New York Agricultural Experiment Station.

GENEVA, N. Y.

DIRECTOR'S REPORT FOR 1902.

W. H. JORDAN.

PUBLISHED BY THE STATION,
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Lucius L. Van Slyke, Ph.D., Howard O. Woodworth, M.S.,
Chemist. Assistant Entomologist.

*William H. Andrews, B.S., Spencer A. Beach, M.S.,
†Christian G. Jenter, Ph.C., Horticulturist.
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Chemist.
Assistant Chemists.

Clerks and Stenographers.

Adin H. Horton, Computer.

Address all correspondence, not to individual members of the staff, but to the New York Agricultural Experiment Station, Geneva, N. Y.
The Bulletins published by the Station will be sent free to any farmer applying for them.

*Connected with Fertilizer Control.
†Absent on leave.
‡In Second Judicial Department.
BULLETIN No. 229.

DIRECTOR'S REPORT FOR 1902.

To the Honorable Board of Control of the New York Agricultural Experiment Station:

Gentlemen.—I have the honor to present herewith the proceedings of the institution under your charge during the year 1902.

It is gratifying to be able to report a year of continued prosperity in what pertains to the essentials of successful experiment station effort. The results of experiments and investigations included in this report are highly satisfactory. There is, so far as I can learn, a continued relation of good will and cooperation with the farmers of the State and the finances of the institution have been adequate in most respects to all pressing needs.

THE STATION STAFF.

An unusual number of changes in the Station staff have occurred during the year. Several members of the staff, in no case the head of a department, after longer or shorter periods of faithful service, have been called to more responsible positions in other institutions; and it should be a matter of pride that these gentlemen are meeting with success in their new work.

Under the new arrangement outlined in my report for 1901, Mr. F. A. Sirrine closed his connection with the Station as Entomologist on July 1, 1902, and became special agent of the Station in assisting in the experiments and investigations in the Second Judicial Department.

Mr. P. J. Parrott, Assistant Entomologist, resigned on August 1 to accept the position of Entomologist to the Ohio Agricultural Experiment Station. In accordance with the requirements of the Civil Service Rules, H. O. Woodworth, M.S., was appointed on July 15 to fill this vacancy. Mr. Woodworth graduated from the University of Illinois in the class of 1892 and subsequently pursued post graduate studies at Cornell University.

N. O. Booth, Assistant Horticulturist, resigned on August 5 to accept the position of Horticulturist at the Washington State College.
A special examination for the purpose of filling this position was requested of the Civil Service Commission, which resulted in the appointment, on October 15, of Vinton A. Clark, B.S. Mr. Clark graduated from the University of Vermont in 1898 and was for a time since connected with the office of Experiment Stations at Washington.

J. A. Le Clerc, who was granted a year's leave of absence from September 15, 1901, resigned on August 17 in order that he might spend a second year in advanced study. The Civil Service Commission was requested to hold a special examination for filling the vacancy, but as the only candidate who was regarded as competent to fill the place accepted another position before I was able to communicate with him, the vacancy remains unfilled.

Lore A. Rogers, Assistant Bacteriologist, resigned on July 1 to accept a position in the Dairy Division of the U. S. Department of Agriculture. Acting under the Civil Service Rules, John F. Nicholson, M.S., was appointed on June 1 from the eligible list to fill the vacancy. Mr. Nicholson received his undergraduate degree from the University of Wisconsin and remained for two years at that institution pursuing special studies in bacteriology.

In accordance with a vote of your Board authorizing such action, H. J. Eustace, B.S., after a special examination was held by the Civil Service Commission, was appointed on June 1 to the position of Assistant Botanist. Mr. Eustace is a graduate of the Michigan Agricultural College and was for one year a student assistant at the New York Agricultural Experiment Station.

Mr. C. G. Jenter, Assistant Chemist, because of ill-health, was necessarily granted a year's leave of absence from November 1, 1902, and Mr. A. J. Patten, Assistant Chemist, was granted a leave of absence for one year from September 1, 1902.

DESTRUCTION BY FIRE OF BUILDINGS AND OTHER PROPERTY.

A fire, the origin of which is not known, occurred at the New York Agricultural Experiment Station on May 7, 1902, and destroyed several buildings—a cattle barn, horse barn and carriage house, a barn for storage of machinery and other materials, and
two poultry houses. All farm machinery and some other property were also burned. This loss rendered necessary the erection of new buildings and incidentally demonstrated the present defenseless condition of the institution against such disasters in the future.

