What's Cropping Up?

A NEWSLETTER FOR NEW YORK FIELD CROPS & SOILS VOLUME 13, NUMBER 5, SEPTEMBER-OCTOBER, 2003

CORN ROOTWORM TECHNOLOGY FOR THE 2004 GROWING SEASON: HOW DO THEY COMPARE

Elson J. Shields

Department of Entomology
Cornell University

The 2003 growing season was a relatively good year for corn rootworm. Larval survival was very good despite the wet soils during the hatching period in late May and early June. The frequent rains and good soil moisture throughout the growing season allowed the corn plant to tolerate the root feeding by rootworms better than in 2002 which was much drier. The increased soil moisture promoted root regrowth after the larval feeding ended in mid-July and reduced the yield impact on the corn crop from rootworm feeding.

Performance of Insecticides with Yield (Pioneer 37M81)

Insecticide efficacy trials are conducted each year at both the Cornell Aurora Farm and the Cornell Harford Farm. The following data is from the Aurora farm where soil PH > 8.0 and excellent rootworm pressure was present in 2003.

Table 1. Corn Rootworm Soil Insecticides: Efficacy, Cost Range and Yield

Treatment	Root Rating (1-6)	Cost/Acre	Yield (T/A 35% DM)
Capture 0.3 fl oz/1000	3.25	$15-17	19.4 a*
Counter 6 oz/1000	2.75	$18-21	17.9 ab
Force 4 oz/1000	2.00	$16-18	17.1 ab
Lorsban**** 8 oz/1000	4.15	$16-18	17.1 ab
Poncho 1250	2.40	$18	20.6 a
Regent 4.2 oz/ac	2.55	$16-18	18.6 a
Untreated Check	5.10	$ 0	16.2 b

* values followed by the same letter are not significantly different.

****This is typical performance of Lorsban in soils with the PH > 7.5. In soils with PH<7.5, a typical root rating at this level of pressure would be 3.0-3.5. Economic losses from rootworm usually start occurring when the root rating exceeds 3.5.

Poncho Rate Confusion

Two rates of Poncho seed treatment are being sold for the 2004 growing season and great care must be taken to use the correct rate for the correct insect. Poncho 250 is the lower rate with 0.25 mg insecticide per kernel and this rate is very effective for the control of secondary pests like seed corn maggot. Poncho 250, which costs between $5-7 per acre, is not effective for the suppression or control of corn rootworm. Poncho 1250 is the higher rate with 1.25 mg insecticide per kernel. The 1250 rate has been very effective against corn rootworm in Cornell University trails for the past several years. This higher rate also is very effective against the secondary pests controlled by the 250 rate. The cost of the 1250 rate should fall between $16-19 per acre.

Granular Soil Insecticide - Less than Label Rates

In past years, 75% of label rate has been shown to be effective against moderate levels of rootworms if equipment is well calibrated to in-

Pest Management

sure accurate dispensing of the insecticide and soil moistures remain at good levels between planting and July 15th. When rates are reduced to 50% of label rate, rootworm control is often variable. In addition, the physical limitation of granular insecticide boxes seems to be 3-4 oz material per 1000 linear ft of row. When rates fall below this level, distribution of the granular material is often erratic. Both dry conditions and prolonged wet soils degrade the performance of granular insecticides. Under these conditions, less than label rates may provide less than acceptable protection of the corn roots.

Performance of YieldGard Rootworm with Yield (Dekalb DKC 53-29 & DK 53-33)

Corn rootworm resistant corn has been released for the commercial growers throughout the Corn Belt. Registration decisions by NYDEC about rootworm resistant corn are expected by March 1, 2004. BT-Rootworm corn has been tested in NY corn rootworm university trials for the past several years and the performance against rootworm has been very good. Listed below are the results from the 2003 trial conducted at the Cornell Farm located at Aurora.

