What's Cropping Up?

A NEWSLETTER FOR NEW YORK FIELD CROPS & SOILS

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Alfalfa Weevil Management in New York Alfalfa

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Outbreaks of alfalfa weevil on first crop continue to be reported in localized hotspots. Careful management of this insect is required to prevent the devastation of the beneficial insects which prevent alfalfa weevil from returning to the widespread outbreaks common during the late 1950's through the early 1970's. Caution should be used whenever insecticide is applied to control alfalfa weevil. Insecticide should be recommended only when no other viable alternative is available. Frequent and unnecessary use of insecticide destroys the beneficial insects responsible for holding alfalfa weevil in check during most years. Whenever possible, fields with economic alfalfa weevil populations should be harvested early rather than sprayed to protect these valuable beneficial insects and to minimize the cost of raising alfalfa. If an insecticide is necessary, it should be used at the lightest rate with the shortest residual possible to minimize its effect on beneficial insects. Since each year is unique, growers should not plan to apply insecticide for alfalfa weevil this year based on last year's infestations. Instead, fields should be scouted during May for the presence of alfalfa weevil larvae and feeding damage. Control decisions can be easily made by using the following procedure.

Scouting Procedure

Randomly collect 10 stems from 10 different locations in the field (100 stems total). Do not visibly select the stems since the sample must be unbiased. Inspect each stem for signs of feeding damage and total the number of stems which have feeding damage present. If 40 or more (40%) of the stems have signs of feeding damage, control measures must be taken to prevent economic damage. This 40% action threshold doesn't mean 40% defoliation of the alfalfa stem but rather signs of feeding occurs on 40% of the stems! If the field has less than 40% incidence of feeding, then the field should be resampled in 3 to 7 days. If the feeding incidence is greater than approximately 20%, the field should be resampled in 3-4 days otherwise the sampling interval should be 5-7 days.

Control Strategies

If the sampled field has 40% or greater incidence of tip feeding and is within 7-10 days of harvest, then early cutting of the field will prevent economic damage to the field. If harvesting can not be accomplished, spray as soon as possible with a registered insecticide**.

If 40% incidence of feeding damage is found more than 10 days ahead of the suggested harvest date, the field should be sprayed as soon as possible. Harvesting too early could be detrimental to alfalfa stands. Growers may not be able to stay ahead of the weevil in years of high alfalfa weevil abundance. In these cases, growers may have to spray the most heavily infested fields and harvest those with lighter infestations.

If a field is harvested early due to alfalfa weevil problems, or if substantial damage has occurred with a standard harvesting schedule, the stubble must be checked carefully for signs of damage to new growth of the second crop. Some fields may fail to green up because adults and larvae are consuming new crown buds as fast as they are formed. Check the stubble, the soil surface around alfalfa plants and under leaf litter for larvae and adults. If you find weevils and if there is no sign of regrowth in 3-4 days after harvest, spray the stubble as soon as possible. Treatment is also suggested if new growth has started and feeding damage is apparent on 50% of the growth. If you find no adults or larvae, lack of regrowth is due to other factors. Remember, dry weather will often delay regrowth of the new crop.

Poor stands of alfalfa mixed with grasses do not justify any chemical treatment. Do not spray such fields as they serve as important sources of weevil parasite buildup. **Protect your alfalfa weevil parasites!** It is a good idea to leave a strip of untreated alfalfa (both unsprayed and uncut) to serve as an area for alfalfa weevil parasite survival on the fields you do treat.

**Refer to 1993 Cornell Recommends for Integrated Field Crop management.

SOIL MANAGEMENT

Recommendations for Sludge Application

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The application of sludge (and sludge products) to cropland requires a commitment by the landowner and/or grower to understand the pros and cons associated with this practice. A discussion of research results and sludge-on-land issues was presented in Vol. 3, no. 1 of this series, and should be referred to by the reader. Commitments must be made to soil erosion and water runoff management, to soil pH management, to a knowledge of soil nitrogen needs based on soil tests, to an understanding of sludge content analyses and rate calculations, and to accurate and uniform applications on the land in question. In addition, field-by-field records of all sludge deliveries, soil and sludge analyses, and application dates and rates should be kept by the landowner/grower.

Recommendations

1. Know what the soil and crop needs are and how the sludge product can meet that need. Use soil tests. Usually, applications are made on the basis of nitrogen requirements, or in the case of kiln-dust plus lime stabilized sludge on the basis of the lime requirement. In both cases, the results need to be used to calculate application rates (Tables 1 and 2).