The sums received from insurance on the property burned were as follows:

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings</td>
<td>$10,500</td>
</tr>
<tr>
<td>Hay and grain</td>
<td>$438</td>
</tr>
<tr>
<td>Cattle</td>
<td>$425</td>
</tr>
<tr>
<td>Machinery</td>
<td>$1,500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$12,863</strong></td>
</tr>
</tbody>
</table>

A ruling of the Comptroller allowed the immediate use of this money for replacing, in so far as possible, the buildings and other property.

NEW BUILDINGS AND OTHER NEEDS.

*New buildings.*—A new cattle barn of the most approved construction, and superior to the old one in almost every particular, is nearing completion. The cost of this barn, fully equipped, together with the expense of grading and of providing temporary shelter for the cattle and horses, will absorb all of that part of the insurance money available for construction purposes. The other buildings necessary to the purposes of the Station are a combination carriage house and horse barn, a storage building for machinery and grain and new poultry houses, all of which must be built, if built at all, by the use of funds specially provided by the Legislature. The probable cost of the proposed structures, based upon estimates by the State Architect for the principal ones, is stated later.

*Fire protection.*—A main of the water system of the city of Geneva reaches the Station but supplies no pressure for fire protection purposes. The city fire apparatus is located one and one-half miles or over from the Station buildings, with a constantly rising grade from the city to the Station. At least thirty minutes must elapse before the city department can give aid. The
Experiment Station unquestionably must provide its own fire protection. A plan has been adopted for doing this, the estimated cost of which is given below. That such protection is essential and wise, in view of the work the Station is doing and the value of the equipment subject to destruction by fire, is self-evident.

Electric lighting, motor service, etc.—The time has come when the Station needs for various purposes, including lighting, motor service and chemical operations, the modern conveniences derived from a supply of electricity.

The nearest wires of the Geneva Light and Power Company are about a mile distant, and considering the local cost of a current and the abundant steam power already in operation at the Station, it seems wise for the Station to install its own plant.

Poultry plant.—As two poultry houses were burned in the late fire, additions must be made to the existing houses.

Fences.—The Station property is bounded on three sides by city streets. At least 400 rods of old fencing must be replaced at once by new, which should be attractive in appearance and a discouragement to marauders.

THE SPECIAL APPROPRIATION DESIRED.

In view of the real needs herein set forth, I recommend to your Board of Control that you ask the Legislature of 1903 for a special appropriation of $25,000 to provide for the following expenditures:

Construction horse barn and carriage house $8,500
Storage building for grain and machinery 4,500
Extension of poultry plant 700
Four hundred rods of fence 600
General repairs 700
Fire protection, including pump, chemical engine, hose, hose carts, and 1,000 ft. pipe 5,000
Electric plant, including dynamo, storage battery, motors, cable and wiring 5,000

Total $25,000
MAINTENANCE FUNDS.

It is recommended that the Legislature be requested to make the following appropriations for maintenance for the fiscal year succeeding October 1, 1903, an increase of $3,000 over former years being necessary to pay sufficient salaries and meet the rise in the cost of labor:

Maintenance fund:

Salaries .......................... $24,000
Labor ............................. 13,000
General expense ..................... 16,000

$53,000

Horticultural investigations .............. 8,000
Fertilizer inspection ...................... 10,000
Feeding stuffs inspection ................ 2,500

THE MAILING LIST.

The number of residents of New York to whom our bulletins are sent continues to show a steady increase, our list showing 1,181 more names than were recorded a year ago. The total increase for the popular bulletin list is 1,362. Since January 1, 1896, the mailing list for New York has increased about 18,000 names, or approximately 3,000 names per year. This represents a normal and not a forced growth.

Bulletin Lists, January 1, 1903.

**Popular Bulletins.**

- Residents of New York ........................................ 35,281
- Residents of other states ................................... 1,300
- Newspapers ..................................................... 770
- Experiment stations and their staffs ..................... 813
- Miscellaneous .................................................. 131

**Total** ......................................................... 38,295

**Complete Bulletins.**

- Experiment stations and their staffs ..................... 813
- Libraries, scientists, etc. ................................ 265
- Foreign list .................................................... 210
- Individuals .................................................... 1,550
- Miscellaneous .................................................. 131

**Total** ......................................................... 2,969
WORK IN SECOND JUDICIAL DEPARTMENT.

The lines of work now in progress in the Second Judicial Department are as follows:

(1) Potato spraying experiments.

