What's Cropping Up?

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Assess Alfalfa Stands for Brown Root Rot This Spring

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If your alfalfa that looked great last October is slow to emerge this spring or if it has suffered apparent 'winterkill', brown root rot (BRR) may be one of the main contributing causes.

Brown root rot, caused by the fungus *Phoma sclerotioides*, is a cold-weather disease affecting the roots and crowns of alfalfa during the dormant period when plants are not actively growing. April through early May is the best time to assess over-wintered alfalfa plants for the symptoms and signs of BRR. It is difficult to diagnose BRR in dead plants, but characteristic lesions can be discerned on the roots and crowns of plants showing slow regrowth of shoots from the crown buds in spring. You will need a good shovel or trowel to dig up plants and a bucket of water to rinse off adhering soil for a closer inspection. A pocket knife is useful for slicing through roots to determine the depth of lesions. BRR lesions vary in appearance, but they are generally light to dark brown, often with a darker border. BRR lesions that girdle the upper tap root or the crown result in winterkill. BRR lesions that girdle the lower tap root or affect just part of the root or crown, can lead to reduced plant vigor and slow emergence of alfalfa in the spring. You can be fairly certain that BRR was a factor in poor winter survival and reduced plant vigor when you see characteristic root symptoms on a high percentage of plants in early spring and there are winterkilled plants interspersed with slowly emerging plants in patches scattered across the field. The severity of brown root rot increases as the plants age and experience more winters.

Range of typical brown root rot symptoms in alfalfa. Note the light to dark brown lesions and the flaky epidermal tissues within the lesions. Photos by Kent Loeffler, Cornell University.

Absolute confirmation of brown root rot requires a molecular laboratory test that is recently available from the Cornell University Plant Disease Diagnostic Clinic (http://plantclinic.cornell.edu/Default.htm) for $40 per composite field sample. The result will be yes/no whether the BRR fungus was present at any level in the overall sample. We suggest you call the clinic at 607-255-7850 prior to submission of samples for diagnosis.

First confirmed within New York in Clinton Co. in 2003, BRR is now known to occur throughout New York, Vermont, New Hampshire and Maine. In New York, high incidence levels of the disease have been observed in alfalfa production fields across western, southern tier, and northern parts of the state. The disease is most severe in regions with harsh winters such as in northern New York and northern New England. Many other stresses to alfalfa plants interact with BRR to cause plant death. Winterkill is not a new problem for New York alfalfa producers. The brown root rot fungus may not be new either though our recognition of it in the Northeast is very recent. The widespread finding of BRR in association with winterkill represents an opportunity to reverse one of the main factors that reduces the productivity and longevity of alfalfa in our region. There is no action that an alfalfa producer can take currently to control BRR, but we hope that ongoing research at Cornell University and elsewhere will change that. With support from the Northern New York Agricultural Development Program we are assessing alfalfa varieties adapted to this region in BRR-infested soils in order to identify varieties that may perform better than others in the presence of the BRR fungus.

Crop Management

ReGen: A Great New Alfalfa Variety from Cornell's Forage Breeding Program

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Alfalfa is a crucial component of many New York crop rotations, providing essential feed for dairy and other livestock, improving soil structure, and building soil fertility. Since an alfalfa crop will be in the ground for several years, it is critical to choose a variety with good disease resistance and persistence, to maintain a good plant stand through various production seasons. Of course high yield and good quality are also desirable features.

ReGen is a new alfalfa variety bred by Cornell's forage breeding program especially for adaptation to New York growing conditions. The name comes from the fact that some of the parents of this variety had been selected for their ability to regenerate a root system after injury from frost heaving or disease damage to roots. ReGen was not selected specifically for this trait, but by the luck of the draw in plant breeding, it appears to have good persistence that may derive from this parentage. Naturally, good stand persistence is a critically important trait for a multi-year crop.

