NNY Agricultural Development Program
2006-2007 Project Report

Cereal Grain Variety Trials for Grain and Straw

Project Leaders

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Background

Grain Production Trials:

Small grain variety trials have been conducted at the Cornell University E.V. Baker Research Farm since the 1980's. Trials of spring and winter wheat, spring and winter triticale, winter rye, barley, and oat varieties provide northern New York farmers with evaluations of the performance of available varieties grown under local conditions.

The size of the spring and winter wheat variety trials has grown considerably in recent years with the increased regional interest in organic bread wheat production. Champlain Valley Milling, a specialty organic flour mill located in Westport, NY, provides local farmers with a premium market for organically grown wheat. As specialty flour markets have very specific quality standards, it is essential that we be able to identify varieties that will meet the requisite standards when grown in northern New York. Our wheat trial entries include established varieties from area seed companies, in addition to promising advanced lines from private company breeding programs, Mark Sorrells' breeding program at Cornell, and public breeding programs from the Upper Midwest (primarily North Dakota State University).

Winter Cereal Straw Production Trials:

High demand coupled with the premium prices paid for good quality straw, have generated increased farmer interest in growing small grains just for straw. Typically, straw is harvested after the grain has been combined; the lower stalk provides most of the dry matter, while the threshed heads remain in the field. Small grains grown just for straw can be "pre-cut" – harvested after the crop has headed out and the stem is fully elongated, but *before* the grain has filled. Yields for pre-cut straw are higher because the entire stem and immature head are included in the harvest. Harvesting heads before the grain heads fill adds a further advantage in that it reduces the potential for lodging, and pre-cut straw is generally cleaner and of higher quality than straw harvested after grain

combining. Winter triticale and rye tend to be tall plants that produce quality straw, and may be ideal candidates for pre-cut straw production in northern New York.

Objectives

(1) To test the agronomic performance of available varieties of spring and winter wheat, spring and winter triticale, spring barley, and oats when produced under northern New York growing conditions.
(2) To evaluate winter hardiness and straw production potential for winter triticale and rye varieties grown on NNY farms.

Methods

Replicated variety trials for spring wheat, spring barley, oats, winter wheat, winter triticale, winter rye, and winter barley for grain, and winter triticale and rye for straw, were conducted at the Baker Research Farm in Willsboro, NY. A randomized complete block design was employed with three replications for each trial except the winter triticale-rye pre-cut straw trial, which had four replications. Plots were located on a Rhinebeck clay loam soil with subsurface tile drainage. 200 lb/acre 6-24-24 was broadcast applied and incorporated with a spring-tooth harrow prior to planting each trial. Additionally, the winter wheat, winter triticale, and winter rye plots all received a topdress application of ammonium nitrate (33-0-0) at a rate of 70 lbs nitrogen per acre on April 23, 2007. No herbicides were used on any of the trials.

Results

Table 1. Northern New York 2007 Winter Wheat Variety Trial Results

Brand/Company Source	Hybrid/Variety Name	Market Class	Yield	Test weight	Moisture	Plant height	Lodging
			bu/a	lb/bu	%	inches	1-10
		Trial Mean	97.5	57.4	14.0	34.4	0.6
		LSD	11.3	1.0	0.5	1.6	1.0
		LSD P >	0.05	0.05	0.05	0.05	0.05
		CV	7.0	1.1	2.1	2.8	105.4
		F Test	0.0001	0.0001	0.0001	0.0001	0.0001
Agriculver	7730R	SRW	106	59.7	14.1	32	0.3
Cornell	Freedom	SRW	104	56.3	13.8	35	1.0
Agriculver	Ashlund	SRW	103	56.0	14.0	34	0.7
JGL Inc.	HR45-104J	HRW	103	52.3	12.8	28	0
JGL Inc.	Gryphon	HRW	103	59.7	14.2	36	0.3
Cornell	NY 88024	SW	103	57.0	14.0	39	0.3
JGL Inc.	HR45-063J	HRW	103	57.3	13.9	28	0
JGL Inc.	Harvard	HRW	103	60.3	14.6	36	0.3
JGL Inc.	Kristy	SRW	102	56.7	14.1	32	0
Pioneer	Piovar25W33	SW	101	56.7	13.9	38	0.3
Cornell	99-53	SRW	100	56.3	13.4	31	1.7
JGL Inc.	CM98091	HRW	100	58.7	14.2	33	0.7
Agriculver	Harus	SW	98	57	13.8	36	1.3
Agriculver	Genesis	SRW	98	56	13.7	35	2.0
Agriculver	Richland	SW	96	56.7	13.9	38	0.3
Cornell	NY Batavia	SW	96	56.3	13.9	37	0.7
Cornell	Geneva	SW	96	56.3	13.9	38	0.7
JGL Inc.	Maxine	HRW	94	58.7	14.2	31	0
JGL Inc.	HR45014J	HRW	93	57.3	14.2	31	0
Cornell	Lindon	HRW	91	59.3	14.3	37	1.3
Agriculver	Caledonia	SW	87	55.0	14	28	0
Agriculver	AC Morley	HRW	87	59.7	14.2	40	0.7
Cornell	Cayuga	SW	81	59.3	14.6	40	1.3

