**61,100**	**21.3**
Agr. Production, Technology			45,400	15.8
Agr. Business Management			9,100	3.2
Agr. Marketing			4,700	1.6
Commercial Food Processing			1,900	0.7
Environmental Quality Natural Resources	**3,600**	**2.3**	**14,700**	**5.1**
Natural Resource Policy, use			12,200	4.2
Pesticide Education			2,500	0.9
Staff Development	**15,000**	**9.5**	**17,600**	**6.1**
4-H & Youth Programs	**38,000**	**24.2**		

The total effort includes that of field staff and the staff of both the College of Agriculture and Life Sciences and the College of Human Ecology. The total financial support for 1979-80 came from the following sources:

State appropriations to the Colleges	$4,274,496
State appropriations to local associations	1,581,000
Federal appropriations	9,546,140
County contributions	12,237,278
Total	**$27,638,914**

Most of Agronomy's extension effort contributed to the Agricultural production and technology area during the decade. In 1977-78, eleven faculty and staff contributed 20% or more of their time to the following areas:

Staff Member	Title	% Effort	Program Area
W. R. Knapp	Asst. Prof.	70	Grain Crops
R. F. Lucey	Prof.	20	Regional Soil & Crop Program
G. W. Olson	Assoc. Prof.	70	Soil Resource use
J. H. Peverly	Asst. Prof.	20	Aquatics
W. S. Reid	Assoc. Prof.	60	Soil Fertility, Regional Program

R. R. Seaney	Prof.	64	Forage, Regional Program
R. F. Burt	Res. Spec.	30	Crop & Soil Management
R. R. Hahn	Sr. Ext. Assoc.	100	Weeds, Crops
S. D. Klausner	Ext. Assoc.	55	Soil testing, fertility
A. B. Pack	Sr. Ext. Assoc.	65	Weather

Eight others contributed 5 to 10 percent of their time, almost all to agricultural production and technology. The total departmental effort amounted to about 6 1/2 full-time equivalents. About 4 1/2 full-time equivalents were on the "Agricultural Production and Technology" program and the "Staff Development" program to support it. Approximately 2 FTE were devoted to Environmental Quality and Natural Resources.

F. N. Swader served the problems of soil physical conditions and drainage for the agricultural program and also contributed to problems of soil and water pollution for Environmental Quality. He was absent on leave during 1978-79 and was not counted in the tabulation above. The diversion of funds for Professor Zwerman's replacement to Atmospheric Sciences by the College Administration in 1976-77 severely curtailed the Department's total research and extension effort in soil and water conservation, which Professor Swader was only partially able to satisfy. That deficiency became especially critical when the College authorized a special program on soil water management in 1977-78. At this writing the deficiency in this area has become essentially a complete void with the resignation of Professor Swader in 1981.

As in the preceding period, Agronomy's extension effort for the Agricultural program focused on training and service for Cooperative Extension Agents, adult education programs for representatives of industry and farmers, and interpretation of research data in support of those two activities. Six regional dairy-field crop teams of agents had been formed, and the field crop members received special attention.

The regional research and extension program of the Department, described in the preceding chapter, was the foundation for much of the Department's extension effort. The 1979-80 annual report of the College summarizes the changes that had taken place in Northern New York Agriculture since that first regional project was initiated in 1959:

	1979:1959
Acreage of corn for silage	3:1
Corn Silage produced	2.2:1
Acreage of corn for grain	15:1
Grain corn produced	25:1
Cows per farm	50:24
Milk produced	1.2:1

These changes had involved major increases in purchased fertilizer and other production inputs for field crops as well as drainage of wet soils. The increased size of herds had also required increased barn and silo capacity and purchase of farm machinery for the corn production to support the industry. Reliable estimates of the magnitude of these expenditures are not available for the entire 20-year period, but in 1965 a survey of county agents of the 6-county area found 285 new silos constructed in the year alone, mainly in St. Lawrence County. Fertilizer sales were regarded to be up 25% over the 5-year period by one dealer. It was estimated at that time that the increased agricultural activity had generated several million dollars in capital expenditures, farm supplies, and service over the 5-year life of the project. Much more than farming had shown the effects of some stimulus.

It would be a serious error to attribute all of the gains to the Northern New York project. Certainly innovative

farmers stimulated by their own observations and normal contacts with farmers of other regions, agricultural industries, and public agencies would have made important changes. The fact that it was common "knowledge" among College authorities, industry, and the farmers themselves that corn was a poor crop for the region, that soil resources posed formidable obstacles, and (as some expressed it) that each new advancement in agricultural technology placed the region at a competitive disadvantage argues that some unusual event catalyzed the observed changes. The fact that the first signs of change came in St. Lawrence County where the "north country project" was first begun is circumstantial evidence that it played an important role. The evidence was convincing enough to prompt Agway to partially underwrite similar research and extension programs in 3 other regions as early as 1965-66.

By 1979-80, minimum tillage had become an important new subject of emphasis by Agronomy extension, accompanied by unforeseen problems that required the attention of faculty of both research and extension. Water management was receiving renewed emphasis, hampered by the shortage of Agronomy specialists in that field. Weed control had become so important by 1975-76 that Russell Hahn was employed as a full-time Senior Extension Associate primarily for that subject. The very large program for dairy and field crops research and extension at Chazy had been underwritten by the W.H. Miner Institute in 1970-71 and was still in full operation in 1979-80. Professor Lucey retained its project leadership after succeeding to the departmental chairmanship in 1975, though he relinquished the Agronomy extension project leader's duties to Professor Seaney, followed by Professor Reid.

A search was underway in 1979-80 for an additional faculty member for atmospheric sciences to serve the new interdepartmental integrated pest management program of the College. Wayne Knapp was giving the cereal crops much needed attention after more than a decade of neglect. Professors Arnold and Reid had assumed the leadership of a major State program for development of methodology for lard-tax assessment on the basis of soil surveys. Professor Olson continued his responsibilities for other soil survey interpretations. Professor Seaney remained the specialist for forage crops in addition to responsibilities in the regional soil and crop management program.

M. Highlights, 1868-1980

1868-1874

Opening of the University, September 1868.

George Chapman Caldwell, Professor of Agricultural Chemistry and primary representative for agriculture.

Unsuccessful search for a Professor of Agriculture.

Instruction in agriculture only after 3 years of classical studies.

John Stanton Gould, Trustee and Visiting Professor and Lecturer in agriculture 1869-74.

Decreasing enrollment in agriculture from 30 in 1868 to 7 in 1874.

University farm an object lesson in poor husbandry.

First extension activity - lectures to groups of farmers under auspices of the New York Dairymen's Association.

1874-1879

Isaac P. Roberts' appointment as Professor of Agriculture, 1874.

Rehabilitation of the University farm by Roberts.

Roberts teaching with the University farm as the laboratory.

Exemption of agriculture students from tuition.

Increase in "agriculture" students to 42 by 1879, largely to escape tuition.

Roberts applied research on the University farm.

First appropriation by trustees for extension activities - to Lazenby of horticulture.

First Farmer's Institute, 1877.

1879-1888

Opposition to agricultural research by the Trustees and President White:

- Organization of the first Cornell University Experiment Station by Caldwell without trustee approval, 1879.
- First annual report financed personally by Jennie McGraw.
- Attrition of the experiment station by reduced appropriations, from $1000 in 1881 to 0 in 1887.
- Research on the University farm with volunteer labor.
- Rebuff of the State legislature's action to establish a State agriculture experiment station at Cornell, 1880.

Establishment of the New York State Agricultural Experiment Station at Geneva in 1881 with appropriations of $20,000/year.

Lack of formal departmental administrative structure in the University.

Decreasing enrollment in agriculture to 1885.

Curriculum modification to make the last 2 years elective, 1886.

Initiation of 2-year program for "Special Students" oriented to motivated farm boys.

Reestablishment of Farmer's Institutes, 1885, under sponsorship of the New York State Agricultural Society.

State appropriation of $6,000 to the Society to expand Farmer's Institutes.

1888-1904

Tempering of Trustees' antipathy toward agriculture by President Adams.

Establishment of the Cornell University College of Agriculture with Roberts as Director and Dean of Faculty, 1888.

Appointment of Liberty Hyde Bailey as Professor of Horticulture, 1888.

Reorganization of the Cornell University Experiment Station under the name Cornell University Agricultural Experiment Station in anticipation of the Hatch Act, 1887.

Hatch Act appropriating $15,000 to each State legislature for agricultural research, 1887.

Award of the Hatch appropriation to Cornell, rather than Geneva, 1888.

Upsurge of research generally.

Predominance of horticultural research under Bailey.

Reduction of agronomic research in favor of dairy and horticulture under policy of a new Director of the Geneva station, 1887.

Increasing student enrollment in agriculture.

Agronomic courses by Roberts (3) and Caldwell (2).

H.B. Cannon first M.S. in agronomic area in the U.S.

C.G. Hopkins (1898), J.G. Lipman (1903), J.A. Bizzell (1903) - Ph.D.'s who became famous.

$25,000 State appropriation for extension, 1897.

Organization of "Bureau of Extension" in the College, 1897.

Employment of John L. Stone by the Bureau of Extension, but under Roberts for sugar beet production trials.

Expansion of trials on farmers' fields to other agronomic crops as an extension tool by John Stone.

Initiation of the Cornell Reading Course for Farmers, 1898, with 3 of the first year's lessons on agronomic subjects.

Growth of enrollment in the reading course to 20,000 by 1900.

Designation of the Geneva station as the State inspection agency for enforcement of the fertilizer control law of 1890 and the feeding stuffs control law of 1898.

1904 - 1914

Establishment of the New York State College of Agriculture at Cornell by the State legislature, 1904.

Bitter competition with Syracuse University for it.

Succession of Liberty Hyde Bailey as Dean on Robert's retirement, 1904.

Sequence of departmental reorganizations under Bailey:

First Department of Agronomy, 1903-04.

Fragmentation of Department of Agronomy, 1907-08:

Farm Crops and Farm Management - G. F. Warren.

Farm Practice - J. S. Stone.

Soil Investigations - T. L. Lyon.

Soils - E. O. Fippin.

Experimental Plant Breeding - H. J. Webber.

Combination of "Soils" and "Soil Investigations" as Soil Technology under Lyon, 1909-10.

Division of "Farm Crops and Farm Management" in 1911-12 into:

Farm Management - G. F. Warren.

Farm Crops -

Combination of "Farm Crops" and "Farm Practice" into "Farm Practice and Farm Crops" under J. L. Stone, 1911-12.

Division of "Farm Practice and Farm Crops" in 1913-14 into:

Farm Practice - J. L. Stone

Farm Crops - E. G. Montgomery

Creation of a Department of Meteorology under W. M. Wilson, 1909.

Completion of State buildings for the College of Agriculture, 1906-07, namely Roberts, East Roberts, and Stone Halls.

Occupancy of Stone Hall by Agronomy, 1906.

Increasing enrollments:

351 students in 4 courses by Field Crops, 1913-14

9 graduate majors

481 students in 10 courses by Soil Technology

10 graduate majors

Purchase of "Mitchell Farm", later Caldwell Field, 1903.

Doubling of College research funds by Adams Act, all allocated to Soil Technology and Plant Breeding.

Completion of Cornell Lysimeters by Lyon, 1909-10.

Maximum participation in Farmers' Institutes, 1910.

Initiation of Farmers' Week, 1908.

Development of special extension trains as a major activity.

Emphasis on exhibits at the State Fair, Syracuse.

Organization of New York State Drainage Association by Fippin, 1909.

Organization of first Farm Bureau in Broome County with John Barron first Farm Bureau agent.

1914 - 1921

"Soil Technology Building", later Caldwell Hall, occupied, 1914.

Separation of Farm Crops and Soil Technology both administratively and physically throughout the period.

Understaffing of Farm Crops.

Beginning of specialization in Soil Technology:

J. K. Wilson - Soil bacteriology, 1914-15.

A. F. Gustafson - Soil conservation, 1920-21.

E. L. Worthen - Soil fertility extension, 1919-20.

Appointment of John Barron as Field Crops extension specialist.

Appointment of H. O. Buckman as the principal instructor of soils course, 1912-13.

Publication of first edition of famous elementary soils text by Lyon, Fippin, and Buckman.

Marked decrease in student numbers during World War I, 1917-18, following 1915-16 enrollments in:

Field Crops - 341 registrations in 4 courses, 20 graduate majors.

Soil Technology - 455 registrations in 6 courses, 20 graduate majors.

Meteorology - 252 registrations in its single course.

Temporary consolidation of Vegetable Gardening under Farm Crops, 1917 to 1921.

Establishment of experimental fields at Virgil, Alfred, and Churchville.

Peak research productivity of Lyon and Bizzell.

Establishment of a Division of Agronomy at Geneva, 1914.

Construction of Geneva lysimeters, 1914.

Transfer of Geneva extension to Cornell, 1915.

Smith-Lever Act providing $10,000 and additional matching funds for extension, 1914.

1921 - 1937

Combination of Soil Technology and Farm Crops to form the modern Department of Agronomy, 1921.

- Transfer of work on potatoes and beans to Vegetable Crops.
- Transfer of work on varieties to Plant Breeding.

Incorporation of Meteorology into Agronomy, 1930.

- Transfer to Pomology, 1934.

Reinforcement of the faculty by new positions:

- B. D. Wilson - organic soils, 1921.
- H. B. Hartwig - crops extension, 1923; to teaching, 1934.
- L. G. Romell - forest soils, 1928.
- E. Van Alstine - soils extension, 1931.
- D. B. Johnstone-Wallace - pastures, 1934.
- G. H. Serviss - crops extension, 1934.

State Education Department authority over the College with:

- Termination of professional forestry at Cornell, 1936.
- Termination of Joseph Slocum College of Agriculture at Syracuse, 1934.

Endowment of the Charles Lathrop Pack Professorship of Forest Soils, 1927; and acquisition of Finch-Pruyn Forest, 1932.

Increasing student enrollment in Agronomy:

- 757 Undergraduate student credit hours, 1929-30; 1808, 1936-37.
- 51 Ph.D. degrees, 1926 through 1930; highest in the U.S.

Establishment of 2-year certificate instructional program, 1929.

- Introduction of soils course for 2-year students, 1929.

Onset of the "Great Depression", 1929.

- Election of Franklin Delano Roosevelt to the Presidency, 1932.
- Establishment of "New Deal" agencies.

Development of a broad spectrum of basic and applied research:

- Decline of work with lysimeters after 1930.
- Increase of applied field research.
- New research programs in forest soils (1928), organic soils (mid-1920s), pastures (1930), and soils for fruit

(1930).

Decline of research related to Agronomy at the Geneva Station.

But creation of a new Division of Seed Investigations.

Reorganization of Agronomy extension, 1921:

12 topics defined as the primary emphasis.

Radio talks initiated as a new medium.

Meteorology extension service to fruit growers, 1921-25.

1937-1955

Appointment of Richard Bradfield as Department Head, 1937.

Expansion and increased specialization of faculty:

Soil Physics - M. B. Russell, 1945; R. D. Miller, 1951.

Soil Chemistry - R. Cummings, 1938; M. Peech, 1941.

Soil Testing - E. Kroth, 1946; D. J. Lathwell, 1950.

Organic Soils - B. D. Wilson from previous period; J. E. Dawson, 1946.

Forest Soils - R. F. Chandler from previous period; E. L. Stone, 1948.

Soil Conservation - A. F. Gustafson, previous period; P. J. Zwerman, 1950.

Soil Genesis and Classification - M. G. Cline, 1942.

Crop Ecology - R. B. Musgrave, 1940.

Pastures - D. B. Johnstone-Wallace from previous period; H. A. MacDonald, 1944.

Forage Crops - D. S. Fink, 1943; R. Blaser, 1945; W. K. Kennedy, 1949.

Weeds - S. N. Fertig, 1950.

Replacement of retiring faculty generalists:

H. O. Buckman by N. C. Brady for soils teaching, 1947.

John Barron by S. R. Aldrich for crops extension, 1950.

Beginning of "courtesy" appointments for scientists of other agencies on campus.

Expansion of physical facilities:

Acquisition of Mount Pleasant experimental farm, 1940.

Acquisition of Aurora experimental farm, 1949; enlargement, 1952.

Expansion of soil testing laboratory to Fernow Hall, 1953.

Planning for new Agronomy building, 1946-48; abandonment.

Growing financial support:

Tripling of State appropriations and federal funds, 1937 to 1955.

Accompanied by doubling of salaries.

Beginning of grants and contracts as important sources:

TVA test demonstration program, 1939.

Aviation Corporation hay project, 1942.

Sun Oil nitrogen project, 1955.

Special State appropriations:

Forage crops, 1943.

Soil testing, 1946.

Controversies with new federal action agencies:

Agricultural Adjustment Administration.
Soil Conservation Service, 1942-1954.
World War II and problems it created, 1942-1946:
Manpower shortages; drain to armed services.
Wartime food production program.
Declining enrollment.
International involvement:
Bradfield, 1941 onward.
Philippine project, 1952 -.
Growth of resident instruction in agronomy:
Expansion of course offerings from 14 in 1938 to 24 in 1955.
Increase of graduate students from 25 in 1938 to 58 in 1955.
Influx of foreign students after World War II.
Expansion of field research:
Concentration on Mount Pleasant, 1940 to 1950.
Transfer to Aurora farm, 1950s.
Emphasis on cropping systems and new forage crops.
Beginning of Northern New York forage research.
Continued decline in agronomic research at Geneva.
But reinforcement of soils work in Vegetable Crops by appointment of M. T. Vittum.
Organization of College extension program by commodities:
Lack of representation of Agronomy on commodity committees.
Recognition of forage crops as subcommittee of dairy, 1950.
Revision of Agronomy extension by regions, 1947.
Shift from farmer contacts toward work with agents and industry as intermediaries.
Development of new extension subjects and activities:
Soil testing, 1938 -.
Weed control, 1939 -.
"Cornell Recommends", 1949 -.
pH test kit, 1951 -.
Field Days at experimental farms, 1953 -.
Soil judging, 1953 -.
Plow-plant systems of culture, 1954 -.
New legumes - Birdsfoot trefoil and ladino clover, 1938 -.

1955-70

Succession of Professor Brady as Department Head after Bradfield, 1955. Followed by Cline, 1963.
Continued growth of financial support:
Quadrupling of State appropriations and federal formula funds.
Tripling of grant and contract funds to $300,000/year.
Doubling of salaries.

Growth of faculty, staff, and graduate students:
- Total roster from 155 to 230.
- Full-time faculty from 23 to 27.
- Support staff from 74 to 125.
- Graduate students from 47 to 64.

Expansion of physical facilities:
- Addition of 160 acres to the Aurora farm, 1955 and 1958.
- Cornell research ponds, 1964.
- Bradfield-Emerson complex, 1968.
- Guterman laboratories and greenhouses, 1968.
- Leland Field House at Caldwell Field under construction 1970.
  - Replacement after fire of 1968.

Establishment of the College Office of International Agricultural Development, 1962-63:
- Agronomy participation in Philippine project.
- Initiation of 4 new Agronomy courses.
- Grants and contracts for international work 1969 and 1970.

Changing priorities of society during the 1960s:
- Decline of concerns for agricultural production.
- Increase of concerns for the environment and health.
- Interest in international affairs.

Student unrest, 1968-70.
- Adjustment of departmental meetings.
- Fluctuating student interests with time.

Changing undergraduate instruction:
- Establishment of undergraduate majors in soils and crops, 1955.
- Changing composition of the student body:
  - Increasing numbers with advanced standing.
  - Increasing numbers of women.
- Addition of 16 new courses.
- Termination of elementary soils for 2-year students.
- Surge of interest in meteorology after 1968.

Impact of grants and contracts on Department's research:
- Reorientation to goals of the funding agencies.
- Beginning of emphasis on environment and health problems.
- Initiation of major projects on soils of the tropics, 1969.
- Surge of research by soil microbiology.

Notable new research endeavors in traditional fields:
- Nitrogen fertilization, 1955-58.
- Nutritional losses from hay, 1955-65.
- Maximum yield experiment, 1958 -.
- Rotation experiment, 1960.

Photosynthesis under field conditions, 1961 -.

Northern New York Research and Extension, 1961 -.

Land forming for soil drainage, 1963 -.

Regional Research and Extension, 1964 -.

Sugar beet production, 1963-67.

Growing research on environmental and health-related problems:

Nitrate poisoning, 1960-64.

Atmospheric contamination and plants, 1962-65.

Herbicide degradation, 1964-68.

Contribution of agriculture to nutrients in water, 1969 -.

Initiation of aquatic studies, 1958 -.

In the Cornell ponds, 1964 -.

Reorganization of the College extension program, 1965:

Establishment of a field crops program.

Trend toward agent specialization.

Regional dairy-field crops agents.

Reinforcement of agent training.

Emphasis on soil resources, forage crops, and weeds in Agronomy.

Continued concentration on agents, industry, and others as intermediaries with farmers.

Start of reinforcement of meteorology faculty and concentration on instruction for professional qualifications.

1970-1980

84% growth of financial support; 115% rise in consumer price index 1970-80:

$1,762,000 in 1970-71 to $3,249,000 in 1979-80.

Increase of Departmental roster from 238 to 282:

Graduate students from 67 to 81.

Support personnel from 128 to 154.

Emeriti from 3 to 11.

Extracurricular activities involving major segments of faculty time:

International: 7 soils and 1 crops faculty members.

Environmental quality and health; 10 soils faculty members.

Growth of atmospheric sciences under policy for eventual autonomy:

Faculty from 2 to 4.

Courses from 16 to 23 credit hours.

Research from 2 to 4 projects.

Fluctuation of student numbers in agronomy courses with changing student concerns for world problems:

Environmental quality early 1970s.

World food mid-1970s.

Course offerings by 1975-76:

Soils - 26; crops - 9; meteorology - 17 courses.

Revision of crops offerings; termination of Agronomy 111(11).

Graduate training:

21% increase in graduate student numbers.

Increase in number of women to 42% in 1978.

Increase in number in field crops to 47% in 1978.

Static research productivity, late 1960s and early 1970s:

Aging faculty from Bradfield era.

Need for adjustment to grantsmanship for support.

Increase of research productivity during 1970s:

52% of faculty effort and 69% of expenditures for research by 1978.

Increase of professional publications.

From 51 in 1970-71 to 76 by 1978-79.

Significance of grants and contracts for research program:

Almost $10,000,000 from 1969 through 1980.

Control of objectives by funding agencies.

Prior commitment to objectives of funding agencies for 44% of research expenditures by 1977-78.

Commitment to research characterized as extracurricular relative to traditional departmental functions:

Environment and health - $2,000,000 1969 through 1980.

International - $3,300,000 1969 through 1980.

1/5 of total departmental funding for the decade.

Shift in research of soils faculty to extracurricular research:

22 of 49 projects of soils faculty for the decade.

Only 2 of 28 projects of crops faculty.

Concentration of traditional applied agricultural research under crops faculty.

Subordination of College extension effort on food and agriculture.

About 20% of total effort for the decade.

Though effort on that program nearly doubled.

Reflection of public's priorities.

Agronomy's aggregate extension effort – 6 ½ full-time equivalents 1978.

4 ½ FTE on agricultural production and technology.

2 FTE on environment and natural resources.

Deficiency of Agronomy extension in Soil and Water area.

Emphasis on regional research and extension program.

Impressive rehabilitation of agriculture, northern region.

New Agronomy extension emphasis on:

Minimum tillage.

Water management.

Weed control.

Cereals and oil crops.

Soil as criterion for tax assessment.

Deficiency of atmospheric sciences extension for integrated pest management.

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Department of Farm Crops, 1912-21
Department of Agronomy and its successors, 1903-12
Department of Agricultural Chemistry, 1868-1903 (faculty related to Agronomy subjects)
Department of Agriculture, 1874-1903 (faculty related to Agronomy subjects)
Department of Meteorology, 1906-1949
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APPENDIX I

Course Offerings

Soils, Crops, and Meteorology
1906-07 to 1979-80

SOILS COURSES AT CORNELL 1906-07 TO 1920-21

Department of Agronomy 1906-07 to 1907-08 and Department of Soils 1908-09 (Part 1)

Course No. & Subject	Cr.	Term	1906-07	1907-08	1908-09
1. Agricultural Soils	3	2	Fippin	Fippin	Crabb[1]
2. Soils of the U.S.	3	1	Fippin	Fippin	Crabb[1]
3. Soil Mapping	2	1	Fippin	Fippin	Fippin
4. Advanced Agr. Soils	1	2	Fippin	Fippin	Fippin
5. Advanced Soils Lab.	1	1 2	Fippin	Fippin	Crabb[1]
6. Soils Research		1 2	x	x	Crabb[1]
7. Soils Seminary	1	1 2	x	x	Crabb[1]
10. Soil Investigations		1 2	x	Lyon	Lyon
101. Agricultural Soils	3	1	x	Fippin	Crabb[1]

[1] Under Fippin's supervision; x - Not listed in University Announcement

Department of Soil Technology 1909–10 to 1920-21 (Part 2)

Course No. & Subject	Cr.	Term	1909-10 to 1911-12	1912-13	1913-14 & 1914-15	1915-16 & 1916-17	1917-18	1918-19 & 1919-20	1920-21
1. Principles Soil Mgt. I	3	2	Fippin & Crabb	x	x	x	x	x	x
1. Principles Soil Mgt.	3	1 2	x	Buckman	Buckman	Buckman	Buckman	Buckman*	Buckman*
2. Principles Soil Mgt. II	3	1 2	Fippin	x	x	x	x	x	x
2. El. Soils, Spec. Students	0	1	x	Buckman	Buckman	Buckman	Buckman	Buckman	Buckman
3. Practical Soil Mgt.	2	1	x	x	x	x	x	x	Worthen
4. Soils of the U.S.	3	2	Fippin & Crabb	x	x	x	x	x	x
5. Soil Survey	2	Summer	Fippin & Crabb	Fippin & Crabb	Buckman	Buckman	Buckman & Bizzell	Buckman & Bizzell	Buckman & Bizzell
6. Advanced Soils	2	2	Fippin	Bizzell	Bizzell	Bizzell	Bizzell	Bizzell	Bizzell
7. Soil Bacteriology	2	2	x	x	x	x	x	Wilson	Wilson
7. Manures & Fertilizers	1	1	Fippin	Buckman	Buckman	x	x	x	x
8. Drainage & Irrigation	2	2	Fippin & Crabb	Fippin & Crabb	x	x	x	x	x
8. Mechanical Analysis	1	1	x	x	x	Bizzell	x	x	x
10. Advanced Soils Lab.	1	2	Fippin & Crabb	x	x	x	x	x	x
11. Soils Research		1 2	Bizzell	Bizzell	Bizzell	Bizzell	Bizzell	Bizzell	Bizzell
14. Soils Seminary		1 2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
21. Drainage & Irrigation	3	2	x	x	Buckman & Robb	Buckman & Robb	Buckman & Robb	Buckman & Robb	x

* Changed to a 5-credit course in 1919-20; x - Not listed in University Announcement.