During its development, ReGen was selected for resistance to a set of diseases that are important in New York and it has a strong disease resistance profile. ReGen has high resistance (meaning that 50% or more of the plants are resistant) to Fusarium wilt, Verticillium wilt, and anthracnose (Race 1). In addition, it has resistance (meaning that 31% to 50% of the plants are resistant) to bacterial wilt and Phytophthora root rot. Four of these diseases are key disease problems facing alfalfa in New York growing environments (Fusarium wilt is a problem in Pennsylvania, but not in New York at this time). ReGen has acceptable levels of resistance to all of these diseases, again contributing to its good persistence over the life span of a typical alfalfa seeding.

Of course, yield and quality are also important in choosing an alfalfa variety. Having been bred in New York, ReGen is well adapted to our growing environments and yields very well compared to other commercially available alfalfa varieties. Table 1 shows the results of a variety evaluation trial planted in Ithaca (Tompkins County), New York in 2004 and harvested for three full production years. Note that these data are sorted by yield in the third production year. ReGen competes well with all of the varieties in this test, yielding in the top group in the first and third production years and for the three-year total forage yield. Only one variety was in a higher yielding group than ReGen in the second production year. ReGen's strong yield performance in the third production year is a reflection of its good persistence over time. Table 2 shows yield data from a trial planted in Cobleskill (Schoharie County), New York in 2002. This trial was harvested three times in the first production year and four

Table 1. Yield of alfalfa varieties seeded in spring 2004 in Ithaca, New York and harvested three times per year for three production years (2005, 2006, and 2007).

	2005		2006		2007		3-Year	
Variety	Total Yield, T/A	% of Check Mean	Total Yield, T/A	% of Check Mean	Total Yield, T/A	% of Check Mean	Total Yield, T/A	% of Check Mean
Genoa	5.53	111	6.22	132	5.31	120	17.01	121
ReGen	**5.42**	**109**	**5.52**	**117**	**5.26**	**119**	**16.20**	**115**
Rebound 5.0	5.41	109	5.69	121	5.23	119	16.33	116
Lightning EXTRA	5.48	110	5.84	124	5.21	118	16.53	117
DKA42-15	5.55	112	5.78	122	5.16	117	16.50	117
6415	5.46	110	5.83	123	5.12	116	16.40	116
WL 348AP	5.38	109	5.42	115	5.08	115	15.92	113
HybriForce-420/Wet	5.39	109	5.54	117	5.06	115	16.00	114
FSG 408DP	5.46	110	5.65	120	5.04	114	16.18	115
WL 357HQ	5.44	110	5.73	121	5.00	113	16.18	115
LegenDairy 5.0	5.34	108	5.68	120	4.98	113	16.03	114
6420	5.32	107	5.05	107	4.94	112	15.33	109
WL 335HQ	5.20	105	5.25	111	4.79	109	15.23	108
5312 (Check)	5.29	107	5.15	109	4.75	108	15.19	108
Oneida Ultra	5.29	107	5.24	111	4.63	105	15.16	108
NOVA	5.13	103	5.05	107	4.54	103	14.69	104
Oneida VR (Check)	4.97	100	4.95	105	4.45	101	14.38	102
Vernal (Check)	4.62	93	4.06	86	4.03	91	12.69	90
Check Mean	4.96		4.72		4.41		14.09	
Trial Mean[1]	5.05		5.25		4.71		15.01	
LSD (5%)	0.36		0.42		0.33		0.97	

[1] Trial mean includes a number of experimental varieties that were evaluated in these same trials but not included in the table because they are not currently commercially available.

Table 2. Yield of alfalfa varieties seeded in spring 2002 in Cobleskill, New York and harvested three times per year in 2003 and four times per year in 2004 and 2005.

