What's Cropping Up?

A NEWSLETTER FOR NEW YORK FIELD CROPS & SOILS VOLUME 2, NUMBER 4, 1992

Outlook for Canola

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Late in May, some eye-catching fields of bright yellow blooms announced that for the first time we were growing winter canola on a commercial scale. At this writing we do not have the yield figures or the reaction of growers post-harvest. But because the New York fields are part of a national get-acquainted process, experiences outside our state may help us predict what will happen here.

The demand for canola oil in the food industry is still ahead of farm production of the seed in the U.S. Our country continues to import spring-sown canola from the Canadian "prairie provinces". We could also get canola from Europe. Both spring- and fall-sown kinds will grow in New York, but preliminary tests favor the fall-sown because it yields more per acre and is less affected by weeds and insect pests.

If the U.S. demand is strong, why hasn't domestic production risen to meet it? Canola growing began in the U.S. in 1985, mainly in the Midwest, and early predictions had it covering a million acres or so by now. But in fact, current acreage is estimated to be under 200,000 and much of that is in the Southeastern states. In some of the states where canola got off to a fast start, there have been setbacks. Disease problems have been more severe than expected. Some production areas are so distant from mills that the farm price is strongly reduced.

Just across the border in Ontario, 20 years of research and development on canola have failed to produce a large or stable acreage. With fall-sown canola, winter kill has been a recurring problem. Returns from spring-sown canola have been too low to be competitive, in some seasons.

Ontario and New York both need more new crops. Great efforts are being made by both public and seed-industry workers to develop canolas that will be more reliably productive. Canola continues to be one of the most attractive prospects in the ranks of candidate crops. This year's experience will add to our knowledge concerning site selection, timing, harvest and storage. The presence of two canola mills in Ontario gives us a price advantage in marketing the seed we produce. It is possible that parts of New York will prove to be among the best places in the country to grow canola.

If you or your growers are considering growing canola this year, you may wish to obtain a publication entitled "*Growing Canola (Oilseed Rape) in New York*." You can obtain this publication through the field crop agent in your county or by ordering directly from the Department of Soil, Crop and Atmospheric Sciences, Cornell University, 142 Emerson Hall, Ithaca, NY 14853. Another excellent publication is *Winter Canola Publication Guide* that can be obtained from Cargill Hybrid Seeds.

FORAGE MANAGEMENT

Fertilizing Pastures in New York State

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Appropriate use and interpretation of soils information using soil surveys are essential in the development of reliable liming and fertilizer recommendations. In New York State, soil scientists have established five soil management groups used for fertility and management recommendations. A number of soil physical and chemical characteristics such as parent material, texture, cation exchange capacity and nutrient supplying power were considered when the soil management groups were established: (Cornell Field Crops and Soils Handbook, 1987). These groups help to explain how physical and chemical characteristics for the specific soil name is also used in the computerized development of liming and fertilizer recommendations from the Cornell Nutrient Analysis Laboratory.

The suitability of soils for farming between and within soil management groups differs significantly. For example, soils in Group I were developed from calcareous glacial till and they are medium to fine textured. The soil profile is slightly acid to slightly alkaline in the surface and slightly alkaline or strongly alkaline in the subsoil. The water-holding capacity of the well-drained soils in the group can exceed 7.1 inches in the top 3-foot of soil. Lime is usually not required, but surface soil pH's are occasionally low. The nitrogen and potassium supplies are generally high, but the native phosphorus supply is low. The well-drained soils of this group have the highest yield potential of all soils in New York. Soils in Group III were developed on glacial till and they are medium textured, acid soils with fragipans. The soils contain shale, sandstone, slate or schist-type rocks with little or no lime. The depth to the fragipan determines the soil drainage characteristics - the deeper the pan, the better drained the soil. The entire profile contains few to many angular and/or flat stones of various sizes. The well-drained to moderately well-drained soils usually contain 4 to 7 inches of available water. Soils in this group are naturally acid (pH 5.7 or below). The nitrogen and potassium supplies are medium and the native phosphorus supply is low.