SOILS COURSES AT CORNELL, DEPARTMENT OF AGRONOMY 1921-22 to 1944-45 (in 2 parts)

Course No. & Subject	Cr.	Term	1921-22 to 1924-25	1925-26	1926-27 to 1928-29	1929-30	1930-31 to 1932-33
1. Nature &Properties Soils	5	1 2	Buckman	Buckman	Buckman	Buckman	Buckman
2. Forest Soils	3	1	x	x	x	x	Buckman
3. Practical Soil Mgt.(Alt.)	2	1	Worthen ‘21 & ‘23	Worthen	Worthen ‘27	Worthen	Worthen ‘31
5. Soil Survey & Mech. Anal.	1	1	Bizzell ‘22 & ‘24	x	x	x	x
6. Advanced Soils	3	1	Bizzell	x	x	x	x
6. Soils for 2-year Students	3	2	x	x	x	x	Buckman
7. Soil Bacteriology	3	2	Wilson	x	x	x	x
11. Soil Research		1 2	Faculty	x	x	x	x
14. Soil Seminary		1 2	Faculty	x	x	x	x
105. Mechanical Analysis	1	1	x	Bizzell	x	x	x
107. Soil bacteriology (7)	3	2	x	Wilson	Wilson	Wilson	Wilson
201. Advanced Soils Lect. (6)	3	1	x	Bizzell	Bizzell	Bizzell	Bizzell
202. Advanced Soils Lab.	3	1	x	x	Bizzell	Bizzell	Bizzell
222. Department Seminary (14)		1 2	x	Faculty	Faculty	Faculty	Faculty
221. Soil Research (11)		1 2	x	Faculty	Faculty	Faculty	Faculty

Courses 3 & 5 taught in alternate years; x - Not listed in University Announcements

	Course No. & Subject	Cr.	Term	1933-34 & 1935-36	1936-37 & 1937-38	1938-39 & 1939-40	1940-41 & 1941-42	1942-43	1943-44 & 1944-45
A.	Introduction to Agron.	3	1 2	x	x	x	x	x	Buckman
1.	Nature & Properties Soils	5	1 2	Buckman	Buckman	Buckman	Buckman	Buckman	Buckman
2.	Forest Soils	3	1		Buckman	x	x	x	x
3.	Practical Soil Mgt.	2	1	Worthen ‘33 & ‘35	Worthen ‘37	x	x	x	x
5.	Soils for 2-year Students	3	2	Buckman	Buckman	Gustafson	Gustafson	Gustafson	Gustafson
7.	Soil Class. & Conservation	3	2	x	Howe	x	x	x	x
101.	Soil Class. & Survey	3	2	x	x	Howe	Howe	Howe	Howe
102.	Soil Conservation	2	2	x	x	Gustafson	Gustafson	Gustafson	Gustafson
103.	Organic Soils	2	1	x	x	B. Wilson ‘39	B. Wilson ‘41	-	Staker ‘43
104.	Forest Soils (115)	2	1	x	x	Chandler ‘38	Chandler ‘40	Chandler	Chandler ‘44
105.	Soil Microbiology (107)	3	2	x	x	J. Wilson	J. Wilson	J. Wilson	J. Wilson
107.	Soil Bacteriology	3		J. Wilson	J. Wilson	x	x	x	x
115.	Forest Soils (2)	2	1	x	Chandler	x	x	x	x
201.	Advanced Soils Lect.	3	1	Bizzell	Bizzell	x	x	x	x
202.	Advanced Soils Lab.	3	1	Bizzell	Bizzell	x	x	x	x
205.	Soil Fertility	3	1	x	x	Bizzell	Bizzell	Bizzell	Bizzell
207.	Soil Physics Lect.	3	2	x	x	Bradfield	Bradfield	Bradfield	Bradfield
208.	Soil Physics Lab.	3	2	x	x	Bradfield	Cummings	Peech	Peech
209.	Soil Research (221)		1 2	x	x	Faculty	Faculty	Faculty	Faculty
221.	Soil Research		1 2	Faculty	Faculty	x	x	x	x
222.	Dept. Seminary		1 2	Faculty	Faculty	x	x	x	x
290.	Dept. Seminar (222)		1 2	x	x	Faculty	Faculty	Faculty	Faculty

Courses 3, 103, & 104 taught in alternate years; x - Not listed in University Announcements; (blank) Not taught, but listed

SOILS COURSES AT CORNELL, DEPARTMENT OF AGRONOMY 1945-46 to 1963-64 (Part 1)

Course No. & Subject	Cr.	Term		1945-46	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52	1952-53	1953-54
A. Introduction to Agronomy	3	1	2	Buckman	x	x	x	x	x	x	x	x
1. Nature & Properties Soils	5	1	2	Buckman	Buckman	Buckman	Buckman	Brady	Brady	Brady	Brady	Johnsgard
6. Soils for 2-year Students	3		2	Gustafson	Cline	Gustafson	Brady	Brady	Brady	Hiltbolt	Hiltbolt	Hiltbolt
101. Soil Class. & Survey	3		2	Howe	Howe	Howe	Howe	Howe	Cline	Cline	Cline	Cline
102. Soil Conservation	2		2	Gustafson	Gustafson	Gustafson			Zwerman	Zwerman	Zwerman	Zwerman
103. Organic Soils	2	1				Dawson		Dawson	Dawson	Dawson		Dawson
104. Forest Soils	2	1							Stone		Stone	
105. Soil & Crop Management	3	1		x	x	x	Cline		Cline			Cline
106. Soil Microbiology	3		2	J. Wilson	J. Wilson	J. Wilson	J. Wilson		Broadbent	Broadbent	Broadbent	Broadbent
107. Physical Edaphology	3	1		x	x	x	x	x	Russell			Miller
201. Soil Chemistry	3		2	Peech	Peech	Peech	Peech	Peech	Peech	Peech	Peech	Peech
202. Soil Analytical Methods	3		2	Peech	Peech	Peech	Peech	Peech	Peech	Peech	Peech	Peech
203. Soil Class. & Genesis	3	1		x	Cline	Cline		Cline		Cline		Cline
204. Isotopic Techniques	2	1		x	x	x	x	x	x	x	Brandt	Brandt
205. Soil Fertility	3	1		Bradfield	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield
207. Soil Physics Lecture	3		2	Russell	Russell	Russell	Russell	Russell		Russell	Miller	
208. Soil Physics Laboratory	3		2	Russell	Russell	Russell	Russell	Russell	Russell	Russell	Miller	Miller
209. Soil Research		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
210. Special Topics in Soils		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
290. Department Seminar		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty

x - Not listed in University Announcement; (blank) Not taught but listed

SOILS COURSES AT CORNELL, DEPARTMENT OF AGRONOMY 1945-46 to 1963-64 (Part 2)

Course No. & Subject	Cr.	Term		1954-55	1955-56	1956-57	1957-58	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64
1. Nature & Properties Soils	5	1	2	Brady	Brady	Brady	Nielsen	Nielsen	Nielsen	Nielsen	Nielsen	Nielsen	Lathwell & Milford
6. Soils for 2-year Students	3		2	Hiltbolt	Lathwell	Lathwell	Lathwell	Lathwell	Lathwell	Lathwell	Lathwell	x	x
90. Undergraduate Seminar	1	1	2	x	x	x	Nielsen	Nielsen	Nielsen	Nielsen	Nielsen	Nielsen	x
101. Soil Class. & Geography	3		2	Johnsgard	Johnsgard	Cline	Cline	Cline	Cline	Cline	Cline	Cline	Cline
103. Organic Soils	2	1			Dawson		Dawson		Dawson		Dawson		Dawson
104. Forest Soils	2	1			Stone	Stone		Stone		Stone	Stone		
105. Soil & Crop Management	3	1		Feuer		Lathwell		Lathwell		Lathwell	x	x	x
106. Soil Microbiology	3		2	Broadbent		Alexander	Alexander	Alexander	Alexander	Alexander	Alexander	Alexander	Alexander
107. Physical Edaphology	3	1		Miller	Miller	Miller	Miller	x	x	x	x	x	x
108. Chem. & Phys. Prop. Soils	4	1		x	Miller		Miller	Dawson & Miller	Dawson & Miller	Dawson & Miller	Dawson & Miller	Dawson & Miller	x
110. Agronomy Literature	1		2	x	Brady	Brady	Nielsen	Nielsen	Nielsen	Nielsen	Nielsen	Nielsen	x
121. Soil & Water Conservation	2		2	Zwerman	Zwerman	Zwerman	Zwerman	Zwerman	Zwerman	Zwerman	Zwerman	Zwerman	Zwerman
124. Soil Fertility Management	3	1		x	x	x	x	x	x	x	x	Brady	Bouldin
201. Soil Chemistry	3		2	Peech	Peech	Peech	Peech	Peech	Peech	Peech	Peech	Peech	Peech
202. Soil Analytical Methods	3		2	Peech	Peech	Peech	Peech	Peech	Peech	Peech	Peech	Peech	Peech
203. Soil Class. & Genesis	3	1			Johnsgard	Cline		Cline		Cline		Cline	
204. Isotopic Techniques	2	1		Brandt	Brandt	Brandt	x	x	x	x	x	x	x
205. Advanced Soil Fertility	3	1		Bradfield	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield	Bradfield	x	x
207. Soil Physics Lecture	3		2	Miller		Miller		Miller		Miller	Miller	Miller	
208. Soil Physics Laboratory	3		2	Miller	Miller	Miller	Miller	Miller	Miller	Miller	Miller	Miller	Miller
209. Soil Research		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
210. Special Topics in Soils		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
290. Department Seminar		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty

x - Not listed in University Announcement; (blank) Not taught but listed

SOILS COURSES AT CORNELL, DEPARTMENT OF AGRONOMY 1964-65 to 1973-74

Course No. & Subject	Cr.	Term		1964-65	1965-66	1966-67	1967-68	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74
200. Nature & Prop. Soils (1)	4	1	2	Lathwell & Milford	Lathwell& Milford	Lathwell& Milford	Lathwell& Milford	Lathwell& Milford	Lathwell & Scott	Lathwell& Scott	Lathwell& Scott	Lathwell& Scott	Lathwell& Scott
301. Ident., Appraisal & Geogr. of Soils (101)	3		2	Cline	Cline	Arnold	Arnold	Arnold	Arnold	Arnold	Arnold	Arnold	Arnold
306. Soil Microbiol Lect. (106)	3		2	Alexander	Alexander	Alexander	Alexander	Hubbell	Alexander		Alexander		Alexander
307. Soil Microbiology Lab.	1		2	x	x	x	x	x	Alexander		Alexander		Alexander
308. Physical & Chemical Prop. of Soils (108)	4	1		Dawson & Miller	x	x	x	x	x	x	x	x	x
310. Agronomy Literature (110)	1		2	Brady	Brady	Milford	Milford	Milford	Scott	Scott	Scott	Scott	Scott
321. Soil & Water Conservation (121)	2		2	Zwerman	Zwerman	Zwerman	Zwerman	Zwerman	Zwerman	Zwerman	Zwerman	Zwerman	Zwerman
324. Soil Fertility Mgmt. (124)	3	1		Bouldin	Bouldin	Bouldin	Bouldin	Bouldin	Bouldin	Bouldin	Bouldin	Bouldin	Bouldin
401. Geog. & Appraisal of Soils of the Tropics	3		2	x	Cline	VanWambeke	Drosdoff	Drosdoff	Drosdoff	Drosdoff	Drosdoff	Drosdoff	Drosdoff
402. Soil Anal. Methods (202)	3		2	Peech	Peech	Peech	Peech	Peech	Peech	Peech	Peech	Peech	Peech
403. Organic Soils (103)	2	1		Dawson	Dawson		Dawson		Dawson		Duxbury		Duxbury
404. Forest Soils (104)	2	1		Stone		Stone		Stone		Stone		Stone	
405. Soil Clay Mineralogy	3	1		Milford		Milford		Milford	x	x	x	x	x
406. Use of Soil Inventories	2	1		x	x	x	x	x	Olson		Olson		Olson
407. Soil Physics Lectures	3		2	x	x	x	x	x	x	Fritton	x	x	x
409. Soil Physics Lab. (208)	3		2	Miller		Miller	Miller	Miller	Fritton	Fritton	Miller	Miller	
410. Soil Microbial Ecology	2		2	x	x	x	x	x	x	Alexander		Alexander	
450. Special Topics (210)		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
451. Agronomy, Regional Studies	4	1		x	x	Milford	Obendorf	Scott	Wright	Drosdoff	Krenzin	Cline	Duke
470. Undergraduate Research		1	2	x	x	x	x	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
480. Management Tropical Soils	3	1		x	x	x	x	x	x	x	x	x	Fox
481. Special Studies Soils of the Tropics	3		2	x	x	x	x	Drosdoff	Drosdoff	Drosdoff	Drosdoff	(Became IAD 602)	
501. Soil Chemistry (201)	3		2		Peech		Peech		Peech		Peech		Peech
503. Soil Class. & Genesis (203)	3	1		Cline		Arnold		Arnold		Arnold		Arnold	
506. Advanced Soil Microbiology	1	1		Alexander	Alexander	Alexander	Alexander	Hubbell	Alexander	Alexander	Alexander	Alexander	Alexander
507. Soil Physics (207)	3		2	Miller		Miller		Miller		Fritton		Miller	
524. Advanced Soil Fertility (224)	3	1		Bouldin	Bouldin	Bouldin	Bouldin	Bouldin			Bouldin	Bouldin	Bouldin
560. Graduate Research (209)		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
690. Departmental Seminar (290)		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
691. Soils Seminar		1	2	x	x	x	x	x	Faculty	Faculty	Faculty	Faculty	Faculty

x - Not listed in University Announcement; (blank) Not taught but listed

SOILS COURSES AT CORNELL, DEPARTMENT OF AGRONOMY 1974-75 to 1979-80

Course No. & Subject	Cr.	Term		1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
200. Nature & Properties of Soils	4	1	2	Lathwell & Scott	Lathwell & Scott	Lathwell & Scott	Lathwell & Scott	Lathwell & Scott	Lathwell & Scott
301. Ident., Appraisal, Geog. Soils	3	1		Arnold	Arnold	Arnold		Arnold	Collins
310. Agronomy Literature	1		2	Wright	x	x	x	x	x
321. Soil & Water Conservation	2		2	Zwerman	Zwerman	Zwerman	Allaway	Allaway	Allaway
324. Soil Fertility Management	3	1		Bouldin	Bouldin	Bouldin	Bouldin	Bouldin	Bouldin
331. Aquatic Plant Management (431)	3	1		Peverly	Peverly	Peverly	Peverly	Peverly	Peverly
401. Geog. & Appraisal of Soils of the Tropics	3		2	Drosdoff	Drosdoff	VanWambeke	VanWambeke	VanWambeke	VanWambeke
403. Organic Soils	2	1				Duxbury		Duxbury	
404. Forest soils	2	1		Stone	Stone	Stone	Stone	Stone	Stanturf
405. Soil Clay Mineralogy	3	1		Weaver	Weaver	x	x	x	x
406. Soil Microbiology Lecture (306)	3		2		Alexander		Alexander		Alexander
407. Soil Microbiology Lab. (307)	1		2		Alexander		Alexander		Alexander
410. Soil Microbial Ecology	2		2	Alexander		Alexander		Alexander	
450. Special Topics		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
470. Undergraduate Research		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
480. Management of Tropical Soils	3	1		Faculty			Faculty	VanWambeke	
506. Use of Soil Inventories (406)	2	1		Olson	Olson		Olson		Olson
602. Soil Analytical Methods (402)	3		2			McBride	McBride	McBride	McBride
603. Soil Genesis & Class. (503)	3		2	Arnold	Arnold	Arnold			
606. Advanced Soil Microbiol. (506)	1	1		Alexander	Alexander	Alexander	Alexander	Alexander	Alexander
607. Soil Physics (507)	3		2	Miller		Miller		Miller	
608. Soil Physics Laboratory (408)	3		2	Miller		x	x	x	x
608. Water in Plants & Soils	2	1		x	x	Miller & Lemon		Miller & Sinclair	
609. Soil Organic Matter	2	1		x	Duxbury		Duxbury		Duxbury
701. Soil Chemistry & Mineralogy (501)	3	1				McBride		McBride	
724. Advanced Soil Fertility (524)	3		2	Bouldin	Bouldin	Bouldin		Bouldin	
760. Graduate Research (560)		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
790. Departmental Seminar (690)		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
791. Soil Science Seminar (691)		1	2	Faculty	Faculty	x	x	x	x

x - Not listed in University Announcement; (blank) Not taught but listed

CROPS COURSES AT CORNELL 1906-07 to 1932-33

Department of Agronomy 1906-07 to 1908-09; Department Established in 1904

Course No. & Subject	Cr.	Term	1906-07	1907-08	1908-09[1]	1909-10[1]
11. Field Crops	4	1	Gilmore	Gilmore	Warren	Warren
12. Farm Management	4	2	Hunt	Hunt	Warren	Warren
13. Advanced Agronomy	2	1	Hunt	Hunt	Warren	Warren
14. Advanced Agronomy	2	2	Hunt	Hunt	Warren	Warren
15. Crops Seminary	1	1 2	Faculty	Faculty	x	x
16. Tropical Agriculture	3	1	Gilmore	Gilmore	x	x
19. Farm Practice	1	1 2	Stone	Stone	x	x
111. Field Crops	4	2	Gilmore	Gilmore	x	x

x - Not listed in University Announcement; [1] In new Department of Farm Crops & Farm Management; Plant Breeding Separate

Department of Farm Crops 1909-10 to 1920-21

Course No. & Subject	Cr.	Term	1909-10 & 1910-11	1911-12 & 1912-13	1913-14	1914-15 & 1915-16	1916-17	1917-18	1918-19 & 1919-20	1920-21
1. Cereal Crops	4	1	White	x	x	x	x	x	x	x
1. Cereals, Forage, & Misc.	4	1 2	x	Montgomery	Montgomery	Montgomery	Dynes	Dynes	Dynes	Dynes
2. Forage, Potatoes & Misc.	4	2	White	x	x	x	x	x	x	x
2. Cereal Croos	4	1	x	Montgomery	Montgomery	Montgomery	Montgomery	x	x	x
2. Advanced Crops	3	1	x	x	x	x	x	Montgomery	Montgomery	Montgomery
3. Cereal & Forage Crops	4	1	White	x	x	x	x	x	x	x
3. Forage Crops	4	2	x	Montgomery	Montgomery	Montgomery	x	x	x	x
4. Advanced Farm Crops	2	2	White	x	x	x	x	x	x	x
4. Special Cash Crops	3	1	x	x	Hardenberg	Hardenberg	Hardenberg	Hardenberg	Hardenberg	Hardenberg
5. Crops Research		1 2	Faculty	Faculty	x	x	x	x	x	x
5. Crops Seminary		1 2	x	x	x	Montgomery	Montgomery	Montgomery	Montgomery	x
6. Crops Seminary		1 2	Faculty	Faculty	x	x	x	x	x	x
6. Crops Research		1 2	x	x	x	Montgomery	Montgomery	Montgomery	Montgomery	x
7. Crops Seminary		1 2	x	x	x	x	x	x	x	Faculty
8. Crops Research		1 2	x	x	x	x	x	x	x	Montgomery
9. Crops Research		1 2	x	Montgomery	Montgomery	x	x	x	x	x
10. Crops Seminary		1 2	x	Montgomery	Montgomery	x	x	x	x	x
12. Systematics Field Crops	2	Sum-mer	x	Montgomery	Montgomery	x	x	x	x	x

x- Not listed in University Announcement

Department of Agronomy 1921-22 to 1932-33

Course No. & Subject	Cr.	Term	1921-22 to 1925-26	1926-27 to 1929-30	1930-31 to 1932-33
2. Cereals, Forage, & Misc.	4	1 2	Cooper	x	x
11. Production of Field Crops	4	1 2	x	Cooper	Gooding[1]

x - Not listed in University Announcement

[1] Fall term only 1931-32; Spring term only 1932-33

FIELD CROPS COURSES AT CORNELL, DEPARTMENT OF AGROMOMY 1933-34 to 1963-64

1933-34 through 1944-45

Course No. & Subject	Cr.	Term		1933-34 & 1934-35	1935-36	1936-37 & 1937-38	1938-39	1939-40 to 1941-42	1942-43	1943-44	1944-45
A. Introduction to Agronomy	3	1	2	x	x	x	x	x	x	Hartwig	Hartwig
11. Production of Field Crops	4	1	2	Hartwig[1]	Hill[2]	Hartwig[2]	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig
211. Advanced Field Crops	2		2	x	x	x	x	Hartwig[3]		Hartwig	
212. Pastures	3		2	x	x	x	Johnstone-Wallace	Johnstone-Wallace	Johnstone-Wallace		Johnstone-Wallace
213. Crop Ecology	3	1		x	x	x	x	x	Musgrave		
219. Field Crops Research		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
290. Departmental Seminar		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty

x - Not listed in University Announcement; (blank) Not taught but listed [1] Fall term only; [2] Spring term only 1935-36 & 1937-38; [3] Not taught 1940-41

1945-46 through 1954-55

Course No. & Subject	Cr.	Term		1945-46	1946-47	1947-48	1948-49	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55
A. Introduction to Agronomy	3	1	2	Hartwig	x	x	x	x	x	x	x	x	x
2. Introduction to Field Crops	3		2	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig
11. Production of Field Crops	4	1		Hartwig[1]	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig
112. Hay and Pasture	3		2	x	x	x	x	Blaser	Kennedy	Kennedy	Kennedy	Kennedy	Kennedy
115. Weed Control	3		2	x	x	x	x	x	x	x	x	x	
211. Advanced Field Crops	2		2			Hartwig	x	x	x	x	x	x	x
211. Special Topics		1	2	x	x	x	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
213. Crop Ecology	3	1					Musgrave		Musgrave		Musgrave		Musgrave
214. Grasslands	3	1		x	x	MacDonald	MacDonald	MacDonald		MacDonald	MacDonald	MacDonald	
219. Field Crops Research		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
290. Departmental Seminar		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty

x - Not listed in University Announcement; (blank) Not taught but listed [1] Spring term

1955-56 through 1963-64

Course No. & Subject	Cr.	Term		1955-56	1956-57	1957-58	1958-59	1959-60	1960-61	1961-62	1962-63	1963-64
2. Introduction to Field Crops	3		2	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig	x	x
11. Production of Field Crops	4	1		Hartwig	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig	Hartwig[1]	Hartwig[1]
112. Forage Crops	3		2	Kennedy		Kennedy	Kennedy	Kennedy	Wright	Wright	Wright	Wright
113. Physiological Ecology Crops	3	1		x	x	x	x	x	x	x	Musgrave	Musgrave
115. Weed Control	3		2	Schreiber	Fertig	Fertig	Fertig	Fertig	Fertig	Fertig	Fertig	Fertig
125. Economic Crops	4		2	x	x	x	x	x	x	x	MacDonald	MacDonald
211. Special Topics		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
213. Crop Ecology	3	1		Musgrave			Musgrave		Musgrave	Musgrave		Musgrave
214. Grasslands	3	1		MacDonald		MacDonald		MacDonald			MacDonald	
219. Field Crops Research		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
290. Departmental Seminar		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty

x - Not Listed in University Announcement; (blank) Not taught but listed [1] Taught both semesters

FIELD CROPS COURSES AT CORNELL, DEPARTMENT OF AGRONOMY 1964-65 to 1979-80

1964-65 through 1973-74

Course No. & Subject	Cr.	Term		1964-65	1965-66	1966-67	1967-68	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74
111. Introduction Crop Sci. (11)	4	1	2	Hartwig	Hartwig	Obendorf	Obendorf & Lucey	Obendorf & Lucey	Obendorf & Lucey	Obendorf & Lucey	Obendorf & Lucey	Obendorf & Lucey	Obendorf & Lucey
312. Feed Crops (112)	4		2	Wright	Wright	Wright	Wright	Wright	Wright	Wright	Fick	Fick	Fick
313. Physiol. Ecology Crops (113)	3	1		Musgrave	Musgrave	Musgrave	Musgrave	Musgrave	Musgrave	x	x	x	x
315. Weed Science (115)	3		2	Fertig	Fertig	Fertig	Duke	Duke	Duke	Duke	Duke	Duke	Duke
422. Tropical Agriculture	3		2	x	MacDonald	MacDonald	MacDonald	MacDonald	MacDonald	MacDonald	MacDonald	MacDonald	MacDonald
425. Economic Crops (125)	4		2	MacDonald	MacDonald	MacDonald	MacDonald	x	x	x	x	x	x
431. Ecology Aquatic Plants	3	1		x	x	x	Mulligan	Mulligan	Mulligan				Peverly
451. Special Topics (211)		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
461. Agronomy Regional Studies	4	1		x	x	Milford	Obendorf	Scott	Wright	Drosdoff	Krenzin	Cline	Duke
471. Undergraduate Research		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
513. Crop Ecology (213)	3	1				Musgrave		Musgrave		Musgrave		Musgrave	
514. Grasslands (214)	3	1		MacDonald	MacDonald		MacDonald		MacDonald	MacDonald	MacDonald	MacDonald	
522. Special Studies Tropic. Agr.	3		2	x	x	x	x	x	x	MacDonald	MacDonald	MacDonald	
550. Research Perspective	2	1		x	x	x	x	x	MacDonald	MacDonald	MacDonald	MacDonald	MacDonald
561. Graduate Research (219)		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
690. Departmental Research (290)		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
692. Field Crops Seminar		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty

x - Not listed in University Announcement; (blank) Not taught but listed

1974-75 through 1979-80

Course No. & Subject	Cr.	Term		1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
111. Introduction to Crop Science	4	1	2	Obendorf & Lucey	Obendorf & Lucey	Obendorf & Hahn	Obendorf & Hahn	Obendorf & Lucey	x
310. Agronomy Literature	1		2	Wright	x	x	x	x	x
311. Grain and Cash Crops	3	1		x	x	x	x	x	Obendorf
3l2. Feed Crops	4		2	Fick	Fick	Fick	McCaslin	Fick	Fick
314. Production of Tropical Crops	3		2	x	x	x	x	x	Wright
315. Weed Science	3		2	Duke	Duke	Duke	Duke	Duke	Duke
361. Agron. Regional Studies (461)	4	1		Swader	Seaney	x	x	x	x
371. Undergraduate Research (471)		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
422. Tropical Agriculture	3		2	MacDonald	MacDonald	Wright	Wright	Wright	x
610. Physiol. Environ. Stress	3		2	x	x	x	x	x	Steponkus
611. Crop Simulation Modeling	3	1		x	x	x	x	Fick	Fick
613. Ecol. & Physiol. of Yield (513)	3	1		Musgrave	Musgrave	Musgrave			
614. Grasslands (514)	3	1		MacDonald	x	x	x	x	x
650. Research Perspective (550)	2	1		MacDonald	x	x	x	x	x
651. Special Topics (451)		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
751. Graduate Research (561)		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
790. Departmental Seminar (690)		1	2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
792. Field Crops Seminar (692)		1	2	Faculty	Faculty	x	x	x	x

x - Not listed in University Announcements; (blank) Not taught but listed

METEOROLOGY COURSES AT CORNELL, 1906-07 THROUGH 1963-64

Course No. & Subject	Cr.	Term		1906-07 to 1915-16	1916-17	1917-18	1918-19	1919-20	1920-21	1921-22 to 1938-39
123. Meteorology & Climatology	3		2	Wilson	Wilson	x	x	x	x	x
1. Meteorology & Climatology	3	1	2	x	x	Wilson	Wilson	x	x	x
1. Elementary Meteorology	3	1		x	x	x	x	Mordoff	Mordoff	Mordoff [1]
2. General Climatology	3		2	x	x	x	x	Mordoff	Mordoff	Mordoff [2]
3. Climate of the United States	3	1		x	x	x	Wilson	x	x	x
3. Meteorology & Climatology	3		2	x	x	x	x	Mordoff	Mordoff	x
4. Climate of the United States	2	1		x	x	x	x	Mordoff	x	x
5. Meteorology & Climatology	2	1		x	x	x	x	x	Mordoff	x
11. Research		1	2	x	x	x	Wilson	Mordoff	Mordoff	x
211. Research		1	2	x	x	x	x	x	x	Mordoff
212. Seminar		1	2	x	x	x	x	x	x	Mordoff