	2003		2004		2005		3-Year	
Variety	Total Yield, T/A	% of Check Mean	Total Yield, T/A	% of Check Mean	Total Yield, T/A	% of Check Mean	Total Yield, T/A	% of Check Mean
HYTEST 410	6.46	109	7.13	118	5.57	132	19.18	118
Paramount II	6.39	108	7.11	117	5.19	123	18.70	115
WL 327	6.42	108	6.91	114	4.88	116	18.23	112
Hybri-Force 400	6.41	108	6.65	110	4.65	110	17.74	109
ReGen	**6.71**	**113**	**7.04**	**116**	**4.64**	**110**	**18.39**	**113**
Seedway 9558	6.39	108	6.73	111	4.58	109	17.72	109
5312 (check)	5.86	99	6.25	103	4.35	103	16.47	102
Oneida VR (check)	6.11	103	6.21	102	4.24	101	16.56	102
Oneida Ultra	6.49	109	6.41	106	4.22	100	17.12	106
Feast +EV	5.86	99	6.16	102	4.13	98	16.16	100
Vernal (check)	5.82	98	5.73	95	4.04	96	15.60	96
Check Mean	5.93		6.06		4.21		16.21	
Trial Mean[1]	6.12		6.33		4.28		16.73	
LSD (5%)	0.26		0.32		0.39		0.80	

[1] Trial mean includes a number of experimental varieties that were evaluated in these same trials but not included in the table because they are not currently commercially available.

times for each of the two following production years. Even with this aggressive harvest schedule, ReGen performed very well. It was the top yielder in the first production year and was in the highest yielding group in the second year and for the three-year total yield. Only two varieties were in a higher yielding group than ReGen in the third production year after two years of a four-cut system. Again, this is good evidence of ReGen's persistence.

A separate trial sown in Ithaca, New York in 2004 was evaluated for forage quality in the first and second production year compared with three standard checks and one high quality check (WL 322HQ). Yield and quality data are shown in Table 3 for this trial. Over the three production years, ReGen was the top yielding variety in this trial. It was not quite as good in forage quality (reflected in predicted milk yield per ton of forage) as the high quality check variety WL 322HQ in the two years when quality testing was done. However, ReGen's superior forage yield combined with its good forage quality made it the top variety for predicted milk production per acre of forage.

ReGen looks like an excellent variety choice for growers who want an alfalfa variety with resistance to all the key diseases of alfalfa in New York, good persistence, very good yield potential, good forage quality, and excellent predicted milk production per acre. If you're putting in a new seeding in 2008, consider giving ReGen a try.

Table 3. Yield and quality of ReGen alfalfa compared to three check varieties and one high quality check variety (WL 322HQ) for three production years (quality measured in first and second production years only); sown in Ithaca, New York in 2004.

	Yield, T/A					Milk/ton, lb/ton		Milk/acre, lb/acre	
	2005	2006	2007	3 Year Total	3 Year % of Check Mean	2005	2006	2005	2006
ReGen	**4.90**	**5.23**	**5.09**	**15.22**	**112**	**2863**	**2823**	**14052**	**14765**
Guardsman II	4.61	5.04	4.67	14.33	106	2871	2775	13251	13985
Preferred	4.88	4.78	4.41	14.07	104	2880	2891	14059	13819
WL 322HQ	4.50	4.26	3.97	12.74	94	2935	2931	13186	12483
Vernal	4.31	3.63	3.76	11.68	86	2815	2895	12149	10495
Trial Mean[1]	4.47	4.71	4.40	13.57		2915	2890	13015	13577
LSD (5%)	0.30	0.22	0.30	0.69		64	59	896	709

[1] Trial mean includes a number of experimental varieties that were evaluated in these same trials but not included in the table because they are not currently commercially available.

Weed Management

Burndown Herbicides Improve Annual Grass Control When Residual Corn Herbicides are Applied Postemergence

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When corn growers choose residual herbicides for annual weed control with conventional hybrids, their intent is to make preemergence (PRE) applications soon after planting. Time constraints and adverse weather often delay these applications until the corn and weeds have emerged. Although labels allow the flexibility of applying these herbicides PRE or early postemergence (EPO), annual grass control and corn yields often suffer when application is delayed. A situation in 2005 and subsequent research suggest that delayed applications of residual herbicides benefit from the addition of a burndown herbicide.