Table 2. YieldGard Rootworm : Efficacy, Cost Range and Yield

Treatment	Root Rating (1-6)	Cost/Acre	Yield (T/A 35% DM)
YieldGard Rootworm	2.00	$23-24	20.8 a*
Isoline + Force	2.15	$16-18	21.0 a
Untreated Check	4.60	$ 0	15.7 b

* values followed by the same letter are not significantly different.

Advantages of YieldGard Rootworm

YieldGard Rootworm incorporates the toxin for corn rootworm within the corn plant. This incorporation of the toxin into the plant makes the effectiveness of the toxin independent of soil environmental conditions, which often degrade the performance of soil insecticides. As a result, the control of rootworm is consistent across all environmental conditions and levels of soil saturation.

Disadvantages of YieldGard Rootworm

When a field of YieldGard Rootworm is planted, regulations require that a refuge be maintained equaling 20% of the acreage planted to YieldGard Rootworm. The refuge needs to be planted in a field immediately adjacent to the YieldGard Rootworm field or as a block within the YieldGard Rootworm field. The refuge corn needs to have the same field history as the YieldGard Rootworm field and be grown under similar cultural practices. Soil insecticide effective on corn rootworm should be used on the refuge to protect the corn yields and to maximize the emergence of adult rootworms beetles, which are available to mate with any potentially resistant rootworm beetles to dilute any genetic resistance and prevent the development of resistant insects. Cornfields most likely to benefit from this new technology are fields with histories of 3 or more years continuous corn.

New technology in future years

YieldGard Rootworm known as Mon 863 is the first of BT toxins active against corn rootworm incorporated into the corn plant's genetic code to reach the market and follows on the heels of the successful YieldGard, targeted at corn borer. Various companies are developing other toxins active against corn rootworm. One example is a toxin called "strain 149' being developed by Pioneer. Pioneer plans to market this new technology with the next couple of years. In late October 2003, Monsanto was granted clearance to market a "stacked product" which was the combination of the corn borer toxin (Mon 810) and the corn rootworm toxin (Mon 863) in the same corn hybrid.

Where and When Is Phosphorus Leaching From Manure Application a Problem? The Data Revisited

Harold van Es and Bob Schindelbeck, Dept. of Crop & Soil Sciences, Cornell Univ., and Bill Jokela, Dept. of Plant & Soil Science, Univ. of Vermont

In The May-June issue of this newsletter (Vol 13, No 3), we reported on the results of a study that evaluated P leaching from liquid manure application on two soil types (clay loam and loamy sand), two cropping systems (grass and corn), and different timing of manure application (early fall, late fall, early spring, and early+late spring). The data clearly showed that the clay loam soil posed a much higher potential for P leaching losses than the loamy sand, resulting in an average 39-times higher P concentrations in tile flow over three years. They averaged 0.5 mg L^{-1}, which is five times above the EPA guideline. We also measured a higher potential for P losses with early fall applications than the other times, especially on the grass plots. For the loamy sand plots, P leaching from manure application was not a problem.

Our data further suggested that P leaching losses in the clay loam soil were high on plots that did not receive any manure or P fertilizer, suggesting that P leaching may be inherently high in these soils when drained. Upon further data analysis, we became convinced that this was an artificial result related to the logistical specifics of manure application on the lysimeter plots. We therefore want to rectify that conclusion. **The high P leaching losses on the clay loam soil were directly associated with liquid manure application.** Well-structured soils like this pose a considerable concern with manure application due to their potential for preferential flow.

Please, consider the re-interpretation of the data. Our apologies for any confusion that may have resulted from our earlier conclusion.

