Northern New York Agricultural Development Program
2020 Final Project Report

Malting Barley Variety Evaluations for Production in NNY

Project Leaders:

- Mark Sorrells, Professor of Plant Breeding and Genetics, Cornell University, 413 Bradfield Hall, Ithaca, NY 14853-1902; 607-255-1665, mes12@cornell.edu
- Gary Bergstrom, Professor of Plant Pathology, Cornell University, 331 Plant Science Building, Ithaca, NY 14853; 607-255-7849, gcb3@cornell.edu

Collaborators:

- Michael Davis, Farm Manager, Cornell University Agricultural Experiment Station/Willsboro Research Farm, Willsboro NY; 607-255-5459, mhd11@cornell.edu
- Kitty O'Neil, Regional Field Crops and Soils Specialist, Cornell Cooperative Extension North Country Regional Ag Team, 2043B State Highway 68, Canton, NY 13617, 315-379-9192, kao32@cornell.edu
- Mike Hunter, Regional Field Crops Specialist, Cornell Cooperative Extension North Country Regional Ag Team, 203 North Hamilton Street, Watertown, New York, 13601 315-788-8450, meh27@cornell.edu

Background:

The New York State (NYS) Farm Brewery Law, passed in 2012, spurred the development of new markets for NYS-grown malting barley, hops, and other small grains. In order to receive a Farm Brewery license with associated tax and marketing incentives in New York State (NYS), brewers must use NYS-grown farm products according to an increasing schedule. Currently, that proportion is 60%; in 2024 the requirement increases to 90%. Presently, there is not enough malting barley being grown in NYS to meet this demand by brewers. Growers are considering this crop because of its high market value of $8-12 per bushel.

Malting barley acreage is increasing in NYS and there is interest in growing winter malting barley in northern New York (NNY), in part because winter barley yields are substantially higher than spring barley because the crop can take advantage of late fall growth and soil moisture from snow. However, winter malting barley is less winter hardy than winter wheat and rye so there is a need to evaluate winter malting barley under the northern NY growing conditions. Cash crop opportunities are limited on most NNY farms due to the short growing season and cool climate,

and historically winter cereals are avoided due to insufficient winter hardiness. However, small grains, including malting-grade and feed-grade barley, could become viable options in the NNY region if today's varieties will reliably overwinter in the regional climate.

The malting barley market in northern New York was quantified in 2018 by the New York State Brewers Association as follows:

County	# of Breweries	Brewery Jobs	Total Wages	Total Output
Clinton	5	58	$7,041,238	$26,104,014
Essex	7	142	$9,657,892	$39,100,382
Franklin	3	33	$3,027,314	$11,919,725
Jefferson	7	80	$7,991,881	$28,966,895
Lewis	1	15	$2,091,516	$ 6,368,391
St. Lawrence	3	21	$4,779,333	$17,941,787
TOTALS	**26**	**339**	**$34,589,174**	**$130,401,194**

If NNY growers can gain entry into the malting- and distilling-grade barley and rye markets, cash crop value could be improved significantly and a new cash crop opportunity developed for NNY farmers. In addition to selling to local buyers, successful production of these small grains in NNY would position regional farmers to also sell their crops to malt houses and brewers in neighboring states. Consequently, we proposed to evaluate, in replicated trials, both spring and winter malting barley at two NNY locations: Chazy and Canton, starting in 2019 and continuing in 2020. These report shares the 2020 trial results; the 2019 results are posted under Field Crops Research at www.nnyagdev.org.

Methods:

2020 Spring Malting Barley Variety Trials: Chazy

A spring malting barley variety trial was established on Roundabout silt loam soils in the Cornell University field crop research area at the W.H. Miner Agricultural Research Institute in Chazy, NY (latitude 44 degrees 38 minutes, longitude -73 degrees 39 minutes). The field was moldboard plowed in the fall of 2019, and 200 lbs/acre 15-15-15 fertilizer was broadcast applied and incorporated during the final seed bed preparations in the spring of 2020.

