What's Cropping Up?

A NEWSLETTER FOR NEW YORK FIELD CROPS & SOILS VOLUME 3, NUMBER 6, 1993

Restricting Reentry Into Treated Fields Required to Protect Agricultural Workers

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Recently EPA passed new safety standards to protect agricultural workers from pesticides. The Worker Protection Standard, or WPS for short, covers all agricultural employees on farms, nurseries, greenhouses and forests. Please make special note of the term "Worker" as it is a legal job title defined in the WPS. ***Workers*** are those employees working to produce agricultural crop products, but they do not apply, handle, mix or work with pesticides in any way. Workers receive special protection in WPS. The WPS recognizes that ***certified applicators*** have advanced knowledge of pesticides and often supervise the mixing, loading, and application by uncertified personnel. Those employees that handle pesticides, but are not certified are called ***pesticide handlers*** in the WPS.

One provision of the WPS for protecting ***workers*** is intended to eliminate or reduce worker exposure to pesticides. The WPS intends to reduce the risk of pesticide poisonings and injuries among agricultural workers by reducing exposure. One of the most important of these measures is controlling when workers can enter an area treated with a pesticide.

For starters, EPA created a new term, "Restricted Entry Interval" or REI. This replaces an old and probably more familiar term "Reentry Restriction." EPA has established an REI for **all** pesticide products that are used in the production of agricultural crops. The REI is a period of time, after the application of a pesticide, during which worker entry to the treated area is restricted. Previously, only a few agricultural pesticides had "Reentry Restrictions," now **all** pesticides used in agricultural plant production will have at least a 12 hour Restricted Entry Interval. Pesticides with higher toxicities will have 24 hour or longer REI's.

The take home message is, if contact with pesticides is possible, the employer must restrict the worker from entering the treated area until the REI is over. This restriction will mean a change in the operation of many farms. Workers are not going to return to work on crops immediately after the dust has settled or the spray has dried as they did in the past. At least 12 hours will have to pass before workers can return to tasks that bring them in contact with the surfaces that were treated. The certified applicator and the pesticide handler can reenter early while wearing personal protective clothing, but the worker is restricted from early reentry.

As with all regulations, things are never quite as clear-cut as they first appear. EPA did include some exceptions to strict REI adherence as part of their new rule. A summary of these exceptions follows:

1. Workers may enter a treated area if there is no possibility of contact with the treated surface. For example, operating tractors or trucks is OK, as long as no contact with the treated surface is made.

2. Some short-term tasks or activities are allowed but:

- they may not do any hand labor such as harvesting or weeding,
- the time is limited to 1 hour per worker per day,

(See Workers, page 7)

CROP MANAGEMENT

Why We Recommend High Corn Silage Populations

Bill Cox
Soil, Crop and Atmospheric Sciences

Once again, we have increased our recommended harvest plant densities for corn silage production in Cornell Recommends for Integrated Field Crop Management (Table 1). For the past 3 years, we have evaluated seven hybrids (Pioneer 3733, 3592, 3527, and 3429, Hytest 424 and 474; and Funks 4385) at 9 harvest plant densities ranging from 12000 to 36000 plants/acre on a well-drained silt loam soil at Aurora in central NY. Regardless of the growing conditions (Table 2) and the yield potential associated with the growing season, average maximum economic silage yields exceeded 30000 plants/acre in each year (Fig. 1). Cumulative rainfall from May 1 through August totaled more than 4 in. below normal in 1991 and 1993 so the yield response to increased plant densities was particularly noteworthy in those years. The data suggest that growers should not select plant densities according to yield potential of a particular field (i.e. high fertility, irrigation, etc.) because corn silage responded the same to plant densities despite the 5 to 7 ton/acre differences in yield among years. For New York corn silage production, we must forget the concept of increased plant densities only for fields of high yield potential and realize that the silage yield response is fairly constant for a particular soil type regardless of the yield potential.