Soil fertility in areas on farms in alfalfa and pasture

Conclusions reached from a summary of the results of chemical analysis of soil samples submitted to the Cornell Nutrient Analysis Laboratory from fields in alfalfa (Medicago sativa L.) and in pasture were: 1) four times as many soil samples were from alfalfa fields than pasture; 2) as expected, percent organic matter was slightly higher under pasture than alfalfa; 3) soil pH was significantly higher in those fields in alfalfa in comparison to fields in pasture (the average pH for all samples submitted to the Cornell Nutrient Analysis Laboratory is 6.2), and 4) we were surprised at the favorable pH and phosphorus levels from pasture areas -- we speculate that a significant number of the soil samples from pastures are from intensively managed pastures and/or are from pastures in rotation with row crops [Table 1. (Lucey and Reid, 1991]

Requirements for lime

Crops, in pasture or otherwise, require the soil pH to be within a given range for optimum production and profit (Table 2). In a planned soil fertility program, the soil pH is adjusted within the optimum range usually before fertilizers are applied or crops planted. The adjustment of the pH,

Table 1. Summary of NY soil test results for soil samples from areas on farms in alfalfa and in pasture, 1988-1991+

Source	Alfalfa	Pasture
# samples	5,817	1,200
# acres	59,852	28,229
% organic matter	3.1	3.7
pH	6.6	6.1
P lb/acre	13.9 H	10.8 H
K lb/acre	202.5 H	199.8 H
Ca lb/acre	3672.4 H	2763.4 H
Mg lb/acre	332.7 H	306.0 H
Zn lb/acre	1.8 H	2.0 H
NO_3 lb/acre	32.1 H	27.6 H

+Cornell Nutrient Analysis Laboratory, Ithaca, NY.

Table 2. Desirable Soil pH for Selected Crops	
Crops	Soil pH Range
Alfalfa, soybeans	6.8 - 7.0
Barley	6.3 - 6.5
Birdsfoot trefoil	6.5 - 6.8
Corn, Clovers, Oats, Grasses	6.0 - 6.2

if necessary, is accomplished by applying lime, usually as agricultural limestone.

With pastures, the surface applications of lime may require several years before the optimum pH is reached.

Results of a fertilizer trial in a pasture grazed by milk cows.

A NPK fertilizer trial was established in a pasture on the Gerow Farm, Franklin County, NY that was subdivided into 33 one acre paddocks. (Lucey et al., 1988) The soil was a somewhat poorly drained Naumburg sandy loam and occurs on nearly level sand plains. The Naumberg soil in the pasture area was characterized as having a high water table that falls slowly as summer progresses. Kentucky bluegrass and white clover were the dominant plant species in the pasture.

Chemical soil test results showed the pH to be 7.1, the phosphorus to be very high and the potassium to be high in paddocks 1-15. The phosphorous was also high but the potassium was low in paddocks 16-33. Recommendations based on soil test results were: for paddocks 1-15, apply from 50 to 75 lb/acre nitrogen as a split application and for paddocks 16-33 apply 70 lb/acre of potassium in addition to the 50 to 75 lb/acre of nitrogen.

Two replications of the study were located within paddocks 1-15, two within paddocks 16-18 and two within paddocks 19-33. The fertilizer was applied annually and the average annual herbage produced is presented in Fig. 1. Maximum response occurred from the application of 80 lb/acre of nitrogen along with the first increment of phosphorus, (30 lb/acre) and the first increment of potassium (60 lb/acre). Increasing the total fertilizer applied did not significantly change the relative amounts of herbage produced at each of the 6 to 7 grazings, but did increase the total production. When yields were averaged for harvests and years, the mean dry matter yield was 6014 #/A per year. The distribution of yield over the 6+ grazings was: 23% for the first grazing, 14% for the second grazing, 16% for the third grazing, 21% for the fourth grazing, 15% for the fifth grazing, 9% for the sixth grazing and 2% for subsequent grazings.