Note: Red *text is unclear in original*

x - Not listed in University Announcement

[1] Taught Fall & Spring semesters after 1925-26

[2] 2 credits after 1925-26

Course No. & Subject	Cr.	Term		1939-40 to 1942-43	1943-44 to 1946-47	1947-48	1948-49	1949-50	1950-51 to 1951-52
1. Elementary Meteorology	3	1	2	Mordoff	Mordoff	Mordoff	Mordoff		Widger
2. General Climatology	2		2	Mordoff	Mordoff		Mordoff		Widger [1]
6. Meteorology & Climatology	3	1		Mordoff		x	x	x	x
105. Methods of Climatology	2		2	x	x	x	x	x	Widger [2]
211. Research		1	2	Mordoff	Mordoff	Mordoff	Mordoff		Widger
212. Seminar		1	2	Mordoff	Mordoff	Mordoff	Mordoff	x	x
212. Special Topics		1	2	x	x	x	x	x	Widger

Note: Red *text is unclear in original*

x - Not listed in University Announcement

(blank) Not taught but listed

Course No. & Subject	Cr.	Term		1952-53 & 1953-54	1954-55 & 1955-56	1956-57 & 1957-58	1958-59	1959-60 &1960-61	1961-62 & 1962-63	1963-64
1. Elementary Meteorology	3	1	2	Curtis	Johnson	Johnson		Dethier	Dethier	Dethier
2. General Climatology	2		2	x	x	x	x	x	Dethier	Dethier
4. Aeronautical Meteorology	1	1		x	x	x	x	x	Dethier	x
105. Microclimatology	4		2	x	x	Johnson		Dethier	x	x
212. Special Topics		1	2		Johnson	Johnson		Dethier	Dethier	Dethier

Note: Red *text is unclear in original*

x - Not listed in University Announcement

(blank) Not taught but listed

METEOROLOGY & ATMOSPHERIC SCIENCES COURSES AT CORNELL, 1964-65 THROUGH 1979-80 Meteorology 1964-65 to 1969-70

Course No. & Subject	Cr.	Term	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70
201. Basic Principles of Meteor.	3	1	Dethier	Dethier	Dethier	Dethier	Dethier	Dethier
202. Climatology	3	2	Dethier	Dethier	Dethier		Dethier	Dethier
331. Tropical Meteorology	3	2	x	x	x	Dethier		Dethier
441. Introductory Dynamic Meteor.	3	1	x	x	x	x	x	Knapp
412. Intermediate Dynamic Meteor.	3	2	x	x	x	Covey		Knapp
413. Micrometeorology	3	1	x	x	Covey			
414. Theoretical Climatology	3	1	x	x	x	Covey		Knapp
415. Hydrometeorology	3	2	x	x	x		Dethier	
462. Undergraduate Research		2	x	x	x	x	Faculty	Faculty
550. Special Topics		1 2	Dethier	Dethier	Dethier		Dethier	Faculty
562. Graduate Research		1 2	x	x	x		Faculty	Faculty
601. Seminar		1 2	x	x	x		Dethier	Dethier

Note: some course numbers were unclear. x – Not listed in University Announcement; (blank) Not taught but listed

METEOROLOGY 1970-71 THROUGH 1972-73; ATMOSPHERIC SCIENCES 1973-74 THROUGH 1979-80

Course No. & Subject	Cr.	Term	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
131. Basic Principles of Meteor. (201)	3	1	x	x	x	x	Dethier	Dethier	Dethier	Dethier	Dethier	Dethier
1??. Principles of Meteor. Lab (201A)	1	1	x	x	x	x	Dethier	Dethier	Dethier	Dethier	Dethier	Dethier
301. Basic Principles of Meteor.	3	1	Dethier	Dethier	Dethier	Dethier	x	x	x	x	x	x
301A. Principles of Meteor. Lab	1	1	Dethier	Dethier	Dethier	Dethier	x	x	x	x	x	x
314. Agricultural Meteorology (413)	3	2	x	x	x	x	x	x	x		Pack	Pack
325.–328. Met. Communication	1	2	x	x	x	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
331. Tropical Meteorology	3	2	Dethier			Paine		x	x	x	x	x
332. Tropical Meteorology (331)	3	2	x	x	x	x	x	Paine	x	x	x	x
411. Basic Theoretical Meteorology	3	1	Knapp	Knapp	Knapp	Knapp	Knapp	Knapp	Knapp	Faculty	Knapp	Knapp
412. Basic Theoretical Meteorology	3	2	Knapp	Knapp	Knapp	Knapp	Knapp	Knapp	Knapp	Faculty	Knapp	Knapp
413. Agricultural Meteorology	3	2	x	x	x	x	x	x	Pack	x	x	x
417. Physical Meteorology	3	1		Knapp		Knapp		Knapp			Knapp	
432. Synoptic Meteorology (431)	3	1	x	x	x	x	x	x	Paine	Paine	Paine	Paine
431. Synoptic Meteorology	3	1	x	x	x	Paine	Paine	Paine	x	x	x	x
431. Synoptic Meteorology	3	2	x	x	Paine	Paine	Paine	Paine	Paine	Paine	Paine	Paine
434. Atmospheric Pollution	3	2		Dethier	Paine		Paine		x	x	x	x
449. Physics of Clouds & Rain	3	1	Knapp		Knapp		Knapp		Knapp		x	x
461. Undergraduate Research		1	x	x	x	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
462. Undergraduate Research		2	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
472. Numerical Weather Prediction (471)	3	1	x	x	x	x	x	x	Paine		x	x
471. Numerical Weather Prediction (571)	3	1	x	x	x	x	Paine		x	x	x	x
573. Multiscale Model. Atmos. (573)	3	1	x	x	x	x	Paine	Paine	x	x	x	x
474. Multiscale Model. Atmos. (473)	3	1	x	x	x	x	x	x		Paine	Paine	Paine
650. Special Topics (550)		1 2	Faculty	Faculty	Faculty	Faculty	x	x	x	x	x	x
562. Graduate Research		1 2	Faculty	Faculty	Faculty	Faculty	x	x	x	x	x	x
571. Numerical Weather Prediction	3	1	x	x	x		x	x	x	x	x	x
573. Multiscale Modeling Atmosphere	3	1	x	x	x	Paine	x	x	x	x	x	x
650. Special Topics (550)		1 2	x	x	x	x	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty
691. Seminar		1 2	Dethier	Dethier	Dethier	Dethier	Dethier	Dethier	Dethier	Dethier	Dethier	Dethier
962. Graduate Research (562)		1 2	x	x	x	x	Faculty	Faculty	Faculty	Faculty	Faculty	Faculty

Note: some course numbers were unclear. x - Not listed in University Announcement; (blank) Not taught but listed

APPENDIX II

Graduate Students Majoring in Soils, Field Crops, and Meteorology

Cornell University, 1890 to 1980

Graduate Students Majoring in Soils, Field Crops, and Meteorology

Cornell University 1890 to 1980

The list which follows was compiled from a number of sources: (1) A card file of graduate student records maintained by the Agronomy Department, (2) volumes of the Cornell University record from 1868 to 1922, (3) card catalogues of the Uris, Mann, and Agronomy Department libraries, and (4) Theses on file in the Mann and Agronomy Department libraries.

The Agronomy card file was the initial and primary source. It contains records of both major and minor graduate students of the current Department of Agronomy since 1921-22 and its predecessors. The record is far from complete. Only a fraction of the graduate student minors are included, so these were not included in this list. Most graduate student majors for later years are included, but the records are increasingly incomplete backward in time. None are represented from the period prior to 1903. Some of the individual cards lack information about origin of the student, major or minor professor, date the degree was granted, and title of the thesis. Some are not specific about whether the degree was actually granted; others give a probable thesis subject under the plan of work, but it is not clear whether that was the final thesis.

To supply some of the missing information, the Agronomy library index cards were searched in detail for thesis topics, dates and kind of degree. A number of theses of students not represented in the departmental student records were found in this way. The theses in the Agronomy library stacks were consulted for biographical data and acknowledgements that would supply missing information about origin of the student, date entered, and major professor. Theses of some students were not indexed in the departmental library card catalogue, and not all theses indexed were in the stacks. The Mann library author card index and theses in its stacks were consulted for these missing items. It was assumed that any student listed in the departmental records had not completed the degree if his thesis was not recorded in the Mann or Agronomy library card catalogues.

The Cornell University Record in the Archives was used to identify students in the relevant subject matter areas for the early periods. The Record gives thesis titles of second degrees granted after 1901. These were used to identify degrees in agronomic subjects from 1902-03 to 1921-22, when the current Agronomy Department was formed. A number were found in addition to those identified from the sources described above.

The Cornell Record for years prior to 1902 does not list thesis titles, but it does give the names and degrees of graduates and, in a separate list, the names of *candidates* for degrees and their general areas of study (as "agriculture" or "chemistry"). The candidates in the areas that might include agronomic subjects were checked against lists of graduates, of later years to see if they graduated, and if they did, their theses were identified in the Uris library card catalogue. As many of the early theses did not contain a biographical sketch, nor an acknowledgement of the major professor's assistance, the theses were not consulted for these details. Most of the records consulted for these early periods give only the subject matter area of the major, such as soils or crops, not the major professor. At that time, however, most areas had only one professor, and his name is given in parenthesis in the list that follows.

Names of students who registered as candidates but did not complete the degree are included to the extent that they are on record in the Agronomy files. They could not be identified from the records consulted for the early years. A number of students listed as candidates for the degree of Master of Science in Agriculture during the 1870s were not included in the degree lists and presumably did not graduate. Some of these were probably in subjects related to Agronomy, but it was decided that their inclusion in the list was not important enough to justify retrieval of Graduate School records from Archives storage to identify them.

The masters degrees through the 1930s were identified as Master of Science in Agriculture as distinct from Master of Science. Later, Master of Science in Agriculture meant a different degree, and many students in Agriculture were awarded Master of Science Degrees. The two are not distinguished in the list that follows.

Graduate Student Majors

Name Yr. Entered	From	Major	Minor	Degree	Date	Thesis
Abreu, R.E. '70	Ven.	Olson	Air Photo	M.P.S	1973	Soil Classification, Venezuela
Ackah, E.E.		Obendorf		M.S.	1979	Culture immature soybean seed
Adamec, J. '73	Czech.	Peverly	V. Crops	Ph.D.	1977	K in polyphos. bodies, Chiorella
Adams, P.P. '73	D.C.	Weaver	Crops	M.S.	1977	Reactivity of P in weathered soils
Adrien, J. '45	Haiti	Buckman	Peech	M.S.	1947	Laterite
Aguilar, R. '79	NM	Arnold	Geomorph.	M.S.	1981	Soil landscapes, PA.
Aguilar-Y, S. '57		Bradfield	Pl. Phys.	M.S.		Withdrew
Aird, P.L. '52	Que.	Stone	Cons. .	M.S.	1953	Soil and site for larch
				Ph.D.	1957	Competition, poplar & herb. veg.
Akhavien, A.S. '65	Iran	Linscott	Bouldin	M.S.	1967	Paraquat for alfalfa establishment
Alcayaga, A. '57	Chile	Nielson	Chem.			Noncandidate
Alcavaga-C.,S. '57	Chile	Cline	Air Photo	M.S.	1958	Taxonomy soils of Chile
Aleem, M.I.H.	Pak.	Alexander	Bact.	Ph.D.	1959	Physiology & metabolism Nitrobacter
Al-Jamie, M. '56	Iraq	Cline	Air Photo	M.S.		Withdrew 1958
Allen, L.H., Jr. '58	AL	Dawson	Chem.	M.S.	1960	Organic matter of Podzols
		Lemon	Musgrave	Ph.D.	1973	Crop micrometeorology
Alleyne, E.P. '58	Trin.	Zwerman	Ag. Eng.	M.S.	1960	Terraces on sloping land
Allman, R.T. '37	Ont.	Johnstone; Wallace	An. Nut.	Ph.D.	1941	Feeding value of pasture mixtures
Allred, K.R. '51	UT	Kennedy	Biochem.	Ph.D.	1955	Hay crop silage
Al-Meshhadani, S.M.	Iraq	Alexander	Microbiol	Ph.D.		Withdrew 1976
Alpert, J.E. '70	ME	Miller	Eng.	Ph.D.		
Altaie '59	Iraq	Cline	Geomorph.	Ph.D.		Withdrew 1960
Amadee, G. '71	Haiti	Peech	Chem.	Ph.D.	1974	Liming weathered soils of tropics
Amatekpor, J.K. '70	Ghana	Drosdoff	Geomorph.	Ph.D.	1976	Flooded soils of L. Volta, Ghana
Andrew, C.S. '57		Bradfield				Noncandidate
Angeles, L.D. '60	Phill.	Stone	Cons.	M.S.	1962	Infiltration under chaparral
Anojulu, C.C. '70	Nigeria	MacDonald	Seed Tech	Ph.D.	1974	Soybean seed quality
Anthony, F.S. '42	S. Leone	Bradfield	Buckman	M.S.	1944	Natural Resources of Sierra Leone
Anwar, R.M. '46	Egypt	Bradfield	Pl. Phys	M.S.	1947	Saline and alkali soils
				Ph.D.	1949	Determination of available P
Araujo, J.E.G. '53	Brazil	Bradfield	Hartwig	M.S.		Withdrew
Archer, A.E.	NY	Agron.	Chem.	M.S.		Withdrew
Ariyanayagam, R. P.	Ceylon	Musgrave	Pl.Breed.	Ph.D.	1974	Photosynthesis and yield of corn
Arnold, R.W. '56	IA	Cline	Geomorph.	M.S.	1959	Origin of surface mantle, Fulton Co.
Arostegui, F.H.		Agron.		M.S.	1949	Effects of N on sugar cane.
Ashworth, E.N. '73	PA	0bendorf	Pl. Phys.	M.S.	1977	Chilling injury, soybean seed
Assa, A.D. '70	Iv. Coast	Lathwell	Pl .Phys.	Ph.D.	1973	Predicting available N
Ataga, D.D. '65	Nigeria	Peech	Chem.	Ph.D.	1968	Cation exchange
Athanassatos,A. '55	Greece	Johnson	MacDonald	M.S.		(Meteorology)
Aughtry, J.D. '38	TX	J. Wilson	Pl.Phys.	Ph.D.	1947	Genetics of alfalfa symbiosis
Austin, M.E. '48	MI	Cline	Geol.	M.S.		Withdrew
Ayanaba, A. '67	Ghana	Alexander	Microbiol	M.S.	1970	Bacterial populations
Aybar-Dionisio, N.	Dom.Rep.	Fick	An.Sci.	M.S.	1977	Competition & nut. value, feedstuffs

Name Yr. Entered	From	Major	Minor	Degree	Date	Thesis
Ayres, A.S.		Agron.				Withdrew
Ayyangar, S.R. '69	India	Musgrave	Scott	Ph.D.	1974	Leaf character & production of rice
Baerug, R. '58	Norway	Bradfield	Pl .Phys.	M.S.	1959	Influence of fertility on oats
Bailey, D.T. '71	NY	Dethier	Stat.	Ph.D.	1976	Wet-bulb climatology of U.S.
Bailey, M.C. '54	Jamaica	Lathwell	Pl.Phvs.	M.S.	1956	K supplying power of Mohawk soil
Baird, G.B. '50	NC	Dawson	Pl. Phys.	Ph.D.	1952	Boron in soils
Baker, A.S. '50	NY	Brady	Chem.	M.S.	1951	Liming & yield and composition, alfalfa
Baker, D.H. '56	PA	Musgrave	Pl. Phys.	M.S.	1959	Ear corn silage
Baker, J.H. ' 55	MD	Peech	Chem.	M.S.	1954	Ion uptake & cation exchange of roots
			Pl. Phys.	Ph.D.	1959	Fate of NH_3 applied to soils
Baldock, J.O. '69	WI	Musgrave	Biochem.	M.S.	1971	Use of solar energy in photosynthesis
			Pl. Phys.	Ph.D.	1976	Analysis Aurora rotation experiment
Ballesteros, S.S. '76	Phil.	Arnold	G. Olson	M.P.S	1978	No thesis required
Bandy, D.E. '71	OH	Musgrave	Pl. Breed	M.S.	1976	Soil moisture & growth of rice
				Ph.D.	1976	Soil moisture & growth of rice
Bandyopadhyay, M.N.	India	MacDonald	Lathwell	Ph.D.	1965	Companion crops for alfalfa & b. trefoil
Banerjee, D.K. '41	India	Agron.				Withdrew
Bansal, R.D. '62	India	Seaney	Pl. Phys.	Ph.D.	1966	Combining clones, birdsfoot trefoil
Bard, G.E. '45	NY	Chandler		M.S.	1947	Nutrient content of forest species
Baril, R. '37	Que.	Howe	Geol.	M.S.	1939	Characteristics of Lordstown soil
Barker, A.V. '58	IL	Bradfield	Biochem.	M.S.	1959	Nitrogen & dry matter, corn leaves
				Ph.D.	1962	N & P nutrition of corn
Barley, K.P.J. '52	Aust.	Miller				Noncandidate
Barlow, J.A. '24	NY	Agron.		M.S.		Withdrew
Barrett, E.L.R. '46	UT	Bradfield	MacDonald	M.S.		
Barrett, R.A. '64	Jamaica	Alexander	Microbiol	Ph.D.	1976	Degradation of protozoan cysts
Barrett, T.W. '46	UT	Bradfield	Chem.	M.S.	1948	Cyanamid, Mfg., Chem., & use
				Ph.D.	1950	Cyanamid, herbicide & fertilizer
Barron, J.H. '03	NY	Fippin		B.S.	1906	Soil survey home farm (B.S. thesis)
Barrows, S.A. '76	NY	Swader	Ag. Eng.	M.S.	1978	Soil-flyash mixtures
Bascones, L. '58	Ven.	Bradfield	Pl.Phys.	M.S.	1960	Guide for land use in Venezuela
Batchelder, A.R. '66	VA	Bouldin	Pl.Phys.	Ph.D.	1971	Root character & ion uptake
Batista, S.A. '43	Brazil					Withdrew 1943
Bauman, T.T. '65	IN	Fertig	soils	Ph.D.		Leave 7/66
Baur, A.J. '30	MI	Bizzell	Pl. Phys.	Ph.D.	1933	Composted peat
Bautista, E.M. '64	Phil.	Alexander	Microbiol	M.S.	1966	Reduction of inorganic compounds
Beadle, G.W. '26	NE	J-Wallace	Pl.Breed	Ph.D.	1930	Botanical composition of pastures
Beattie, J.M. '41	MD			Ph.D.		*Called to military duty 1942*
Beauchamp, E.G. '62	Que.	Lathwell	Chem.	Ph.D.	1965	Effect of root-zone temp. on corn
Beaumont, A.B. '14	KY	Bizzell	P. Chem.	Ph.D.	1918	Reversibility of soil colloids
Beckham, P.B.		Lucey		Ph.D.	1973	Winter wheat in Northern New York
Beeson, K.G?. '41	IA	Bradfield	Chem,	Ph.D.	1948	Soil relations to Co needs ruminants
Begg, J.E. '59	Aust.	Wright	Dethier	Ph.D.	1962	Reed canary grass shoots
Belanger, R. '53	Que.	Kennedy	Biochem.	Ph.D.	1963	Volatile bases in grass silage
Bell, R.S. '35	NY	J .Wilson	Pl.Phys.	Ph.D.	1939	Organic bases as fertilizers
Benson, J.P.	UT			Ph. D.		Withdrew

Name Yr. Entered	From	Major	Minor	Degree	Date	Thesis
Berger, C.A. '53	Guat.	Dawson	Biophys.	M.S.	1956	Nutritional requirements Rhizobia
Bernal, J. '68	Columb.	Obendorf	Scott	M.S.	1970	Effect of N & water depth, paragrass
Bethlahmy, N. '54	US	Zwerman	Ag.Eng	Ph.D.	1956	Electrical resistivity apparatus
Bhagat, S.P. '50	India	Zwerman	R. Ed.	M.S.	1951	Contour tillage
Bhattacharyya, A.K.	India	Zwerman	R.Ed.	Ph.D.	1958	Soil splash factor in soil erosion
Bidinger, F.R. '72	OH	Musgrave	Pl. Breed	Ph.D.	1977	Yield physiology & drouth stress
Bingham, G.E. '68	ID	Lemon	Musgrave	M.S.	1971	Measurement of plant-water status
				Ph.D.	1972	Stomatal response in corn & apple
Blacklow, W.M. '64	Aust.	Linscott	Pl. Phys.	M.S.	1966	2,4-D on birdsfoot trefoil
Bizzell, J.A.		Caldwell		Ph.D.	1903	
Blackmore, A.V. '57	Aust.	Miller	Phys.	M.S.	1958	Swelling pressure, Na-sat. Montmor'ite
				Ph.D.	1960	Osmotic swelling, Ca-montmorillonite
Blair, B.O. '51	KS	Musgrave	Ag.Ec.	Ph.D.	1954	Statistical techniques, field plots
Blankenberg, C.W. '66	S.Afr.	Alexander	Microbiol	M.S.	1969	Metabolism of N by Nitrosammonas
Bloom, P.R. '73	MN	McBride	Chem.	Ph.D.	1978	Exchangeable H & Al, soil org.matter
Bockus, J.G. '68	IN	Drosdoff	Lathwell	Ph.D.		Withdrew 1971
Boersma, L. '56	Neth.	Zwerman	Eng.	Ph.D.	1959	Runoff from small watersheds
Bohn, H.L. '58	CA	Peech	Chem.	Ph.D.	1963	P complexes with Fe & Al
Bohnen,H.				Ph.D.	1980	Growth of corn re: Ca, pH, & Al
Bolt, G.H. '50	Neth.	Miller	Eng.Phys	M.S.	1952	Membrane potential in soil solution
				Ph.D.	1954	Electric double layer
Bordon, F.Y. '52		Lathwell	P. Chem.	M.S.	1957	TVA phosphate fertilizers
Bornholdt, R.C. '62		Scott	Ext. Ed.	M.S.	1964	Mo, lime, & pH for b. trefoil
Bouyoucos, G. J.		(Lyon)	Cavanaugh	Ph.D.	1911	Transpiration & plant growth
Boyer, L.S. '23		Bizzell	P. Chem.	M.S.	1925	Partial deficiencies of nutrients
Bramao, L. '37	Port.	Bradfield	P. Chem.	M.S.	1938	Characteristics of Ontario soil
Brawand,H. '46		Musgrave		M.S.	1947	Fertilization of wheat
Brecke, B.J. '69	WI	Duke	Pl. Phys.	M.S.	1974	Life cycles of Panicum species
				Ph.D.	1976	Mode of herbicide action
Bremner, P.M. '56	Scot.	Lathwell	Musgrave	M.S.	1958	Response to lime on acid soils
Brito-Mutunayagam	India	Bizzell	Ag. Chem	M.S.	1934	Persistence of $CaCO_3$ in limed soil
Brittian, J.O.	KY	Peverly	Ecol.	M.S.	1978	Aquatic systems & P in agriculture
Brockfield, M,B.		(Hartwig)		M.S.	1951	A portable forage elevator
Brockman, F.E. '58	NY	Duke	MacDonald	M.S.	1971	
			Scott	Ph.D.	1975	Methazole selectivity, seedling alf.
Bromley, J.H.		Soil Tech	Geogr.	Ph.D.		Withdrew
Brook, R.B.		Soils		M.S.	1946	Maintaining soil productivity in tropics
Brown, C.S. '49	NH	MacDonald	Pl. Phys.	Ph.D.	1955	Hard seed in birdsfoot trefoil
Brown, H.D. '21	Ont.	J. Wilson	P. Chem.	M.S,	1922	Effect of sulfofication on soil N
Brown, K.W. '60	PA	Lemon	Pl. Phys.	M.S.	1962	Energy budget of a corn field
				Ph.D.		
Bruce, R.R, '49	Ont.	Russell	Ag. Eng.	M.S.	1951	Ground water & soil drainage
Bryant, J.C. '33	PA	Bizzell				
		Johnsgard	Pl. Phys.	Ph.D.	1955	Glacial drift border SW New York
Buckman, H.O. '08	IA	Lyon	Bact.	Ph.D.	1912	Soil moisture & fertility
Buckwalter, R.D. '68	NY	MacDonald	Int. Agr.	M.S.	1970	

Name Yr. Entered	From	Major	Minor	Degree	Date	Thesis
Buettner, F.J. '62	NY	Fertig	Chem.	M.S.		Withdrew 1962
Bullock, P. '64	Eng.	Milford	Geol.	Ph.D.	1968	Clay degradation at A-B interface
Burdette, D.L. '79	AR	Duke		Ph.D.		Withdrew 1980
Burt, G.W. '61	MD	MacDonald	Pl. Phys.	M.S.	1964	P & K needs of seedling forages
Burt, R.F. '60	NY	Wright	Pl. Phys.	M.S.	1963	NO_3 accumulation by plants
Cady, J.G. '38	NY	Chandler	Mineral.	Ph.D.	1941	Soil relationships to forest type
Cain, P.S. '53	NY	Kennedy	Ag. Ec.	M.S.	1956	Continuous cropping
Cal, J.P. '68	Hond.	Obendorf	Pl. Breed	Ph.D.	1971	Chilling injury, corn germ
Callister, G.J. '23	Ont.	Bizzell	P. Chem.	M.S.		Withdrew
Calderon, F. '41	C. Rica	Bradfield	Chem.	M.S.	1943	Determination of sol. nutr. in tissue
Calo, L.L. '55	Phil.	Kennedy	An. Husb.	M.S.	1956	Pasture research techniques
Cameron, D.M. '48	Ont.	Dawson	Bot.	Ph.D.	1952	Water soluble acids of peat
Campbell, J.C. '61	CA	Brady	Pl. Phys.	M.S.	1963	Effects of root zone temperatures
		Bouldin	Biochem.	Ph.D.	1965	Effects of root zone temperatures
Cannon, M.B.		(Roberts)		M.S.	1898	Soil as a factor in plant variation
Capo, B.G. '40	PR	Buckman		Ph.D.	1942	Available nutrients by pot tests
Cardoso, P.W.O. '25	Nigeria	Bizzell	Ag. Ec.	M.S.	1926	Effects of straw on NO_3 accum.
Carey, J.B. '59	PA	Cline	Geomorph.	M.S.	1964	Slope as a factor in soil genesis
Carlisle, F.J. '48	ND	Cline	Mineral.	Ph.D.	1954	Fragipans
Carodemos, P.P. '22	MA	(Cavanaugh)		M.S.		Muck soils at Elba
Carrasco, M.A. '70	Chile	Peech	Chem.	M.S.	1972	Electric charge, soils from vol. ash
Carrigan, R.A. '42	FL	Bradfield	P. Chem.	Ph.D.	1948	Cobalt in Florida soils
Carroo, W.G. '46	Jam.	Scott	Ext. Ed.	M.P.S	1973	Effect of drying on available K
Carter, O.G. '56	Aust.	Lathwell	MacDonald	M.S.	19 58	Effect of liming on K supplying power
				Ph.D.	1960	Effects of Cl, SO_4, & temp, on P uptake
Cary, E.E. '67		Hodgson	Chem.	M.S.	1968	Selenium in soils
Case, V.W. '58	BC	Brady	Pl. Phys.	M.S.	1961	Soil temperature & nutrient uptake
Case, W.D. '48	OH	Bradfield	Chem.	M.S.	1950	Use of organic P in soil
Cassady, C.F. '57	NH	Cline	Stat.	Ph.D.	1962	Soil productivity
Cato, R.B. '58	DC	Cline	Mineral.	M.S.		Withdrew 1959
Cattie, M.T. '67	PA	Mulligan		M.S.		Withdrew 1968
Cavallaro, N. '76	CA	McBride	V. Crops	M.S.	1979	Adsorption & solubility of Cu & Cd
Cedron, A. '56	Peru	Bradfield	MacDonald	M.S.	1957	Fertilizer & green manure for cotton
Cerilli, R.V. '76	NH	Musgrave	Flor.	M.S.		Transferred to Floriculture 1977
Chahal, R.S. '56	India	Miller	Phys.	M.S.	1958	Removal of salts from saline soil
				PhD.	1961	Supercooling water
Chan, H.K. '25	China.	Bizzell	P.Chem.	M.S.	1926	H-ion conc. & chemical comp. of soil
Chan, Y.H. '69	Malaysia	Arnold	Air Photo	M.S.	1975	Taxonomy of soils under *Hevea*
Chan, H.H. '78	Taiwan	Obendorf				Noncandidate
Chapman, J.E. '29	ND	(Lyon)	P.Chem.	Ph.D		Superphosphate on acid soils
Chatterjee, B.M.	India	(Warren)		M.S.	1909	A monograph on corn
Chaverri, G. '44	C.Rica	Bradfield	Buckman	M. S.	1945	N & organic matter in trop. soil fert.
Chirco, E.H. '76	NH	Pardee	Pl.Path.	M.S.	1979	Effects of disease on *Brassica*
Chen, Chi '45	China	Bradfield	Hartwig	M.S.	1948	Soil & water conservation in China
Chen, S.C. '70	Taiwan	Linscott		M.S.	1971	Herbicide mixtures for alfalfa
Chen, Wei '29	China	Bizzell	Ag.Chem.	Ph.D	1935	$CaCO_3$ on acid soils