Crop Management

Corn Silage: Row Spacing Studies

Bill Cox, Dept. of Crop and Soil Sciences, Cornell University

Corn silage has been typically produced in 30-inch row spacing. During the past 15 years, however, recommended final plant densities for corn silage have increased from about 22,000 to 34,000 plants/acre. Consequently, the number of corn plants within a foot of a 30-inch row has increased from about 1.25 to 2.0, which increases interplant competition. The increase in plant densities has contributed to considerable interest in narrow row corn (15-inch row spacing) because narrow row corn decreases interplant competition by decreasing the number of plants within a row to 1.0 at 34,000 plants/acre. Previous studies in New York (Cox and Cherney, 1997; Cox, Otis, and Cherney, 2001) indicated that corn silage yielded about 4% greater in 15 compared with 30-inch rows. Cox and Hanchar (1997) estimated that corn silage producers, who harvest about 400 acres of corn silage, most obtain about a 1.5 ton/acre yield response to narrow row corn to realize a 5% return on their investment for the purchase of a narrow-row planter and a bi-directional corn chopper. Many dairy producers, however, purchased a bi-directional corn chopper in the late 1990s without switching to narrow row corn. We decided to reevaluate narrow corn silage to determine if dairy producers with a bi-directional or rotary corn chopper should switch to narrow row corn.

We evaluated two corn hybrids, 36G12 (Pioneer) and 3681FQ (Mycogen), at 30-inch, 15-inch, and in twin rows (7-inch pairs spaced 22.5 inches apart) at the Table Rock Farm in Wyoming Co. The two hybrids were planted at 15 and 30-inch row spacings with Table Rock's Kinze 20-ft. wide planter and the twin-rows with Southview Farm's 30 ft. wide Great Plains Drill. Each plot, which was replicated 4 times, measured about 1150 ft. long. All plots were planted on May 20th and harvested on October 1st.

Hybrid x row spacing interactions did not exist as each hybrid responded similarly across row spacings for final plant populations, early-season growth, harvest moisture, and silage yield (Table 2). Averaged across hybrids, corn had the same plant populations at 15-inch and twin row spacings but corn had greater early-season dry weights in twin row compared with 15-inch row spacings. It is not clear why corn had faster early-season growth rates in twin rows compared to the 15-inch row spacings. Averaged across hybrids, corn had lower early-season dry weights at 30-inch compared with 15-inch and twin row spacings because of lower plant populations.

Averaged across hybrids, corn had about a 3/4 point lower harvest moisture in 15-inch compared with corn in twin rows. Corn in twin-rows also had about 3/4 point lower harvest moisture compared with corn in 30-inch rows. Narrow row corn may be beneficial on farms where silage dry-down is slow. Corn in 15-inch rows yielded 0.9 tons/acre or 4% more compared with corn in twin-rows, and 1.9 tons/acre or 8.5% more compared with corn in 30-inch rows. This exceeds the 4% yield advantage for 15-inch compared with 30-inch corn in previous studies. In previous studies, however, corn also yielded about 9% more in high-yielding years such as 2003.

Conclusion

Corn silage in 15-inch rows yielded 1.9 tons or 8.5% more and had 1.5% less moisture compared with corn in 30-inch rows. Corn silage in twin rows had similar corn stands and faster early-season growth but yielded 4% less than corn in 15-inch rows. Nevertheless, corn silage in twin rows yielded 4.25% more than corn in 30-inch rows. We will repeat this experiment another year or two before making any final recommendations on twin-row or narrow corn for dairy producers who already own bi-directional corn choppers.

Table 1. Final plant populations, dry weights at the sixth-leaf (V6) stage, harvest moistures, and silage yields (65% moisture) of two corn hybrids planted at 30 inch, 15 inch, and twin row spacings on the Table Rock Farm in Wyoming Co., NY in 2003.