All hybrids in this study generally responded the same to increases in plant densities. Nevertheless, maximum economic yield did vary among hybrids from a low of about 28000 to a high of about 32000 plants/acre. Maximum economic yield varied the greatest among hybrids in the dry years of 1991 and 1993. Because of the 4000/acre plant density difference among hybrids for maximum economic yields, we now recommend for a particular soil type a range in harvest plant densities that is dependent upon the response of a particular hybrid to plant densities (Table 1). Understandably, the grower must rely on the seed dealer for information on the particular hybrid. Hybrids, however, respond much greater to increased plant densities in New York compared to the Corn Belt or other regions with warmer growing conditions. Therefore, most of the recommended plant populations in seed company brochures do not apply to New York corn silage production.

Modern hybrids require high plant densities for maximum economic silage yields. Studies at Aurora from 1988 to 1990 indicated that modern hybrids varied little in silage quality as plant densities increased from 20000 to 32000 plants/acre. Studies at Aurora from 1991 to 1993 indicated that modern hybrids showed the same type of yield response to plant densities regardless of growing conditions and yield potential. Other benefits associated with high plant densities include more competitive stands that reduce weed pressure and faster dry-down of the stalks that allows for earlier harvest. If all New York corn silage producers plant at the optimum plant density for their particular soil type, the New York State average silage yields should increase significantly.

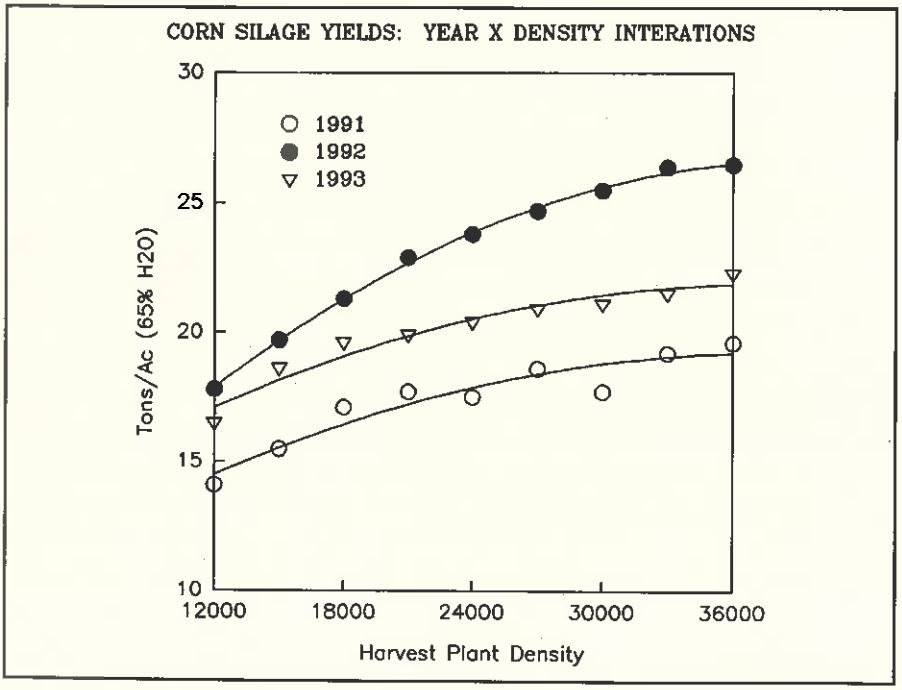

Table 1. Guide to corn silage populations for New York.

Soil Conditions	Planting Rate (90% emergence)	Harvest Population
	----------plants/acre----------	
Deep well-drained soils with high water-holding capacity	~34450	30000-32000†
Well to moderately well drained silt loams to clay loams	~32250	28000-30000
Sandy loams or somewhat poorly drained loams to clay loams	~30000	26000-28000
Gravelly or shallow loams to clay loams	~25500	22000-24000

† Hybrids that respond to plant populations should be at the high end of the range.