An experiment in 2005 was designed to demonstrate the potential of a mid-postemergence (MPO) application of Impact for annual broadleaf weed control following a PRE application of Dual II Magnum. Limited rainfall during the 2 weeks after PRE Dual II Magnum application resulted in poor giant foxtail control (60%). A PRE Dual II Magnum application followed by a sequential MPO application of Impact, with 1% methylated seed oil (MSO) and 2.5% of 28% UAN, resulted in 99% giant foxtail control and a 37 Bu/A boost in corn yield. This result demonstrated the value of a burndown herbicide for control of emerged annual grasses.

Experiments were conducted in 2007 to further evaluate Impact and other herbicides for burndown of emerged annual grasses. Impact was compared with Steadfast for burndown of giant foxtail at Aurora and Valatie. This comparison was made because Steadfast, along with Steadfast ATZ, has become a standard for annual grass control in total postemergence programs with conventional hybrids. A separate experiment at Valatie compared Impact with Steadfast and Callisto for burndown of large crabgrass. While Callisto does not work well against giant foxtail, it does have good activity against large crabgrass.

Giant Foxtail Experiments

Pioneer hybrid 38P05 was planted May 24 and 17, 2007 at Aurora and Valatie respectively. Residual herbicide combinations of Dual II Magnum plus AAtrex or of Prowl H2O plus AAtrex were applied postemergence alone, and with either Impact or Steadfast. All treatments, including those with residual herbicides only, were applied with 1% MSO and 2.5% of 28% UAN in 20 gallons per acre of water. Treatments were applied EPO at Aurora when giant foxtail was 2.5 inches tall and MPO at Valatie when giant foxtail was 4 inches tall. Burndown and control ratings were made 3 and 12 weeks after treatment (WAT) respectively, and grain corn yields measured. Results from the two locations were similar so data has been combined to simplify discussion.

When Dual II Magnum plus AAtrex was applied alone, giant foxtail burndown was 44% 3 WAT (Table 1). When applied with Impact or Steadfast, foxtail burndown increased to an average of 96%. This improved burndown resulted in 30 and 24 Bu/A increases in yield for the Impact and Steadfast treat-

Table 1. Giant foxtail burndown (3 WAT) and control (12 WAT), and grain corn yields with postemergence applications of residual combinations applied alone and with burndown herbicides at Aurora and Valatie in 2007.

	Rate	% Foxtail Burndown and Control		Yield
Herbicides*	Amt/A	~3 WAT	12 WAT	Bu/A
Dual II Magnum	X pt **	44	20	107
AAtrex 4L	1 qt			
+ Impact	0.75 fl oz	97	95	137
+ Steadfast	0.75 oz	95	93	131
Prowl H2O	3 pt	37	17	104
AAtrex 4L	1 qt			
+ Impact	0.75 fl oz	94	95	147
+ Steadfast	0.75 oz	94	93	142
Untreated	-	0	0	53
LSD (0.05)		6	6	14

*All treatments applied with 1% (v/v) MSO and 2.5% (v/v) 28% UAN.
** Dual II Magnum rate was 1.33 pt/A at Aurora and 1 pt/A at Valatie.

ments respectively. Results with the Prowl H2O plus AAtrex combinations were similar. Foxtail burndown 3WAT improved from 37% when Prowl H2O plus AAtrex was applied alone to 94% when this residual combination was applied with Impact or Steadfast (Table 1). This improved control increased corn yields from 104 Bu/A to an average of 145 Bu/A for the treatments that included a burndown herbicide.

Large Crabgrass Experiment

Pioneer hybrid 38K46 was planted May 4, 2007 at Valatie. Residual herbicide combinations of Dual II Magnum plus AAtrex or of Prowl H2O plus AAtrex were applied EPO alone and with either Impact, Callisto, or Steadfast. All treatments, including those with residual herbicides only, were applied with 1% crop oil concentrate (COC) and 2.5% of 28% UAN in 20 gallons per acre of water. The EPO applications were made on May 22 when large crabgrass was about 0.5 inch tall. Burndown and control ratings were made 3 and 6 WAT respectively.