(2) Asparagus spraying experiments.

(3) Investigation on the rots of cabbage and cauliflower.

(4) Cane blight and other raspberry diseases.

(5) Spraying for control of San José scale.

(6) The growing of chestnuts.

(7) The commercial value of orchards of dwarfed apple trees.

(8) A study of grape stocks.

As results are reached in these various directions they will be published.

Much of the other work done by the Station is as useful to the people of the region contiguous to New York city as to the farmers of those sections where the experiments are conducted.

Mr. F. A. Sirrine, the special agent of the Station, is now located near Riverhead.

INSPECTION WORK.

This includes the same lines of inspection that are enumerated in my report for 1901.

An outline of what has been accomplished in 1902 is as follows:

*Inspection of fertilizers.*—For 1902 71 manufacturers licensed 548 brands of fertilizers. The Station’s collecting agents visited 199 towns between April 2 and July 31, obtaining 924 samples of fertilizers, representing 446 brands.

The following tabulated statement shows the average composition of the complete fertilizers collected during the year, together with a comparison of the guaranteed composition and that found by analysis.
### Average Composition of Complete Fertilizers Collected

<table>
<thead>
<tr>
<th></th>
<th>Per ct. guaranteed.</th>
<th>Per ct. found.</th>
<th>Average per ct. found above guarantee</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lowest.</td>
<td>Highest.</td>
<td>Average.</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>0.41</td>
<td>8.23</td>
<td><strong>1.92</strong></td>
</tr>
<tr>
<td>Available phosphoric acid</td>
<td>1.50</td>
<td>12.00</td>
<td><strong>7.71</strong></td>
</tr>
<tr>
<td>Insoluble phosphoric acid</td>
<td>—</td>
<td>—</td>
<td><strong>—</strong></td>
</tr>
<tr>
<td>Potash</td>
<td>1.00</td>
<td>11.00</td>
<td><strong>4.45</strong></td>
</tr>
<tr>
<td>Water-soluble nitrogen</td>
<td>—</td>
<td>—</td>
<td><strong>—</strong></td>
</tr>
<tr>
<td>Water-soluble phosphoric acid</td>
<td>—</td>
<td>—</td>
<td><strong>—</strong></td>
</tr>
</tbody>
</table>

### Commercial Valuation and Selling Price of Complete Fertilizers

<table>
<thead>
<tr>
<th>Commercial valuation of complete fertilizers.</th>
<th>Selling price of one ton of complete fertilizer.</th>
<th>Average increased cost of mixed materials over unmixed materials for one ton.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average.</td>
<td>Lowest.</td>
<td>Highest.</td>
</tr>
<tr>
<td></td>
<td>$16</td>
<td>$44</td>
</tr>
</tbody>
</table>

In the table below we present figures showing the average cost to the purchaser of one pound of plant-food in different forms in mixed fertilizers.

### Average Cost of One Pound of Plant-food to Consumers in Mixed Fertilizers

- Nitrogen ........................................... 20.8 cents.
- Phosphoric acid (available) ..................... 6.1 cents.
- Potash .............................................. 5.7 cents.

*Inspection of commercial feeding stuffs.*—Bulletin 217 shows that for 1902 eighty-five manufacturers or jobbers paid a license fee on 129 brands of feeding stuffs.
The list of licensed brands may be classified as follows:

<table>
<thead>
<tr>
<th>Product</th>
<th>Brands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cottonseed meal</td>
<td>3</td>
</tr>
<tr>
<td>Linseed meal</td>
<td>8</td>
</tr>
<tr>
<td>Gluten meal</td>
<td>4</td>
</tr>
<tr>
<td>Gluten feed</td>
<td>7</td>
</tr>
<tr>
<td>Germ oil meal</td>
<td>1</td>
</tr>
<tr>
<td>Distillery grains</td>
<td>5</td>
</tr>
<tr>
<td>Brewer’s grains</td>
<td>2</td>
</tr>
<tr>
<td>Malt sprouts</td>
<td>4</td>
</tr>
<tr>
<td>Hominy feed</td>
<td>16</td>
</tr>
<tr>
<td>Corn bran</td>
<td>2</td>
</tr>
<tr>
<td>Meat and bone meal</td>
<td>15</td>
</tr>
<tr>
<td>Proprietary or mixed feeds</td>
<td>62</td>
</tr>
</tbody>
</table>

Total .................. 129 brands.