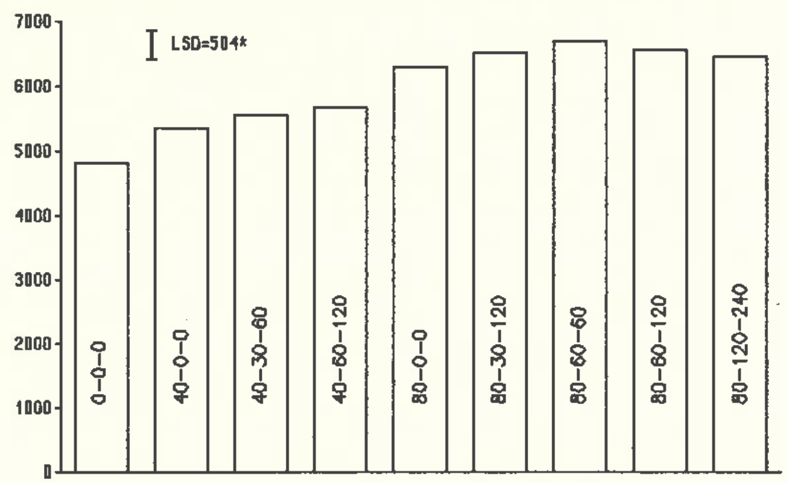

Figure 1. Average annual yield of a Kentucky bluegrass/white clover sward as influenced by N, P_2O_5, K_2O fertilizer, Gerow Farm.

*LSD = Least significant difference at 5% level of significance

References

Lucey, R.F. and W.S. Reid. 1991. Fertility management of pasture swards. Proceedings of the IX Eastern Forage Improvement Conference. University of Prince Edward Island, Charlottetown, Prince Edward Island, Canada.

Lucey, R.F., W.S. Reid and C.A. Tillinghast. 1988. Optimizing grazing on a 50-cow dairy farm in northern New York. In J.P. Cropper (ed.) Pasture in the Northeast Region of the United States - Workshop Proceedings. Northeast Regional Agric. Eng. Serv. Bull. NRAES-36. Cornell Univ., Ithaca, NY.

WEED CONTROL

Smooth Bedstraw Control Provides Opportunity to Improve Hayfields

Russ Hahn
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Smooth bedstraw was introduced from Europe and is commonly found in pastures, hayfields, along roadsides, and in waste areas throughout the Northeast. Smooth bedstraw stems arise from clumps and are branched and spreading. Individual stems are four-angled, smooth or nearly so, and up to 4 feet long. Main stems have eight small, narrow leaves in whorls, while branches have five or six leaves in a whorl. Flower heads have spreading branches and small white flowers. It reproduces by seeds and rootstocks.

Control Dilemma

Historically, recommendations for smooth bedstraw control included mowing hayfields before seeds were produced, close grazing to prevent its spread, and plowing badly infested fields to grow a clean cultivated crop before reseeding. Unfortunately, many bedstraw infested pastures and hayfields are extensively managed and are not rotated to row crops. For many years, Kuron was recommended for chemical control of this weed in pastures, however, EPA suspended the pasture and other uses of Kuron in 1979. The subsequent spread of smooth bedstraw and increased interest in no-tillage pasture and hayfield renovation prompted new investigations on the control of this weed.

Experiments Established

Preliminary results indicated that Roundup had little activity against this weed. Triclopyr, which is one of the components of Crossbow herbicide and high rates of Banvel provided acceptable control.

An experiment was established to compare fall and spring herbicide applications and to determine their residual effect on a subsequent no-tillage seeding of alfalfa. Herbicide applications were made on October 12, 1984 to bedstraw with 3 to 4 inches of regrowth and on May 11, 1985, to bedstraw with 8 to 12 inches of new growth. Hay was harvested in June. Bedstraw control ratings were made on July 23 and the site then prepared for a no-tillage alfalfa seeding by spraying paraquat. Hay yields and composition were determined for the first cutting in 1986.

Results Show Promise

Bedstraw control ratings (Table 1) made on July 23, 1985 showed that efficacy was affected by the time and rate of herbicide application. Fall applications were more effective than spring applications. Although the 1 qt/A rate of Banvel did not result in acceptable bedstraw control, the 2 qt/A rate applied in October did provide acceptable control. The application of 1.5 or 2 qt of Crossbow, which is a mixture of triclopyr and 2,4-D provided good control when applied in the fall. Spring applications of Crossbow were less effective than fall applications, however the 2 qt/A rate provided acceptable control when applied in May.

There were no significant differences in hay yields among the treatments, however, there were differences in hay composition. All treatments except those with 1 qt/A of Banvel had less bedstraw than the untreated check. In addition, hay from many treatments had a higher proportion of alfalfa than hay from the check.

Table 1. Bedstraw control ratings, hay yields and composition following herbicide applications and no-tillage alfalfa seeding.