Name Yr. Entered	From	Major	Minor	Degree	Date	Thesis
Cheng, P.C. ’22	China.	(Bizzell)	P.Chem.			Withdrew
Child, R.B. ‘38.	NY	Howe	Hartwig	M.S.	1942	Soil-crop relations, cost acct. farms
Chin, P.T. ‘72	Malaysia	Stone	Pl.Phys.	M.S.	1974	Growth hormones for *Hevea*
Chu, S.B. ’66	Taiwan	Alexander	Microbiol	M.S.	1968	Fungal spore lysis
Cionco, R.M. ‘67	CA	Lemon	Phys.	M.S.	1971	Canopy flow concept, roughness
		Alexander	Microbiol.	Ph.D		
Cisney, R.W. ‘64	CA	Linscott		M.S.		Withdrew 1965
Clapp, C.E., Jr. ‘54	ME	Dawson	Pl.Phys.	M.S.	1955	Water-soluble acid polymers of peat
				Ph.D	1957	High Molecular-wt. water-sol. muck
Clark, C.F. ‘05	VT	(Fippin)		M.S.	1907	Corn producing potential, infert. soil
Clark, J.S. ‘50	Ont.	Peech	P.Chem.	Ph. D	1953	Phosphate equilibria
Clark, L.J. ‘63	CA	Peech	Chem.	M.S.	1964	Anthcyanins in corn, determination of
Clark, R.E. ‘47	IN	Peech	Hartwig	M.S.	1949	Tissue testing
Cline, G.W. ’59	NY	Griffeth	R. Ed.	M.S.	1960	Forage production, Chautauqua Co.
Cline, M.G. ’38	MN	Bradfield	Fm Mgt	Ph.D.	1942	Estimating soil productivity
Cobb, J.S. ’15	PA	Montgomery	Pl Phys	Ph.D.		
Coen, G.M. ‘65	Alta.	Arnold.	P.Chem.	Ph.D.	1970	Clay mineral genesis in Spodosols
Cogger, C.G. ‘74	CT	Duxbury	V .Crops	Ph.D.	1979	Interactions of P in organic soils
Cohn, M.A. ‘71	NY	Obendorf	Pl. Phys.	M.S.	1974	Imbibitional chilling injury, corn
				Ph.D	1977	Cause of Imbibitional chilling injury
Colwell, W.E. ‘40	NE	Cummings	Chem.	Ph.D.	1942	Boron in soils
Comeau, E.J. ‘55	N.B.	MacDonald	Lathwell	M.S.	1959	Establishment of small-seeded grasses
Conn, H.J. ‘09	CT	(Bizzell)	Pl.Path.	Ph.D.	1911	Soil bacteriology
Connelly, K.A. ‘77	U.S.	Arnold		M.S.		Withdrew 1978
Coote, D.R. ‘66	Eng.	Zwerman	Agr. Eng.	M.S.	1969	Surface drainage of soil
				Ph.D.	1973	Animal waste disposal
Cope, J.T. Jr. ‘48	AL	Bradfield	Chem.	Ph.D.	1950	Effect of Na on yield & composition
Cormany, C.E. ‘18		Wiggans		M.S.	1920	Varieties of barley in New York
Cornwall, S.M.		Stone		Ph.D.	1966	Coal-mine spoil for plant growth
Corpuz, I.T. ‘55	Phil.	Zwerman	Ag. Eng.	M.S.	1956	
				Ph.D.	1971	Tillage & fert., upland crops, Phil.
Cory, M.M. ‘48	CA	Buckman	Ed.	M.S.		Withdrew ?
Couso, F.M. ‘70	Chile	Arnold		M.P.S	1972	Structure of knowledge of soil science
Couto, W ‘73	Urag.	Lathwell	Int.Agr.	Ph.D.	1976	Sulfate adsorption in tropical soils
Cowan, R.L. ‘58	CA	Peech	Chem.	M.S.	1960	Triethanol amine method for exch. H
Craig, C.E. ‘07	IN	(Gilmore)	(Lyon)	M.S.	1908	Effect of soil phys. prop. on N, corn
Craig, S.J. ‘07	IL	(Fippin)	Pl.Breed	M.S.	1908	Soil types of Hancock Co., Illinois
Crawford, R.F. ‘56	NY	Kennedy	Beeson	M.S.	1958	Nitrate accumulation in forages
				Ph.D.	1960	Effects of NO_3 in forage on ruminants
Crawford, T.W. ‘73	NJ	Peverly		Ph.D.		Withdrew 1974
Crucena, A.E. ‘75	Phil.	Olson	Arnold	M.P.S	1976	No thesis required
Cruickshank, A. M. ‘59	W.Indies	Musgrave	Pom.	M.S.	1960	Microclimate in a corn field
Cubbon, M.M. ‘21	PA	J.Wilson		Ph.D.	1925	Effect of grass on fruit trees
Cushman, N.D. ‘49	MI	Widger	MacDonald	M.S.		Withdrew?
Dabney, S.M. ‘74	NJ	Scott	Ag.Eng.	M.S.	1978	Use of chicken manure, New York
Dagdalen, M. ‘59	Turkey	Lathwell				Noncandidate

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Damery, J.T., Jr '64	IL	Alexander	Microbiol.	M.S.	1966	Root nodule bacteria
			Ecol.	Ph.D.		Trans. to Ecology?
Danielson, R.E. '48	CO	Dawson	Chem.	M.S.	1950	Exchange of Ca for N in wood peat
Danso, A.S.K. '70	Ghana	Alexander	Microbiol	M.S.	1972	Survival of *Rhizobium*
				Ph.D.	1974	Effects of amoebae on *Rhizobium*
Darrah, C.H. III '71	DE	Fick	Steponkus	Ph.D.	1978	Lipid changes in alfalfa under cold
Darst, W.H.	OH			M.S.	1925	Withdrew?
Datta, M.	India	Cavanaugh		M.S.	1909	Soluble salts and soil acidity
Daugherty, L.A. '60?	NE	Cline	Air Photo	M.S.	1972	Landscape evolution
		Arnold	Air Photo	Ph.D	1975	Plinthitic soils of Venezuela
Davide, J.G. '54	Phil.	Brady	Pl.Phys.	M.S.	1955	N fertilization of rice
Davidson, J. '09		Lyon	Org.Chem.	Ph.D.	1914	Coumarin & vanillin on wheat
Dawson, J.E. '42	FL	Bradfield	P.Chem.	Ph.D.	1946	Boron and production of alfalfa
Dawson, M.E. '51	N.Z.	Brady	Ag.Ec.	.Ph.D.	1954	Split root technique, study of nutrition
Deatrick, E.P. '13	PA	(Bizzell)	Org.Chem.	Ph.D.	1917	Manganese, effects on soils & plants
DeCastro, A.B. '58	Brazil	Bradfield	Pl.Phys.	M.S.	1960	Effects of Si & citrate on P uptake
DeMent, J '56	LA	Cline	Ag.Ec.	M.S.	1959	Relation of red pine to site factors
				Ph.D.	1962	Subarctic Brown Forest soils, Alaska
Desai, H.M. '35	India	Buckman	Ag.Ec.	M.S.	1936	Mixed farming in Bombay province
DeShield, M. A. '61	Liberia	Stone	Botany	M.S.	1962	Shifting cultivation in Liberia
Desjardines, R.L. '67	Ont,	Lemon	Musgrave	Ph.D.	1972	CO_2 & sensible heat flux
Devasundrarajah, N. '68	India	MacDonald	Lathwell	Ph.D.	1972	Land prep. & water mgt. for rice
Dewan, M.L. '45	India	Bradfield	Hartwig	Ph.D.	1948	Efficiency of P fertilizers
DeWet, C.L.R. '16	S. Africa	(Bizzell)	Pl.Phys.	Ph.D.		Withdrew
Diamond, S.J. '65	Ireland	Arnold	Geol.	M.S.		Leave 6/67
Dijkerman, J.C. '61	Neth.	Cline	Geol.	Ph.D.	1965	Genesis of textural subsoil lamellae
Dirkson, C. '60	Neth,	Miller	Hydraulic	Ph.D.	1964	Frost Heaving
Dittenhoefer, A.C '71	NY	Dethier	Hydrology	M.S.	1976	Precipitation, New York
Dodd, D.R. '27	WV	Bizzell	Ag.Ec.	Ph.D.	1931	Effects of soybeans on soils & crops
Donahue, R.L. '37	MS	Chandler	Ecol.	Ph.D.	1939	Soil morphology & tree growth
Donoso-Torres, J '52	Mexico	Lathwell.	Hartwig	M.S.	1955	Salt & alkali tolerance of quinoa
				Ph.D.	1958	Reactions of metaphosphates in soil
Doran, J.W. '72	VA	Alexander	Microbiol	Ph.D.	1976	Microbial transformations selenium
Dorrance, A.B. '27	MI	Cooper	Ag.Ec.	M.S.	1929	Oxidation potentials & plant nutrition
Dorsey, H. '17	WV	Montgomery		Ph.D.		Withdrew?
DosSantos, H.G. '75	Brazil	Arnold	Air Photo	M.S.	1978	Quality control for soil surveys
Dossou, V. '76	Dahomey	Lathwell		M.S.		Withdrew
Doxtader, K.G. '63	CA	Alexander	Bact.	M.S.	1963	Heterotrophic nitrification
			Biochem.	Ph.D.	1965	Heterotrophic nitrification
Dreibelbis, F.R, '28	OH	B. Wilson	P.Chem.	Ph.D.		K for tip burn of lettuce on muck
Drielsma, A.B. '65	Neth.	Zwerman	Ag.Eng.	Ph.D.	1970	Soil erodibility
DuBuisson, J.P. '14	S.Afr.	Lyon	Pl.Phys.	Ph.D.	1916	Extraction or soil w/volatile antisept,
Dumith, D.A. '71	Ven.	Arnold	Air Photo	M.S.	1973	Taxonomy clay soils of Venezuela
Dunton, E.M., Jr. '38	VA	Bizzell	Pl.Phys.	Ph.D.	1942	Effects of org. matter on P fixation
Durbin, K.J. '77	U.S.	Leopold	Pl.Path.	Ph.D.		Changed field 8/79

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Dutt, A.K. '44	India	Bradfield	Musgrave	Ph.D.	1947	Soil aggregation
Edwards, I.K. '61	Jamaica	Peech	Musgrave	M.S.	1963	Residual effects of P fertilizers
Elliott, L.D. '12	CA	Cavanaugh	Soil Tech	Ph.D.		Withdrew?
Ellyard, P.W. '60	Australia	Musgrave	Pl.Phys.	M.S.	1962	Soil water diffusivity
ElSayed, M.H.A. '60	Egypt	Lathwell	Hodgson	M.S.	1963	Soil phosphorus
Engel, M.S. '55	Germany	Alexander		Ph.D.	1959	Metabolism of nitrosammonas
Engeln, O.D. von '08	OH	Geog.	Soils	Ph.D.	1911	Glacial drainage & waste
Engle, C.C. '12	OH	(Bizzell)	0rg.Chem.	Ph.D.		Development & use of muck
Engle, E.B. '20	KS	(Bizzell)	P.Chem.	Ph.D.		Withdrew?
Esteva, C., Jr. '29	P.R.	Bizzell	Ag.Eng.	M.S.	1930	Methods for determining C in soils
Etheridge, W.C. '10	NC	Montgomery	Lyon	M.S.	1912	Rainfall & efficiency of fertilizers
		Montgomery		Ph.D.	1916	Varieties of cultivated oats
Evans, D.W. '55	PA	MacDonald	Pl.Breed	M.S.	1958	Birdsfoot trefoil
		Lemon	Pl.Breed	Ph.D.	1962	O_2 & CO_2 of root zone, effects legumes
Evans, E.N.? '47	AL	Dawson	Blaser	M.S.	1949	Organic phosphorus in soils
Evans, G.N. '61	Australia	Miller	Eng.Phys	Ph.D.	1965	Radial root growth in granular soil
Everett, L.A. '76	IA	Musgrave	Biometry	M.S.	1979	CO_2 exchange & CHO storage
Fagundes, A.B. '23	Brazil	(Buckman)	P.Chem.	M.S.		Hardpans
Faix, J.J. '69	OR	Wright	Lathwell	Ph.D.	1974	Effect of temp. & day length on legumes
Fanning, D.S. '57	NY	Brady	Ag.Eng.	M.S.	1959	Minimum tillage
Farah, S.J. '16	Palestine	Bizzell	Fm. Mgt.	M.S.	1917	N supplied by green manure
Fay, P.K. '69	NJ	Duke	Int. Agr	M.S.	1973	Oil, protein, & Methionine, soybean
			Toxicology	Ph.D.	1975	Scapolitin for biol. weed control
Ferreira-A., F.F. '71	Dom.Rep.	Scott	V. Crops	M.S.	1972	N fertilization, tropical soils
Fertig, S.N. '48	WV	Hartwig	An.Sci	Ph.D.	1950	2,4-D for weed control
Ferwarda, J.A. '61	VT	Cline	Geomorph	M.S.	1963	Classification of wet upland soils
Feuer, R. '51	NH	Cline	Ag.Ec.	Ph.D.	1956	Soils of Federal District, Brazil
Finstein, M. '59	NY	Alexander	Biochem.	M.S.	1961	Competition between *Fusarium* & bact.
Fisher, R.F., Jr. '64	IL	Stone	Pl.Phys.	M.S.	1967	Red pine on shallow soil
			Biochem.	Ph.D.	1968	Avail. M & P in conifer root zone
Flach, K.W. '53	Germ.	Cline	Geol.	M.S.	1955	Organic matter in New York soils
			Chem.	Ph.D.	1959	Sols Bruns Acides of N.E. U.S.A
Fletcher, S.W.	MA	(Roberts)	Bact.	M.S.	1898	
Fontaine, C.A. '20	Que.	Bizzell	P.Chem.	M.S.	1923	Growth promoting auximones
Forbes, T.R. '71	CA	Arnold	Ag.Ec.	M.S.	1975	A W. African soil climosequence
		vanWambeke		Ph.D.	1981	Sandy surface layer, Nigeria
Forbush, W.C. '21	MA	(Cooper)	R.Ed.	Ph.D.		Withdrew
Forrest, J.D. '53	Scot.	Fertig	Bradfield	M.S.	1955	Weed seeds in oat seedings
Foster, D.W. '45	Jamaica	Cline	Mineral.	Ph.D.	1948	Growth rates of hardwoods in NY
Foster, W.A., Jr. '46	CA	Hartwig	V.Crops.	M.S.	1947	Botany & culture of rice
Fraley, L. Jr. '59	OH	Griffeth	Biochem.	Ph.D.		Withdrew 1960
Francis, A.J. '66	India	Alexander	Pl.Path.	Ph.D.	1971	*Rhizobium*-legume symbiosis
Fraser, S.	NY	(Hunt)		M.S.	1905	Variation in timothy
Fredette, F.E. '16	PA	(Bizzell)	Pl.Phys.	M.S.		Withdrew?
Free, G.R. '48	IA	Russell	Ag.Eng.	M.S.	1950	Effects of storm direction on erosion
Fribourg, H.A. '49	NY	Kennedy	Pl.Breed	M.S.	1951	Practices for yield & survival, alfalfa

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Fried, M. '44	NY	Peech		M.S.	1945	Effects of lime & gypsum on plants
Friedman, E.C. '64	NJ	Alexander	Wright	M.S.	1966	Decomposition of 2,4-DB
Fridley, H.M. '19	SD	Bizzell	Phys.Geog	M.S.	1925	Effect of S on physical soil properties
Frink, C.R. '57	NH	Peech	Chem.	Ph.D.	1960	Al ion in solution & soil suspensions
Fuelleman, J.R. '51	IL	MacDonald	Pl.Path.	Ph.D.	1954	
Furrer, A.H., Jr.'58	NY	Fertig	Ag.Ec.	M.S.	1960	Life history of horsenettle
Gaeu, D.W. '59	WI	Peech	Chem.	M.S.	1961	Reaction of limestone with soil
Gallo, V. '57	San Salv	Lathwell				Withdrew?
Gano, L.	IN	(Hunt)		M.S.	1906	A study of genus *Trifolium*
Gardner, H.R. '54	UT	Miller	P.Chem.	Ph.D.		Withdrew?
Gardner, W.H. '40	UT	Cummings	Phys.	M.S.		Withdrew?
Gayle, G.F.F. '53	Jamaica	Zwerman	Ext.Ed.	M.S.	1954	A soil conservation extension publ.
Geering, H. '55	CT	Peech	Chem.	M.S.	1967	Sorption of NH_4 by soils
Gershon, D. '57	Israel	Seaney	Musgrave	M.S.	1961	Birdsfoot trefoil pod dehiscence
Gieseker, L.F. '13	MT	Bizzell	Pl.Phys.	M.S.	1914	Toxicities in soil & water cultures
Gifford, R.M. '65	England	Musgrave	Pl.Phys.	Ph.D.	1970	CO_2 exchange of maize leaves
Gile, L.H. Jr. '54	ME	Johnsgard	Geomorph	Ph.D.		Withdrew 1955
Gill, W.R. '50	PA	Miller	Pl.Phys.	Ph.D.,	1955	Effect of aeration & mech. barriers
Gillespie, M.S. '67		Mulligan		M.S.		Withdrew 10/68
Gilmore, J.W.	NY	(Hunt)		M.S.	1905	Quality in potatoes
Goodding, T.H. '30	NE	J.Wilson	Pl.Phys.	Ph.D.	1933	Cross inoculation of legumes
Goldhaar, J. '07		(Hunt)		B.S.	1907	B.S. Thesis on soil granulation
Gosdin, G.W. '50	GA	Brady	Chem.	Ph.D.		Withdrew 1951
Graham, W.G. '60	Ont.	Miller		Ph.D.		Withdrew 1961
Graves, R.L. '55	NY	Schreiber	Org.Chem.			Withdrew 10/56
Greenberg, J.M. '77	MA	Seaney	Reid	M.S.	1980	Incorporation of lime for alfalfa
Grossman, R.B. '52	NY	Cline	Geol.	M.S.	1954	Brittleness of fragipans
Guerrero, R. '61	Columb.	Cline	Geol.	M.S.	1963	Taxonomy of soils of Columbia
Gunner, H.B. '51	Israel	Alexander	Biochem.	Ph.D.	1961	Response of *Fusarium* to environment
Gunnison, D. '70	NY	Alexander	Nat.Res.	Ph.D.	1974	Decomposition of algae
Gustafson, A.F.'17	IL	Lyon	P.Chem.	Ph.D.	1920	Recovery of salts from soil after drying
Guthrie, J.D. '26	VA	Bizzell	Pl.Breed	M.S.	1928	Fertilizer placement
Guthrie, R.L. '65	AL	Arnold	Nat.Res.	Ph.D.	1968	Vegetable production in NY valleys
Guthrie, T.F. '74	MN	Duxbury	Pom.	M.S.	1976	Mineralization & denitrification, His'sols
Guzman, C.L.F. '77	Ecuador	Linscott	An.Nut.	M.S.	1980	Economics of limited tillage for forage
Habte, M. '71	Ethiopia	Alexander	Microbiol.	M.S.	1974	Microbial antagonism
				Ph.D.	1976	Persistence of bacteria fed to protozoa
Hagin, R.D. '70	U.S.A.	Linscott	Pl.Phys.	M.S.	1971	3-(2,4-DP) from 2,4-D applied to grasses
Haigh, L.D.	MO	(Bizzell)				Noncandidate. Ph.D. U of MO 1911
Haines, J.R. '72	OH	Alexander	Microbiol.	M.S.	1974	Biodeg. of polyglycols & N-alkanes
				Ph.D.	1979	Effects of phys. microenviron. on microbes
Hall, T.B.	S.Africa	Lyon	Pl.Phys.	M.S.	1915	Effects of alternate wetting & drying
Hamilton, H.A. '59	Canada	Lathwe11	Pl.Phys.	Ph.D.	1962	Monocalcium & diammonium Phosphate
Hammond, M.W. '68	MT	Alexander	Microbiol.	M.S.	1971	Degradation aliphatic carboxylic acids
Hanna, W.E. '69	NY	Arnold	Air Photo	M.S.	1972	Landscape evolution

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Hardenburg, E.V.		Montgomery	Pl.Breed	M.S.	1915	Potato production in Steuben Co.
				Ph.D.	1919	Factors affecting yield of potatoes
Harkess, R.D. '57	Scotland	Kennedy	An.Nut.	M.S.	1958	Grazing systems for pasture
Harris, C.D.	NC	Cavanaugh	Geol.	A.M.	1902	Methods for determining K in fertilizers
Harris, F.S. '08	UT	Lyon	Pl.Phys.	Ph.D.	1911	Soil moisture relations for plant growth
Harris, M.C. '23	NC	Lyon	Pl.Phys.	Ph. D.	1927	Effect of lime on available P
Hart, R.G.	UT	Soils	P.Chem.	Ph.D.		Withdrew?
Hawes, D.T. '62	MA	Fertig		M.S.		Transferred to Floriculture 1963
Hayes, M.H.B. '53	Ireland	Dawson	Bact.	M.S.	1956	Browning reaction in humus formation
Hayes, S.H.	ME	(Roberts)	Caldwell	M.S.	1895	Availability of N in organic fert.
Hedayat, A. '64	Iran	MacDonald	Pl.Breed	M.S.		Transferred to Plant Breeding 9/65
Heichel, G.H. '62	IA	Musgrave	Biometry	M.S.	1964	Plant-water relations
				Ph.D.	1968	Intervarietal photosynthesis of corn
Heimberger, C.C.'29	Latvia	Romell	J.Wilson;	Ph.D.	1933	Forest types of the Adirondacks
Henderson, G.S. '65	MN	Stone	Geol.	M.S.	1966	Mycorrhizae
				Ph.D.	1968	Mycorrhizae
Henry, D.D. '56	Jamaica	MacDonald	Pl. Phys.	M.S.	1958	Effects of defoliating alfalfa & b.tref.
Herendeen, N.R. '68	NY	Scott	Comun.Art	M.S.	1969	Rate & timing of N for corn
Hergert, G.W. '71	CO	Bouldin	Biometry	Ph.D.	1975	Effect of manuring on P movement
Hermanson, H. '54	MN	MacDonald	Cline	M.S.	1957	Soil requirements of birdsfoot trefoil
Hernandez, J.R. '40	PR	Bradfield	Hartwig	M.S.		Withdrew?
Hersman, F.C.	IL	B.Wilson	Ag. Ed.	M.S.	1932	Organic soils of New York
Hesketh, J.D. '56	ME	Lathwell	Biochem.	M.S.	1958	Liquid P fertilizers
		Musgrave	Biochem.	Ph.D.	1961	Leaf-chamber studies of photosynthesis
Hesse, W.H. '52	CA	Kennedy	Pl.Breed	M.S.	1953	Use of herbicides to promote drying
				Ph.D.	1955	Errors in determination of dry matter
Hickin, P.R. '74	VT	Vittum	Fick	M.S.		Withdrew 2/76
Higbee, H.W. '28	KN	J.Wilson	Pl.Phys.	M.S.	1930	Sulfur oxidizing organisms
				Ph.D.		Withdrew?
Higgins, L.J. '39		Bizzell	Pl.Breed	M.S.		Withdrew?
Hill, D.D. '32	OR	Lyon	Pl .Breed	PhD.	1936	Quality of Oregon malting barley
Hiltbold, A.E.	IA	Lathwell	Hartwig	Ph.D.	1955	C-P-N relations in decomposition of O.M.
Hirsch, P. Dr. '58	Germany	Alexander				Noncandidate
Ho, T.S.S. '69	Taiwan	Alexander	Microbiol	M.S.	1973	Amoebae feeding on algae
Hobbs, P.R. '69	Scotland	Obendorf	Pl.Phys.	Ph.D.	1972	Imbibitional chilling of soybeans
Hodnett, R.C. '57	NY	Feuer	Ext.Ed.	M.S.	1958	Agronomic extension & soils of Jeff.Co.
Hoekstra, P. '61	Neth.	Miller	Eng.Phys	Ph.D.	1963	Water movement between ice & glass
Hofer, A.W. '30s	IL	J.Wilson	Bact.	Ph.D.		Withdrew?
Honda, K. '76	Japan	Alexander	Microbiol	Ph.D.		Withdrew?
Hood, J.T. '51	CA	Brady	Hartwig	Ph.D.	1954	Availability of K
Hopkins, C.G.	IL	Caldwell		M.S.	1894	Standard reagents for acidity & base
				Ph.D.	1898	Chemistry of the corn kernel
Hopkins, E.S. '19	Alta.	Bizzell	Montgomery	Ph.D.	1931	Crop rotations
Hopkins, H.T. '35	DE	Chandler	Pl.Phys.	M.S.	1939	Tree root distribution
Hopper,W.C. '28	Ont.	Bizzell	Pl.Phys.	M.S.	1930	Depth of fertilizer application