Seed of ten varieties were obtained from the Cornell small grains breeding program: Quest, KWS Tinka, ND Genesis, AAC Synergy, Newdale, KWS Jessie, KWS Chrissie, LCS Opera, CU127 and CU198. All entries were planted at a 3 bushel/acre seeding rate on April 16, 2020. A randomized complete block experimental design with four replications was employed. Individual plots were 16.5' long and eight rows wide with a 7"-row spacing. Plant height and lodging data were collected prior to harvest. Plots were combined on July 31, 2020, and the seed was cleaned prior to determining grain weights, percent moisture levels, and bushel weights.

2020 Spring Malting Barley Variety Trials: Canton

The same ten-variety spring malting barley trial was established on Hailesboro silt loam at the Cornell Cooperative Extension Learning Farm (44.564544°, -75.102489°) on April 24, 2020, utilizing the same experimental design and plot size as the Chazy site.

Plant height data were collected prior to harvest. Because of severe bird damage this trial was not harvested.

2019-2020 Winter Malting Barley Variety Trials: Willsboro

A winter malting barley variety trial was planted on a Stafford Fine Sandy Loam soil at the Willsboro Research Farm (latitude 44 degrees 22 minutes, longitude -73 degrees 23 minutes) on September 13, 2019. The winter trial included ten varieties: Saturn, KWS Scala, SY Tepee, Endeavor, AC07/041/8-Flavia, SU Mateo, DH 130910, LCS Calypso, LCS Violetta, and Buck. A randomized complete block design with four replications was used and the 16.5'-long plots consisted of 8 rows with a 7"-row spacing. Seedling emergence was uniform and the plants exhibited good fall growth. Plots were harvested on July 10, 2020.

2019-2020 Winter Malting Barley Variety Trials: Canton

The ten-variety winter malting barley trial was established at the Cornell Cooperative Extension Learning Farm (44.564544°, -75.102489°) on September 19, 2019, utilizing the same varieties, experimental design and plot size as the Willsboro site. Plots were harvested on July 15, 2020.

Results:

Spring Malting Barley Variety Trials: Chazy and Canton

Agronomic data are presented in Table 1. Very little lodging was observed in the trials. Newdale had the highest mean plot yield and test weight, while KWS Chrissie produced the lowest mean plot yield and Quest had the lowest test weight. Last year, ND Genesis produced the highest yield and Newdale the lowest. While ND Genesis yielded well this year (3rd), this illustrates that the large effect of year-to-year variation in weather greatly affects variety performance. ND Genesis was the tallest last year and this year it was tied for the tallest with CU198.

Table 1. Agronomic performance of spring malting barley varieties in NNY; NNYADP Malting Barley Variety Evaluations for Production in NNY, 2020 .

			Yield (kg/h)		Yield		Test Weight (Kg/hl)			Height (cm)			Lodg	HD
Ent#	Entry	Row	Chazy	Canton	Bu/ac	Rank	Chazy	Canton	Rank	Chazy	Canton	Mean	Chazy	Chazy
1	Quest	6	3304	Bird	61	4	51.6	Dam-	10	64	54	59	0.5	6/13
2	KWS Tinka	2	3193	Dam-	59	6	52.9	age	7	61	62	62	0.0	6/22
3	ND Genesis	2	3828	age	71	3	56.1		2	68	60	64	0.0	6/22
4	AACSynergy	2	4287		80	2	56.1		3	66	59	62	0.5	6/22
5	Newdale	2	4428		82	1	56.4		1	61	54	57	0.0	6/22
6	KWS Jessie	2	2918		54	7	53.9		6	47	56	51	0.0	6/22
7	KWSChrissie	2	2697		50	10	52.6		8	52	56	54	0.0	6/22
8	LCS Opera	2	2730		51	9	52.0		9	56	58	57	1.3	6/22
9	CU127	2	3284		61	5	55.5		5	65	61	63	2.3	6/22
10	CU198	2	2783		52	8	56.1		4	64	65	64	0.3	6/22
	Mean		3345		62		54.3			60	58	59	0.5	6/21
	CV		17.8											

Winter Malting Barley Variety Trials: Willsboro and Canton

This was the first year for the winter malting barley variety trial in NNY and the winter survival was surprisingly good, especially at Willsboro (Table 2). Overall, Flavia had the best survival

and Endeavor and Buck the poorest. LCS Calypso, LCS Violetta, and Saturn also showed excellent survival at both locations.