2. Take delivery only after the DEC permit process is complete and analytical papers and application plans have been read, understood, and agreed to.

3. Materials should be spread within one or two days, and incorporated no more than 48 hours after application.

4. Apply as you would handle manure, using a calibrated spreader to ensure accurate, uniform distribution. "Hotspots" are to be avoided.

5. Maintain setbacks of 100 feet from streams and ponds to avoid water pollution and 300 feet from domestic water supplies.

6. If applied to no-till crops, perennial forages or turf grasses, careful management will be required to prevent odor problems and enrichment of surface water runoff. Forage and pasture crops physically contaminated by sludges should not be consumed by animals.

7. Grow directly-consumed (raw) food crops only after sludge applications have been discontinued for three years prior to the planting of the crop.

8. Sludge applications should be made only to soils having greater than 20 inches to bedrock, slopes less than 15%, and on well-drained and moderately well-drained soils. Avoid applications on saturated soils or soils subject to active flooding.

Cumulative metal loading can be calculated on the basis of sludge application rates and the sludge metal content. This has been done for cadmium the most likely limiting metal, in Table 3. Soil testing can be used to check your calculations. A similar table can be made for any of the metals, so it is important to keep complete records of application rates, and analytical results.

Remember, sludge should be applied only to carefully managed land, where pH control can continue indefinitely, processed food crops or grain are grown, soil nutrient imbalances are not produced, and cumulative metal loading is monitored closely.

It is recommended that Bulletin 851 be used for the time being as the best reference for land application of sludge. It should be used until there is better research-based analysis of best management in NYS and until we better understand the technical documentation behind EPA 503.

Table 1. Recommended maximum metal content of sludges and total cumulative soil metal content for safe land application (Dry wt. basis).

Metal	Max. conc. mg/kg	Cumulative load lb/acre
Arsenic	41	37
Cadmium	25	3.0
Chromium	1000	300
Copper	1000	75
Lead	300	273
Mercury	10	15
Molybdenum	18	16
Nickel	200	30
Selenium	36	91
Zinc	2500	152

Table 2. Tons dry wt per acre of sludge or sludge product needed to annually meet crop nitrogen needs, for a range of sludge N contents (dry wt basis). Assume 40% of total N available first year*.

Sludge	Crop N requirement, lb/acre						
% Total N	20	40	60	80	100	120	140
0.5	5.0	10	15	20	25	30	35
1.0	2.5	5.0	7.5	10	12	15	18
1.5	1.7	3.3	5.0	6.7	8.4	10	12
2.0	1.2	2.5	3.8	5.0	6.2	7.6	8.8
2.5	1.0	2.0	3.0	4.0	5.0	6.0	7.0
3.0	0.83	1.6	2.5	3.2	4.2	5.0	5.8
3.5	0.71	1.4	2.1	2.8	3.6	4.2	5.0
4.0	0.62	1.2	1.9	2.4	3.1	3.8	4.4
4.5	0.55	1.1	1.6	2.2	2.8	3.3	3.8
5.0	0.50	1.0	1.5	2.0	2.5	3.0	3.5

* For lime-stabilized product (20% available N), multiply these numbers by 2. For composted product (10% available N), multiply by 4.

Table 3. Recommended cumulative sludge application limit (tons dry wt/acre) based on cadmium content and soil cadmium content limits*.

Soil Textural Class	Total Soil Cadmium Limit lb/acre	Sludge Cadmium Content mg/kg								
		1	2	4	6	8	10	15	20	25
Loamy Sand Sandy Loam	2.0	1000	500	250	167	125	100	66.7	50	40
F. Sandy Loam Loam Silt Loam	3.0	1500	750	315	250	188	150	100	75	60
Silt, Silty Clay Loam, Sandy Clay	4.5	2250	1125	562	375	281	225	150	169	90

* Limits based on recommendations from Bulletin 851, "Criteria and Recommendations for Land Application of Sludges in the Northeast".

PEST MANAGEMENT

Conservation Tillage - Early Season Corn Pests

J. Keith Waldron
IPM coordinator, Dairy & Field Crops

Conservation tillage practices in combination with other farm cropping operations, such as rotation sequence, planting date, and choice of hybrid, create unique agroecosystems which can greatly influence pest and crop interactions. Under conservation tillage systems, some pests may be more of a challenge, others less so, while still others will not be affected at all. An understanding of those factors which contribute to pest activity and economic importance, combined with regular crop monitoring will help protect crops from several early season pests and minimize losses.