Name Yr. Entered	From	Major	Minor	Degree	Date	Thesis
Hou, S.H. '64	Taiwan	MacDonald	Seed Tech	Ph.D.	1971	Premature sprouting wheat
Hovland, J.H. '54	Norway	Kennedy				Visiting Fellow, Noncandidate
Howeler, R.H. '66	Neth.	Bouldin	Chem.	Ph.D.	1970	Oxygen in submerged soils
Hoyt, P. B. '57	Alta.	Bradfield	Statistics	M.S.	1959	Leaf area index for corn
Hsieh, E.L. '09	China	Lyon	Pl.Breed	M.S.	1911	Liming soils
Hsing, Y.C. '75	Taiwan	Musgrave	Pl.Breed	M.S.	1977	Gas exchange & photosynthesis
Huber, G.F. '54	ME	Peech	Musgrave	M.S.		Transferred to U. of Maine 1955
Huddleston, J.H. '63	NY	Cline	Geol.	M.S.	1965	Sewage disposal in soils
Huff, W.C. '36	NY	Gustafson	Ag.Ec.	M.S.	?	Economics of strip cropping
Huffman, EW.D. '70	CO	Allaway	Chem.	Ph.D.	1973	Effects of chromium in plants on rats
Hurst, R.L. '50	UT	Musgrave	Russell	Ph.D.	1952	Soil climatic factors affecting corn
Hussein, S. '24	Turkey	(Bizzell)	Ag.Ec.	M.S.	1924	Climate & chemical composition of soils
Hutchison, C.B.		Montgomery		M.S.	1913	Production of maize
Hutter, J.A. '78	U.S.A.	Fick		M.S.		Withdrew?
Hwang, S.L. '29	China	Cavanaugh	Bizzell	Ph.D.		Withdrew?
Ida, S. '62	Japan	Alexander				Noncandidate
Ike, A. F. '54	NJ	Stone	Stat.	M.S.	1957	N accumulation from black locust
Isaah, P.D. '34	CA	Bizzell	P.Chem.	Ph.D.		Withdrew?
Jacobson, S.N. '75	NY	Alexander	Scott	Ph.D.	1978	Denitrification
Jacox, J.W. '12	NY	J.Wilson	Bact.	M.S.		Withdrew?
Jaffa, G. M. '76	NY	Paine	Stat.	Ph.D.		Withdrew 12/76
Jagschitz, J.A. '52	RI	Fertig	Flor.	M.S.	1954	Control of wild white clover in turf
Jahn, R.E. '43	Ven.	Bradfield	Stat.	M.S.	1945	Soils of Valencia basin, Venezuela
Jaiyebo, E.O. '63	Nigeria	Bouldin	Wright	Ph.D.	1966	Effects of fert. & rotation on non-EX. K
Jamison, V.C. '37	ID	Bradfield	Pl.Phys.	Ph.D.	1941	Methods for studying soil moisture
Janson, I.J. '68	IA	Arnold	Fm.Mgt.	M. S.	1971	Relation of farm success to soils
				Ph.D.	1972	Soil classes & bodies of soil
Jennings, D.S. '12	UT	Bizzell	Geogr.	Ph.D.	1917	Effect of colloids on wheat seedlings
Jha, P.P. '58	India	Cline	Geomorph.	Ph.D.	1961	Genesis of Williamson soil
Joffe, A, '55	S.Afr.					Visiting Fellow to 1/56
Johannesson, B. '41	Iceland	Bradfield		Ph ,D.	1945	Effect of soil volume on plant growth
Johnsgard, G. A.' 38	ND	Bradfield	Fm.Mgt.	Ph.D.	1941	Simplified class. soils of Dutchess Co.
Johnson, A.H. '73	PA	Bouldin	Ecol.	Ph.D.	1975	P export from a watershed
Johnson, C.M. '51	WA	Kennedy	An.Husb.	Ph.D.	1953	Ladino clover production
Johnson, D.D. '48	UT	Dawson	Brady	M.S.	1952	Soil nitrification
Johnson, I.E. '49	Jamaica	Brady	Ag.Ed.	M.S.		Withdrew?
Johnson, R .W. '23	CA	Bizzell	R. Ed.	M. S .	1924	Nitrate under organic mulches
Jones, C.M. '39	SC	Bizzell	PI.Breed	M. S.	1940	Nitrogen in crops
Jones, G.D. '70	NJ	Zwerman	Ag.Eng.	M.S.	1971	Nitrate loss from soil drains
Jones, J.S. '13	ID	Bizzell	Pl.Phys.	M.S.	1914	Properties of an unproductive soil
Jones, J.W. '37	SC	Bizzell	Pl.Breed	M.S.	1938	Microchemical soil tests for SC.
Jones, L.G. '23	TX	Bizzell	Chem.	Ph.D.	1927	Loss of nitrates under timothy
Jones, L.I. '37	MS	Bizzell	Pl.Breed	M.S.	1938	Green manure & soil fertility
Jonsson, L. '60	Iceland	Lathwell		M.S.		Withdrew 6/60
Joo, P.J. '65	Korea	MacDonald	Pl.Phys.	Ph.D.	1970	Phytotoxins in seeds of crown vetch
Jornlin, F.M. '39	SD	B.Wilson	Geol.	Ph.D.		Withdrew

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Jurdant, H.L. '61	Que.	Stone	Geomorph.	Ph.D.	1968	Ecological classification forest lands
Kalisz, P.J. '77	PA	Stone	Geomorph.	M.S.	1979	CEC of acid humus layers
Kalu, B.A. '75	Nigeria	Fick	An.Nut.	M. S.	1976	Alfalfa, quality, age and time of year
Kam, S.P.		(Scott)		M.S.	1978	Iron toxicity for rice in acid sulf. soils
Kao, C.W. '71	Taiwan	Bouldin	Aquatics	Ph.D.		Withdrew 1973
Karikka, A.K. '46						Withdrew 1946
Kass, D.C.L. '70	NY	Drosdoff	Alexander	M.S.	1972	*Azotobacter paspali* as a source of N
			Pl.Breed	Ph.D.	1976	Polyculture in the Amazon basin
Kassa, B. '63	Ethiopia	MacDonald	Ag.Ec.	M.S.	1966	Cotton in Ethiopia
Kaufman, M.D. ' 63	OR	Bouldin	R. Soc .	M.S.	1965	Movement of K in soil
Kawaguchi, K '60	Japan	Bradfield				Noncandidate. (Prof. Kyoto Univ)
Kearney, P.C. '57	MD	Kennedy	Biochem.	Ph.D.	1961	Alfalfa silage
Kelley, R.J. '50	TN	Cline	R.Ed.	M.S.	1951	Plan B,-no thesis
Keng, J.C.W. '74	Taiwan	Scott	Ag.Eng.	Ph.D.	1978	Drip irrigation for soils of the tropics
Kennedy, W.K. '40	WA	J.-Wallace	An.Nut.	M.S.	1941	Grazing habits of cattle on pasture
		MacDonald	An. Nut.	Ph.D.	1947	Effects of grazing on comp. of pasture
Keulemans, N.C. '68	Neth.	Wright				Noncandidate
Keya, S.O. '58	Uganda	Alexander	Microbiol	M.S.	1970	*Rhizobium* specificity
			MacDonald	Ph.D.	1974	Predatory protozoa
Keyfauver, D.S. '41	AZ	Bradfield	V.Crops	Ph.D.		Withdrew for military service 1942
Khan, I.H. '46	India	Musgrave	Ag.Ec.	M.S.	1947	Production of rice
Kilham, O.W. '72	CA	Alexander	Duxbury	Ph.D.	1979	Organic matter in flooded soils
Kimball, B.A. '65	MN	Lemon	Musgrave	Ph.D.	1970	Gas exchange from soil
Kinne, E. '52	NY	MacDonald	Ag.Eng.	M.S.	1955	Bedstraw control in alfalfa
Kinsman, D.F. '21	NY	Bizzell	Geol.	M.S.	1924	Organic soils
Klamt, R.H. '16	IL	Montgomery	Lyon	M.S.	1924	Clover for soil improvement
Klein, M.A. '11	NE	Lyon	Bact.	Ph.D.	1915	Effects of drying soils
Kliewer, W.M. '55	CA	Kennedy	Alexander	M.S.	1958	Storage of moist grain w/fungicides
				Ph.D.	1961	Nodulation of legumes, Nutrients for
Kling, G.F. '68	PA	Olson	Drosdoff	M.S.	1973	P losses from a drainage basin
			IAD	Ph.D.	1974	Model of sediment & P movement to a lake
Klute, A. '48	MI	Russell	Phys.	Ph.D.	1951	Flow of water in unsaturated media
Knapp, J.S. '76	NY	W.R. Knapp	V.Crops	M.S.	1978	Winter wheat & barley
Knoll, H.A. '60	Neth.	Lathwell	Chem.	Ph.D.	1963	Soil temperature for corn
Knox, E.G. '51	IL	Cline	Chem.	Ph.D.	1954	Rigidity in fragipans
Koehler, L.F. '38	CA.	Bradfield	P.Chem.	M.S.	1940	Properties of Bath & related soils
Koopmans, R.W.R. '61	Neth.	Miller	Eng.	Ph.D.	1965	Soil freezing
Kosabzade, S.H. '23	Anatolia	Buckman	Ag.Ec.	M.S.	1924	Effect of climate on chem. comp. of soil
Koslow, E.E. '78	U.S.A.	Miller	Ag.Eng.	Ph.D.		Transferred to Ag. Eng. 1979
Kreizinger, H.F '52	NE	Musgrave	Pl .Phys.	Ph.D.	1955	Liquid N fertilizer for corn, oats, wheat
Krebs, A.H.		Lathwell		M.S.	1948	New York soil testing service
Krishna, R.G. '23	India	J.Wilson	Bact.	Ph.D.	1927	N fixation by *Azotobacter*
Krishnamurthy, D.V. '46	India	Bradfield	Pl.Phys.	M.S.	1947	Tobacco, physiology & fertility
Kristensen,K.J. '58	Denmark	Lemon	Pl.Phys.	M.S.	1958	Oxygen diffusion
Kuhl, A.D. '67	NY	Arnold	Geol.	M. S.	1969	Soil interpretation of color air photos

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Kuiter, B. '75	Neth.	Bouldin	IAD	M.P.S	1977	No thesis required
Kupper, A. '35	Brazil	Cline				Noncandidate
Kyle, E.J.		(Roberts)		M.S.	1902	Preserving soil moisture by tillage
Lagerwerff, J.V. '53	Neth.	Peech	Crops	Ph.D.	1956	Ion uptake by plants
Lamb, J.,Jr. '29	IL	Bizzell	Pl.Phys.	Ph.D.	1933	Availability of soil K
Lang, A.L. '28	IL	Bizzell	Chem.	M.S.	1929	Availability of rock phosphate
Larsen, M.?F. '75	Ven.	W.W.Knapp	Eng.	M.S.	1977	Tropospheric circulation
				Ph.D.	1979	Gravity waves in shear flow
Laverdiere, M.R. '73	Que.	Weaver	Nat.Res.	Ph.D.	1976	Electrochemistry of spodic horizons
Lavkulich, L.M. '63	Alta.	Cline	Geomorph.	Ph.D.	1967	Aluminum in soils
Lazar ,V.A. '50	NY	Beeson		Ph.D.		Withdrew?
Leavitt, L.C. '68	NY	Lucey	Swader	M. S.	1974	Date of Planting corn
LeBarron, H. '57	Alta.	Fertig	Pl.Phys.	Ph.D.	1961	Quackgrass control
Lecher, D.W. '65	NE	Dethier	Ag.Eng.	Ph.D.	1971	Ozone concentrations in atmosphere
Lee, O.	NY	Fippin		B.S.	1906	B.S. Thesis: Soil survey of Lee Farm
Lee, S.B. '22	NC	Soils	Pl.Phys.	Ph.D.		Withdrew?
Lemon, E.R.	NY	Russell		M.S.	1946	Effects of soil aeration on Mn & Fe
Lennox, L.K.B.		Alexander		Ph.D.	1980	Effect of thiram on bean *Rhizobium*
Leonard, J.W. '55	MA	Brady	P.Chem.	M.S.		Leave 6/56
Levato, J.A. '68	N Y	Mulligan		M.S.		Transferred 1/71
Liang, L.K. '09	China	(Fippin)		M.S.	?	Alkali soils
Lin, C.C. '39	China	Cummings	Chem.	M.S.	1940	Effect of Ca & pH on soybeans
Lindsay, W.L. '53	ID	Peech	Pl.Phys.	Ph.D.	1957	Relation of Al to P fixation
Linke, H.B.	NY	Agron.	V.Crops	M.S.	?	Crop production on Merrimac soil
Linsley, C .M. '24	IL	Bizzell	Pl.Phys.	M.S.	1926	Rawness of subsoils
Lipman, J.G.	NJ	Caldwell	Veterinary	A.M.	1900	Studies in nitrification
			Agriculture	PhD.	1903	Nitrogen fixing bacteria
Lisk, D.J. '52	NY	Peech	Chem.	M. S.	1954	Determination H_2O extractable P
				Ph. D.	1957	Chemical composition soil solution
Lister, R.A. '69	Ont.	Lemon	Biometry	Ph.D.	1974	CO_2 & photosynthesis
Little, D.W. '76	Jamaica	Scott	Com. Arts	M.P.S.	1978	Control of soil salinity
Liu, B.W.Y. '71	Taiwan	Fick	An.Nut.	M.S.	1974	Alfalfa response to weevil feeding
				Ph.D.	1977	Models for alfalfa quality
Liu, T.		J.Wilson		Ph.D.	1939	Solubility of $CaCO_3$ & rate of Nitrif.
Liu, W.T. '70	Taiwan	Lemon	Miller	Ph. D.	1974	Soil-plant water relations
Loch, J.P.G. '69	Neth.	Zwerman	P.Chem.	M.S.	1971	Stability of soil structure
		Miller	Eng.	Ph.D.	1975	Frost heaving
Loddesol, Dr.A.	Norway					Noncandidate
Loftus, N.S. '62	PA	Stone		Ph.D.		Withdrew 8/63
Loos, M.A, '63	S.Afr.	Alexander	Bact.	Ph. D.	1966	Decomposition of 2,4-D
Lopes, E.S. '65	Brazil	Alexander	Microbiol	M.S.	1968	Interactions among microorganisms
Loredo-G., J. '45	Mexico	Bradfield		M.S.	1947	Corn production
Lort, W.R.V. '52	CT	Lathwell	Musgrave	M.S.		Withdrew?
Losche, C.K. '55	NJ	Cline	Geomorph.	M.S.	1957	Illuviation in fragipans
Lott, W.L. '38	UT	J.Wilson	Pl.Phys.	Ph.D.	1939	Zinc injury in crops
Lucas, R.F. '68	MA	Stone	Sinclair	Ph.D.		Withdrew 6/71

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Luce, R.S. '75	NJ	Obendorf	An.Nut.	M.S,	1978	Protein synthesis in corn seed
Lugg, D.G. ' 74	England	Sinclair	Pl .Phys.	Ph.D.	1978	Effect of leaf char. on photosynthesis
Lugo-Lopez, M. A. '44	PR	Bradfield	Buckman	M.S.	1945	Agriculture & soil erosion in PR
		Russell	Hartwig	Ph.D.	1950	Moisture relationships in PR soils
Lunin, J. '45	NY	Peech	Pl.Phys.	M.S.	1947	Chemistry of Al, Fe, & Mn in soils
				Ph.D.	1949	Solubility of Al, Fe, & Mn in soils $
Lyon, T.L.	NE	Caldwell	Agric.	Ph.D.	1904	Improving quality of wheat for bread
Lyons, E.S. '27	KN	(Bizzell)	P.Chem.	Ph.D.		Withdrew?
MacDonald, G.E. '59	NY	Lathwell	Pl.Phys.	M.S.	1961	Response of crops to P & K
MacDonald, H.A. '37	N.S.	J.-Wallace	Pl.Breed	M.S.	1938	Effect of fert. on bot. comp. of sward
				Ph.D.	1943	Birdsfoot trefoil
MacGregor, A.N. '64	N.Z.	Alexander	Microbiol	Ph.D.	1968	Specificity of *Rhizobium* sp.
MacIntire, W.H. '13	TN	Bizzell	P.Chem.	Ph.D.	1916	Carbonation of burnt lime in soil
MacKay, D.C. '48	N.B.	Bradfield	Chem.	M.S.	1949	Chemical methods for class. of Podzols
MacKenzie, A.F. '57	Sask.	Dawson	Pl.Phys.	Ph.D.	1959	Formation of peat
MacLean, A.A. '56	N.B.	Bradfield				Noncandidate
MacLeod, J.A. '68	Ont.	Lathwell	Pl.Phys.	Ph.D.	1971	NO_3 vs NH_4 as source of N for corn
MacLeod, L.B. '59	N.S.	Bradfield	Musgrave	Ph.D.	1962	Lime & K for alfalfa & grass
MacMillan, K. A. '70	Que.	Scott	V.Crops	Ph.D.	1972	Poultry manure for corn
MacTaggert, A. '17	N.Z.	Lyon	Montgomery	Ph.D.	1921	Effects of fertilizers on legumes
MacRae, I.C. '60	Austral	Alexander	Microbiol	Ph.D.	1963	Metabolism of phenoxyalkyl carboxylic-acids by *Flavobact*.
Macy, P.F.	IL	Bizzell	P.Chem.	Ph.D.	1935	Critical nutrient composition of plants
Mandero, L.A. '74	Venez.	Arnold	Nat.Res.	M.S.	1977	Soil development, semiarid Venezuela
Madrid, C. '39	Columb.	Cummings	Pl.Phys.	M. S.	1941	Properties of soils of the tropics
Magdoff, F.R.' 63	DC	Bouldin	V.Crops	M.S.	1965	Release of Mg under intensive cropping
				Ph.D.	1969	N fixation in submerged soil
Magruder, J.W. '27	MD	Hartwig	Ag.Ec.	M.S.	1941	Hay curing in the United States
Mahmud, A . M. '30	Iraq	Bizzell	Ag.Ec.	M. S.	1932	water requirements of crops
Malcolm, P.A.	GA	Soils		Ph.D.		Withdrew 1961
Malouf, T.P. '31	Palestine	Buckman	Hort.	M.S.	1933	Pastures in Palestine
Mamicpic, N.G.' 64	Phil.	MacDonald	Pl.Phys.	Ph.D.	1970	Variability in mung bean
Mann, H. B. '26	NC	Bizzell	P.Chem.	Ph.D.	1929	Effects of liming on avail. Mn & Fe
Maoui, H. '61	Morocco	Cline	Geol.	M.S.		Failed 1962
Marrese, R. '53	NY	Hartwig	Zwerman	M.S.	1955	Effects of manure on legume seedlings
Marshall, K.C. '57	Aust.	Alexander	Microbiol	M.S.	1959	*Fusarium*-microflora competition
				Ph.D.	1961	Nitrification by *Aspergillus*
Martin, J.M.	NY	Zwerman	Ag.Eng.	M.S.		Withdrew? $
Martin, R. T. '48		Dawson	Chem.	Ph.D.	1952	Mineralogical analysis NY clay soils
Martin, T.L. '15	UT	Bizzell	Pl.Phys.	Ph.D.	1919	Decomposition of green manures
Martini, J.A.'62	Panama	Lathwell	Pl.Phys.	Ph. D.	1965	CEC & K of surface soils, Panama
Marull, J. '40	Chile	Zwerman	Hartwig	Ph.D.	1952	Analysis of soil & water conservation
Massey, E.W. '52	India	Lathwell	Ag.Eng.	M.S.		Transferred to Entomology 1953
Mather, W. '21	MA.	Agron.	Geol.	Ph.D.		Withdrew?
Matsuo, H. '56	Japan	Peech	Chem.	M.S.	1958	Analytical Methods for nitrification
Matthews, B.C. '50	Ont.	Peech	Chem.	Ph.D.	1952	Fixation & release of soil K

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Matura, A.D. '72	NY	Dethier	Eng.	M.S.	1975	Meteorology of ozone episodes
Maynard, L.A.		(Bizzell)		Ph.D.	1915	Fixation of N by sweet clover
McAuliffe, C.D. '42	NE	Bradfield	Chem.	Ph.D.	1948	Hydroxylic minerals of surface soils
McBeath, D.K.'59	Alta.	Dawson	Chem.	Ph. D.	1963	Inhibition of nitrification
McCaleb, S.B. '46	CA	Cline	Geol.	M. S.	1948	Soils from high-lime till in NY
				Ph.D.	1950	Genesis Gray Brown Podzolic soil
McClelland, C. K.		(Caldwell)		M.S.	1902	Phosphoric acid as fertilizer
McClung, A.C. '47	WV	Dawson	Pom.	M.S.	1949	Boron status by growth of sunflower
				Ph.D.	1950	Soil boron under cropping
McCracken, R.J '49	IN	Cline	Min.	M.S.	1951	Soil geography of Palau & Saipan
McDonald, J.E. '36	NY	Howe	Geol.	M.S.	?	Soil & water loss from pastures
McDonald, M.B., Jr.	VA	MacDonald	Pl.Phys.	Ph.D.	1963	Seed germination of Indian Ricegrass
McDowell, G.R. '61	RI	Scott	Ag.Ec.	M.S.	1963	Farm records for soil mgt. data
McFee, W.W. '61	TN	Stone	Cons.	M.S.	1963	Organic matter of Podzols
			Biom.	Ph.D.	1966	NH_4 & NO_3 for *Pinus* spp.
McHargue, J.S. '18	KY	Lyon	P.Chem.	Ph.D.	1921	Mn for Plant growth
McKeague, J.A. '59	Man.	Cline	Chem.	Ph.D.	1962	Silica in soils
Meisinger, J.J. '68	IL	Bouldin	V.Crops.	Ph.D.	1976	Fertilizer N for potatoes
Melnyk, G.		Lathwell		M.S.		Did not complete (Analyst in Dept.)
Melrod, D.M. '75	NJ	Duke	Pl.Breed	M.S.	1977	Allelopathy- root exudates
Mendez-C., F.A.		Alexander		M.P.S.	1975	Adaptation in *Rhizobium*
Menzies, R.G. '45			Soils	?		Withdrew 1946
Merkle, F.G. '28	MA	Bizzell	P.Chem.	Ph.D.	1933	Base exchange prop. of Jordan plots
Merkle, M.G. '59	AL	Fertig	Pl.Phys.	Ph.D.	1963	Determination of 2,4,5-TP in forage
Merritt, R.S. '55	CA	Cline	Geol.	M.S.	1958	Effect of CO_3 content on depth of leach.
			Mineral.	Ph.D.		Withdrew 1959
Merwin, H.D. '40	DC	Bradfield	Hartwig	Ph.D.	1950	Release of nonexchangeable K
Mielke, L.N. '65	NY	Zwerman	Ag.Eng.	M. S.	1967	Evapotranspiration with soybeans
Miller, E.V. '41	MN	Bradfield	Pl.Phys.	Ph.D.	1948	Equadorian soil fertility properties
Miller, M.F.	MO	(Caldwell)		M.S.	1901	Lime, gypsum, & salt as soil amendments
Miller, P.R. '38	VT	J.-Wallace		Ph.D.		Withdrew ?
Miller, R.D. '41	MO	Bradfield	Phys.	Ph.D.	1948	Infrared adsorption meas. low conc. CO_2
Mills, A.L. '70	NY	Alexander	Microbiol	M.S.	1973	Algae decomposition & nutrient cycling
Minglegrin, U.N. '65	Israel	Dawson	P.Chem.	M.S.	1966	Sugars isolated from peat
Mitchell, R. '57	Ireland	Alexander	Microbiol	M. S .	1959	Microbial changes in flooded soil
				Ph.D.	1961	Control of Panama disease (*Fusarium*)
Mitchell, R.L. '56	IA	Kennedy	Pl.Phys.	M.S.	1958	N fertilization of forage crops
Mittra, M.K. '61	India	Wright	Pl.Phys.	Ph.D.	1965	Reed canary grass
Molina, J.A.E. '61	France	Alexander	Microbiol	M.S.	1964	*Nitrosammonas* & *Nitrobacter* in rhizo-sphere
				Ph.D.	1968	Nitrate formation by *Aspergillus*
Moore, J.T. '74	NY	Paine	Env. Qual	M. S .	1976	Severe storms
				Ph.D.	1979	Severe weather index
Morales-R. D.	Mexico	Lathwell-	V.Crops	M.S.	1961	Seasonal changes in fertility, Honeye
Mordoff, R.A. '12	NY	Phys. Geo	(Lyon)	A.M.	1914	(Not available)
Moreno, R.	Mexico	Bradfield	Musgrave	Ph.D.	1948	Effect of N on yield & comp. of wheat

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Morgan, J.O, Dr. '07	NC	Lyon	(Warren)	M.S.	1908	Methods to estimate soil mineral def.
				Ph.D.	1909	Effects of soil temp. & moist. on Mineral needs of soil
Morrill, L.G. '55	UT	Dawson	Pl. Phys.	Ph.D.	1959	Nitrification patterns w/ $(NH_4)_2SO_4$
Morris, D.R. '75	MO	Lathwell	Stat.	M.S.	1977	Anaerobically digested manure
Morris, R.A.'67	NY	Bouldin	Pl.Phys.	M.S.	1968	Response of alfalfa to K
Morrison, D. '54	Scotland	Musgrave	MacDonald	M. S.	1955	Effects of fertilizer on germin. corn
Morrison, I.?. '64	Ont.	Stone	Geomorph	Ph.D.		Withdrew 1965
Moser, F. '29	IA	Bizzell	Chem.	Ph. D.	1932	Relation of Ca/Mg ratio to crops
Moss, D. H.'54	ID	Musgrave	Pl.Phys.	M.S.	1955	Growth studies with corn
		Lemon	Bradfield	Ph.D.	1959	Photosyn. of corn under field cond.
Mott, G.O. '36	NE	J.Wilson	Pl.Breed	Ph.D.	1940	Influence of Se on *Rhizobia*
Moyer, R.T. '26	PA	Bizzell	Pom.	M.S.	1927	Basic slag for acid soils
				Ph.D.	1941	Nonsymbiotic N fixation in China
Mueller, O.P. '56	WA	Cline	Geol.	M.S.	1957	Relation of tree rooting to soils
Mughogho, S. M. K. '70	Malawi	Drosdoff	IAD	M.S.	1975	Organic P in soils of Malawi
		Lathwell	IAD	Ph.D.	1977	Liming Ultisols for corn in Ghana
Muro-C., J. del C. '52	Peru	soils				Special student
Murphy, B.C. '57	MS	Peech	Griffith	M.S.	1959	K supplying power of soils
Murrmann, R.P. '62	IN	Peech	Chem.	M.S.	1963	Solubility of P reaction products
				Ph.D.	1966	Adsorbed & crystalline phosphates
Muslih, R.K. '70	Iraq	MacDonald	Biochem	M.S.	1972	Comp. of soybeans by stage of growth
		Linscott	Pl.Phys.	Ph.D.	1976	Effects of herbicides on soybean seeds
Muselle, P. '49	Que.	Russell	Ag.Eng.	M.S.		Withdrew?
Naderman, G.C., Jr. '67	IN	Drosdoff	V.Crops.	Ph.D.	1973	Yellowing of rice in Columbia
Nair, C.K.N.	India	Dawson	Pl .Phys.	Ph.D.	1949	Activity of cupric ions in peat
Nair, K.M. '46	India	J.Wilson	Pl.Phys.	M.S.	1948	pH of nodules & tissues of legumes
Namken, L.N. '57	TX	Lemon	Miller	M.S.	1958	Internal moisture relations of corn
Neafsey, J.A. '72	CT	Peverly	Env.Qual	M.P.S.	1976	P loss from organic soil
Nearing, C.L. '48	NY					Withdrew ?
Nearpass, D.C. '48	FL	Bradfield	Pl.Phys.	M.S.	1950	Ca uptake by plants
		Peech	Pl .Phys.	Ph.D.	1952	Cation balance for ladino clover
Necesito, A.C. '65	Phil.	Wright	MacDonald	Ph.D.	1971	Virginia tobacco in the Philippines
Neguse, A. '57	Ethiopia	Nielsen		M.S.	1959	Determination of lime requiremant
Nelson, L.E. '48	ND	Brady	Pl.Phys.	M.S.	1950	Ca-K relations in soil plant systems
				Ph.D.	1952	Cation interactions by split-root tech.
Neuburg, W.P. '43	NY					Withdrew
New, T. '14	China	Bizzell	Geol.	M.S.	1915	Methods of mechanical analysis
Ng, W. '75	Taiwan	Fick	Lathwell	M.S.	1977	Distribution of dry matter in alfalfa
Ngongi, A.G.N.'71	Cameroon	MacDonald	Scott	M. S.	1973	Tropical root & fiber crops
				Ph.D.	1976	Mineral nutrition cassava
Nyamapfene, K.W. '77	Zimbabwe	VanWambeke	IAD	M.S.	1979	Iron fixation of P in tropical soils
Obordo, R.A. '57	Phil.	Kennedy	Stat.	M.S.		Withdrew?
O'Conner, K.F. '54	N.Z.	MacDonald	Zwerman	Ph. D .	1956	Effects of treading on grassland
Odeyemi, O. '71	Nigeria	Alexander	Microbiol	M.S.	1974	Soil organic matter & soil N
				Ph.D.	1976	*Rhizobium* resistance to herbicides