Winter Wheat Trial: The 2007 winter wheat trial consisted of eight soft white (SW), six soft red winter (SRW), and nine hard red winter (HRW) varieties (Table 1). Plots were planted at a 2 bu/acre rate on September 27, 2006, and harvested August 1, 2007. Yields were excellent and ranged from 81 bu/acre to 106 bu/acre with a trial mean of 97.5 bu/acre. There was little to no lodging in the winter wheat trial. The top 17 yielding varieties did not differ significantly at the 0.05 level, and included soft red winter, soft white winter, and hard red winter entries (Table 1). *7730R* and *Freedom*, two soft red winter varieties, had the highest mean yields in the entire test at 106 bu/acre and 104 bu/acre, respectively. Four entries from JGL Inc. topped the hard red winter wheat rankings with *HR45-104J*, *Gryphon*, *HR45-063J*, and *Harvard* all averaging 103 bu/acre. The top yielding soft white winter entry was *NY88024* with a mean yield average of 103 bu/acre. *NY88024* is from Mark Sorrells' breeding program at Cornell. The soft white winter variety Cayuga had the lowest mean yield at 81 bu/acre, which was significantly less than all but three other winter wheat entries.

Table 2. Northern New York 2007 Spring Wheat Variety Trial Results

Source	Hybrid/Variety Name	Market Class	Yield	Test weight	Moisture	Plant height
			bu/a	lb/bu	%	inches
		Trial Mean	64.7	56.0	14.5	30.6
		LSD	6.3	2.6		1.1
		LSD P >	0.05	0.05		0.05
		CV	5.9	2.8	2.1	2.1
		F Test	0.0001	0.0012	0.0819	0.0001
JGL Inc.	HRS6002J	HRS	79	57.0	14.7	36
Cornell	Stoa	HRS	75	55.0	14.2	26
NDSU	2375	HRS	72	55.0	14.5	27
Champlain Valley Milling	Russ	HRS	71	54.7	14.4	33
JGL Inc.	HRS45-025J	HRS	70	55.7	14.6	30
JGL Inc.	HRS45-035J	HRS	69	58.0	14.4	29
JGL Inc.	Profit	HRS	66	55.7	14.3	25
Champlain Valley Milling	Freyr	HRS	65	56.3	14.8	30
Champlain Valley Milling	Hannah	HRS	65	57.0	14.5	34
NDSU	Alsen	HRS	65	56.0	14.2	29
JGL Inc.	HRS6001J	HRS	64	55.3	14.4	30
NDSU	Butte 86	HRS	64	54.7	14.2	32
Champlain Valley Milling	Knudson	HRS	63	56.7	14.5	25
NDSU	Parshall	HRS	62	58.3	14.8	32
JGL Inc.	CM606	HRS	62	59.7	14.6	30
Champlain Valley Milling	Gunner	HRS	61	56.0	14.6	35
Champlain Valley Milling	Coteau	HRS	57	55.0	14.0	36
NDSU	Dapps	HRS	57	56.3	14.3	36
JGL Inc.	SD45-015J	HRS	46	52.0	14.5	26