Stand Establishment Problems

Heavy mulch cover may affect stand establishment. Seed germination or emergence may be retarded during cool wet springs in conservation tillage as the result of poor seed soil contact and colder soil temperatures associated with heavy mulch cover and certain soil types. This problem may be particularly significant in soils that crust at the surface. Extended periods of cool soil temperatures may be favorable to seedling blights and damping off diseases. High amounts of organic matter from surface or plowed down crop residues or manures are also attractive oviposition sites for seed corn maggot which feed on decaying plant matter or germinating seeds. Corn planted into sod may be at risk to wireworm.

Emergence problems are diagnosed by closely examining affected seeds and seedlings. Many early season problems can be minimized if agronomic practices that enhance crop growth and development are used. An insecticide-fungicide seed treatment added to the planter box at planting is an effective means to avoid losses from these pests.

In wet warm spring weather, slugs may cause significant damage to young seedlings in fields with high surface residues. Continuous corn as well as first-year corn following sod or grass/legume mixtures are equally affected. Reduction of surface residue, particularly in wet areas, and early season seeding help to minimize slug damage. No chemical controls are registered for use on slugs in NY.

Poor Weed Control?

Corn fields with poor weed control are attractive egg laying sites to moths of black cutworm, armyworm, and stalk borers. Larvae of these insects move from weed hosts to adjacent corn plants after weeds are killed in the spring.

Black cutworm moths migrate into fields in early spring and lay their eggs on green weeds, particularly winter annuals such as peppergrass, shepherd's purse, and common chickweed. Fields with vegetation cover or crop residue are more likely to have black cutworm infestation develop. Black cutworms are often attracted to weeds in low, wet areas of fields.

Stalk borer moths deposit eggs in late summer and early fall. Continuous corn fields that had dense populations of quackgrass, giant foxtail, ragweed, wirestem muhly, orchard grass or rye late last summer are prime candidates for stalk borer damage this season.

Armyworm may be the most severe and consistent pest of conservation tillage corn. Armyworm moths migrate in the spring and lay eggs in grasses. Fields with dense grassy weed populations, such as quackgrass, rye or small grain cover crops in a no-tillage system are often at risk for armyworm defoliation later in the season.

Early detection of young larvae of these pests is key to effective management. When present, pest damage is often limited to smaller areas within a field providing opportunities for localized field treatments of the affected area and a 20-40 foot border.

Foliar Diseases and Surface Residues

Surface residues may increase risk of several foliar diseases, particularly in continuous corn. Infection and disease development are very dependent on weather conditions, and the susceptibility of the crop to the particular pathogen. Disease development occurs only when the pathogen, a susceptible host, and a favorable environment occur together for a critical period of time.

Scouting fields on a regular schedule helps detect problems early, protecting crops from unnecessary losses. For more information on common corn pests consult the Cornell Recommendations for Integrated Field Crop Management.

Insect/Disease Complex Widespread in New York Alfalfa

PEST MANAGEMENT

David W. Kalb & Gary C. Bergstrom, Plant Patholgy
Elson J. Shields, Entomology

A pest complex has been implicated as the cause of alfalfa plant death and decreased yield and quality in large areas of the Northeast, but, until recently, the distribution and severity of this problem in New York was unknown.

The Pest Complex

The alleged culprits in this damage are the clover root curculio (a small weevil) and *Fusarium* fungi that cause Fusarium crown and root rot. During warm days of August through November and again in March through May, adult weevils migrate into alfalfa fields to lay eggs at the base of plants. Eggs hatch in the spring and the larvae burrow into the soil and begin feeding on nitrogen-fixing root nodules, a step essential to their survival. As the larvae grow and develop, their feeding progresses from the fibrous roots to the fleshy tap root. They eventually cause deep wounds that expose the water-conducting tissues of the tap root to invasion by *Fusarium* and other fungi that cause root and crown rot. From June through July the larvae pupate and adults emerge from the soil to spend the hottest part of the summer in a dormant state.

Extent of the Problem in NY

During 1990 and 1991, a survey of 61 alfalfa fields (including roughly equal numbers of fields in the first, second, and third years after seeding) was conducted in four major forage production regions of New York (Figure 1). Based on samples of up to 45 alfalfa plants per field, the average injury per plant caused by clover root curculio (number of deep wounds) and root and crown rot (percentage of plant tissues rotted) was determined and was averaged for fields of the same age in the same production area (Table 1). The pest complex was found in every field and 92% of the sampled plants exhibited some level of clover root curculio feeding injury. Fields with higher levels of insect injury tended to have higher levels of root and crown rot suggesting that the insect predisposed plants to disease. Intensities of both pests tended to increase with stand age, but even stands in the first production year (exposed to a single generation of insects) showed substantial injury. Individual fields in each production region showed pest injury levels likely to result in economically significant yield reduction (based on research in other states). There is no obvious explanation for the

See Insect/Disease, pg. 7

Table 1. Average injury to alfalfa plants by clover root curculio and root and root and crown rot in stands of three ages in four forage production regions of New York.