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Okigbo, B.N. '54	Nigeria	Musgrave	Ent.	M.S.	1956	A review of grain storage
		Brady	Ent.	Ph.D.	1959	Effect of fertilization of wheat on Hessian fly
Oloya, T.O. '73	Uganda	Scott	V.Crops	M.S.	1976	Use of poultry manure & N for collards
Olsen, R.A. '49	UT	Peech	Hartwig	M.S.	1951	Donnan equilibrium for ion activity
				Ph.D	1953	Ionic environment of plant roots
Olson, R.P. '46				M.S.		Withdrew?
O'Roirdan,T. '63	Scotland	Zwerman	Dethier	M.S.	1965	Small river basin development
Ormsby, J.P. '68	NY	Dethier	Air Photo	Ph. D.	1973	Cloud climatology for New York
Osorio, S.V. '75	Columbia	Scott	IAD	M.S.	1979	Sewage sludge on soybeans
Otten, R.J. '54	NH	Dawson	Ext.Ed.	M.S.	1956	Effects or herbicides on nitrification
Overriein, J. '59	Norway	Alexander		Ph.D.		Withdrew 1961
Oyama, M. '59	Japan	Cline				Noncandidate
Ozuygur, M. '46		Agron.		Ph.D.		Withdrew
Pacheo, R. '58	Ecuador	Cline	Geomoroh	M.S.		Withdrew 1959
Palmer, A.F.E. '62	England	Musgrave	Stat.	M. S.	1964	Corn physiology & growth
			Pl.Breed	Ph. D.	1969	Translocation in corn
Palmer, T.Y. '50	KS	Widger		M.S.		Withdrew
Panganiban, E.H.'21	Phil.	(Bizzell)	Ag.Chem.	Ph.D.	1925	Effect of temperature on N changes
Parakh, J.S. '55'	India	Schreiber	Pl.Phys.	Ph.D.		Failed final
Parberry, D.B. '55	Aust.	Brady	MacDonald	Ph.D.	1959	Crop logging with wheat & corn
Parry, R.W. '40	UT	Cummings	Pl.Phys.	M.S.		Withdrew?
Patrick, A.L. '25	PA	Bizzell	Pl.Phys.	Ph.D.	1931	Effect of roots on nitrate in soil
Pattanaik,S.	India	Lathwell		Ph.D.	1952	Assessment of available P
Patterson, R.P. '63	NC	Lathwell	Biochem	Ph.D.	1968	Root-zone temperature effects on corn
Paul, P.M. '65	Man.	Dethier	Hist.Sci.	M.S.	1970	Fire weather forecasting, maritime
				Ph.D.	1974	Fire weather forecasting. Canada national
Pauling, N.W., Jr. '69	NY	Lucey	Reid	M.S.	1975	Fertilization of alfalfa, Haplorthod
Payne, H.W. '57	Jamaica	Lemon	Ag.Ec.	M.S.	1959	Evaporation from corn & free water
Pearson, C.S. '27	NY	(Bizzell)	Pl.Phys.	Ph.D.		Withdrew? (Employed after 1928)
Peck, N.H. '52	NY	Miller	Pl.Path.	Ph.D.	1956	Evapotranspiration, veg. crops
Peele, T .C. '29	NC	J. Wilson	Chem.	Ph.D.	1933	Adsorption of bacteria by soil
Pendleton, J.D. '48	VA	Peech	Musgrave	Ph.D.	1951	Donnan equil.: Dissac. & hydration clays
Pennock, R.,Jr. '53	NJ	Cline	Geomorph.	M. S.	1958	Genesis hydromorphic soils
Pepin, A. '19	Que.	Lyon	Phys.Geog	Ph.D.	1924	Ca in volusia & Dunkirk soils
Perigrina, R.P. '47	Mexico	Bradfield	Musgrave	M.S.	1948	Seasonal uptake of N by corn
				Ph.D.	1952	Rates & timing of N for corn
Perez, J .C. '76	Ven.	Arnold	Olson	M.P.S.	1978	Quality control, soil survey Venezuela
Peter, C.J. '73	NY	Scott	Ag.Eng.	M.S.	1976	Use of manure from waste mgt.system
Peters, R.J. '62	CA	Alexander	Microbiol	M.S.	1964	Effect of legume exudate on nodule bact.
Peterson, F.F. '50	WI	Cline	Bot.	M.S.	1953	Relation org. matter to base status
Peterson, G. '73	NY	Stone	Bot.	M.S.	1977	Mycorrhiza & soil respiration
Pfaender, F. '68		Alexander	Ecol.	Ph.D.	1971	Metabolism of DDT
Pfaender, S.S. '70	MN	Alexander	Bact.	M.S.	1974	Microbial lysis of fungi
Pheng, K.S. '76	Malaysia	Scott		M.S.	1978	Rice on acid sulfate soils
Philipson, W.R '68	NY	Drosdoff	Air Photo	Ph.D.	1975	Relation crop dist. to soil & climate

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Phipps, W.M. '23	KY	Bizzell	Geol.	M.S.	1925	Org.Matter in calc. & noncalc. soils
Piech, P.A. '78	NY	Arnold	Ag.Ec.	M.S.	1980	Concepts soil map delineations
Pinkas, L.L.H. '57	NY	Wright	An.Nut.	M.S.		Withdrew?
Plice, M.J. '26	IN	Romell	Forestry	Ph.D.	1932	Forest litter & humus layers
Plummer, J.K., Jr. '12	NC	Bizzell	Cavanaugh	Ph.D.	1915	O_2 & CO_2 effects on nitrification
Poladi, C.H. '74	Pak.	MacDonald	Pl.Breed	M.S.	1975	Hormones in seed germination
Polk, H.T. '34	KY	Bizzell	Chem.	Ph.D.	1938	Use of K in peats by plants
Pomerening, J.A.'51	WI	Cline	Mineral	M.S.	1956	Soil mapping by photo interpretation
Ponnamperuma, F. '51	Ceylon	Brady	Hartwig	Ph.D.	1955	Chemistry of submerged soils
Poostchi, I. '55	Iran	MacDonald	Pl .Breed	Ph.D.	1959	Birdsfoot trefoil
Porter, H.L. '46	ND	Gustafson	Hartwig	M.S.		Withdrew?
Posner, J.L. '72	NY	Seaney	Ag.Ec.	M.S.	1975	Culture of *Sorghum bicolor*
		Musgrave	Ag.Ec.	Ph. D.	1978	Solar radiation & growth upland rice
Posner, R. J. '73	NY	Paine	Env.Qual.	M.S.	1976	Generation of kinetic energy
Potgeiter, H.J. '62	S. Afr.	Alexander	Biochem.	Ph.D.	1965	Lysis of *Fusarium* sp.
Prevatt, R.W. '54	FL	Peech	Musgrave			Withdrew?
Proulx, H?	Que.	Agron.	Pl.Breed	Ph.D.		Withdrew?
Prundeanu, J. '52	Romania	Zwerman	Musgrave	M.S.	1953	Agr. Production & population, E. Europe
				Ph.D.	1955	Acceptance of soil cons, practices
Pruntel, J.'73	Neth.	Zwerman	Drosdoff	M. S.	1975	Irrigation, Federal District, Brazil
Puertas-F., J.L. '50	Mexico	Bradfield	Hartwig	M.S.	1951	Use of N for cotton
Punyasingha, T. '38	Thai.	J.Wilson		M.S.	1939	Varieties of soybeans & strains *Rhiz.*
Purnariksha, R. '36	Thai.	Bizzell	Ag.Chem.	M.S.	1937	Properties of fertile rice soils
Quevado, F.E. '59	Peru	Cline				Noncandidate
Quirega, M.	Argentina	Fippin		M.S.	1905	Soil survey Northern Tompkins Co.
Ram, A. '57	India	Kennedy	Ag.Ec.	Ph.D.	1960	N fertilization for forage sorghum
Ram, D.M. '56	India	Zwerman	MacDonald	M.S.	1957	Covercrops for soil conservation
				Ph.D.	1959	Management of cover crops
Ramirez-B., G. '46						Withdrew '46
Ramirez-M. C.M '76	Costa Rica	Alexander	Microbi	Ph.D.	1979	Rhizobium pop. effects on beans
Rane, F.W.		(Roberts)	Bailey	M.S.	1892	Effect of bottom heat on plants
Raney, F.C. '49	WA	Stone	Pl.Path.	Ph.D.		Withdrew 1/54
Raney, J.L.	NY					Noncandidate
Raney, W.A. '48	MS	Russell	Chem.	Ph.D.	1950	Oxygen diffusion re: soil aeration
Rao, V.S. '69	India	Duke	Swader	Ph.D.	1976	Action of acetanalide herbicides
Raymond, D.G.M. '66	IL	Alexander	Microbiol	M. S.	1970	Metabolism of nitrophenols
Raymond, D. J. (Dean) '68	CA	Alexander	Biochem.	M.S.	1971	Cleavage of ether bond,m-Methoxy-benzoic acid
Raymundo, H.E. '54	Phil.	Johnsgard	Ag.Ec.	M.S .	1956	Factors of soil genesis, Philippines
Redgrave, M.J. '57	MD	Miller	P.Chem.	Ph.D.		Withdrew 12/58
Reed, Dr. J.F. '39	LA	Cummings				Noncandidate
Reed, W.E. '44	La.	Bradfield	Hartwig	Ph.D.	1946	Effect of plants on soil phys. properties
Reichart, M.A.L '45	Argen.	Bradfield	Musgrave	M.S.	1946	Fertilization of alfalfa
Reid, D.J. '59	CA	Lathwell	An.Nut.	M. S.	1961	K fertilization of alfalfa & b. trefoil
		Wright	An.Nut.	Ph.D.	1964	Effects of K on CHO in alfalfa
Reid, S.A.	Jamaica	Brady	Pl.Phys.	M.S.	1956	Availability of P in liquid & solid fert.

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Reisner, J.H. '13	PA	Montgomery	Pl.Breed	M.S.	1915	Wheat in New York
Rhee, G-Y. '68	Korea	Mulligan		Ph.D.	1971	Competition for P in aquatic environment
Richard, J.A. '38	Que.	Chandler	Phys.Geog	M.S .	1940	Forest types in Quebec
				Ph.D.	1943	Nature of podzolization
Richards, N.A. '57	NY	Stone	Ag.Ec.	M.S.	1959	Soil-site studies, Allegheny Plateau
Ritchey, K.D. '65	NV	Hodgson	Pl.Phys.	M.S.	1967	Wheat root secretions
		Fox	V.Crops	Ph.D.	1973	Limitations of Ultisols & Oxisols
Robarge, W.P. '69	NJ	Peech	Chem.	M.S.	1971	Release of P by soils
Robb, R.B. '12	NY	Fippin		M.S.	1913	Irrigation
Roberts, C.A. '62	KS	MacDonald	V.Crops	M.S.	1964	Drouth hardiness in oats
Roberts, K.J. '74	NY	Swader	Eng.	M.S.	1977	Landfill leachates
Robison, R. S. '44	NY	J .Wilson	Pl.Phys.	M.S.	1946	Bacterial byproducts antagonistic for *Rhizobium*
Rodriguez-P., M.S. '72	Columbia	Bouldin	IAD	M.S.	1975	Ca, Mg, & K, soils of Columbia
				Ph.D.	1977	Uptake & translocation of N in corn
Rogoff, M.J. '73	NY	Olson	Water Res	M.S.	1976	Soil ratings for farming
Roldan,J. '55	P.R.	Dawson	Lathwell	M.S.	1957	Fertility of muck soils of Puerto Rico
Romero, S.A. '43	Ven.	Cline	Pl.Breed	M.S.	1944	Soil variability
Romkens, M.J.M. '64	Neth.	Miller	Phys.	Ph.D.	1969	Migration or particles in ice
Ross, H.E., Jr. '38	NY	Bradfield	Fm.Mgt.	M.S.	1939	Fractios of plant P & K from fertilizer
Roth, J.R. '65	MO	Peech	Chem.	Ph.D.	19 68	Equilibrium Labile & cryst. P in soil
Rundle, J.R. '72	IA	Stone	Pom.	M.S.	1976	*Lycopodium* fairy rings
		Lathwell;	Pl.Breed	Ph.D.		Withdrew 1977
Runolfsson, S. '71	Iceland	Zwerman	MacDonald	M.S.	1973	Wind erosion of organic soils
Russo, J.M. '74	CT	W.W. Knapp	Fick	Ph.D.	1978	A method of evaluating crop systems
Rykbost, K.A. '63	NY	Zwerman	Ag.Eng.	M.S.	1966	Response of corn to surface drainage
Ryssdal, J. '60	Norway	Musgrave	Pl.Phys.	M.S.	1964	Ecological problems of cereal production
Sahin, T. '72	Turkey	Miller	Ag.Eng.	M.S.	1973	Transport of water in frozen soil
St.Pierre, J.-C.W. '66	Que.	Wright	Lathwell	Ph.D.	1970	Effects of defoliation on timothy
Sajise, P.E. '67	Phil.	Musgrave	Ecol.	Ph.D.	1972	Cogon in vegetation succession, Phil.
Saleh, H. '67	Iran	Lathwell	IAD	M.S.		Transferred to Ag. Ec, 6/68
Salih, M.O. '65	Sudan	MacDonald	Pl.Breed	Ph.D.	1969	Effect of variety & soil on soybean roots
Saltonstall, L. '41	MA	J.-Wallace	An.Sci.	Ph.D.	1948	Quant. & Qual. forage consumed by sheep
Sanchez, N. '47	Mexico	Lathwell	Hartwig	Ph.D.	1955	P supplying power, methods for
Sanchez, P.A. '60	Cuba	Brady		M.S.	1964	Soil survey for locating s. beets
		Feuer	Ag.Ec.	Ph.D.	1968	Puddled vs granular soil for rice
Santiago, P.A. '70	Ven.	Drosdoff	IAD	M.S.	1972	Effects of org. matter on Al toxicity
Santos, F. '56	Phil.	Musgrave	Cline	M.S.	1959	Agrononic research, College Agr., UP
Santos, H.G. des '75	Brazil	Arnold	Air Photo	M.S.	1973	Quality control in reconn. soil survey
Santos, O. deG. '73	Phil.	Lucey	Ag.Ec.	M.P.S.	1976	Alfalfa & corn in northern New York
Schafer, J.W., Jr. '60	MI	Musgrave	Pl.Breed.	Ph.D.		Withdrew 1963
Schenk, R.U. '51.	IN	Kennedy	Chem.	M.S.	1953	Preservation of hay with fungicides
				Ph.D.	1954	Preservation of grain with fungicides
Schluter, M?.M? '75	WI	Duke	V.Crops	M.S.	1977	Uptake of ?? [original is unclear]

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Schmehl, W.R. '40	CO	Bizzell	Pl.Phys	M.S.	?	?
		Bradfield	Pl.Phys.	Ph.D.	1948	Rate & placement of lime
Schmidt, D.R. '68	WI	MacDonald	Ext.Ed.	Ph. D.	1971	Tropical leafy vegetables
Schreiber, M.M.' 51	MA	Fertig	Bradfield	Ph.D.	1954	Control of yellow rocket in legumes
Schubert, J.H. '35	NY	J.Wilson	Org.Chem.	Ph.D.	1937	Microflora of eroded soils
Scott, A.D. '45	Sask.	Peech	Chem.	Ph.D.	1949	Donnan equil. & ion activity in soil
Scully, R.W. '74	NY	Arnold	Geomorph.	M.S.	1977	Holocene alluvium in southern New York
Seay?, B.D. '57	OK	Cline	Geomorph.	M.S.	1960	Crop yield predictions by soils
Secor, W. '42	NY	Buckman				Noncandidate
Seglin, L. '53	NY	Kennedy	Lathwell	M.S.	1955	N & irrigation for ladino clover-grass
Seif, S.A. '75	Egypt	Obendorf		M.S.		Withdrew 4/76
Shainberg, I. '62	Israel	Dawson	Pl.Phys.	Ph.D.	1964	Ionic interactions, clay & salt sol'ns
Shahan, K.W. '76	NY	Steponkus		M.S.	1980	Internal water relations, rice plant
Shalhevet, J. '54	Israel	Zwerman	Ag.Eng.	M.S.	1955	Mole drainage
		Lemon	Ag.Eng.	Ph.D.	1958	Effect of drainage on response of corn to nitrogen
Sharpe, F.M.	England	Math,	Meteor.	Ph.D.	1907	General circulation of atmosphere
Sharpee, M?.S?. '68	WI	Alexander	Microbiol	Ph.D.	1973	Degradation of phenoxy herbicides
Shastry, ?.D. '46	India	Bradfield		M.S.	1948	Soil fertility for cotton
Shattuck, G.M. '60	VT	Alexander	Microbiol	Ph.D.		Withdrew?
Shaulis, N.J. '38	?A	Bradfield	Pom.	Ph.D.	1941	Mulch for young peach orchards
Shawcroft, R.W. '65	CO	Lemon	Dethier	Ph.D.	1970	Water & stomatal response of corn
??? '55	England	MacDonald	Zwerman	M.S.	1956	Grass for control of soil erosion
Sheard, R. '57	Ont.	Kennedy	Stat.	Ph.D.	19 64	Factors in vegetative reproduction, timothy
Sheldon, W.B. '59	CA	Bradfield		M.S.		Withdrew 1962
Sherrill, C. '35	TN	Agron.	Pl.Breed	M.S.		Withdrew?
Shibles, R.M. '56	ME	MacDonald	Pl.Phys.	M.S.	1958	Grass control in birdsfoot trefoil
				Ph.D.	1960	Seedling vigor of birdsfoot trefoil
Shilo, D. '71	Israel	Zwerman	Ext.Ed.	M.S.	1973	N from manure in subsurface flow
Shinn, J.H. '59	PA	Lemon	Pl.Phys.	M.S.	1963	Water transfer in a corn field
Sieveking, W.E. '53	IL	Musgrave	Chem,	M.S.	1956	Effects of 2, 4-D on corn
Sigafus, R.E. '48	IL	Kennedy	An.Husb.	Ph.D.	1951	Effect of defoliation on alfalfa
Silcox, C.H. '20	MI	J.Wilson	Pl.Phys.	M.S.	1922	Effect of stirring on nitrification
Silva, A.K. '24	HI	(Bizzell)	P.Chem.	M.S.		Withdrew
Silveyra, J.P. '62	Mexico	Bouldin	Pl .Phys.	M.S.	1965	Fertilizer for corn in New York
Simpson, T.J . '65	VT	Bouldin	Pl .Phys.	Ph.D.	1968	K, B, & moisture for alfalfa
Simsaa, O. el S. '71	Sudan	Macdonald		M.S.		Transferred to Wisconsin 1971
Sinclair, T.R. '68	IN	Lemon	Pl.Phys.	Ph.D.	1971	Effect of leaf angle on photosynthesis
Singh, N.J. '56	Jamaica	Zwerman	Ag.Ed.	M.S.	1957	Soil erosion control in Jamaica
Singh, R.P. '58	India	Bradfield	V. Crops	Ph.D.		Withdrew 1958
Singh, V. '65	India	MacDonald	Pl.Breed	Ph.D.	1969	Density & spacing of soybeans
Sitkin, R.S. '74	CA	Duke	V.Crops	M.S.	1976	Parasite-host interaction of dodder
Sivarajasingham, S. ' 57	Ceylon	Cline	Mineral.	M.S.	1959	Nature & origin of laterite
				Ph.D.	1961	Genesis of soils on ultrabasic rocks
Skipka '67	NY	Dethier	Air Photo	M.S.	1970	Application of Pasquil model

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Skory, J. '47	Alta.	Hartwig	Biochem.	Ph.D.	1951	Quality of hay on New York farms
Slater, R.A. '66	PA					Withdrew 10/66
Smalley, R.R. '50	NY	Hartwig	Brady	M.S.		Withdrew?
Smedema, L.K. '61	Neth.	Zwerman	Hydrol.	Ph.D.	1965	Fluctuations at phreatic surface
Smith, D.H.	NY			M.S.	1961	Soil associations for extension plans
Smith, D. L. '64	MA	Milford	Chem.	M.S.	1966	Intercalation of kaolinite
Smith, F.W. '64	Austral	Wright	Scott	Ph.D.	1969	Nitrate reductase in Chlorella & barley
Smith, J.B. '53	KY	MacDonald	Pl.Breed	M.S.	1956	?
Smith, J.M. '52	ID	Broadbent	Bact.	Ph.D.	1955	Modulation & yield of birdsfoot trefoil
Smith, L.M. '65	Barbados	Scott	Pl.Phys.	M.S.	1967	Fertilization of sugar beets
				Ph.D.	1969	Na & K for sugar beets
Smith, M.S. '73	NH	Duxbury	Pl.Path.	M.S.	1976	Volatile organics from manure & soil
Smith, R.S. '15		Bizzell	Pl.Phys.	Ph.D.	1918	Potassium salts on soils
Snyder, R.N. '14	MI	(Lyon)	Pl.Phys.	Ph.D.	1918	Physical effects of lime on clay sols
Soberon-H. H. '48	Mexico	Bradfield	Hartwig	M.S.	1950	Role of legumes in soil fertility
Sohn, J.B. '55	NY	Peech	P.Chem.	M.S.	1957	Retention & fixation of NH_3 in soil
Sombatpanit, C. '65	Thailand	Fertig	Pl.Phys.	Ph.D.		Leave 1966
Sonderhausen, E.O. '63	Den.	Alexander	Pl.Path.	M.S.		Transferred to plant Pathology 1964
Sonnenfeld, H. '10	S.Africa	Lyon	Org.Chem,	M.S.	1912	Soil toxins
Soto, M.V. '40	Mexico	Bradfield				Noncandidate
Southard, A.R. '58	KY	Cline	Mineral.	Ph.D.	1963	Genesis of soils high in black shale
Spalding, B.P. '71	PA	Duxbury	Org.Chem.	Ph.D.	1974	Lycopodium fairy rings
Spear, E.D. '67	NY	Duke	Fm.Mgt.	M. S.	1969	Simazine & Terbacil for weeds in alfalfa
Squires, J.H. '06	NC	Fippin	Lyon	Ph.D.	1909	Properties of unproductive soil
Srivastava, S. '59	India	Peech				Visiting Fellow
Staver, C.P. '75	PA	Reid	IAD	M.P.S.	1977	No thesis required
Stevenson, E.E. '62	CA	MacDonald				Noncandidate
Stewart, C.R. '60	IL	Musgrave	Biochem.	M.S.	1963	Plant reactions to environmental factors
				Ph.D.	1967	Amino acids of leaves
Stewart, D.W. '65	Ont.	Lemon	Musgrave	Ph.D.	1970	Net photosynthesis in corn
Stewart, G.R. '25	HI	Lyon	P.Chem.	Ph.D.	1931	Soil changes from forest to pasture
Stice, N.W.	CA	Miller				Noncandidate
Stoffer, R.V. '62	WA	Wright	Bouldin	Ph.D.		Withdrew 6/64
Stojanovic, B. '53	Germany	Broadbent	Bact.	M.S.	1955	Mineralization & immobilization of N
Stoller, J.H. '59	IL	Lemon	P.Chem.	M.S.	1960	Microclimate of a corn field
Stone, E.L., Jr. '41	NY	Chandler		Ph.D.	1948	Micorrhizae & P nutrition of pine
Stone, J. E. '69		Stone	Cons.	Ph. D.	1974	Water conduction in roots of P.resinosa
Strahan, J.L.		Fippin		M. S.	1913	Irrigation for peaches
Subbarao, R.V. '72	India	Alexander	Duxbury	Ph.D.	1976	Co-metabolism of DDT & effects on microbes
Sullivan, E.F. '50	ME	Kennedy	An.Husb.	Ph.D.	1953	Fertility management for forage
Suttle, A. D.	MS	Wiggans*		M.S.	1921	Hull percentage of oat varieties
				Ph.D.	1924	Pastures & grasses of Texas
		* Wiggans was transferred from Farm Crops to Plant Breeding 1921-22				
Sutton, R.F. '61	Ont.	Stone	Nat.Res.	Ph.D	1968	Ecology of young white spruce
Swader, F.N.	NY	Zwerman		M.S.	1963	Plastic canopies to modify microclimate

