What's Cropping Up?

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Reduced Rates of Residual Herbicides with Burndown Products Perform Well with Conventional Corn Hybrids

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Research in 2007 showed that burndown and control of annual grasses was better when postemergence (POST) applications of residual herbicide combinations were applied with a burndown herbicide than when applied alone. Burndown of emerged giant foxtail, 3 weeks after treatment (WAT), improved from 40% when residual combinations were applied alone to 95% when applied with Impact or Steadfast. This improved burndown increased corn yield by an average of 32 Bu/A. In a separate experiment, burndown of emerged large crabgrass 3 WAT improved from 73% when residual combinations were applied alone to 98% when applied with Impact, Callisto, or Steadfast. Corn yield increased 23 Bu/A on average as a result of this improved control.

Early postemergence application of reduced rates of residual combinations with a burndown product control emerged annual grasses as well as the preemergence treatment shown here.

Full rates of the residual herbicide combinations, either Dual II Magnum plus AAtrex or Prowl H2O plus AAtrex, were used in the 2007 experiments and all treatments were applied with 1% modified seed oil (MSO) and 2.5% of 28% urea ammonium nitrate (UAN) in 20 gallons of water per acre. Experiments in 2008 compared full and half rates of these residual combinations with burndown herbicides for POST control of emerged annual grasses in conventional (non GMO) corn.

Giant Foxtail Experiment

Corn was planted May 21, 2008 at Aurora. POST applications of full and half rates of residual combinations of Dual II Magnum plus AAtrex or Prowl H2O plus AAtrex were applied with Impact or Steadfast for burndown of emerged giant foxtail. All treatments, including those with the residual herbicides only, were applied with 1% MSO and 2.5% of 28% UAN in 20 gallons of water per acre when giant foxtail was about 6 inches tall. Burndown and control ratings were made 3 and 6 WAT respectively, and corn yields measured.

When full rates of the residual combinations were applied without a burndown herbicide, giant foxtail burndown averaged 49% 3 WAT and control averaged 27% 6 WAT (Table1). When full or half rates of these residual combinations were applied with Impact or Steadfast, giant foxtail control was at least 98% 3 and 6 WAT. In addition, there was no significant difference in the average corn yields between the full (205 Bu/A) and half rates (219 Bu/A) of the residual herbicide combinations with Impact or Steadfast.

Table 1. Giant foxtail burndown 3 weeks after treatment (WAT) and control 6 WAT, and corn yields following postemergence applications of full or half rate residual combinations with burndown herbicides at Aurora in 2008.

Herbicides*	Rate Amt/A	% Burndown 3 WAT	% Control 6 WAT	Yield Bu/A
Residual	Full Rate	49	27	194
+ Impact	0.73 fl oz	100	100	209
+ Steadfast	0.75 oz	99	100	200
Residual	Half Rate	-	-	-
+ Impact	0.73 fl oz	99	99	219
+ Steadfast	0.75 oz	98	100	219
LSD (0.05)		8	10	31

*Applied with 1% (v//v) MSO and 2.5% (v/v) 28% UAN.

Weed Management

Large Crabgrass Experiment

Corn was planted April 25, 2008 at Valatie. Early POST applications of full and half rates of residual combinations of Dual II Magnum plus AAtrex or Prowl H2O plus AAtrex were made with Impact, Callisto, or Steadfast for burndown and control of emerged large crabgrass. All treatments, including those with the residual combinations only, were applied with 1% MSO and 2.5% of 28% UAN in 20 gallons of water per acre when large crabgrass was 1.25 inches tall. Burndown and control ratings were made 1 and 6 WAT respectively, and corn yields measured.

Table 2. Large crabgrass burndown 1 week after treatment (WAT) and control 6 WAT, and corn yields following postemergence applications of full or half rate residual combinations with burndown herbicides at Valatie in 2008.

Herbicides*	Rate Amt/A	% Burndown 1 WAT	% Control 6 WAT	Yield Bu/A
Residual	Full Rate	55	23	132
+ Impact	0.73 fl oz	97	95	138
+ Callisto	3 fl oz	97	99	147
+ Steadfast	0.75 oz	71	83	143
Residual	Half Rate	-	-	-
+ Impact	0.73 fl oz	95	87	143
+ Callisto	3 fl oz	97	95	143
+ Steadfast	0.75 oz	73	83	137
LSD (0.05)		10	15	14

*Applied with 1% (v//v) MSO and 2.5% (v/v) 28% UAN.