Region	Stand age:	# of deep wounds per plant:	%tissue rotted:
St. Lawrence/Champlain Valleys			
A-St. Lawrence Co.	1 yr	0.5	7
	2 yr	1.0	14
	3 yr	2.6	21
B-Clinton Co.	1 yr	0.5	14
	2 yr	2.0	17
	3 yr	3.3	22
Lake Plains (Genesee, Orleans, and Niagara Co.)	1 yr	2.0	10
	2 yr	9.0	38
	3 yr	6.1	38
Southern Plateau			
A-Erie, Cattaraugus, and Wyoming Co.	1 yr	7.5	40
	2 yr	6.0	34
	3 yr	7.5	50
B-Tompkins and Cortland Co.	1 yr	3.1	22
	2 yr	8.0	30
	3 yr	9.0	51
Hudson/Mohawk Valleys (Rennsselaer Co.)	1 yr	3.5	26
	2 yr	6.0	26
	3 yr	8.0	30

WEED CONTROL

Low-Rate Postemergence Weed Control in Field Corn with Accent Combinations

Russ Hahn
Soil, Crop and Atmospheric Sciences

Field corn acreage in New York has been about one million acres in recent years. It is estimated that herbicides are used on more than 95% of this acreage and that an average of 3.5 lb ai/A of herbicides are used for annual weed control. The limited (until December 31, 1993) registration of Accent Herbicide in New York provides the opportunity to reduce herbicide load per acre and to reduce the potential for herbicide movement into surface and groundwater.

Low-rate, postemergence annual weed control programs are now possible because Accent, which is used at 0.5 oz ai/A, can be used in combination with Buctril or Banvel, which are applied at a maximum rate of 0.38 and 0.5 lb ai/A respectively in field corn. If these combinations are used, the amount of herbicide applied per acre would be less than 1 lb ai/A.

RESEARCH EFFORTS

Although postemergence applications of Accent with Buctril or Banvel provided generally good control of a broad spectrum of annual weeds, experiments in 1990 and 1991 indicated that these tank mix partners might reduce annual grass control with Accent. Additional experiments were conducted in 1992 to further evaluate the potential of these Accent combinations for total postemergence annual weed control and to determine the effect of different adjuvants on crop safety and weed control with these combinations.

Experiments were established at the Musgrave Research Farm near Aurora and at the Barrett Research Farm near Etna. Herbicides were applied in water using 80015 flat spray tips mounted on a compressed-air bicycle sprayer calibrated to deliver 25 gpa of spray solution. Corn was at the 4- to 5- leaf stage of development at the time of herbicide application. Visual corn injury and weed control ratings, as a percent of the population in the untreated checks, were made for the dominant weed species. Grain corn yields were measured by harvesting the center two rows in each plot.

RESULTS SHOW PROMISE

The standard treatment of 0.55 lb/A of Atrazine 90DF plus 1.66 lb/A of Bladex 90DF provided excellent control of velvetleaf (ABUTH), common ragweed (AMBEL), and a mixture of green and yellow foxtail (SETSP) (Table 1). Combinations of Accent with Buctril or Banvel provided good to excellent control of these summer annual weeds. Foxtail control ratings with Accent plus Buctril or Banvel were not significantly lower than with Accent alone (data not shown).

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Table 1. Corn injury, annual weed control ratings, and grain corn yields with early postemergence applications near Aurora, NY in 1992.

Herbicide Combinations	Amt/ Acre	% Injury	% Control ABUTH	AMBEL	SETSP	Yield Bu/A
Atrazine 90 DF Bladex 90 DF	0.55 lb 1.66 lb	0	100	100	95	177
Accent + NIS* + Buctril	0.66 oz 1.00 pt	13	95	91	89	165
Accent + NIS + Buctril	0.66 oz 1.50 pt	23	99	97	87	177
Accent + NIS + Banvel	0.66 oz 0.50 pt	0	96	99	90	168
Accent + NIS + Banvel	0.66 oz 1.00 pt	0	100	100	85	166
Untreated		0	0	0	0	119
LSD (0.05)		2	11	5	16	14

*Nonionic surfactant added to spray solution at 0.25% (v/v).