Table 2. Weather conditions at Aurora during the 1991, 1992, and 1993 growing seasons.

	PRECIPITATION				GDD			
Month	1991	1992	1993	Mean	1991	1992	1993	Mean
	---------- in. ----------				----------°F----------			
May	1.87	3.28	0.95	3.00	495	305	328	296
June	0.89	2.91	3.32	3.94	595	450	482	495
July	3.38	8.81	2.20	2.88	682	530	679	628
August	3.29	3.20	2.49	3.86	677	557	641	581
September	--	--	--	--	430	405	368	390
Total	9.43	18.20	8.96	13.68	2879	2247	2498	2390

CROP MANAGEMENT

Cornell Recommends for Field Crops: Yesterday and Today

Bob Lucey and Shaw Reid
Soil, Crop and Atmospheric Sciences

The annual issues of *Cornell Recommends for Field Crops* provide a historical perspective of practices used for field crops in New York. One quickly concludes from reading the first issue (1950) of *Cornell Recommends for Field Crops* (yesterday) and the most recent issue (1994) of *Cornell Recommends for Integrated Field Crop Management* (today) that significant changes have occurred over this span of 44 years. Even the title was changed starting with the 1992 issue. The current recommendations are more specific than in earlier issues. This specificity is required to more accurately consider the increased knowledge and technology available for the production of field crops. The specificity is also required to ensure that the recommendations properly address the environmental and biological concerns as well as production practices. Many examples can be used to illustrate the changes in recommendations between 1950 and 1994. We have selected the following: format for presenting the recommendations, development of soil management groups, characteristics for selecting varieties of alfalfa and corn, chemical weed control and integrated pest management (Table 1).

Scope and Format. As the science of Agronomy advanced, as the number of topics increased and the recommendations became more specific, the number of pages had to increase. By 1977, the annual issues had reached 55 pages. In 1978, the *Field Crops Handbook*, a companion publication to *Cornell Recommends for Field Crops*, was written, and the format to *Cornell Recommends for Field Crops* was changed (Table 1). Of particular importance were: reduced discussion of the recommendations, the organization of the recommendations by crop, the expansion in the scope and detail of the recommendations related to the control of insects and diseases, and the development and publication of IPM Scouting Calendars.

Before the 1973 issue, recommendations for chemical weed control for all field crops were presented in a separate table and fertilizer recommendations for all field crops were also presented in a separate table. Starting with the 1973 issue, the recommendations were organized by crops. For example, weed control recommendations for field corn were in the section on corn and weed control recommendations for soybeans were in the section on soybeans.

Insect and disease control recommendations have increased in scope and detail. In the 1994 issue of *Cornell Recommends for Integrated Field Crop Management*, there are sections dealing with the management of: insects, slugs and nematodes in corn; insects in forage crops; insects in small grains and management of diseases in corn, perennial forage legumes, small grain cereals and soybeans. This illustrates the interdepartmental nature of the *Cornell Recommendations* as faculty from the Departments of Entomology, Plant Breeding, Plant Pathology and Soil, Crop and Atmospheric Sciences are involved.

The development and publication of IPM Scouting Calendars beginning in 1992, represent an important addition to the identification and subsequent control of plant pests. The calendars for alfalfa, corn and winter wheat indicate when key insects and diseases can be expected to occur, the times to inventory weeds and the time to take stand counts of the crop plants, etc.

Development of soil management groups. The concept and use of soil management groups in the development of fertilizer recommendations for field crops evolved over a 27-year period (1951-1978). High, medium and low potassium supplying soils were an impor-

tant feature of the 1951 issue. A New York State map delineating high, medium and low potassium supplying soils was published in 1959. Information on the natural soil drainage class, lime level and potassium supplying power of New York soils of different regions was presented in a table in the 1960 issue. The 1965 fertilizer recommendations for field crops were presented in three separate tables representing the three different soil management groups. The soil management groups were expanded to five for the 1978 issue. These five soil management groups continue to be an important feature of the fertilizer recommendations for field crops.