Spring Wheat Trial: Spring grain trial plots were planted April 25, 2007 and harvested August 15, 2007. The seeding rate was 2.5 bu/acre for all nineteen entries. No lodging was observed in any of the plots. Mean yields ranged from 46 bu/acre to 79 bu/acre with an overall trial mean of 64.7 bu/acre. *HRS6002J* topped the spring wheat yield ranking for the second consecutive year. The hard red spring wheat entry from JGL Inc. produced significantly higher yields (79 bu/acre) than all other entries except *Stoa* in 2007, and out-yielded all other entries in 2006 with a 77 bu/acre average. The consistent high performance of *HRS6002J* is especially encouraging given that growing conditions in 2007 were excellent, while the 2006 season was very wet and the growing conditions were only fair. On the low end of the ranking, *SD45-015J* (entry from JGL Inc.) was an outlier and yielded significantly less than all other entries at 46 bu/acre.

Table 3. Northern New York 2007 Winter Triticale Variety Trial Results

Source	Hybrid/Variety Name	Yield	Test weight	Moisture	Plant height	Lodging
		lbs/a	lb/bu	%	inches	Scale 0-10
	Trial Mean	4706	48.1	12.9	45.4	4.7
	LSD	707	2.2	0.6	2.8	5.2
	LSD P>	0.05	0.05	0.05	0.05	0.05
	CV	8.0	2.4	2.3	3.3	59.5
	F Test	0.0001	0.0001	0.0001	0.0001	0.0144
Agriculver seeds	Trical 102 lot# T521	2635	44.3	12.2	55	8.7
Agriculver seeds	Trical 103BB T412B	3081	42.0	11.8	54	9.0
Agriculver seeds	Trical 336	6162	53.0	13.7	40	0
Agriculver seeds	Alzo	5915	50.0	13.3	39	3
Agriculver seeds	Trical 815	5736	51.3	13.6	39	2.6
Winter barley entry	McGregor	5981	44.7	11.5	28	1.7

Winter Triticale (and Barley) Trial: Five winter triticale varieties and one winter barley variety were included in the 2007 test. Plots were seeded 9/27/06 and harvested 8/01/07. The planting rate was 2 bu/acre for both triticale and barley. The 2006-2007 winter was relatively mild through mid-January, and provided good snow cover from mid-January to mid-March. As a result no winterkill was observed in the plots (even the winter barley entry survived). 2007 results were consistent with those observed in 2006. *Trical 336*, *Alzo*, and *Trical 815* (first year in the trial) were markedly shorter, had less lodging problems, much higher yields, and higher test weights than *Trical 102 lot #T521* or *Trical 103BB T412B*. *McGregor*, the lone winter barley entry, performed well with a mean yield of 133 bu/acre, and had no lodging or disease problems.

Table 4. Northern New York 2007 Spring Barley Variety Trial Results

Source	Hybrid/Variety Name	Yield	Test weight	Moisture	Plant height	Lodging
		bu/a	lb/bu	%	inches	Scale 0-10
	Trial Mean	87.5	46.7	14.3	26.1	0
	LSD	11.6	1.0		1.7	
	LSD P>	0.05	0.05		0.05	
	CV	7.0	1.2	1.3	3.5	
	F Test	0.0001	0.0001	0.455	0.0001	
Mark Sorrells	Sterling	103	49.0	14.3	24	0
Mark Sorrells	Bullock	103	48.0	14.4	22	0
Mark Sorrells	AC Malone	96	47.7	14.1	28	0
Mark Sorrells	Island	96	46.7	14.2	27	0
Mark Sorrells	AC Klinck	39	42.0	14.3	29	0

Spring Barley: Five spring barley varieties were included in the 2007 trial (Table 4). Plots were planted 4/25/07 at a seeding rate of 2 bu/acre, and harvested 8/15/07. For the first time in several years the barley plots managed to mature without any significant bird damage. The 2007 field season provided timely rains, growing conditions were generally excellent, and most varieties performed well. The one outlier was *AC Klinck* which yielded poorly in all three replications, averaging 39 bu/acre. The other four entries had much higher yields that did not differ significantly. No lodging, disease, or insect problems were observed in the plots.