Herbicides	Amt/A	Time	Bedstraw control[a]	Hay Composition: Bedstraw	Alfalfa	Forbs[b]	Grass
Banvel	1.0 qt.	Fall	3.3	34	27	3	36
Banvel	1.0 qt.	Spring	1.5	28	19	3	50
Banvel	2.0 qt.	Fall	6.8	2	43	9	46
Banvel	2.0 qt.	Spring	3.8	18	53	6	23
Crossbow	1.5 qt.	Fall	8.5	3	41	4	52
Crossbow	1.5 qt.	Spring	6.8	7	43	14	36
Crossbow	2.0 qt.	Fall	8.8	1	40	5	54
Crossbow	2.0 qt.	Spring	7.8	3	58	11	28
Untreated	---	---	0.0	31	21	1	47

[a] Bedstraw control ratings: 0 = no effect; 10 = complete kill.
[b] Broadleaf weeds other than smooth bedstraw.

SOIL MANAGEMENT

Composts Made from Solid Waste and Sludge Evaluated in Field Plot Study

J. H. Peverly
Soil, Crop and Atmospheric Sciences

Solid wastes of several types have been suggested for use on agricultural land. The traditional and beneficial one we're all familiar with is manure. We also know that even this material has some risks associated with its application, such as nitrate pollution of water or odors. This is also the case with sewage sludges, sludge products, and composts, which have both benefits and risks or liabilities associated with their use. In previous articles, Jack Martin described some of these for sludge and the sludge product, N-Vira Soil. He also cited the rules and regulations at the State and Federal levels which are thought to satisfy the need to manage these risks to the landowner and consumer.

Regulations are in a state of revision both at the state and the USDA-EPA levels. The new federal rules are expected in October, with allowable toxic metal levels determined by a risk analysis giving somewhat surprising results. The risk analysis procedure was used to calculate the metal level in waste which would have no adverse effect on the most exposed individual (cow, person, wildlife) if applied to crop land at very high rates forever. These levels are actually higher for some metals than in the previous (current) regulations. In addition, most sludges are cleaner than 15 years ago. The result is that our current best calculation used to develop the proposed rules is telling us that we can use sludge and compost at field rates based on crop nitrogen needs with a pretty good safety margin for metals.

Of course, it is still going to be necessary to have good records of applications, waste and soil analyses, and crops grown. Applications should not be made to erosive soils, directly consumed crop products, and low soil pH situations. Pathogens are probably not a major problem, but there is still some guessing about toxic organics in these waste materials. The assumption is that most are inactivated or broken down within several weeks of application.

There are still some unknown risks. For instance, asbestos fibers have been found in virtually all municipal solid waste (MSW) compost products. What this means for users of compost or the land receiving it is not known.

Better definition of expected benefits for the land and the grower or landowner from waste applications is needed. To help answer some of these questions, a three-year field plot study was initiated this spring. The waste materials, a MSW compost and a low-metal sewage sludge compost with wood chips will be applied each year. Both qualify as DEC Class I composts, which can be applied under current regulations to all crops except those for direct human consumption. Analyses are presented in Table 1.

Two sites were established in Seneca County, one for row crops on the Rodney Lott Farm, Seneca Falls, and the other for vineyards at the Lucas Winery, Interlaken. Both composts at rates of 25,

(See COMPOSTS, page 7)

Table 1. Levels of metals and PCBs for MSW and sludge composts applied to plots, and upper limited for Class I composts (ppm).

	Composts		
Parameter	MSW	Sludge	Class I
Mercury	2.7	ND	10
Cadmium	2.3	ND	10
Nickel	76.8	172	200
Lead	270	21.0	250
Chromium-total	-	21.0	1000
Copper	207	340	2000
Zinc	760	226	2500
PCB's	ND	ND	1
Total N	approx 1%	1.3%	-

FORAGE MANAGEMENT

A Quick Way to Diagnose Silage Management

R. E. Pitt and Kurt Ruppel
Agricultural & Biological Enginering/Cornell Cooperative Extension

The goals in silage making are to create an anaerobic (oxygen free) environment in the silo, and to acidify the forage by natural action of lactic acid bacteria. If these goals are achieved, forage nutrients are well preserved and the losses of dry matter are minimized.