In 1977, fertilizer recommendations based on the results of soil analysis were computerized and these recommendations are specific to the individual soil series.

Characteristics for selecting varieties of alfalfa and corn. Notable advances have been made in the development and release of alfalfa varieties resistant to important diseases and tolerant to winter injury are discussed in the sections recommending varieties (Table 1). These advances are reflected in the relative ratings assigned to the 94 alfalfa varieties listed in the 1994 issue of *Cornell Recommends for Integrated Field Crop Management* for tolerance or susceptibility to five diseases and to winter injury. Fall dormancy ratings are used to indicate relative winter hardiness; these ratings often, but not always, indicate relative winter hardiness of varieties. Information on the severity of the five diseases listed in Table 1 and where they occur in the state is also given. The bacterial wilt pathogen is endemic in New York soils; anthracnose is found in the warmer areas of the state, particularly the lower Hudson Valley; fusarium wilt may also be a problem in the state, but the need for resistance has not yet been established.

Reporting the maturity of corn hybrids was an important feature of the 1950 issue and it has remained an important feature of all 44 issues published. Performance of the 155 corn hybrids included in recent Cornell trials is summarized in the 1994 issue. Hybrids are listed in order of maturity (Growing Degree Days, GDD), from early to late, and placed in four tables, for early, medium early, medium and long season areas. 1400 GDD indicates the earliest maturing hybrids; 3000 GDD indicates the latest maturing hybrids. GDD were first used as an indication of maturity of corn hybrids in the 1966 issue. Information on comparative yield, comparative standability, years in test and the number of tests the hybrids were included in are reported for each hybrid.

Chemical Weed Control. Two selective and one nonselective herbicide were recommended for weed control in field crops in the 1950 issue. In comparison to the 1950 issue, thirty selective and seven nonselective herbicides are listed in the 1994 issue (Table 1). In the 1950 issue, 2,4-D used at one of two rates was the only selective herbicide recommended for the control of weeds in field corn. In the 1994 issue, 2,4-D along with 13 other herbicides used either alone or in combination are included in the recommendations. When tillage practice, weed situation and product(s), are considered, the 1994 issue lists 33 options for the control of weeds in field corn.

What's in the future. We will have even more soil, crop, climate, cultural and chemical specific recommendations probably down to the soil type and/or areas in the fields. The annual issue of *Cornell Recommends for Integrated Field Crop Management* will become the written guide to the more specific computer derived recommendations for each field on each farm.

CROP MANAGEMENT

Table 1. Features of the 1950 issue and the 1994 issue of Cornell Recommends for Field Crops.

	1950	1994
Format	Varieties of field crops Fertilizer recommendations Chemical weed control	Pesticide information General information Recommendations by crop for corn, forage, small grains, soybean Total vegetation control Recommendations by crops first appeared in the 1973 issue
# Pages	17	90
Companion Publication	None	Cornell Field Crops Handbook (1978, 160 p) Cornell Field Crops and Soils Handbook (1987, 168 p).
Fertilizer Recommendations	Not soil management group specific	Soil management group specific for N and K
Alfalfa # Varieties Characteristics for selection	 7 Resistance to bacterial wilt Winter-hardiness Persistence Yield	 94 Disease resistance to: - Bacterial wilt - Verticillium wilt - Fusarium wilt - Anthracnose - Phytophthora root rot Fall dormancy ratings Persistence Yield
Field Corn # Hybrids Characteristics for selection	 57 Hybrids listed in order of maturity for silage and grain.	 155 Hybrids listed in order of maturity by growing degree days (GDD) Four GDD tables: early, medium early, medium and long season Other selection criteria: - Yield - Standability
Chemical Weed Control in Field Crops For Field Corn	Only 2 selective herbicides (2,4-D and dinitro compounds) and 1 nonselective herbicide (sodium chlorate) 2,4-D at 2 rates was the only selective herbicide	Thirty selective and 7 nonselective herbicides Fourteen herbicides used either alone or in combination Eight weed situations are given for conventional tillage and 4 for no-tillage. 33 separate options
Scouting Calendars	None	Scouting calendars for alfalfa, field corn and winter wheat giving information on when key pests can be expected to occur Calendars first used in the 1992 issue

Will There be Designer Soybeans?