When full rates of the residual combinations were applied without a burndown herbicide, large crabgrass burndown and control averaged 55 and 23%, 1 and 6 WAT respectively (Table 2). When the full or half rates of the residual combinations were applied with Impact or Callisto, large crabgrass burndown was at least 95% 1 WAT. Crabgrass control 6 WAT with full or half rates of the residual combinations with Impact or Callisto was at least 87% and there were no significant differences among these treatments. When Steadfast was used, crabgrass burndown and control averaged only 73 and 83% 1 and 6 WAT respectively but there was no difference between the full and half rates of the residual herbicide combinations. Corn yields averaged 143 Bu/A when burndown herbicides were applied with full rates of the residual combinations and 141 Bu/A when applied with half rates of the residual combinations.

Conclusions and Recommendations

These 2008 results reinforce the importance of including a burndown herbicide when residual herbicides are applied after annual grasses have emerged. The results also show that half rates of the residual combinations performed as well as full rates when used with the burndown products. The choice of burndown product depends on the kind of annual grasses present. Since Callisto has little activity on foxtails, either Impact or Steadfast would be recommended for foxtail burndown. On the other hand, Callisto or Impact would be the choice for large crabgrass burndown. Steadfast is not as effective on large crabgrass as these other burndown products. Callisto also has some residual activity against large crabgrass. In addition to using a burndown product when applications of residual herbicides are delayed until after annual grasses have emerged, any reduced rate residual herbicide combination with one of these burndown products can be effective in planned, total POST weed control programs for conventional (non GMO) corn.

Planting Rates for Grain Corn and Silage

Bill Cox and Phil Atkins, Department of Crop and Soil Sciences, Cornell University

Crop Management

Currently, we recommend seeding rates of about 30,000 kernels/acre for grain corn and about 34,500 kernels/acre for corn silage on most silt loam soils in New York. On soils that are deep with high water-holding capacity, seeding rates can be inched upward by a couple of thousand kernels/acre. Conversely, on soils that are shallow and/or droughty, seeding rates can be inched downward by a couple of thousand kernels/acre. Also, hybrids vary in their response to seeding rates so growers should communicate with their seed representative to determine if seeding rates for the selected hybrids require further fine-tuning. New hybrid releases with new traits are offered annually so we believe that it is important to periodically test seeding rates for grain corn and corn silage using new hybrid releases to validate our current recommendations.

We conducted a 3-year field scale study on a moderately well drained silt loam soil where we evaluated the grain yield response of a Pioneer hybrid (different one each year) at four seeding rates, replicated six times, in plots that measured about 0.20 acres in size. Planting dates were in early May in 2006 and 2008 and mid-May in 2007. Plots were harvested with a 6-row combine in late October of each year at moistures close to 20%. When averaged across years, the 29,600 kernel/acre seeding rate resulted in optimum yields (Table 1). In 2008, however, when yields were exceptionally high, the 34,200 kernel/acre seeding rate did best. Nevertheless, we believe that in most years an approximate 30,000 kernel/acre seeding rate will result in the most profit on moderately well drained silt loam soils. If a grower routinely pushes 200 bu/acre in yield, the grower should experiment on their farm to determine if a 32,000 or 34,000 kernel/acre seeding rate yields best.