HYBRID	30 INCH	15 INCH	TWIN ROW
	plants/acre		
36G12	29329	32904	32253
3681FQ	30039	35136	35251
Avg.	29864	34022	33752
LSD 0.05		2160	
	dry wt (lbs/acre)		
36G12	1034	1220	1336
3681FQ	1050	1400	1486
Avg.	1042	1310	1422
LSD 0.05		97	
	harvest moisture (%)		
36G12	70.6	68.7	69.4
3681FQ	70.8	69.7	70.7
Avg.	70.7	69.2	70.0
LSD 0.05		0.8	
	silage yield (tons/acre - 65% moisture)		
36G12	21.8	24.2	22.6
3681FQ	20.4	21.5	21.4
Avg.	21.1	22.9	22.0
LSD 0.05		0.8	

Weed Management

Common Ragweed Problems and Control in Field Corn

Russell R. Hahn and Paul J. Stachowski
Department of Crop and Soil Sciences, Cornell University

There have been increasing concerns and questions about common ragweed control in field corn in recent years. When ragweed control is less than expected/desirable, the possibility of triazine-resistant biotypes is usually among the explanations. Over the past 10 years, a number of ragweed seed samples from around the state have been subjected to greenhouse bioassays to determine whether they were from triazine-resistant populations. Seed collected in 1992 from the Bainbridge area was among the first tested and was confirmed as triazine-resistant. Only one other sample has been triazine-resistant. After finding most of the "suspect" populations to be susceptible to triazine herbicides, doubt about the original diagnosis led to rechecking seed from the Bainbridge site this past winter. It once again proved to be a triazine-resistant population of common ragweed.

What other reasons might be responsible for the poor ragweed control in those fields where the ragweed populations proved to be susceptible to the triazine herbicides? There are several possibilities. First, corn growers have reduced atrazine application rates. Atrazine label changes in 1990 and again in 1992 reduced use rates from a maximum of 4 pounds active ingredient/acre (lb ai/A) to 3 and 2.5 lb ai/A in 1990 and 1992 respectively. In addition, the 1992 changes included a preemergence (PRE) application maximum of no more than 1.6 or 2 lb ai/A depending on soil erodibility and tillage practices. Because of these label changes and because of rotational concerns, most corn growers apply between 1 and 1.6 lb ai/A of atrazine. In addition, no-tillage/zone-tillage corn acreage has been increasing across the state. With reduced-tillage systems, pH of the surface layer of soil may be significantly lower than the pH of the 0-to 6-inch soil sample that is normally collected for testing. A low pH in the surface layer may adsorb (tie-up) triazine herbicides and result in reduced weed control. As a result, no-tillage/zone-tillage fields should have two samples: (a) a 0- to 1-inch depth sample checked for soil pH only and (b) a 0- to 6-inch sample analyzed for both pH and nutrients. Finally, above average rainfall in May and June may also contribute to reduced ragweed control by diluting the herbicide in the surface layer of the soil profile and allowing ragweed to break through late in the season.

While there are many postemergence herbicides with good to excellent activity against triazine-susceptible and triazine-resistant ragweed, there are few good choices for PRE programs in fields with triazine-resistant populations. Herbicides like Prowl, Python, and Callisto all have good activity against triazine-resistant common lambsquarters, but they rate only poor to fair for all biotypes of ragweed. Another herbicide that has activity against ragweed is Hornet WDG. Hornet WDG was originally registered for postemergence use only in NY State with a maximum application rate of 2 oz/A. As of September 2003, NY State has expanded the registration of this product to include PRE applications at rates up to 5 oz/A of product.

Field Research

Field experiments were established in 2002 and 2003 near Valatie and Aurora, NY to evaluate PRE and mid-postemergence (MPO) herbicide programs for common ragweed control in field corn. Ragweed populations at both locations were of triazine-susceptible biotypes. The focus of these experiments was to determine the role that mesotrione (as Callisto or in the premix products of Camix and Lumax) and clopyralid (Stinger), as a component along with flumetsulam (Python) in Hornet WDG, might play in control programs for either triazine-susceptible or triazine-resistant biotypes of common ragweed. In 2002, 6 oz/A of Callisto was applied PRE with 1.33 and 1.66 pt/A of Dual II Magnum of Valatie and Aurora respectively. In addition, MPO applications of 3 oz/A of Callisto alone and in combination with 0.5 pt/A of AAtrex were made following PRE applications of Dual II Magnum. A review of the 2002 results from Valatie, in the Hudson Valley, showed the PRE application of Dual II Magnum plus 6 oz/A of Callisto and the PRE standard of 1.1 qt/A of Bicep Lite II Magnum controlled only 65 and 55% of the ragweed respectively. At Aurora, the

Table 1. Common ragweed control ratings and grain corn yields with PRE treatments at Valatie and Aurora in 2003.