Dry matter losses between cutting the forage and feeding the silage are typically about 20% (equal to one acre in five), but these losses can be reduced by good management. This means cutting the forage at or near its optimum maturity, harvesting in the optimum moisture range (between 60 and 70%), filling the silo rapidly with as few delays as possible, enhancing compaction in bunker silos using heavy wheeled tractors, covering and sealing the silo tightly to keep out air, and feeding out of the silo rapidly enough to stay ahead of spoilage.

Good Silage Management

The quality of silage management varies considerably among farm operators. On a well managed farm, the harvest equipment is fully prepared when the forage is ready for harvest, and the field personnel are trained to think in terms of rapid harvest. During filling of a bunker silo, the forage must be packed, and both the size of tractor used and the time spent packing are important. Rapid filling means the silo is sealed in under 10 days from the start of harvesting. To do this, the harvest equipment must be properly sized, an appropriate amount of trained labor must be available, and the harvest operation has to work within what is usually a narrow weather window. Bunker silos need to be sealed with high quality plastic as soon as they are filled and weighted down with tires to prevent billowing. Finally, unloading at least 6 inches per day in summer will reduce most of the problems with aerobic deterioration during feedout; this requires that the size of the exposed face be properly matched to the daily silage dry matter needs for the herd.

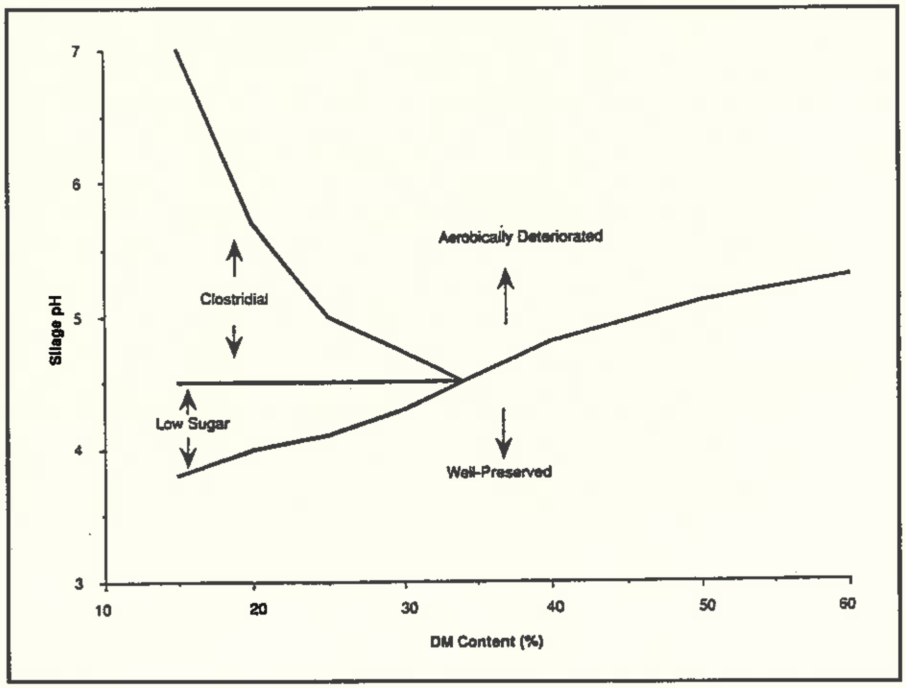
Diagnostic Measures of Silage Management

Two simple measurements -- moisture content and pH -- are a combined indicator of the quality of silage management. pH is a measure of acidity, such that low pH means high acidity. Because one of the goals in silage making is to acidify the forage, pH is a measure of preservation.

The pH needed for good preservation depends on moisture content. As dry matter content decreases (moisture content increases), the pH for stable preservation decreases (see graph). For example, when silage dry matter content is 40%, the pH should be about 4.8 or below. When dry matter content is 30%, the pH should be 4.2 or below.

The graph helps to interpret high silage pH. For silages of dry matter content 35% or greater, a pH above the curve for stable preservation indicates "Aerobically Deteriorated" silage. In these silages, yeasts, molds, and aerobic bacteria have been allowed to

(See SILAGE, page 7)



COMPOSTS, from page 5

37.5, and 75 tons per acre, corresponding to about 50, 75 and 150 lbs mineralizable N per acre, were applied and incorporated by disking. Pioneer 3751 was planted May 30 and all plots received 21 lbs starter N.

The composts were applied as mulches in the vineyard allies at rates of 25 and 50 tons per acre, corresponding to about 50 and 100 lbs N per acre. Appropriate controls and replications were included.