Leafy (TMF) and brown midrib (BMR) hybrids have been developed specifically for silage use, whereas Pioneer and DeKalb hybrids typically are dual-use. We initiated a 3-yr study at the Aurora Research Farm in 2008 to determine if our recommended 34,500 kernel/acre seeding rate recommendation was valid for the different hybrid types. When averaged across the four hybrids, the 35,000 kernel/acre seeding rate did indeed yield best (Table 2). There were some subtle differences, however, in hybrid responses. The two Pioneer hybrids (3489 and 33T55) tended to yield best at the 40,000 kernel/acre seeding rate, whereas the two DeKalb hybrids (DKC61-69 and DKC63-42) tended to yield best at the 30,000 kernel/acre seeding rate. The two leafy (TMF2Q716 and X28566) and two BMR hybrids (F2F566 and F2F610), however, yielded best at the 35,000 kernel/acre seeding rate. Final stands differed among the hybrids (data not shown) so that may have influenced the somewhat different responses to seeding rates among the four hybrid types in this study. We have not analyzed silage quality yet, which also plays a role in seeding rate recommendations for corn silage. Nevertheless, in a high-yielding year, the recommended 35,000 kernel/acre seeding rate approximated maximum yield for most of the hybrid types. We will continue this study for 2 more years before finalizing our results. Meanwhile, we continue to recommend seeding rates of about 34,500 kernels/acre for corn silage production and about 30,000 kernels/acre for grain corn on most silt loam soils in New York.

Table 1. Harvest populations and grain yield of one hybrid at four seeding rates in 2006, 2007, and 2008 and pooled across years at the Aurora Research Farm in Cayuga Co., NY.

RATE	HARVEST POPULATION				GRAIN YIELD			
	2006	2007	2008	Avg.	2006	2007	2008	Avg.
	----------plants/acre---------				----------bu/acre----------			
~27500	23874	23700	24820	24131	144	130	187	154
~29,600	25888	25825	26187	25967	**156**	**134**	189	**160**
~32,100	28904	28480	29378	28921	150	132	188	157
~34,200	31691	29830	31698	31073	157	133	**197**	162

Table 2.

RATE	SILAGE YIELD				
	Pioneer	DeKalb	Leafy	BMR	Avg.
	----------tons/acre----------				
~25,000	27.6	28.6	25.1	24.4	26.4
~30,000	29.8	**28.9**	27.2	26.2	28.0
~35,000	30.0	29.1	**29.5**	**27.3**	**29.0**
~40,000	**31.4**	29.1	28.8	26.5	28.6

Crop Management

CruiserMaxx Seed Treatment on Soybeans Greatly Increases Final Stands but Only Marginally Improves Final Yield.

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We conducted field-scale studies on four farms in 2007 and 2008 to test two soybean varieties that were treated with the insecticide/ fungicide, CruiserMaxx. The participating farmers planted, sprayed, and harvested all the plots while we took measurements, including stand counts, aphid counts, yield (with our Weigh Wagon), and moisture. The varieties tested included Asgrow 2406, treated and untreated, and 92M33, treated and untreated. The growers in Livingston and Cayuga Counties used a corn planter so were able to easily plant the treated and untreated Asgrow and Pioneer varieties. The growers in Jefferson and Onondaga Counties used grain drills so we only planted one variety in a split-planter study (treated on one side and untreated on the other side of the drill). We thank Bob DeWaine and Don Specker for providing the seed for the study.

The use of CruiserMaxx resulted in significantly higher stand counts, taken in mid-June, at three of four sites in 2007 and at all four sites in 2008 (Table 1).The CruiserMaxx seed treatment averaged about 23,000 more plants/acre in 2007 and 27,000 more plants/acre in 2008. Clearly, the use of CruiserMaxx improves soybean stands. We did not dig up many seeds so we are not sure if CruiserMaxx protected the soybean seeds from soil-borne insects, such as seed corn maggot and wireworm, or soil-borne pathogens, such as Phytophthora and Pythium species. We observed more vigorous growth and healthier looking plants in the treated seed in mid-June so the seed treatment may have also enhanced emergence. Regardless, the difference in final stand was dramatic and consistent between treated and untreated soybean seed.

Soybean aphids were monitored weekly in 2007 and monthly in 2008. We only observed aphids at one site in 2007 but numbers remained below the 250 aphid/plant threshold (data not shown). The use of CruiserMaxx, however, resulted in much lower aphid counts at this site for the first 50 days after planting (data not shown). Researchers have reported that CruiserMaxx greatly reduces aphid feeding for the first 45 days after planting and we did observe that at the one site in 2007. Aphid numbers were exceptionally low at all sites in 2008 (data not shown).