Name Yr. Entered	From	Major	Minor	Degree	Date	Thesis
			Pl.Phys.	Ph.D.	1968	Interactions of soil, weather, & crop
Swanson, C.O. '19	KS	Lyon	P. Chem.	Ph.D.	1922	Calcium adsorption & soil acidity
Tana, O.H. '70	Sudan	Alexander	Mycology	M.S.		Withdrew 1973
Talukder, M.R. '46	India ;	Cline	Ag.EC.	M. S.	1948	Cigar & cigarette tobacco
Tan, K.H. '61	Malaysia	Cline				Noncandidate
Tan, T.C.	China	Cavanaugh	(Hunt)	M.S.	1906	Liming for alfalfa
Taylor, G.C. '56	NY	Stone	Cons.	M.S.	1958	K & Mg deficiencies of red pine
Taylor, S.A. '46	UT	Russell	Pl.Phys.	Ph.D.	1949	Characterization of soil aeration
Taylor, S.B. '26	S.Leone	Bizzell	Pl .Breed	M.S.	1927	Calcic & magnesic lime (Died '32)
terKuile, C .M. '49	Neth.	Bradfield	Pl. Breed	M.S.	1950	K supplying power of New York soils
				Ph.D.	1952	Release of K from soil
Tetrick, N.J. '72	MA	Paine	Comp.Sci.	M.S.	1976	Analysis of potential verticity
Theron, A.A. '54	S.Africa	Brady	Hartwig	Ph.D.	1957	Effects of soil temperature on plants
Thomas, E.M. '74	NY	MacDonald		M.S.		Withdrew 1/75
Thomas, R.E. '61	OH	Peech	Chem.	Ph.D.		Withdrew 1963
Thompson, T.E. '77	IN	Fick		M.S.	1980	Effect of flooding on alfalfa
Thorne, M.D. '45	UT	Russell	Phys.	Ph.D.	1948	Dielectric properties of soil water
Throckmorton, R.I. '22	KS	(Buckman)	Geol.	Ph.D.		Withdrew?
Tiedje, J.M. '64	IA	Alexander	Bact.	M.S.	1966	Metabolism of organophosphorus cpds
				Ph.D.	1968	Metabolism of 2,4-D
Tiller, K.G. '58	Austral.	Peech	Chem.	Ph.D.	1961	Sorption of heavy metal cations
Timmer, V.R. '72	N.B.	Stone	Ecol.	Ph.D.	1979	Foliar diagnosis of nutrient status
Tio-Garcia, R.E.'71	Dom.Rep.	Scott	IAD	M.S.	1973	Response of sorghum to P, Caribbean
Tollenar, D. '53	Neth.	Brandt		M. S.	1956	Fertilizer Placement & root penetration
Tong,Y-H.	China	Fippin		M.S.	1908	Irrigation
Torrance, J.K. '63	Ont.	Miller	Phys.	M.S.	1965	Water movement in porous ice
				Ph.D.	1968	Frost Heaving
Tressler, D.K. '14	OH	Cavanaugh	Soils	Ph.D.	1918	?
Tri, B.H. '60	Viet Nam	I.athwell	Pl.Phys.	M.S.	1962	Fertilization of rice in Viet Nam
				Ph.D.	1967	Aggregate formation under grass
Troeh, F.R?. '59	ID	Cline	Geomorph.	Ph.D.	1963	Landform parameters
Tung, S.T. '21	China	Bizzell	Ag.Ec.	M.S.	1922	Adsorption of nitrate
Turlington, J.E. '08	NC	Lyon	(Warren)	M.S.	1910	?
				Ph.D.	1912	Timing of fertilization
Turpin, H.W. '16	S.Africa	Lyon	P.Chem.	Ph.D.	1919	Carbon dioxide of soil air
U? Ko Lay '50	Burma.	Bradfield				Noncandidate
Ufkes, E.A. '77	CA	McBride	Chem.	M.S.	1979	Heavy metal interactions w/org. acids
Uhlen, C. '57	Norway	Bradfield	Visiting	Fellow		Tech Rpt. On technique for soil-plant studies
Urriola-M., P.J. '70	Ven.	Arnold		M.P.S.	1971	Soil interpretations, Venezuela
Vacharotayan, S. '56	Thai.	Dunkle	Pl.Phys.	M.S.	1958	Rapid method for exch. H in soils
Valera, C.L. '55	Phil.	Brady	Bact.	M.S.	1956	P supplying power of soils, Philippines
		Alexander	Bact.	Ph .D.	1959	Denitrifying organisms
Valmidiano, A.T. '75	Phil.	Arnold	Air Photo	M.S.	1977	Soil-landscape relations, Philippines
Van, N.H. '60	Viet Nam	Cline	Geol.	M.S.	1962	Viet Nam soils

Name Yr. Entered	From	Major	Minor	Degree	Date	Thesis
vanAmson, F.W. '54	Surinam	Johnsgard	Ag.EC.	M. S.	1956	Soil morphology & corn root development
van deGraff, R.H.M. '63	Austrl	Arnold	Air Photo	Ph. D.	1971	Genesis of subsoil structure
vanHorn, D.L. '39	NE	Hartwig	Bradfield	M.S.	1940	Dry matter determination for forage
			Pl.Breed	Ph.D.	1943	Plot technique, emergency forages
VanHoutte, R.G. '75	CT	Sinclair	Ag.Eng.	M. S .		Withdrew?
Vann, J.R. '71	FL	Cline		M.P.S.	1973	Estimating soil temperature regime
VanNatta, H.W. '68	IN	Lucey	Ag.Ec.	M.S.	1975	Preservation of high-moisture soybeans
VanRaij, B. '68	Brazil	Peech	Chem.	M.S.	1971	Electrochem. properties Brazilian soils
				Ph. D.	1973	Electrochem. properties Brazilian soils
Vasquez, N.F. '29	Peru	Bizzell	Pl.Phys.	M.S.	1930	Relation between NH_3 & soil reaction
Vass, A.F. '15		J.Wilson	Pl.Phys.	Ph.D.	1926	Effect of low temperature on soil bact.
Vega, M.R. '56	Phil.	Fertig	Pl.Phys.	M.S.	1957	Weed control in rice
Vega, V.M. '54	Columbia	Dawson	Musgrave	M.S.	1956	Phosphorus in acid soils
Vengara, J.V. '53	Columbia	Bradfield	Ag.Eng.	M.S.		Withdrew 10/54
Verstraete, W.H. '68	Belgium	Alexander	Microbiol	Ph.D.	1971	Heterotrophic nitrification
Vick, V.S. '71	VA	W.W..Knapp	Com.Arts	M.S.	1974	Use of meteorological data by architects
Vietor, D.M. '71	MN	Musgrave	Lemon	Ph.D.	1975	CO_2 exchange & dry weight of corn
Villegas, M?.S. '42	Mexico	Buckman	Pom.	M.S.	1946	Alkali soils of L. Texcoco
Violanda, A.T. '54	Phil.	Dawson	Chem.	Ph. D.	1958	NH_4 fixation by soil organic matter
Vogel, A. '69	CA	Mulligan		M.S.		Transferred to Natural Resources 1971
Volkerding, C.C. '38	??	Bradfield	Pl.Phys.	Ph. D.	1942	Properties of metaphosphates
Vondracek, L.J. '13	IA	Soils	Ag.Ec.	M.S.		Withdrew?
Wain, R.J. '67	England	Linscott	M.S.			withdrew 1/68
Waller, W. '59	England	Dawson	Musgrave	M.S.	1960	Loss of ammonia from urea.
Wallihan, E.F. '37	CA	Chandler	Pl.Phys.	Ph.D.	1938	Response of forests to trenching
Walter, R.H. '60	Antigua	Dawson	Chem.	M.S.		Withdrew 1961
Wang, Chang '67	Taiwan	Arnold	Geol.	Ph.D.	1971	Genesis of Langford & Lansing soils
Wang, S. '62	Taiwan	Alexander	Bact.	M.S.	1964	Fungal lysis by actinomycetes
Warkentin, B.P. '53	B.C.	Miller	P.Chem.	Ph.D.	1956	Bonding between Montmorillonite particles
Warren, C.F.	NY	(Fippin)		M.S.	1904	Soil survey University farm
		Bailey		Ph.D.	1906	Apple industry, Wayne & Orleans Cos
Waterman, S. '23	Ont.	(Bizzell)	P. Chem.	M.S.	1925	C/N ratio
Watson, G.C.	NY	(Roberts)		M.S.	1893	Factors affecting value farm fertilizers
Weaver, T.F. '58	PA	Dethier		M.S.	1963	Nocturnal air drainage
Weavind, T.E.F. '64	S.Africa	Hodgson	Mineral.	Ph.D.	1968	Gradients of Fe in soil after cropping
Webb, H.J. '33	SC	J.Wilson	Chem.	Ph.D.	1938	*Rhizobium*, effects of symbiotudes
Webb, T.W. '29	SC	(Bizzell)	Pl.Phys.	Ph.D.		Withdrew?
Webber, L.R. '47	Ont.	Russell	Ag.Ec.	M.S.	1948	Hillside seepage
Weir, C. '59	Jamaica	Dawson	Bact.	Ph.D.		Withdrew?
Weiss, A. '69	NY	Allen	Stat.	Ph.D.	1975	Air flow in vineyards
Welch, H.W. '46						Withdrew 1946
Wells, W.E. '60	CT	Fertig		Ph.D.	1977	Withdrew 2/61
Wenkert, W. '73	NY	Lemon	Musgrave	Ph.D.	1977	Moisture changes in soybeans
Westman, W.E. '67	NY	Hodgson	Drosdoff	Ph.D.		Transferred to Ecology 1968

Name Yr. Entered	From	Major	Minor	Degree	Date	Thesis
Westgate, P.J. '38	MI	Bizzell	Pl.Phys.	M.S.	1940	Phosphorus availability
				Ph.D.	1943	F-P relationships in New York soils
Whiteside, J.S.	NY	Alexander	Education	M.S.	1958	Detoxification of herbicides in soil
White, P.J.	OK	(Hunt)	Hort.	M.S.	1906	Germination and growth of wheat
Whitney, A.S. '56	OH	MacDonald	Pl.Breed	M.S.	1958	Seed char. & germination, birdsfoot tref.
Whitney, R.S. '58	CO	Peech	Pl.Phys.	M.S.	1939	Soil/water ratio & cation equilibrium
				Ph.D.	1951	Na & Ca ion activities in clay susp.
Whittaker, M.D. '72	IN	MacDonald	L.Am.Stud	M.S.	1975	Quinoa of Andean highlands
Wiant, L. '62		Dawson				Noncandidate
Wiest, S.C. '77	PA	Steponkus	Pl.Phys.	Ph.D.	1979	Freeze-thaw lysis of chloroplasta
Wiggans, R.G.		Montgomery	Pl.Breed	M.S.	1915	Effect of corn roots on evaporation
		Montgomery	Pl.Breed	Ph.D.	1919	Classification of barley
Wilcox, J .C. '52	Wales	Kennedy	An.Husb.	M.S.	1959	Milk yield from rotational grazing
Willey, C.R . '57	NY	Brady	Pl.Phys.	M.S .	1959	Effects of soil temp. on corn & oats
Williams, W.A. '48	NY	MacDonald	Russell	Ph.D.	1951	Forage legume seedling establishment
Wilson, B.D. '14	KY	Lyon	P.Chem.	Ph.D.	1917	Translocation of Ca in soil
Wilson, J.K. '11	OK	Pl.Phys	Bizzell	Ph.D.	1914	Physiol. of *B. radicicola*
Wilson, J.T. '75	TX	Alexander	Duxbury	Ph.D.	1978	Factors limiting N-fixing algae
Winch, J.E.E. '53	Ont.	MacDonald	Pl.Breed	Ph. D.	1958	Management & harvest b. trefoil seed
Winsberg, T.W. '52	IL	Cline	Ag.Ec.	M.S.	1954	Hydrologic sequence of Podzols
Winters, N.E. '19	NC	J.Wilson	Cooper	Ph.D.	19 23	Soil conditions for azofication
Witty, J .E. '63	ID	Arnold	Geomorph.	Ph. D.	1968	Soils of Whiteface Mountain
Wivutrongvana, P. '75	Thai.	Bouldin	V.Crops	Ph. D.	1979	Oxidation of Fe & Mn after drainage
Woltz, W.G. '41	NC	Peech	Pl.Phys.	Ph.D.	1948	Fertilizers for tobacco
Woodhouse, W.W. '45	NC	Chandler	Musgrave	Ph.D.	1948	Fertilizer placement for pasture
Woods, L.E. '61	Austral.	MacDonald	Pl.Phys.	Ph.D.	1965	Germination of birdsfoot trefoil
Work, R. '47	NY	Dawson	V.Crops	M.S.	1949	Effect of herbicides on nitrification
Worthen, E.L.	IL	(Fippin)	Montgomery	M.S.	1908	Soils of Whiteside Co., IL
Wright, B.C.'56	MS	Peech	Musgrave	Ph.D.	1959	Phosphate reaction products
Wright, J.L. '61	MT	Lemon	Pl.Phys.	Ph.D.	1965	Turbulent transfer in corn fields
Wu, Bang-Fang '66	Taiwan	Musgrave	Pl.Phys.	Ph.D.	1971	Partitioning photosynthates in corn
Yamane, I. '58	Japan	Kennedy				Noncandidate
York, E.T., Jr. '46	AL	Bradfield	Chem.	Ph.D.	1949	Ca-K interrelationships in soils
Yoshida, T. '63	Japan	Alexander	Microbiol	Ph.D.	1966	Nitrosammonas, metabolism of N
Young, M.H. '13	TX	(Lyon)		M.S.		Withdrew?
Young, R.A. '50	ND	Bradfield	Pl.Phys.	Ph.D.	1953	Effects of Na on crops
Young, R.S. '30	Alta.	Bradfield	Chem.	Ph.D.	1934	Determination of rare elements
Young, W.R. '77	UT	Stone	Eng.	M.S.		Withdrew?
Younts, S.E. '54	NC	Musgrave	Pl.Phys.	Ph.D.	1957	Effects of Cl in K fertilizer on corn
Ystaas, S.E. '64	Norway	Bouldin	Pom.	M.S.	1965	K fertilization for alfalfa
Yo, S-C. '34	China	Buckman	Pl.Breed	M.S.	1935	Cultural practices for cotton
Zandstra, H.G. '68	Neth.	Bouldin	Drosdoff	Ph.D.	1972	Al toxicity in soils of the tropics
Zimdahl, R.L. '64	NY	Fertig	Pl.Phys.;	M.S.	1966	Weed competition with sugar beets

Summary of Graduate Student Majors

	1888 -1904	1904 -1914	1914 -1921	1921 -1937	1937 -1957	1957 -1970	1970 -1980	Total
SOILS								
Masters degrees	10	17	5	32	97	104	75	340
Doctors degrees	3	11	16	29	85	84	71	299
Total degrees	13	28	21	61	182	188	146	639
Noncandidates		1		1	9	11	3	25
Candidates who withdrew		4	3	15	30	29	17	98
Ave. No. degrees per year	0.8	2.8	3.0	3.8	9.1	14.5	13.3	6.9
CROPS								
Masters degrees	2	8	4	3	23	31	38	109
Doctors degrees			3	2	20	28	32	85
Total degrees	2	8	7	5	43	59	70	194
Noncandidates					1	3	1	5
Candidates who withdrew			2	2	6	13	7	30
Ave. No. degrees per year	0.1	0.8	1.3	0.4	2.5	5.8	7.1	2.5
METEOROLOGY & ATMOSPHERIC SCIENCES								
Masters degrees		1			1	1	9	12
Doctors degrees		1					7	8

APPENDIX III

Grants and Contracts

Department of Agronomy, 1938-1980

The sources of information for this appendix were mainly the individual grant and contract folders held in the departmental files, data assembled for the SEA/CR research review for the period 1974 to 1978, and active grant files for the period 1978 to 1980. The amounts of dollar support indicated should be considered approximations. In some instances, the original grant documents were not available, and the amounts were taken from correspondence, budget estimates, or similar documents that may not accurately represent the final agreements. Renewals and extensions were added if they were documented in the files, but not all may have been found. Residual amounts returned to donors were subtracted if they were documented in the files, but some may not have been found.

It is likely that some industrial grants made prior to 1955 have not been recorded. The departmental files contain records of only two grants made prior to 1952. A record of one other for the early years was found in correspondence of the Department Head. There were almost certainly small grants-in-aid from local commercial concerns during the 1940s following World War II, but they were probably small in both number and amount. A number of small grants for graduate student fellowships are probably unrecorded.

The summary of funds available to the department by years at the end of the appendix was compiled from records of allocations if those were included in the grant files. In many instances, such records were not available without painstaking review of account records for which the fiscal year does not necessarily correspond with either the calendar year or the fiscal year of the grant or contract. Consequently, funds available over the life of the grant or contract were distributed uniformly by years unless there was evidence to the contrary. This is clearly not the manner in which funds were actually used, but it is believed that the summary shows trends reasonably well for five-year periods as errors may be compensating. The total available funds through 1980 does not equal the total of grants and contracts listed. Approximately $796,000 was estimated to have been carried beyond 1980 within terms of grants and contracts awarded in the later years.

Grants and Contracts by Years

1928- $500

Chilean Nitrate Agencies. Travel grant. 1928. T.L.Lyon, $500

1939 - $12,725

Tennessee Valley Authority. Contract for farm unit demonstrations- ½ salary of New York supervisor. R.B. Child 1939-42; S.R. Aldrich 1942-48. $12,725

1944 - $22,000

Aviation Corporation of America. Grant for interdepartmental research on hay and hay-making. R. Bradfield, Leader. Agronomy allocation, 1942-48. $22,000

1951 - $8,000

Grange League Federation. Grant for study of ladino clover maintenance. W.K. Kennedy. 1951-55. $8,000

1952 - $86,000

Tennessee Valley Authority. Contract for evaluation of TVA fertilizers. D.J. Lathwell. 1952-61. $86,000

1953 - $9,000

Grange League Federation. Grant for studies of grass silage. W.K. Kennedy. 1953-57. $9,000

1954 - $17,300

New York Farmers Association. Grant for forage studies. W.K. Kennedy. 1954-56. $2,000

Climax Molybdenum Company. Grant for studies of Molybdenum on crops. D.J. Lathwell. 1954-55. $1,000

Grange League Federation. Grant for studies of birdsfoot trefoil in relation to soils, Northern New York. M.G. Cline. 1954-56. $5,000

Grange League Federation. Grant for studies of birdsfoot trefoil seed production. H.A. MacDonald. 1954-57. - $6,300

Olin Matthieson Chemical Corporation. Grant for studies of soil conditioners. M. Peech. 1954-56. - $3,000

1955 - $170,700

American Potash Institute. Grant for studies of forest fertilization. E.L. Stone. 1955-59. - $7,400

Grange League Federation. Grant for studies of preservation of moist grain. W.K. Kennedy. 1955-57.- $4,000

Olin Matthieson Corporation. Grant for studies of use of anhydrous ammonia as fertilizer. M. Peech. 1955-57 - $9,300

Sun Oil Company. Grant for studies of nitrogen fertilization. R. Bradfield. 1955-58. - $50,000

1956 - $108,200

Allied Chemical Corporation. Grant for study of urea solutions as fertilizers. W.L. Griffeth. 1956-61. - $10,000

Dow Chemical Company. Grant for study of residues from the herbicide Dalapon. S.N. Fertig. 1956-57. - $7,000

Grange League Federation. Grant for study of ear-corn silage. R.R. Musgrave. 1956-59. - $9,000

Grange League Federation. Grant for study of potassium supplying power of soils. M. Peech. 1956-59. - $7,500

Grange League Federation. Grant for study of weed control practices. S.N. Fertig. 1956-57. - $2,500

Grange League Federation. Grant for study of weed growth habits. S.N. Fertig. 1956-65. - $22,500

U.S. Army Corps of Engineers. Contract for study of frost heaving. R.D. Miller. 1956-63. - $49,700

1957- $149,500

Grange League Federation. Grant for studies of foliar nitrogen fertilization. W.K. Kennedy. 1957-59 - $6,000

Grange League Federation. Grant for studies of soil requirements for forage. R. Feuer. 1957-58. - $2,500

USDA. Contract for studies of "plow-plant" system of tillage. N.C. Brady. 1957-58. - $6,000

United Fruit Company. Grant for studies of "Panama" disease control on bananas. J. Dawson and M. Alexander. 1957-62. - $135,000

1958 - $93,100

American Cyanamid Corporation. Grant for studies of forage production. W.K. Kennedy. 1958-59. - $2,000

American Cyanamid Corporation. Grant for publication of bulletin on forage. W.K. Kennedy. 1958. - $2,500

Columbia Southern Chemical Corporation. Grant for study of chlorides in fertilizers. N.C. Brady. 1958-59. - $8,000

National Plant Food Institute. Grant for soil testing. E.C.Dunkle. 1958-60. - $4,000

New York Department of Environmental Conservation. Contract for analytical work re Marsh Ecology. D.J. Lathwell. 1958-61. - $1,600

Rockefeller Foundation. Grant for studies of management for maximum yields. R.B. Musgrave. 1958-63. - $75,000

1959 - $47,950

American Potash Institute. Grant for studies of potash physiology in plants. D.J. Lathwell. 1959-64. - $10,000

American Potash Institute. Grant for studies of forage production. W.L. Griffeth. 1959-64. - $10,000

Grange League Federation. Grant for studies of lime effectiveness. M. Peech. 1959-60. - $1,500

Grange League Federation. Grant for studies of summer annuals. R.B. Musgrave. 1959-64. - $12,750

National Science Foundation. Grant for study of metabolism of nitrifying organisms. M. Alexander. 1959-60 - $12,500

New York Lime Association. Grant for study of lime effectiveness. M. Peech. 1959-60. - $1,000

Titanium Division, National Lead Company. Grant for study of silage. W.K.Kennedy. $500

1960 - $215,800

American Cyanamid Corporation. Grant for forage studies. W.L. Griffeth. 1960-61. - $1,000

Climax Molybdenum Company. Grant for studies of molybdenum in agriculture. T.W. Scott. 1960-62. - $5,600

Dow Chemical Company. Grant for study of residues from the herbicide Dalapon. S.N. Fertig. 1960. - $600

Grange League Federation. Grant for study of economic value of agronomic practices. T.W. Scott. 1960-63. - $6,000

Grange League Federation. Grant for molybdenum studies. N.C. Brady. 1960-63. - $2,100

National Institutes of Health. Contract for studies of nitrates in plants and effects on animals. M.J. Wright. 1960-64. - $186,000

National Plant Food Institute. Grant for study of economic value of agronomic practices. T.W. Scott. 1960-61 $1,000

New York Lime Association. Grant for study of economic value of agronomic practices. T.W. Scott. 1960-62. $4,000

Rockefeller Foundation. Grant for hydroponic studies. R. Bradfield. 1960. $3,500

Stauffer Chemical Company. Grant for soil microbiology. M. Alexander. 1960-62. $6,000

1961- $113,315

Esso Research and Engineering Company. Grant for study of mulches. N.C. Brady. 1961-62. $5,000

Grange League Federation. Grant for study of improvement of agronomic practice. T.W. Scott. 1961-62. $1,500

Grange League Federation. Grant for study of magnesium needs in New York. D. J. Lathwell. 1961-63. $4,000

Grange League Federation. Grant for study of forage cutting management. W.L. Griffeth. 1961-64. $4,200

International Minerals and Chemical Corporation. Grant for study of magnesium needs in New York. D.J. Lathwell. 1961-63. $6,000

National Science Foundation. Grant for study of metabolism of nitrifying organisms. M. Alexander. 1961-67 $68,800

New York Lime Association. Grant for study of magnesium needs in New York soils. D.J. Lathwell. 1961-64. $3,000

Rockefeller Foundation. Grant for studies of photosynthesis under field conditions. R.B. Musgrave. $3,815

Tennessee Valley Authority. Grant for study of ionic equilibria. M.Peech. 1961-63. $7,000

Tennessee Valley Authority. Grant for study of effects of soil temperature on plant growth. D.J. Lathwell. 1961-63. $10,000

1962- $423,893

Grange League Federation. Grant for studies of soil compaction. H.Wilson. 1962-63. $2,000

National Institutes of Health. Contract for studies of microbial lysis of fungi. M. Alexander. 1962-69. $145,704

National Science Foundation. Grant for studies of *Rhizobium* symbiosis. M. Alexander. 1962-68. $114,100

National Science Foundation. Grant for studies of photosynthesis under field conditions. R.B. Musgrave. 1962-71. $125,700

New York Lime Association. Grant for county agent traineeship.
N.C. Brady. 1962-64 $1,000
R.F.Lucey. 1964-71. $3,500

New York Lime Association. Grant for undergraduate scholarships in Agronomy. Office of Resident Instruction. 1962-69. - $3,250

Shell Development Corporation. Grant for herbicide studies. S.N. Fertig. 1962. - $600

US Air Force. Contract for studies of atmospheric contamination effects on plants. J.E. Dawson. 1962-63. - $28,039

1963- $149,478

Broome County, New York. Grant for soil survey interpretation. G.W. Olson. 1963-64. $8,000

National Institutes of Health. Contract for studies of flight of European Chafer. B.E. Dethier. 1963-64. $14,258

New York State Department of Environmental Conservation. Contract for studies of marsh ecology.
S.N. Fertig. 1963-65. $25,400
D.J. Lathwell. 1965-72. $101,820

1964- $271,206

Agway, Inc. Grant for study of liming materials. M.Peech. 1964. $2,000

AmChem Products, Inc. Grant for herbicide trials. S.N. Fertig. 1964. $800

American Potash Institute. Grant for alfalfa studies. W. Griffeth, M.J. Wright, & D.R. Bouldin. 1964-67. $6,000

Empire State Sugar Company. Grant for sugar beet trials. T.W. Scott. 1964-65. $20,000

Eversman Manufacturing Company. Grant for study of land forming. P.J. Zwerman. 1964. $500

General Electric Company. Contract for detection of microorganisms by analysis for metabolites. J.E. Dawson. 1964-69. $83,763

Grange League Federation (Agway). Grant for regional research and extension program. M.G. Cline. 1964-65. $19,000

National Aeronautics and Space Administration. Contract for studies of amino acids and polypeptides. M. Alexander. 1967-69. With J.R. Valentine. 1964-67. $19,000

National Institutes of Health. Contract for microbial and plant degradation of herbicides. J.E. Dawson. 1964-68. $117,443

New York Lime Association. Grant for study of liming needs. T.W. Scott. 1964. $1,000

Seneca County, New York, Grant for soil survey. R.W. Arnold. 1964-66. $7,000

Stauffer Chemical Company. Grant for herbicide trials. S.N. Fertig. 1964. $500

1965- $182,830

Chevron Chemical Company, Ortho Division. Grant for herbicide trials. D.L. Linscott. 1965-66. $1,000

New York Lime Association. Grant for studies of lime maintenance.
W.L. Griffeth. 1965-66. $4,000
W.S. Reid. 1967-69. $4,000

Oswego County, New York. Grant for soil survey. R.W. Arnold. 1965-74. $123,500

Stauffer Chemical Company. Grant for herbicide trials. S.N.Fertig. 1965. $500

Steuben County, New York. Grant for soil survey. R.W. Arnold. 1965-70. $12,500

Tennessee Valley Authority. Contract for study of phosphate reactions in soil. M. Peech. 1965-68. $9,000

Tennessee Valley Authority. Contract for space and facilities for TVA representative. M.G. Cline. 1965- 68.