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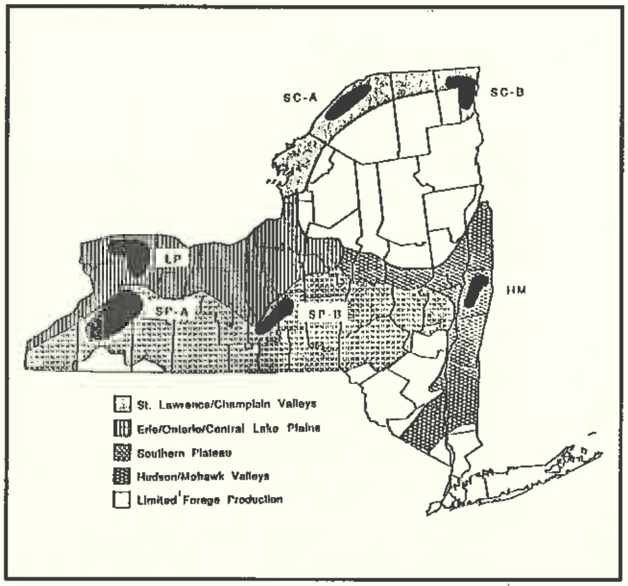
apparently lower levels of this pest complex in the two northern counties surveyed. No evidence was found of occurence of Fusarium wilt, a related and more damaging disease.



Prospects for Pest Management

There is speculation that clover root curculio and other pests may have become more prevalent in the last 15 years due to the gradual depletion of chlorinated hydrocarbon insecticides, once widely used, from agricultural soils. The best promise for future management of this pest complex lies not with synthetic pesticides, but rather with biological control. One form of biological control is the selection and breeding of alfalfa varieties that resist or tolerate *Fusarium* fungi and/or clover root curculio. Progress towards resistant varieties is expected to be slow and incremental. Exciting work is currently being conducted at Cornell on the potential use of nematodes (soil-inhabiting, microscopic worms) for biological control of clover root curculio and its even more damaging cousin, the alfalfa snout beetle. Another promising approach is the introduction of exotic wasps that parasitize clover root curculio. Until new methods of control are available, the impact of this pest complex on New York alfalfa fields can be minimized by following integrated crop management recommendations that maximize crop health and minimize plant stress.

Weed Control, from pg. 6

Although the Accent plus Buctril combination showed significant corn injury one week after treatment, this injury did not result in a yield reduction. There were no significant differences in grain corn yield among the early postemergence herbicide combinations shown. They averaged 171 bu/A compared with a yield of 119 bu/A for the untreated check.

ADJUVANT COMPARISONS

In the second experiment, where the Accent combinations with Buctril and Banvel were applied with 0.25% (v/v) of nonionic surfactant (NIS), 1% (v/v) crop-oil concentrate (COC), or 1% (v/v) methylated sunflower oil (MSO), all treatments included 4% (v/v) of 28% N and showed significant corn injury 11 days after application. Accent plus Buctril caused more injury than Accent alone or in combination with Banvel.

There were significant differences in injury among the Accent plus Buctril combinations with NIS causing 37% injury, COC causing 30% injury, and MSO causing 20% injury. Although this injury was quite obvious 11 days after application, grain corn yields were not affected. The addition of Buctril or Banvel did not antagonize yellow foxtail control compared with the corresponding Accent only adjuvant combinations.

These and other results indicate that combinations of Accent with Buctril or Banvel could provide broad spectrum postemergence annual weed control in field corn unless large or smooth crabgrass are a problem. Results from other experiments have shown Accent activity against crabgrass to be marginal at best. Although corn injury and antagonism of annual grass control occur from time to time with these combinations, the results from the past 2 years indicate that neither problem should prevent these combinations from being used for total postemergence annual weed control in integrated weed management programs.

Calendar of Events

June 3	Small Grain Management Field Day. Musgrave Research Farm. Aurora, NY.
June 20-23	Northeast Agronomy Meetings. Penn State Univ. University Park, PA.
June 29	New York Alliance Residue Management Workshop. Holiday Inn. Auburn, NY.
July 1	Weed Science Field Days. Agronomic Crops, Valatie, NY 10:00-noon.
July 7	Cornell Seed Growers Field Day. Ithaca, NY.
July 7	Weed Science Field Days. Agronomic Crops. Aurora, NY 1:00-5:00.
July 9	Aurora Field Day, Musgrave Research Farm, Aurora, NY.
July 20	NYS Forage and Grasslands Summer Tour. Plant Materials Center, Big Flats, NY.
July 21	Empire State Soil Fertility Association Summer Meeting. Northern NY.

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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