Despite the average 25,000 plant/ acre increase across years, CruiserMaxx increased soybean yields at only one site in 2007 and at no sites in 2008 (Table 1). When averaged across all four sites, CruiserMaxx had no significant yield advantage in 2007 but did provide a significant 2 bu/acre yield increase in 2008. Obviously, the dramatic increases in final soybean stands did not translate into dramatic yield increases. Seed treatment also did not

Table 1. Final stands and yield of 92B33 and AG2406 treated or untreated with CruiserMaxx seed treatment at Cayuga and Livingston (Living.) Counties, AG2406 treated or untreated with CruiserMaxx at Jefferson (Jeff.) County, and 92B33 treated or untreated with CruiserMaxx at Onondaga (Onon.) County in 2007.

	FINAL STANDS					YIELD				
SEED TREATMENT	CAYUGA	LIVING.	JEFF.	ONON.	AVG.	CAYUGA	LIVING.	JEFF.	ONON.	AVG.
CruiserMaxx	143,907	257,081	191,093	125,506	179,397	32	53	22	39	36
Untreated	145,435	240,552	141,078	97,788	156,213	32	54	18	36	35
LSD 0.05	NS	12,316	13,785	11,199	9,974	NS	NS	2	NS	NS

Table 2. Final stands and yield of 92B33 and AG2406 treated or untreated with CruiserMaxx seed treatment at Cayuga and Livingston (Living.) Counties, AG2406 treated or untreated with CruiserMaxx at Jefferson (Jeff.) County, and AG2406 treated or untreated with CruiserMaxx at Onondaga (Onon.) County in 2008.

	FINAL STANDS					YIELD				
SEED TREATMENT	CAYUGA	LIVING.	JEFF.	ONON.	AVG.	CAYUGA	LIVING.	JEFF.	ONON.	AVG.
CruiserMaxx	119,153	174,496	156,073	174,335	156,014	54	61	24	46	47
Untreated	103,836	159,742	127,733	125,494	129,201	52	60	22	44	45
LSD 0.05	5,750	7,463	8,785	7,003	4,502	NS	NS	NS	NS	2

significantly impact seed moisture (data not shown).

Although yields were not dramatically increased, one strategy to make the use of CruiserMaxx most profitable is to use CruiserMaxx on fields planted early (April 25-May 15) and/ or under high residue conditions. Another strategy is to reduce seeding rates of varieties treated with CruiserMaxx from the recommended 180,000 to 160,000 plants/acre. We suggest that growers run some strip trials in the fields, especially when planting later in May under warm growing conditions, to see if soybean seeding rates can be reduced when the seed has been treated with CruiserMaxx.

Crop Management

Soybean Seeding Rates

Bill Cox and Phil Atkins, Department of Crop and Soil Sciences, Cornell University

We revised our soybean seeding rates downward from 200,000 to 180,000 seeds/acre in 2007, based on small-plot and field-scale studies at the Aurora Research Farm. Despite doubling seeding rates from 160,000 to 320,000 seeds/acre from 2003-2005 in small plot studies, average soybean yields remained almost constant at 52-53 bu/acre (see What's Cropping Up?, Vol.18, No.3 p.1-2). Furthermore, in field-scale studies under no-till conditions with late Group I varieties, AG1903 (2005 and 2006) or S19-R5 (2007), soybean yields remained almost constant in all 3 years of the study (Table 2). We conducted another 3-year (2006-2008) field scale study at the Aurora Research Farm under zone till conditions into corn grain residue with an early May planting date to determine if the lower seeding rates are valid for stressful conditions (zone till at an early planting date).

Soybeans (not treated with a seed-applied insecticide/fungicide) were planted during the first week of May with a no-till drill in all 3 years at seeding rates of about 120,000, 150,000, 185,000, and 220,000 seeds/acre. Final stands were determined in mid-June. Emergence averaged about 80 to 85% across years, despite the very cool May conditions in 2007 and 2008 (Table 1). Even under the most challenging conditions for stand establishment (zone till, early May planting, and cool May temperatures), emergence was within the expected 80% range. Obviously, soybeans can be planted in New York in early May with no real adverse effects. More importantly, yields did not vary more than 5% among the four seeding rates when averaged across years (Table 1). The 187,640 seeds/acre seeding rate yielded best across years, despite not yielding the best in any of the individual years. If soybean prices remain above the $8/bu range, the 180,000 seeds/acre rate with untreated seed is probably most profitable. If prices drop much lower than that, growers may wish to experiment with lower seeding rates. Likewise, if growers purchase seed treated with a seed-applied insecticide/fungicide, growers may wish to experiment with lower seeding rates The data from this study indicate that the yield penalty is not too great for planting at much lower rates.