	Rate (Amt/A)		Control (%)		Yield (Bu/A)	
Herbicides	Valatie	Aurora	Valatie	Aurora	Valatie	Aurora
Bicep Lite II Mag	1.1 qt	1.5 qt	66	88	112	175
Camix	2 qt	2.4 qt	55	75	107	180
Lumax	2.5 qt	3 qt	88	96	129	189
+ AAtrex	1 pt	1 pt	95	94	132	182
Dual II Magnum	1 pt	1.33 pt	0	28	13	130
+ Hornet WDG	2 oz	2 oz	33	63	79	184
+ Hornet WDG	3 oz	4 oz	64	89	98	180
Untreated	-	-	0	0	11	141
LSD (0.05)			9	7	25	14

PRE combination of Dual II Magnum plus 6 oz/A of Callisto provided 86% late season ragweed control compared wtih 91% control with a PRE application of 1.5 qt/A of Bicep Lite II Magnum. When averaged over both locations, sequential MPO application of 3 oz/A of Callisto following a PRE application of Dual II Magnum controlled 89% of the ragweed while sequential applications of 3 oz/A of Callisto tank mixed with 0.5 pt/A of AAtrex provided 99% control.

PRE Results in 2003

In 2003, 2 and 2.4 qt/A of Camix (Dual II Magnum and Callisto) and 2.5 and 3 qt/A of Lumax (Dual II Magnum, Callisto, and AAtrex) were applied at Valatie and Aurora respectively. In addition, PRE applications of Hornet WDG (Python and Stinger) were made in 2003 at 2 and 3 oz/A at Valatie and at 2 and 4 oz/A at Aurora in combinations with Dual II Magnum. Ragweed control ratings and grain corn yields for these PRE treatments are shown in Table 1. At Valatie, the PRE standard of 1.1 qt/A of Bicep Lite II Magnum controlled 66% of the ragweed, while 2 qt/A of Camix and 2.5 qt/A of Lumax controlled 55 and 88% of the ragweed respectively. Grain corn yields were 107 and 129 Bu/A for the Camix and Lumax treatments respectively. Ragweed control at Aurora was 88% with 1.5 qt/A of Bicep Lite II Magnum while 2.4 qt/A of Camix controlled 75% of the ragweed and 3 qt/A of Lumax provided 96% ragweed control. Grain corn yield with the Lumax treatment (189 Bu/A) was higher than with the Bicep Lite II Magnum treatment (175 Bu/A). The Camix treatment yielded 180 Bu/A. While the three-way premix (Lumax) that contains AAtrex provided better ragweed control than the two-way premix (Camix) of Dual II Magnum and Callisto, the addition of 1 pt/A of AAtrex to the Lumax treatments did not increase ragweed control or grain yields at either location.

Ragweed control at Valatie at the end of July was only 33 and 64% (Table 1) with applications of 2 and 3 oz/A of Hornet WDG applied PRE with 1 pt/A of Dual II Magnum. As control increased from 33 to 64%, grain corn yield increased from 79 to 98 Bu/A. At Aurora, the 2 and 4 oz/A rates of Hornet WDG applied PRE with 1.33 pt/A of Dual II Magnum provided 63 and 89% ragweed control on August 1. Grain yields for these two treatments averaged 182 Bu/A and were not different. These results suggest that PRE applications of less than 4 oz/A of Hornet WDG are not adequate for good ragweed control.