Late in 1901 and early in 1902 the Station’s collecting agents took 143 samples of feeding stuffs, which were analyzed and reported in Bulletin 217.

**Classification of Samples Analyzed.**

<table>
<thead>
<tr>
<th>Product</th>
<th>Samples</th>
<th>Brands</th>
<th>Samples unlicensed goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cottonseed meal</td>
<td>9</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Linseed meal</td>
<td>11</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Gluten meal</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Gluten feed</td>
<td>6</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Germ oil meal</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Distillery grains</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Malt sprouts</td>
<td>8</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Hominy feed</td>
<td>13</td>
<td>19</td>
<td>4</td>
</tr>
<tr>
<td>Mixed offals (bran and middlings)</td>
<td>17</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Ground grains</td>
<td>6</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Meat and bone meal</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Proprietary or mixed feeds</td>
<td>64</td>
<td>54</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>143</td>
<td>118</td>
<td>34</td>
</tr>
</tbody>
</table>

It is gratifying to note that the discrepancies between the guarantees and the actual composition of the samples as analyzed are becoming less numerous from year to year. This may readily be seen from the following list:
Samples Falling below Guarantees.

<table>
<thead>
<tr>
<th></th>
<th>In protein.</th>
<th>In fat.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Per ct.</td>
<td>Per ct.</td>
</tr>
<tr>
<td>1900</td>
<td>50</td>
<td>30</td>
</tr>
<tr>
<td>1901</td>
<td>31</td>
<td>23</td>
</tr>
<tr>
<td>1902</td>
<td>11</td>
<td>21</td>
</tr>
</tbody>
</table>

A large number of samples taken late in 1902 are now in hand awaiting analysis.

The results of this inspection show that while the brands of feeding stuffs as a rule compare favorably with the guarantees filed at the Station, the character of the goods is such, in many cases, as to demand on the part of the purchasers watchfulness and close scrutiny of the materials offered in our markets. Oat hulls and other nearly worthless stuff are still freely used as adulterants and while the manufacturers exercise care that the guaranteed percentages of protein and fat shall be maintained, the carbohydrate compounds of many brands are of a very inferior character.

Inspection of insecticides.—During the past year 44 samples of paris green and two of other materials have been taken, representing 23 manufacturers. Our results indicate a satisfactory condition as to the arsenic content of paris green found in the market during 1902, and the same can be said as to the amount of water-soluble compounds present in the samples examined.

Inspection of Babcock test glassware.—The Station has continued to test and mark as required by law all Babcock glassware received for that purpose. The responsibility for having this done rests with the creameries and cheese factories. It is unquestionably true that the effect of this inspection has been very beneficial.

Department of Bacteriology.

Rusty spot in cheddar cheese.—The fact that this trouble is due to the presence of a specific bacterium was pointed out in Bulletin No. 183. In connection with the Dairy Department the Department of Bacteriology has worked out and tested a plan of exposing all the factory utensils to live steam for 20 minutes on each
of three days per week. Where this plan has been carefully followed the trouble has been held below the limit where it would cause financial loss. In some factories the germs causing the trouble continue to be brought by the patrons after the factory is put in a satisfactory condition. This phase of the subject is now under consideration.

Cheese curing.—Work in connection with the Chemical and Dairy Departments on the causes of cheese ripening continues to occupy much time. During the year a definite advance has been made in measuring the different factors concerned in the breaking down of the casein. The important part taken by acid-forming bacteria in the process of manufacture and in certain later changes as well as the action of the pepsin of the rennet in the decomposition of the casein have been worked out in detail.

Gas formation in canned peas.—The commercial canning of fruit and vegetables is an industry important to the agriculture of this State, but thus far its problems have received little attention. During the year assistance has been rendered in extricating a factory from serious trouble with gas formation in canned peas, and the results of our work upon this subject will soon appear as a bulletin.

DEPARTMENT OF BOTANY.

Potato spraying experiments.—Very few farmers in New York spray potatoes regularly. Because blight and rot are not destructive every season, many persons doubt that it pays to spray regularly. In order to obtain some definite information on this point the Station has undertaken some experiments designed to determine how much the yield of potatoes in New York may be increased, on the average, by spraying. A second object of the experiments is to compare the benefit from three sprayings with that from spraying every two weeks.