We urge New York soybean growers to conduct seeding rate studies on their farms to fine-tune seeding rates for soil and planting conditions in their fields. Seeding rates of drilled soybeans probably should not exceed 180,000 seeds/acre on most farms and probably could be lowered on some farms, especially if the seed is treated with a seed-applied insecticide/fungicide. We have initiated a 3-year small-plot study at the Aurora Research Farm to evaluate seeding rates at 15 and 30-inch row spacing. We will share the results of that study in 2009 when we have another year of data. In the first year, both row spacings also did best at about 180,000 seeds/acre.

Table 1. Seeding rates, final stands, and yields of soybeans planted under zone tillage following corn grain in the first week of May in 2006, 2007, and 2008 at the Aurora Research Farm.

	FINAL POPULATIONS				YIELD			
Seeding Rate	**2006**	**2007**	**2008**	**Avg.**	**2006**	**2007**	**2008**	**Avg.**
118,560	111475	100300	96598	102791	50	26	50	42
153,265	144125	123445	115253	127608	50	26	50	42
187,640	164376	138700	132659	141912	51	29	51	**44**
221,265	185100	160992	149688	165223	50	30	**52**	44
LSD 0.05					NS	NS	2	2

Coming Evens

Cornell University **Soil Health Initiative**

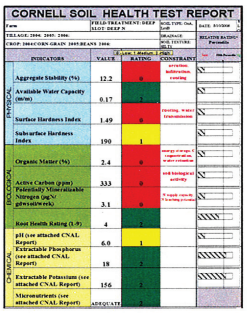
Cornell Soils Workshop: Cornell Soil Health Test (CSHT) Report Interpretation & Dynamic Nitrogen Modeling

One-day event, Tuesday, March 17, 2009

Conference Room 102, Mann Library, Cornell Campus, Ithaca, NY

- ***Morning session on Advanced Soil Health Management (10am - 12pm)*** – Using the Cornell Soil Health Test Report to 1) Diagnose Soil Management Targets and 2) Explore the Toolbox of Remedial Soil Management Practices
- ***Catered Lunch (12pm-1pm)*** - FREE!!!
- ***Early Afternoon session (1pm – 2pm)*** - Hand-on Discussions of CSHT Reports with Soil Management Scenario Testing using Real-world Examples and Strategies
- ***Mid- Afternoon session on Dynamic Nitrogen Modeling (2pm – 3:30pm)*** - Hands-on Demonstration of Scenario Testing using Adapt-N, a Web-based Tool for Adjusting N Recommendations for Corn using Weather Data and Modeling

Soil Health session targets


CORNELL SOIL HEALTH TEST REPORT

- Quick overview of Soil Health- review of linkages between soil indicators and soil functions
- Soil Health Test Report interpretation (uses and limitations of the data)
- Applying the recommendations for improved soil health management- a comprehensive analysis and discussion of real-world situations

N Modeling session targets

- Understanding the importance of weather for soil and plant N dynamics for Corn in New York State
- Hands-on demonstration of the web-based tool for N fertilizer adjustment with demonstrations of situation-testing scenarios

Registration/details: Larissa Smith, lls14@cornell.edu, 607.255.2177 or Bob Schindelbeck, rrs3@cornell.edu, 607.227.6055

CCA credits available, this event is free and open to all. MAP on page 2.

Calendar of Events

March 17, 2009	**Soil Health & Dynamic Nitrogen Modeling Workshop, Ithaca, NY**
June 4, 2009	**Cornell Small Grains Management Field Day, Musgrave Research Farm, Aurora, NY**

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 Larissa Smith, 237 Emerson Hall, Cornell University, Ithaca, NY 14853 or lls14@cornell.edu.**

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