Physical and chemical status of the soils will be monitored, concentrating on moisture, organic matter, nutrients and heavy metals. Pore water quality will be evaluated, especially during periods of high water table. Crop yield and quality will be measured at the end of the season.

The 37.5 tons per acre corn plots were split and the presidedress nitrogen test applied to half the treated plots. One result obtained so far is that soil mineralizable N from the sludge compost appears in greater amounts, and more quickly, than from the MSW compost. The MSW plots at the 37.5 ton rate will require sidedressed N for full production.

After this and other projects have been completed, there will still be a need for scientists, extension staff, farmers, and consumers to evaluate and balance the benefits of such practices with the risks. To this end, there is also a social outreach and education component to this project under the direction of Cliff Sherer, Ken Cobb, and extension field staff. Their main objective is to see if the decision making process by local leaders and the public can be improved and facilitated when issues having strong emotional as well as technical components are faced by the community. This part of the project should help alleviate the growers' risks associated with the layman's perception that the value of products grown on a farm, or the value of land, receiving compost is diminished.

SILAGE, from page 6

grow and convert plant carbohydrates and other energy-rich nutrients to carbon dioxide and water. In this process, silage energy content is decreased and the silage may be toxic to animals. The root cause of aerobic deterioration is excessive exposure to oxygen as a result of poor management: slow filling, low compaction, inadequate sealing, and/or low feedout rate.

A high pH in silages with dry matter content 30% or less can indicate one of several problems. Starting from the curve for well preserved silages, progressively higher pH values are associated with "Low Sugar," "Clostridial," and "Aerobically Deteriorated" silages.

A "Low Sugar" silage is one in which the plant sugars have been depleted, and the pH stabilizes at a higher than normal point. In fermentation, plant sugars are converted to acids which cause the pH to decrease. Alfalfa silages are often low sugar silages, because alfalfa is naturally low in sugars. A prolonged period between mowing and ensiling causes plant respiration to deplete these sugars further. Low sugar silages are still usually well preserved.

A somewhat higher pH means a silage is "Clostridial." Clostridia are spoilage bacteria that thrive in wetter forages. Clostridia break down acids in the silage and generate putrefying compounds. Clostridial silages are high in ammonia and are usually associated with a depressed intake or toxicity. The primary reason that clostr idial spoilage occurs is inadequate moisture control. Harvesting at less than 70% moisture (above 30% dry matter) usually prevents clostridial spoilage. A pH above that for clostridia indicates aerobic deterioration.

Measuring Silage pH

Silage pH can be obtained as a supplemental option in forage analyses ($2.50 for Northeast DHIA). Alternatively, one can purchase a pocket-sized pH meter from many companies for about $50 or color coded pH paper for less. To test the pH of silage, scrape away a handful of silage from several locations at the open face of silage, mix these handfuls together, put one handful of silage into a glass, and cover the silage with water. After a few minutes, insert the meter or the paper into the liquid.

Good silage management requires year-round attention to detail. To see how a particular silage has been managed, one can measure its moisture content and pH, plot the results on the graph, and gain a rough interpretation of the quality of management.

Calendar of Events

Oct. 6-7, '92	Northeast Regional Field Crops Insect Conference. Contact E. Shields 607-255-8428.
Oct. 13-16	Field Crop Dealer Meetings. Contact P. Kline 607-255-2177.
Oct. 25-27	Empire St. Chap. SWCS Annual Mtg., Auburn Holiday Inn.
Nov. 1-6	Amer. Soc. of Agronomy Mtgs., Minneapolis. Contact ASA 608-273-8080.
Nov. 9-12	Cornell Pest Management Conference, Sheraton Inn, Ithaca.
Jan. 12-13, '93	Empire State Soil Fertility Assoc., Inc. Meeting, Auburn Holiday Inn

What's Cropping Up? is a bimonthly newsletter distributed by the Department of Soil, Crop and Atmospheric Sciences at Cornell University. The purpose of the newsletter is to provide timely information on field crop production and environmental issues as it relates to New York agriculture. Articles are regularly contributed by the following Departments at Cornell University: Soil, Crop and Atmospheric Sciences, Plant Breeding, Plant Pathology, and Entomology. **To subscribe for 1992 send a check for $8.00 along with the form at the right.**

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