CROP MANAGEMENT

Madison Wright
Soil, Crop and Atmospheric Sciences

Soybean seeds are valued because they are packed with protein and oil. This rich mixture supports a wide variety of feed and food industries, and has made soybeans one of the Big Four crops nationally.

Now biotechnologists and plant breeders have joined forces to alter the usual gross composition of soybean seed -- roughly 35% protein, 18% oil -- so as to fit the needs of particular processors and users. A few such varieties are making their way from test plots to seed catalogs.

New York dairy and livestock farmers might wish to grow or feed soybeans with a protein content higher than 35%, because for years they have been feeding soybean oil meal with 44% or 48% protein. Those who have already shifted to whole roasted soybeans had to make adjustments for the lower protein, but higher energy content, of the full-fat roasted beans.

At least one high-protein variety developed at the Ottawa headquarters of Agriculture Canada is being offered for sale in New York by Prograin of Quebec. The variety, AC Proteus, has been tested by Cornell at Miner Institute in Clinton County. Its protein content has been several percent higher than standard varieties.

Radical alterations in crop characteristics usually bring some drawbacks along with the desired improvement, and that is true in this case. Typically, as protein content rises oil content falls. And the "first editions" of new plant types usually yield less than the standard ones, though breeders can narrow the gap eventually. In 1992 at Miner, AC Proteus (formerly identified as OT89-16 in our annual test reports) ran 42.7% protein while the other 35 varieties in the test averaged 36%. Its oil content was 11.8% against the group average of about 16%. In yield it ranked 30 x 36.

Plant breeders are also able to alter the chemical composition of both protein and oil, as well as change the gross percentages. Whether such designer soybeans will be attractive enough to users to create marketing encouragement in the form of forward contracts, premiums and discounts remains to be seen. At present, most U.S. soybeans are priced according to physical or cosmetic attributes rather than chemical makeup.

* * * * * * * *

(Workers, from page 1)

- and they must be trained as early-entry workers and provided PPE.

3. Workers may be allowed to enter early if the state or federal government declares an agricultural emergency.

Farming in the 90's will be affected by this rule. Many of the WPS provisions can be complied with if the grower plans applications and changes job assignments. Selecting the pesticide that has the shortest REI will also be important.

What was discussed here is one part of the WPS rule. Other provisions include central posting of pesticide applications, training requirements, new protective equipment requirements, new label directions and others. The provisions of the Standard go into effect on April 24, 1994. Farmers will need to learn how to comply with the standard this winter and make plans for next spring. Training sessions and How to Comply manuals for farmers will be available from Cooperative Extension offices this winter. So keep your ear to the rail for the upcoming training sessions and manual availability.

Calendar of Events

Jan. 11-12	Empire State Soil Fertility Assoc., Inc. Meeting, Holiday Inn. Auburn, NY.
Jan. 19	Western NY Corn Congress, Sheraton Inn, Batavia, NY.
Jan. 20	Finger Lakes Corn Congress, Holiday Inn. Waterloo, NY.
Jan. 26	Southern Tier Corn Congress, VFW, Dryden, NY.
Feb. 15	NYS Forage and Grasslands Council, Holiday Inn, Auburn, NY Contact K. Hoffman 607-334-9971.
March 4-5	Transitions Sustainable Agriculture Conference, Holiday Inn, Auburn, NY.
Aug. 5	New York State Certified Crop Adviser (CCA) Exam, Site to be announced.

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, send a check for $8.00 along with the form at the right.**

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