When Dual II Magnum plus AAtrex was applied with Impact, Callisto, or Steadfast, large crabgrass burndown averaged 99% compared to 78% when applied alone (Table 2). This improved large crabgrass burndown increased corn yield from 118 Bu/A to an average of 144 Bu/A for the treatments with a burndown herbicide. Large crabgrass burndown 3 WAT was 68% with Prowl H2O plus AAtrex alone but averaged 96% when applied with Impact, Callisto, or Steadfast. This improved control increased corn yield from 122 Bu/A to an average of 145 Bu/A for the treatments with a burndown herbicide.

Table 2. Large crabgrass burndown (3 WAT) and control (6 WAT), and grain corn yields with postemergence applications of residual combinations applied alone and with burndown herbicides at Valatie in 2007.

Herbicides*	Rate Amt/A	% Crabgrass Burndown and Control ~3 WAT	6 WAT	Yield Bu/A
Dual II Magnum	1 pt	78	55	118
AAtrex 4L	1qt			
+ Callisto	3 fl oz	100	97	150
+ Impact	0.75 fl oz	99	94	143
+ Steadfast	0.75 oz	98	93	140
Prowl H2O	3 pt	68	61	122
AAtrex 4L	1 qt			
+ Callisto	3 fl oz	99	99	149
+ Impact	0.75 fl oz	94	96	147
+ Steadfast	0.75 oz	96	95	138
Untreated	-	0	0	49
LSD (0.05)		6	6	14

*All treatments applied with 1% (v/v) COC and 2.5% (v/v) 28% UAN.

Conclusions

When applied with residual herbicides, giant foxtail burndown and control were similar with Impact and Steadfast. Large crabgrass burndown and control were also similar when one of the three burndown herbicides, Impact, Callisto, or Steadfast, was applied with the residual combinations. When yields were averaged over both residual combinations, there was a 32 Bu/A yield advantage when a burndown herbicide was used for giant foxtail compared to when the residual combinations were applied alone. With large crabgrass, there was a 23 Bu/A advantage on average when a burndown herbicide was applied with the residual combinations compared to when these combinations were applied alone. These results clearly show the value of burndown herbicides when residual herbicides are applied postemergence in conventional corn. Future research will evaluate reduced rates of the residual combinations with these burndown herbicides.

Crop Management

How About Planting Rates for Grain Corn When Prices are High?

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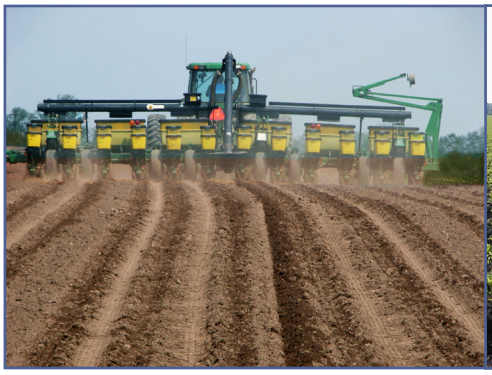
Corn prices are over $5/bu for May delivery on the Chicago Board of Trade and locally in some regions of NY. On the other hand, seed costs increase annually, especially for hybrids with stacked traits. Consequently, planting at the correct rate to obtain the optimum harvest population has increased in importance. Planting at too high a rate without a yield benefit reduces profit because of the high seed costs. On the other hand, planting at too low a rate can incur a yield loss, thereby reducing profit, especially in times of high prices. Now more than ever corn producers must plant at the correct rate to maximize profit from expensive seed costs.



We conducted a 3-year plant population study on grain corn at the Aurora Research Farm in Cayuga Co., NY on a well-drained silt loam soil from 2003-2005 to evaluate the response of a Pioneer and a DeKalb hybrid. The hybrids were planted on 7 May 2003, 6 May 2004, and 29 April 2005. Plots measured 50 by 10 feet and each final population for each hybrid was replicated four times for each hybrid. We harvested the center two rows of each plot with an Almaco small plot combine when grain moisture averaged about 25%.