Table 5. Northern New York 2007 Spring Oat Variety Trial Results

Source	Hybrid/Variety Name	Yield	Test weight	Moisture	Plant height	Lodging
		bu/a	lb/bu	%	inches	Scale 0-10
	Trial Mean	97.0	31.6	9.3	34.8	0
	LSD		3.5	0.4	3.3	
	LSD P>	0.05	0.05	0.05	0.05	
	CV	18.0	6.7	2.4	2.2	
	F Test	0.3	0.0190	0.0468	0.0001	
Mark Sorrells	Blaze	115.0	34	9.6	35.4	0
Mark Sorrells	Ogle	101.9	31	9.4	33.5	0
Mark Sorrells	Esker	101.9	32	9.2	33.5	0
Mark Sorrells	Spurs	95.1	34	9.6	33.9	0
Mark Sorrells	Drumlin	94.1	33	9.5	36.2	0
Mark Sorrells	Kame	93.0	30	9.2	32.3	0
Mark Sorrells	Newdak	90.7	31	9.2	35.0	0
Mark Sorrells	Rodeo	84.4	30	9.0	38.4	0

Oats: Oat variety trial plots were planted on field block 12-4 on April 25 and harvested August 15, 2007. The seeding rate was 3 bu/acre. There was a significant (0.0001) replication block effect on yield as the mean yields for replication blocks 2 and 3 were almost twice the yields in replication block 1. Yield data from the outlier replication block 1 was removed from the data set, so the yield averages presented in Table 5 just represent the results from replication blocks 2 and 3. Mean yields ranged from a low of 84.4 bu/acre for *Rodeo* to a high of 115 bu/acre for *Blaze,* with an overall mean of 97.0 bu/acre. No lodging, disease, insect, or bird damage was noted in the trial.

Table 6. 2007 Winter Triticale and Rye for Straw Trial

Source	Hybrid/Variety Name	Straw Yield Dry Matter Per acre (lbs)	Moisture At Harvest %	Plant height inches	Lodging Scale 0-9
	Trial Mean	6256	10.5	42.2	2.28
	LSD	441.9	2.2	1.7	2.8
	LSD P>	0.1	0.1	0.1	0.1
	CV	5.4	16.0	3.2	94.0
	F Test	0.0667	0.0004	0.0001	0.039
Agriculver	Alzo	6043	15.8	37.6	3.88
Agriculver	Trical 336	6623	9.0	36.0	0.25
Agriculver	Trical 815	5939	8.2	39.9	0.5
Agriculver	Winter rye	6420	9.1	55.3	4.5

Winter Triticale and Rye for Straw Trial: Three winter triticale and one winter rye entry were included in the 2007 straw production test. Plots were seeded 9/27/06 in field block 12-1, and harvested 7/31/07. The planting rate was 2 bu/acre for both triticale and rye. Dry matter yields ranged from 5939 lbs/acre to 6623 lbs/acre with a trial mean of 6256 lbs/acre (Table 6). Among the triticale varieties, *Trical 336* had markedly higher yields than either *Alzo* or *Trical 815*. *Trical 336* also had a higher mean yield than winter rye, although differences were not statistically significant. *Trical 336* had the shortest mean height in the trial and almost no lodging issues. *Alzo*, in contrast, had significant lodging problems, and the relatively high percent moisture levels in the *Alzo* staw at harvest were likely related to the fact that many of the plants had lodged. The winter rye entry was much taller than any of the triticale varieties, and had the highest mean lodging score in the trial (slightly higher that *Alzo*). It was interesting to note that the percent moisture levels in the rye straw at harvest were similar to those of the un-lodged triticale entries even though many rye plants had lodged.

These results illustrate that winter triticale straw yields can be comparable to winter rye, and in regions where triticale can reliably survive the winter, winter triticale offers a viable alternative to rye for straw production. Winter triticale survival in Willsboro Farm trials has been inconsistent. The 2005-2006 and 2006-2007 winters were relatively mild and winter triticale survival was excellent in both years. However, winter triticale plots all winterkilled in both 2003-2004 and 2004-2005. Given the uncertainty of winter triticale survival, winter rye would generally be considered a safer bet for straw production from a winter grain. An additional advantage of winter rye is that it can be successfully planted later in the fall than winter triticale.

Outreach

Tabulated trial results will be posted on the Northern New York Agricultural Development Program website www.nnyagdev.org and in the variety trial section of the online journal Plant Management Network www.plantmanagementnetwork.org. Results will also be presented at regional extension meetings and wheat production workshops.

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Photo: Small Grain Variety Trial Plots at the Cornell E.V. Baker Farm (photo by Michael H. Davis)