MPO Results in 2003

Common ragweed control with MPO (7- to 8- inch ragweed) applications of 3 oz/A of Callisto following PRE applications of Dual II Magnum averaged 66% for the two locations (Table 2). The addition of 0.5 pt/A of AAtrex boosted control to 93%. The addition of AAtrex to the Callisto treatments boosted grain yields as well. At Valatie, grain yield increased from 95 to 131 Bu/A and from 176 to 190 Bu/A at Aurora. Following PRE applications of Dual II Magnum, MPO applications of 2 oz/A of Hornet WDG alone and in combination with 2 oz/A of Clarity provided an average of 69 and 75% ragweed control respectively compared with 84% control with MPO application of 8 oz/A of Clarity. Grain yields for these three treatments averaged 82 and 172 Bu/A at Valatie and Aurora respectively and there were no differences between them at either location.

Table 2. Common ragweed control ratings and grain corn yields with MPO Callisto and Hornet WDG treatments at Valatie and Aurora in 2003.

Herbicides	Rate (Amt/A)	Ave. Control (%)	Yield (Bu/A) Valatie	Yield (Bu/A) Aurora
Callisto*	3 oz	66	95	176
Callisto* + AAtrex	3 oz 0.5 pt	93	131	190
Hornet WDG**	2 oz	69	75	172
Hornet WDG** + Clarity	2 oz 2 oz	75	83	170
Clarity**	8 oz	84	89	175
Untreated	-	0	11	141
LSD (0.05)		8	25	14

*Applied with 1% (v/v) COC and 2.5% (v/v) 28% UAN.
**Applied with 0.25% (v/v) NIS.

Conclusions

These preliminary results suggest that Hornet WDG may be a viable PRE option with triazine-resistant common ragweed populations though applications of less than 4 oz/A do not seem adequate for good ragweed control. The results with the mesotrione products Callisto and Lumax (Camix is not registered for use in NY State) clearly indicate these products benefit from the addition of AAtrex to the PRE or MPO applications. While these combinations should provide good control of ragweed populations that are susceptible to triazine herbicides, they may not be the best choice for triazine-resistant common ragweed.

Calendar of Events

December 2-4, 2003	Certified Crop Advisor Training, Holiday Inn, Waterloo, NY
January 5-8, 2004	Northeastern Weed Science Society Meeting, Cambridge, MA
January 15, 2003	Field Crop Industry Day, Holiday Inn, Waterloo, NY
January 21, 2004	Western New York Corn Congress, Holiday Inn, Batavia, NY
January 22, 2004	Finger Lakes Corn Congress,Holiday Inn, Waterloo, NY
January 29, 2004	Corn Production Conference, Holiday Inn, Oneonta, NY
February 3, 2004	Western New York Soybean/Wheat Congress, Batavia Party House, Batavia, NY
February 4, 2004	Finger Lakes Soybean/Wheat Congress, Holiday Inn, Waterloo, NY
Feb 9-12, 2004	Weed Science Society of America, Kansas City, MO
Feb 10, 2004	Pest Management 2004, Delphi Falls, NY
Feb 12, 2004	Crop Production 2004, CCE Education Center, Auburn, NY
Feb 24-25, 2004	NYSABA Annual Meeting, Holiday Inn, Auburn, NY
Mar 4, 2004	North Country Corn Congress, Miner Institute, Chazy, NY
Mar 4, 2004	Quality Forage Forum, Fire Hall, North Java, NY
Mar 5, 2004	Quality Forage Forum, Randolph, NY
July 11-14, 2004	Northeastern ASA/SSSA Branch Meeting, Bordentown, NJ
Oct. 31-Nov 4, 2004	ASA-CSSA-SSSA Annual Meeting, Seattle, WA

What's Cropping Up? is a bimonthly newsletter distributed by the Crop and Soil Sciences Department 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: Crop and Soil Sciences, Plant Breeding, Plant Pathology, and Entomology. **To get on the mailing list, send your name and address to Pam Kline, 234 Emerson Hall, Cornell University, Ithaca, NY 14853.**

Cornell Cooperative Extension

Dept. of Crop and Soil Sciences
234 Emerson Hall
Cornell University
Ithaca, NY 14853

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