Although we did not achieve our targeted harvest populations in all years of the study, the results were very clear. Harvest populations of about 26,000 – 27,000 plants/acre at harvest were optimum for both hybrids when averaged across all years of the study (Table 1). The 2003 growing season was conducive for lodging, which limited the yield of DKC53-34, once harvest populations exceeded 24,700 plants/acre. The 2004 growing season was stress-free with lodging problems, but yields topped out at harvest populations of 25,125 plants/acre for DKC53-34 and 27,700 plants/acre for 37F16. The 2005 growing season had significant heat and drought stress but once again DKC53-34 and 37F16 had optimum yields at harvest populations of 26,631 and 25,870 plants/acre, respectively. When averaged across the very different growing seasons, DKC53-34 had optimum yields at harvest populations of 26,785 plants/acre and 37F16 had optimum yields at 26,858 plants/acre. This clearly indicates that a harvest population of about 27,000 plants/acre was optimum on well-drained silt loam soils across very different climatic conditions for these hybrids.

We initiated a 3-year field scale study on a moderately well drained silt loam soil where we evaluated the response

Table 1. Harvest populations and grain yield of a DeKalb and a Pioneer hybrid in 2003, 2004, and 2005 and pooled across years at the Aurora Research Farm in Cayuga Co., NY.

HYBRID	HARVEST POPULATION				GRAIN YIELD			
	2003	2004	2005	Avg.	2003		2005	Avg.
	----------plants/acre---------				----------bu/acre----------			
DKC53-34	24700	20310	20870	21960	**187**	178	148	171
	28600	25125	26631	**26785**	188	**197**	**152**	**179**
	33160	28000	31305	30822	187	189	142	173
	37020	30440	34457	33972	175	188	142	168
37F16	18420	27700	20000	22040	165	186	143	165
	21580	33125	25870	**26858**	171	**189**	**150**	**170**
	25090	34875	29565	29260	180	180	134	165
	27370	39000	37066	34479	**186**	180	138	168

of one hybrid at four seeding rates in plots, replicated four to six times, that measured about 0.20 acres in size. The planting date was in early May in 2006 and mid-May in 2007 and plots were harvested with a 6-row combine at moistures close to 20%. In both years and averaged across years, the 29,600 plant/acre seeding rate resulted in optimum yields. Final stands averaged close to 26,000 plants/acre in this study. Consequently, the results from our field scale studies corroborate our small plot findings.

Table 2. Harvest populations and grain yield of corn at four seeding rates in 2006 and 2007 and pooled across years at the Aurora Research Farm in Cayuga Co., NY.

RATE	HARVEST POPULATION			GRAIN YIELD		
	2006	2007	Avg.	2006	2007	Avg.
	----------plants/acre---------			----------bu/acre----------		
27,500	23,874	23,700	23,787	144	130	137
29,600	25,888	25,825	**25,867**	**156**	**134**	**145**
32,100	28,904	28,480	28,692	150	132	141
34,200	31,691	29,830	30,760	157	133	145
LSD 0.05				10	3	5

Moderately well-drained to well-drained silt loam soils represent more than half the grain corn acreage in NY so we believe that our recommendation of harvest populations of 26,000-28,000 plants/acre are accurate, at least for May-planted corn. When planting corn from April 25th to May 7th, we assume only an 85% emergence rate and recommend a planting rate for grain corn of about 32,000 plants/acre. When planting corn from May 8th to May 22nd, we assume a 90% emergence rate and recommend a planting rate of about 30,000 plants/acre. When planting corn after May 22nd, we assume a 95% emergence rate and recommend a planting rate of about 28,500 plants/acre. Seed costs are expensive so growers should strive to plant at the correct rate, depending upon planting conditions and hybrid selection. Grain prices are high but “pushing the hybrid” with high seeding rates does not necessarily translate into higher yields.

Mar.31 & Apr.1, 2008	**Nutrient Management SPEAR Program 2008 Spring Retreat**
Jun. 5, 2008	**Small Grains Management Field Day, Musgrave Farm, Aurora, NY**
Jul. 8, 2008	**Cornell Seed Growers Field Day, Ithaca, NY**
Jul. 26-30, 2008	**American Phytopathological Society Centennial Meeting, Minneapolis, MN**
Oct. 8-10, 2008	**Northeastern Division of the American Phytopathological Society, Newport, RI**

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.**

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