The varieties that had the best winter survival also produced the best grain yields.

Table 2. Agronomic performance of winter malting barley varieties in NNY; NNYADP Malting Barley Variety Evaluations for Production in NNY, 2020.

				Yield (kg/h)			Yield		Test Weight (Kg/hl)			
Ent#	Variety	Row#	Type	Wills	Canton	Mean	Bu/ac	Rank	Wills	Cant	Mean	Rank
1	Saturn KWS	6	Feed	2397	3586	2991	56	2	48.1	55.1	51.6	10
2	Scala SY	2	Malt	2369	1573	1971	37	8	52.6	55.5	54.0	8
3	Tepee	2	Malt	2443	1145	1794	33	9	52.6	54.6	53.6	9
4	Endeavor	2	Malt	3438	806	2122	39	6	54.8	54.6	54.7	7
5	Flavia	2	Malt	3303	2654	2978	55	3	53.8	60.0	56.9	3
6	Su Mateo DH	2	Malt	1810	2430	2120	39	7	54.6	55.8	55.2	6
7	130910 LCS	2	Malt	3576	1820	2698	50	4	55.5	61.3	58.4	2
8	Calypso LCS	2	Malt	2745	3352	3048	57	1	54.2	59.0	56.6	4
9	Violetta	2	Malt	2515	2749	2632	49	5	53.5	58.7	56.1	5
10	Buck	6	Naked	2146	1278	1712	32	10	67.4	69.0	68.2	1
	Mean			2674	2139	2407			54.7	58.4	56.5	
	CV			21.5	38.6							

				Height (cm)			HD	Winter Survival (%)		
Ent#	Variety	Row#	Type	Wills	Cant	Mean	Wills	Wills	Cant	Mean
1	Saturn KWS	6	Feed	41	39	40	5/31	95	88	91
2	Scala SY	2	Malt	43	40	41	5/30	94	79	86
3	Tepee	2	Malt	42	40	41	5/31	89	60	74
4	Endeavor	2	Malt	43	40	41	5/28	100	51	76
5	Flavia	2	Malt	43	41	42	5/30	98	86	92
6	Su Mateo DH	2	Malt	43	40	41	5/31	91	85	88
7	130910 LCS	2	Malt	44	41	43	5/28	98	74	86
8	Calypso LCS	2	Malt	43	41	42	5/30	91	90	91
9	Violetta	2	Malt	43	41	42	5/28	98	83	90
10	Buck	6	Naked	51	47	49	5/31	94	44	69
				44	41	42	5/29	95	74	84

Conclusions:

This research is the first step in developing the production of NNY climate-friendly small grains (malting-grade and feed-grade barley and rye) as a viable economic option for northern New York growers. The first year of surprisingly good winter survival data and the trials' other early data sets, e.g., the varieties that had the best winter survival also produced the best grain yields; and four varieties produced yields of 50 or more bushels per acre with survival rates of 86 percent or better, clearly make the case for pursuing multi-year and regional testing here.

Outreach:

A preliminary factsheet about suitability of spring and winter malting barley for NNY will be developed for distribution across all six counties and will be available on the Northern New York Agricultural Development Program website at www.nnyagdev.org. Results of this research project will be presented at field days, workshops, and CCE-hosted grower meetings in 2021 (virtually if necessary due to any COVID-19 restrictions) and available at www.nnyagdev.org.

Acknowledgments:

Funding from the Northern New York Agricultural Development Program and from seed companies entering hybrids in these trials is gratefully acknowledged. We also acknowledge support for regional malting barley evaluations from the Cornell University Agricultural Experiment Station and New York Department of Agriculture and Markets; the assistance of Cornell Willsboro Research Farm Manager Michael H. Davis, Ph.D., with planting, general management, and harvest of the trials at the Willsboro Research Farm, at Miner Institute in Chazy, and in Canton; the assistance of Kitty O'Neil at Canton.

For More Information:

- Mark Sorrells, Professor of Plant Breeding and Genetics, Cornell University, 413 Bradfield Hall, Ithaca, NY 14853-1902; 607-255-1665, mes12@cornell.edu