$3,330

US Army Cold Regions Laboratory. Contract for studies of freezing and frost heaving. R.D.Miller. 1965-68. $25,000

1966- $431,500

Agway. Grant for herbicide trials. D.J. Lathwell. 1966. $500

Erie County, New York. Grant for soil survey. R.W. Arnold. 1966-75. $125,000

Ford Foundation. Institutional grant for development of international program in agricultural sciences. Agronomy allocation. M.Drosdoff. 1966-73. $246,000

International Salt Company. Grant for study of salt for sugar beets. T.W. Scott. 1966-68. $2,000

National Science Foundation. Grant for undergraduate research participation. D.R. Bouldin. 1966. $11,200

New York State Conservation Department. Contract for study of soils of Oswego river basin. G.W. Olson. 1966 $6,000

New York Lime Association. Grant to support summer trip for course "Agronomy Regional Studies". M.G. Cline. 1966-68. $4,500

Stauffer Chemical Company. Grant for herbicide trials. S.N. Fertig. 1966. $500

Sulfur Institute. Grant for study of sulfur metabolism. W.H. Allaway. 1966-70. $33,500

W.H. Miner Institute. Grant for research equipment for northern New York project. R.F. Lucey. 1966-67. $2,300

1967- $101,588

Industry grants for herbicide trials. W.B. Duke. 1967. $5,250

Dow Chemical Company	$1,000
Air Products & Chemical Company	$500
Shell Oil Company	$500
Stauffer Chemical Company	$750
Upjohn Company	$500
Geigy Chemical Company	$500
Monsanto Chemical Company	$500
Velsicol Chemical Company	$500
Agway	$500

Mobil Oil Corporation. Grant for tests of "Tree-Heet" B. Dethier. 1967 $800

New York State Department of Conservation. Contracts for Appalachian Resource Studies. G.W. Olson $21,538

Phase I. 1967-68.	$7,538
Phase II. 1968-69.	$14,000

Shell Companies Foundation. "Shell Aid" for innovation in teaching; Agronomy Regional Studies summer trip. $35,000

M.G. Cline. 1967-70.	$15,000
M.J. Wright. 1971-74.	$20,000

W.H. Miner Institute. Grant for soil and field crop studies, Northern New York. R.F. Lucey. 1967-80. $39,000

1968- $39,650

American Potash Institute. Grant for potassium trials. W.S. Reid. 1968. $500

Dow Chemical Company. Grant for herbicide residue studies. M.J. Wright. 1968-69. $550

Dyson Foundation. Grant for field trip of Agronomy Regional Studies course. T.W. Scott. 1968. $2,500

Industry grants for herbicide trials: W.B. Duke. 1968. $10,100

Geigy Chemical Company	$3,000
Fissons Chemical Company	750
Monsanto Chemical Company	1,000
DuPont	1,000
Rohm and Haas	1,000
Stauffer	750
Rhodia-Chipman	600
Shell	500
Upjohn	500
Velsicol	500
Agway	500

National Science Foundation. Grant for undergraduate instructional equipment. D.J. Lathwell. 1968. $9,000

National Science Foundation. Grant for undergraduate research participation. W.G. Covey. 1968. $11,000

W.H. Miner Institute. Grant for soil and crop management research. R.F. Lucey. 1968-70. $6,000

1969- $1,362,521

Allied Chemical Foundation. Grant for fellowships. M.G.Cline. 1969-71. $6,000

Dyson Foundation. Grant for field trip of Agronomy Regional studies course. R. Krenzin, M.J. Wright, M. Drosdoff. 1969-71 $6,850

Federal Water Pollution Control Administration. Grant for studies of agricultural contributions to nutrients in water. P.J. Zwerman. 1969-71. $147,268

Ford Foundation. Pesticide management training grant. (Administered by Entomology, Agronomy participated)

Industry grants for herbicide trials. W.B. Duke. 1969. $15,400

Agway	$1,000	Fisons	$500
Allied Chemical	500	Gulf	250
American Cyanamid	500	Geigy	3,000
American Hoechst	500	Monsanto	1,000
Atlas	500	Rhodia-Chipman	600
BASF-Wyandotte	500	Rohm & Haas	1,000
Chevron	1,000	Shell	1,000
CIBA	500	Stauffer	1,250
DuPont	1,000	Velsicol	800

New York Lime Association- Agway. Grant for study of lime requirement. M. Peech. 1969-70. $7,350

Schnectady County, New York. Contract for soil survey. R.W. Arnold. 1968-69. $15,000

US Agency for International Development. Contract for studies of soil fertility in the humid tropics. M.Drosdoff et al. 1969-74. $1,134,653

Westchester County, New York, contract for soil survey. R.W. Arnold. 19?9-72. $30,000

1970- $1,015,782

Dow Chemical Company, grant for studies of soil microbiology. M. Alexander. 1970-71. (Chemicals supplied)

Industry grants for herbicide trials. W.B. Duke. 1970. $12,900

Agway	$1,000	Fisons	$ 500
AmChem	500	Geigy	1,000
American Hoechst	500	Gulf	100
Atlas	500	Monsanto	2,000
BASF-Wyandotte	500	Rohm & Haas	1,000
Chemargo	400	Shell	1,000
Chevron	1,000	Stauffer	1,000
CIBA	500	Velsicol	800
DuPont	1,000		

National Aeronautics and Space Administration. Contract for detection of microorganisms- methods. M. Alexander and J. Duxbury. 1970-73. $108,632

New York State Department of Health. Grant for study of Canadarago Lake pollution. G.W. Olson. 1970. $3,250

Rockefeller Foundation. Interdepartmental grant for environmental nutrient management. Agronomy allocation. D.R. Bouldin. 1970-74. $159,700

US Agency for International Development. Grant for institutional development of expertise in soils of the tropics. M.G. Cline. 1970-75. $500,000

USDA Agricultural Research Administration. Grant for study of turbulent transport mechanisms in the atmosphere. E.R. Lemon. 1970-71. $11,800

US Navy, Office of Naval Research. Contract for study of the persistence of DDT. M. Alexander. 1970-81. $207,500

W.H. Miner Institute. Grant for agronomic extension education. R.F. Lucey. 1970-78. $12,000

1971- $366,404

Agway. Grant for studies of crop response to fertilizers. W.S. Reid. 1971-72. $2,000

DuPont de Neimours Corporation. Grant for studies of crop physiology. R.B. Musgrave. 1971. $3,000

Industry grants for herbicide trials. W.B. Duke. 1971. $10,750

Agway	$1,000	International Minerals	$ 500
AmChem	300	Monsanto	2,000
American Hoechst	500	Rohm & Haas	500
BASF-Wyandotte	350	Shell	1,000
Chevron	1,500	Stauffer	1,100
Eli Lilly	500	Velsicol	500

Geigy	1,000

National Science Foundation. Grant for conference on space and atmospheric science. B.E.Dethier. 1971. $17,525

Tennessee Valley Authority. Contract for fertilizer test demonstrations. W.S. Reid. 1971-81. $41,854

USDI Office of Water Resources Research. Contract for study of organo-metal compounds in water. M. Alexander. 1971-72. $6,275

W.H. Miner Institute. Contract for dairy and crop improvement program. Interdepartmental project funded at 1,140,000 dollars with R.F. Lucey project leader. Agronomy allocation approximately, for 1971-80, $285,000.

1972 - $474,163

Industrial grants for herbicide trials. W.B. Duke. 1972. $14,400

Agway	$1,000	ICA	$1,000
AmChem	200	Minn. Mining	750
Atlas	1,000	Monsanto	2,000
BASF-Wyandotte	350	Niagara Chemical	400
Chevron	1,000	Rohm & Haas	500
CIBA-Geigy	1,000	Shell	1,000
Eli Lilly	500	Stauffer	1,000
Gulf	200	Velsicol	1,000
Hercules	500		

National Aeronautics and Space Administration. Contract for satellite determination of phenology. B.E. Dethier. 1972-74. $232,863

National Science Foundation. Grant for integrated pest management. Administered by Entomology. Agronomy allocation for alfalfa weevil. G.W. Fick. 1972-78. $109,700

National Science Foundation. Grant for severe weather analysis. D.A. Paine. 1972-75. $60,000

National Science Foundation. Grant for study of the impact of *Lycopodium* on soil. E.L. Stone & J.M. Duxbury. 1972-75. $38,500

New York Lime Association. Grant for educational tours of New York State. M.J. Wright. 1972-75. $1,400

New York Lime Association. Grant for soil judging team. G.W. Olson. 1972-76. $2,700

Presidents Advisory Panel on Timber and the Environment. Grant for supporting studies. E.L. Stone. 1972. $6,400

US Army Cold Regions Laboratory. Grant for study of secondary frost heaving. R.D. Miller. 1972-73. $8,200

1973- $122,580

Atlantic Richfield Company. Grant for study of effects of oil spill on soil. F.N. Swader. 1973-75. $5,000

Chenango County, New York. Contract for soil survey. R.W. Arnold. 1973-78. $75,000

Cornell Water Resources Center. Grant for education re water planning. S.K. Wright for State Soil & Water Conservation Committee. 1973. $940

FMC Corporation. Grant for study of alfalfa-insecticide interactions. G.W. Fick. 1973. $1,000

Industry grants for herbicide trials. W.B. Duke. 1973. $14,250

Agway	$1,000	Minnesota Mining	$ 750
AmChem	200	Niagara Chemical	1,200
BASF-Wyandotte	350	Rohm & Haas	750
CIBA-Geigy	1,000	Stauffer	1,350
Eli Lilly	500	Shell	1,300
Gulf	200	Velsicol	2,650
Hercules	2,000	Monsanto	2,000

New York State Sea Grant for evaluation of wet lands by aerial photography. J.H. Peverly. 1973. $4,490

Niagara Chemical Division, FMC Corporation. Grant for alfalfa studies. G.W. Fick. 1973-76. $1,500

USDI, Economic Development Administration, Grant for extension on recovery from Hurricane Agnes. F.N. Swader and S.K. Wright. 1973-74. $18,000

USDI, Office of Water Resources Research. Grant for study of aquatic weed management. J.H. Peverly. 1973-74. $2,400

1974- $1,170,847

Agency for International Development. Contract for studies of soil fertility in the humid tropics. 1974-77. M.Drosdoff 1974-75; D.J. Lathwell 1976-77. $914,000

Agway. Grant for birdsfoot trefoil studies. D.L. Linscott. 1974-78. $5,000

Chevron Chemical Company. Grant for studies of pasture renovation. D.L. Linscott. 1974-78. $7,000

Chevron Chemical Company. Grant for studies of minimum tillage. R.F. Lucey. 1974. $500

New York State Department of Environmental Conservation. Grant for studies of waste water treatment. M.Weaver. 1974. $1,000

US Environmental Protection Agency. Interdepartmental grant for education for land disposal of wastes, administered by Agricultural Engineering, $157,248. For Agronomy E.L. Stone. 1974-76. $16,847

Curtis-Burns Canning Company. Grant for studies of cannery waste disposal. W.J. Jewell (Agricultural Engineering) and G.W. Olson. 1974-77. $22,500

Industry grants for herbicide trials. W.B. Duke. 1974. $13,950

Agway	$1,000	Minnesota Mining	$ 750
American Hoechst	300	Niagara Chemical	600
American Cyanamid	2,000	Stauffer	1,250
CIBA-Geigy	1,000	Shell	1,000
DuPont	500	Thompson-Hayward	750
Eli Lilly	500	Velsicol	1,500
Gulf	200	U.S. Borax	600
Monsanto	1,000	North American	
Mobil	500	Agricultural Prod.	500

Industry grant for herbicide trials. D.L. Linscott. 1974 $1,000
Agway $1,000

Monsanto Chemical Company. Grant for studies of pasture renovation. D.L. Linscott. 1974-75. $1,000

National Science Foundation. Grant for studies of soil freezing and frost heaving. R.D. Miller. 1974-78. $42,100

New York Seed Association. Grant for studies of birdsfoot trefoil seed production. D.L. Linscott. 1974. $3,000

St. Lawrence County, New York. Grant for soil survey. R.W. Arnold. 1974-81. $112,000

University of Vermont. Reimbursement for birdsfoot trefoil seed production studies. D.L. Linscott. 1974. $2,250

USDA. Grant for studies of soybean production. H.A. MacDonald. 1974-75. $28,700

1975- $509,704

Chevron Chemical Company. Grant for study of minimum tillage for corn. R.R. Seaney. 1975. $750

US Environmental Protection Agency. Contract for studies of acid rain. M. Alexander. 1975-78. $135,150

Industry grants for herbicide trials:

W.B. Duke. 1975. $14,800

Agway	$1,000	Mobil	$ 500
American Hoechst	5,000	Niagara Chemical	1,000
CIBA-Geigy	1,500	Stauffer	1,300
DuPont	500	Shell	1,000
Eli Lilly	500	Velsicol	1,500
Monsanto	1,000		

D.L. Linscott. 1975. $3,500

Agway	$1,000	Dow	$1,000
Chevron	500	Monsanto	1,000

R.R. Hahn. 1975. $1,500

CIBA-Geigy	$500	Monsanto	$1,000

Jurzykowski Foundation. Grant for studies of chilling injury of seeds. R.L. Obendorf. 1975-76. $3,500

Monsanto Chemical Company. Grant for studies of marsh ecology. J.H.Peverly. 1975. $1,700

Monsanto Chemical Company. Grant for studies of glyphosate. D.L. Linscott. 1975-78. $6,500

National Science Foundation. Grant for studies of fertilizer and food production. D.J. Lathwell. 1975. $9,900

National Science Foundation. Grant for studies of effects of properties of organic compounds on their degredation. M.Alexander. 1975-77. $260,929

New York State Department of Environmental Conservation. Grant for studies of nutrient losses from organic soils. J.M.Duxbury. 1975-76. $30,000

New York State Department of Environmental Conservation. Contract for study of landfill leachate. G.W. Olson, 1975-77. $25,675

Olin Mathieson Corporation. Grant for study of urea as an inhibitor of nitrification. W.S. Reid. 1975-79. $10,800

Potash and Phosphate Institute. Grant for studies of potassium and magnesium in Brazil. D.J. Lathwell. 1976-79. $4,000

1976- $525,866

Agway. Grant for forage studies. D.L. Linscott. 1976-78. $3,000

Agency for International Development. Contract for studies of nitrogen in the tropics. M. Alexander. 1976-78. $137,575

Agency for International Development. Grant for conference on soil mineral stress. M.J. Wright. 1976-77. $40,000

Dow Chemical Company. Grant for studies of dalapon residues. D.L. Linscott. 1976. $1,500

Environmental Protection Agency. Grant for extension on pollution control. F.N. Swader. 1976-79. $6,000

Industry grants for herbicide trials:

W. B. Duke. 1976. $13,750

Agway	$ 750	Eli Lilly	$ 500
American Hoechst	5,500	Monsanto	1,000
Chevron	1,000	Mobil	500
CIBA-Geigy	l,250	Stauffer	1,500
DuPont	500	Shell	1,250

D.L. Linscott. 1976. $5,000

Agway	$1, 000	Chemargo	$1,500
Chevron	1,500	Monsanto	1,000

R.R. Hahn. 1976. $2,000

CIBA-Geigy	$ 750	Mobil	$250
Monsanto	1,000		

International Rice Research Institute. Contract for studies of nitrogen fixation. M. Alexander. 1976-81. $240,141

Jurzykowski Foundation. Grant for studies of environmental control for seedlings. R.L. Obendorf. 1976-77. $3,500

Olin Matthieson Corporation. Grant for fertilizer studies W.S. Reid. 1976. $3,400

US Army. Contract for nitrogen studies. M. Alexander. 1976-79. $45,000

USDA Agricultural Research Service. Grant for pesticide studies. D.L. Linscott. 1976. $20,000

USDA Agricultural Research Service. Grant for magnesium uptake studies. T.W. Scott. $5,000

1977- $1,498,313

Agway. Grant for studies of minimum tillage for forage crops. D.L. Linscott and R.R. Seaney. 1977-79. $3,000

Agency for International Development. Grant for studies of appraisal of soil resource inventories. A. VanWambeke. 1977-78. $300,000

Agency for International Development. Contract for interpretation of soil fertility for the humid tropics. D.J. Lathwell. 1977-79. $295,729

AmChem Corporation. Grant for study of Ethrel with small grains. W.R. Knapp. 1977-78. $1,000

Chevron Chemical Company. Grant for study of pasture renovation with herbicides. R.R. Seaney. 1977. $1,000

Chevron Chemical Company. Grant for study of minimum tillage for corn. R.F. Lucey. 1977. $750

Electric Power Research Institute. Contract for studies of acid precipitation. M. Alexander. 1977-79. $118,816

Eli Lilly Company. Grant for study of growth inhibitors. J.H.Peverly. 1977-80. $6,000

Environmental Protection Agency. Grant for study of soil ecosystems. M. Alexander. 1977-78. $46,000

Industrial grants for herbicide trials:

W.B. Duke. 1977. $14,050

Agway	$ 750	Eli Lilly	$ 500
American Hoechst	2,000	Monsanto	1,250
American Cyanamid	1,000	Stauffer	1,500
BASF-Wyandotte	300	Shell	750
Chevron	2,000	North American	500
CIBA-Geigy	1,000	Velsicol	2,000
Dupont	500		

D.L. Linscott. 1977. $4,500

Agway	$1,000	Monsanto	$1,500
Chevron	1,000	Velsicol	1,000

R.R. Hahn. 1977. $2,500

Chevron	$1,000	Monsanto	$500
CIBA-Geigy	750	Mobil	250

National Aeronautics and Space Administration. Contract for severe weather prediction. D.A.Paine. 1977-78. $29,268

National Science Foundation. Grant for models of farming systems. G.W. Fick. 1977-78. $10,600

National Soybean Council. Grant for study of cold stress on soybeans. A.C. Leopold. 1977-78. $24,000

New York State Department of Agriculture and Markets. Grant for study of nonpoint sources of water pollution. W.F. Croney. 1977-81. $45,000

New York State Department of Environmental Conservation. Contract for soil characterization. R.W. Arnold. 1977-81. $32,400

New York State Department of Environmental Conservation. Grant for study of water quality management. W.F. Croney. 1977-78. $60,000

New York Health Research Council. Contract for study of heavy metals in water from organic soils. J.M. Duxbury and J.H. Peverly. 1977. $34,700

Union Carbide Corporation. Grant for study of DEA nitrosomine. M.Alexander. 1977-79. $57,000

Union Carbide Corporation. Grant for study of disposal of sewage sludge on land. W.J. Jewell (Agricultural Engineering) and T.W. Scott. 1977-78. $15,000

USDA/SEA. Grant for study of weed control with minimum tillage. D.L. Linscott. 1977-82. $395,000

Velsicol Chemical Company. Grant for study of dicamba for weed control in minimum tillage. D.L. Linscott. $2,000

1978- $1,002,680

Agway. Grant for studies of minimum tillage for forage. R.R.Seaney. 1978-79. $1,000

Agway. Grant for studies of lime with minimum tillage. R.R.Seaney and W.S. Reid. 1978-80. $7,500

Agway. Grant for studies of nitrogen from crop residues. T.W.Scott. 1978-80. $10,000

Agency for International Development. Contract for workshop on food production. A. VanWambeke. 1978-80. $55,142

Aquashade, Inc. Grant for study of efficiency of the product for control of aquatic vegetation. J.H. Peverly. 1978-80. $2,250

Chevron Chemical Company. Grant for studies of minimum tillage. F.N.Swader. 1978. $1,000

Chevron Chemical Company, Grant for crops research in Northern New York. R.F. Lucey. 1978. $3,000

Chevron Chemical Company. Grant for study of minimum tillage. R.R. Seaney. 1978-81. $10,047

Empire State Electric Energy Research Corporation. Contract for studies of use of flyash. F.N.Swader. 1978-79 $37,500

Environmental Protection Agency. Grant for intergovernmental personnel action. F.N. Swader. 1979. $23,703

Environmental Protection Agency. Grant for intergovernmental personnel action. Wilson. 1979. $74,124

Industrial grants for herbicide trials:

W.B. Duke. 1978. $14,422

American Hoechst	$1,000	Eli Lilly	$ 800
American Cyanamid	2,000	Monsanto	1,500
BASF-Wyandotte	400	Stauffer	1,500
CIBA-Geigy	1,000	Shell	1,000
Chipman	500	Velsicol	4,222
DuPont	500		

D.L. Linscott. 1978. $4,500

Agway	$1,000	Monsanto	$1,500
Chevron	1,000	Velsicol	1,000

R.R. Hahn. 1978. $2,000

American Cyanamid	$1,000	Mobil	$250
CIBA-Geigy	750		

International Institute of Tropical Agriculture. Support for thesis research. M.J. Wright. 1978-79. $1,525

National Institutes of Health. Training grant, toxicology. M. Alexander. 1978. $3,180

National Science Foundation. Contract for study of soil as a sink for nitrous oxide. J.M. Duxbury. 1978-82. $282,439

National Science Foundation. Contract for study of organo-metal complexes. M.B. McBride. 1978-80. $32,444

National Science Foundation. Contract for study of frost and frost heaving. R.D. Miller. 1978-80. $93,322

Office of Water Resources Research. Interdepartmental grant for study of nitrate pollution on Long Island. Agronomy allocation (estimated) D.R. Bouldin. 1978-79. $30,000

Potash-Phosphate Institute. Grant for study of soil fertility in the tropics. D.J. Lathwell. 1978-79. $1,000

Potash-Phosphate Institute. Grant for study of Rb/K tracer. E.L. Stone. 1978-79. $2,000

Purdue University. Support for thesis research. R.W. Arnold. 1978-79. $1,059

Shell Companies Foundation. Shell Aid for plant science teaching. P.L. Steponkus. 1978-79. $5,243

USDA, Science and Education Administration. Grant for study of nitrogen supplying power of soil. D.R. Bouldin. 1978. $15,000

USDA, Science and Education Administration. Grant for studies of soybean vigor. A.C. Leopold. 1978-79. $52,000

USDA, Science and Education Administration. Grant for studies of drought tolerence. P.L. Steponkus. 1978-81 $50,000

USDA, Science and Education Administration. Contract for studies of soybean growth. R.L.Obendorf. 1978-81. $81,280

USDA, Soil Conservation Service. Grant for development of conservation program for New York. W.F. Croney. 1978-79. $106,000

1979- $867,854

Agency for International Development. Contract for study of nitrogen fixation in the tropics. M. Alexander. 1979-81. $375,180

Agway. Grant for study of nitrogen fertilization of small grains. W.R. Knapp. 1979-80. $5,000

Agway. Grant for study of sunflower production. M.J. Wright. 1979. $1,000

Battelle Institute. Contract for study of biodegredation of organic compounds. M. Alexander. 1979-80. $42,800

Chevron Chemical Company. Grant for studies of minimum tillage with sunflowers and oats. W.R. Knapp. 1979-81. $4,500

Chevron Chemical Company. Grant for studies of minimum tillage. R.R. Seaney. 1979-81. $2,000

Chevron Oil Field Research Company. Grant for studies of petrolium migration mechanisms. M.B. McBride. 1979-80. $5,000

Environmental Protection Agency, Texas A&M Subcontract. Study of integrated pest management. G.Fick. 1979-81. $130,049

Industrial grants for herbicide trials:

W.B. Duke. 1979. $7,850

American Cyanamid	$1,000	DuPont	$ 600
BASF-Wyandotte	1,000	Monsanto	1,500
CIBA-Geigy	750	Stauffer	1,500
Chipman	500	Shell	1,000

D.L. Linscott. 1979. $1,500

Monsanto	$1,500

R.R. Hahn. 1979. $4,900

American Cyanamid	$1,000	Monsanto	$ 400
CIBA-Geigy	750	Mobil	250
Chevron	1,000	Stauffer	1,500

International Institute of Tropical Agriculture. Grant for studies of maximum nitrogen fixation. M. Alexander. 1979-80. $42,800

Monsanto Agricultural Products Company. Grant for studies of phytotoxin activity. W.B. Duke. 1979-80. $12,500

National Institutes of Health. Grant for travel. M. Alexander. 1979. $3,000

TetraTech, Inc. Subcontract for studies of acid precipitation. M. Alexander. 1979-81. $150,000

USDA Soil Conservation Service. Contract to provide Senior Extension Associate for water management. R.F.Lucey. 1979-81. $37,568

U.S. Geological Survey. Grant for ground water studies. D. R. Bouldin. 1979. $6,500

1980-$871,505

Agency for International Development. Contract for supplementary studies of nitrogen fixation in the tropics. M. Alexander. 1980-81. $33,816

Agency for International Development. Contract for soil survey of Yemen. A. VanWambeke. 1980-82. $325,450

Alaska Natural Gas Transport System, Grant for model of frost heaving. R.D. Miller. 1980. $3,258

Battelle Institute. Contract for studies of hydraulic conductivity. R.D. Miller. 1980-81. $31,270

Boyce Thompson Institute. Grant for graduate student stipend. R.F.Lucey. 1980. $3,280

Chevron Chemical Company. Grant for study of fertilization and liming with minimum tillage. W.S. Reid. 1980. $1000

Environmental Protection Agency, contract for study of soil ecosystems. M. Alexander. 1980-82. $134,918.

Industrial grants for herbicide trials:

W.B. Duke. 1980. $10, 200

American Cyanamid	$1,000	Eli Lilly	$ 800
BASF-Wyandotte	1,150	Monsanto	1,500
Chevron	1,000	Stauffer	1,500
CIBA-Geigy	750	Shell	1,000
DuPont	1,100	PPS Industries	400

D.L. Linscott. 1980. $2,500

Chevron	$1,000	Monsanto	$1,500

R.R. Hahn. 1980. $4,100

American Hoechst	$ 200	Monsanto	$400
American Cyanamid	1,000	Stauffer	500
Chevron	500	Velsicol	750
CIBA-Geigy	750		

Monsanto Agricultural Products. Grant for study of environmental stress. P.L. Steponkus. 1980-81. $5,000

National Science Foundation. Grant for studies of temperature stress. P.L. Steponkus. 1980-82. $13,058

New York State Department of Agriculture and Markets. Grant for water pollution studies. W. Croney. 1980-81. $20,000

North Carolina State University. Subcontract for study of acid precipitation. M. Alexander. 1880-81. $32,764

Potash and Phosphate Institute. Grant for study of maximum yield of alfalfa. G.W. Fick. 1980-81. $5,500

Potash and Phosphate Institute. Grant for maximizing wheat yield. W.R. Knapp. 1980-81. $12,000

St. Regis Paper Company. Grant for advice on conifer seedling nursery. S. Riha. 1980. $527

USDA. Contract for study of nitrogen fertilization. D.R. Bouldin. 1980-83. $34,353

USDA Soil Conservation Service. Contract for conservation studies. W. Croney. 1980-81. $16,174

USDA Foreign Agricultural Service. Contract for hand book of soil resource inventory evaluation. A. VanWambeke. 1980. $64,479

USDA Foreign Agricultural Service . Contract for soil map of Rwanda. A. VanWambeke. 1980. $3,000

USDA/OICD. Grant for advisory soil management support service. A. VanWambeke. 1980. $3,200

USDI. Contract for study of phosphorus use by algae. D.R. Bouldin. 1980-82. $17,653

USDI Office of Water Research and Technology. Grant for Aquatic studies. J. Peverly. 1980-81. $10,000

W.H. Miner Institute. Grant for soil and field crop research. R.F.Lucey. 1980. $24,000

Approximate Amounts of Grant and Contract Funds Available for Use by the Department by the Indicated Periods and their Distribution among the Indicated Functions.

Period	Total Funds Available	Farm Problems		Basic Research		Atmospheric Science	Resource Inventories	Environmental Health	International Programs	Teaching
		Soils	Crops	Soils	Crops					
Years	$	%	%	%	%	%	%	%	%	%
1928-50	35,200	99								1
1951-55	126,700	79	18	3						
1956-60	524,500	40	12	13	2			11	21	1
1961-65	872,400	9	8	43	8	2	3	23	3	1
1966-70	1,656,000	2	4	19	4		11	16	39	5
1971-75	3,450,000	1	10	5		9	6	12	56	1
1976-80	4,981,000	2	13	12	5	1	3	28	35	1

Period	Total Funds Available	Farm Problems		Basic Research		Atmospheric Science	Resource Inventories	Environmental Health	International Programs	Teaching
		Soils	Crops	Soils	Crops					
Years	*$, In thousands*	*$, In thousands*	*$, In thousands*	*$, In thousands*	*$, In thousands*	*$, In thousands*	*$, In thousands*	*$, In thousands*	*$, In thousands*	*$, In thousands*
1928-50	35	34								1
1951-55	127	101	23	3						
1956-60	525	211	65	69	13			56	108	3
1961-65	872	73	70	372	70	14	30	206	27	5
1966-70	1,656	26	57	319	70	1	190	263	854	76
1971-75	3,450	25	344	185	3	293	202	427	1,942	23
1976-80	4,881	95	644	594	231	29	127	1,432	1,747	72
Total	**11,646**	**670**	**1,203**	**1,542**	**387**	**337**	**565**	**2,384**	**4,478**	**180**