The experiments are to be conducted during ten consecutive years in order to secure reliable averages. One experiment is located on the Station farm at Geneva; the other near Riverhead, Long Island. The results for the first year are as follows: At Geneva, where late blight was severe and the tubers rotted some, three sprayings increased the yield by 98½ bushels per acre,
and seven sprayings increased it 123 $\frac{1}{2}$ bushels per acre. At Riverhead, where there was neither blight nor rot, three sprayings increased the yield 27 $\frac{2}{3}$ bushels per acre, and seven sprayings increased it 45 bushels per acre.

Wrinkling of apple and quince leaves.—In June apple and quince foliage over the greater part of the State became much wrinkled, blistered and distorted. An investigation showed that the trouble was caused by severe late frosts which occurred on May 10th and 11th while the leaves were partially unfolded. Ice crystals formed between the lower epidermis and the green tissue of the leaf causing a separation. Thereafter the epidermis ceased to grow and expand, and being unable to spread out laterally took the form of an arch and thus brought about large interior cavities or blisters. Some of the blisters broke, others did not. The wrinkling seemed to interfere but little with the action of the leaves and it is doubtful if any appreciable damage was done.

Spray injury to apple foliage.—In July apple foliage in western New York became yellow and spotted and many leaves fell prematurely. Unquestionably this was chiefly due to spraying. The protracted cold wet weather made apple foliage unusually tender and susceptible to spray injury. In midsummer it seemed as if the orchards must be much injured, but at the close of the season sprayed orchards had the advantage in spite of the injury to the foliage. Scab was unusually destructive in unsprayed orchards. The spraying of apples should not be discontinued.

Raspberry cane blight.—It has now been conclusively proven by inoculation experiments that the fungus, Coniothyrium sp., so universally found on raspberry canes dying with cane blight is the cause of the disease. Infection occurs on the new canes in summer and autumn and, probably, also on the fruiting canes in early spring. The bluish-black areas which appear on the new canes in autumn and which were formerly mistaken for the early stage of cane blight certainly have no connection with the disease, but, instead, they seem to be due to a comparatively harmless fungus, Sphaerella rubina.

Spraying experiments with cane blight are in progress. Thus far it has not been ascertained what can be accomplished by
spraying the new canes, but the experiments show that it is useless to spray the fruiting canes with bordeaux mixture.

In a plantation of Cuthbert damaged about 25 per ct. by cane blight, rows sprayed three times in the spring gave an average yield of 185\(\frac{1}{4}\) pints while the average yield of unsprayed rows was 203\(\frac{3}{4}\) pints.

The new apple rot.—In the autumn of 1902 there was a remarkable epidemic of apple rot in New York State caused by a common fungus, *Cephalothecium roseum*, which has been known to scientists for over sixty years and during all that time supposed to be harmless. Inoculation experiments show that the fungus is unable to penetrate the uninjured skin of apples, but that when the skin is once broken by other agencies it is capable of causing rot. In the present case it took advantage of breaks in the skin made by scab.

Since only scabby apples were attacked by the rot the trouble might have been prevented by thorough spraying to prevent scab. In cold storage the fungus, although not killed, does no damage. Unsuccessful attempts have been made to prevent the decay of slightly affected apples by dipping them in solutions of copper sulphate and formalin of various strengths. Briefly stated, the proper treatment for this new apple rot is, to spray thoroughly and place in cold storage as soon as gathered.

DEPARTMENT OF ENTOMOLGY.

The investigations upon the origin and early stages of sexual and parthenogenetic eggs of aphids are being continued. A series of observations upon the fly-resisting qualities of about 30 varieties of wheat planned for the past season were carried out only in part owing to the scarcity of the Hessian fly.

The San José scale—Further studies in methods of control.—Experiments with the lime-sulphur-salt wash as a remedy for the scale have been conducted simultaneously in four sections of the state, namely, on Long Island near Riverhead, in the upper Hudson Valley near Kinderhook, in western New York at Geneva and near the extreme western part of the state in Niagara County. The treated trees numbered 713, of which 251 are peaches, includ-
ing 11 varieties; 129 plums, Japan varieties; 284 pears, including about 6 varieties; 3 sour cherries and 31 large Baldwin apple trees.

The trees were examined frequently during the summer to ascertain results. The effect upon the trees and scales was practically uniform in all the orchards. There was no evidence of injury except on Long Island where the fruit-buds of the Japan plums were apparently slightly injured, due in all probability to the late date of treatment. In all cases the foliage was delayed about a week but was uniformly as good or better than that of the check trees. All of the treated trees, with the exception of the Japan plums, bore a fair crop of fruit practically free from scale. In some cases, especially the apples, the crop was greatly increased. The fruit on the check trees was in every case badly disfigured and unmarketable.

The effect upon the scale was equally pronounced. The check trees in all the orchards showed an abundance of living scales on both the old and the new growth while on the treated trees only an occasional scale was found.

The wash adhered to the trees much better than was anticipated. All of them remained white for at least two months and a residue remained adhering to the bark throughout the season.

The lime-sulphur-salt wash combines readily with bordeaux mixture. A number of experiments were made with this compound which gave highly satisfactory results.

DEPARTMENT OF HORTICULTURE.

Variety tests.—The former custom of issuing annual bulletins containing observations on varieties of small fruits was discontinued in 1899. The first report on strawberry varieties published by the Station since then is contained in Bulletin No. 218, November, 1902. In that bulletin are given careful descriptions of the new varieties of strawberries which have been fruited at the Station, together with lists of the kinds most productive here, of new kinds apparently worthy of testing, of medium early varieties, of late varieties and of varieties having a long fruiting season. Other characteristics of interest to strawberry growers are also set forth.
Pollen-studies.—In a laboratory study of grape pollen in 1902 the interesting discovery was made that the self-sterile varieties of the grape which were studied have a pollen of a peculiar form which, when examined dry under the microscope, may readily be distinguished from the pollen of self-fertile grapes. This discovery appears to disclose a quick and reliable way for answering the question whether or not a variety is self-sterile. The microscopic examination of the pollen is a much easier and more expeditious method for answering this question than the old way of bagging the clusters before the blossoms open to prevent the access of other pollen and in due time observing whether any fruit is formed under such conditions. An account of this work is published in Bulletin No. 224.

Self-fertility of grapes.—From 1900 to 1902 certain other questions pertaining to the self-fertility of the grape were investigated which were treated in Bulletin No. 223. In previous tests varieties which are self-sterile, or nearly so, have shown about as little ability for fertilizing other self-sterile sorts as they have for fertilizing themselves. In the tests reported in Bulletin No. 223 they have usually failed to fertilize self-fertile sorts also. In some instances, however, indications were found that some self-impotent pollen was potent to some extent on other varieties.

The influence on self-fertility of girdling or sharply bending the fruiting canes before the blooming season was also investigated. In some cases self-sterile or imperfectly self-fertile sorts were stimulated to increased productiveness by such treatment. In other cases they were not. Further tests need to be made to learn whether or not this practice may be profitable with any of our commercial varieties. The method is not new in viticulture. It is practiced by Greeks with Zante grapes to promote setting of fruit and to secure uniformity of bunch and increased size of berry. The ring of bark which is taken out is so narrow that the wound readily heals over. In this respect the method differs from that uses in girdling grapes after the fruit sets as described in Bulletin No. 151.
BULLETINS PUBLISHED IN 1902.

No. 212. April. Miscellaneous notes on injurious insects, II: (1) The periodical cicada; (2) The palmer worm; (3) white grubs attacking aster plants; (4) *Papilio asterias* attacking celery. V. H. Lowe. Pages 25.

No. 313. April. Treatment for San José scale in orchards, II: Spraying with kerosene and crude petroleum. F. A. SIRIRINE. Pages 25.

No. 214. July. A study of some of the salts formed by casein and paracasein with acids: Their relations to American cheddar cheese. L. L. VAN SLYKE and E. B. HART. Pages 27.


No. 220. December. Two unusual troubles of apple foliage: (1) Frost blisters on apple and quince leaves; (2) spotting and dropping of apple leaves caused by spraying. F. C. STEWART and H. J. EUSTACE. Pages 17.


No. 223. December. Investigations concerning the self-fertility of the grape, 1900-1902: (1) Potency of the pollen of self-sterile grapes; (2) influence on self-fertility of girdling or bending the canes. S. A. BEACH. Pages 22.

No. 224. December. Investigations concerning the self-fertility of the grape, 1900-1902, III: A study of grape pollen. N. O. BOOTH. Pages 12, plates 6, fig. 1.


No. 228. December. San José scale investigations, IV: Spraying experiments with the lime-sulphur-salt wash; summer treatment with lime-sulphur washes; experiments in making a lime-sulphur wash without boiling; spraying experiments with other washes. V. H. LOWE, and P. J. PARROTT. Pages 68, plates 7.


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