Northern NY Agricultural Development Program
2010 Project Report

Corn Hybrids for Grain and Ethanol Production in Northern New York

Project Leader: Margaret E. Smith, Professor
Department of Plant Breeding and Genetics, Cornell University
G42 Emerson Hall, Ithaca NY 14853
Tel. 607-255-1654, FAX 607-255-6683
E-mail mes25@cornell.edu

Collaborator(s):
Mike Davis, Department of Crop and Soil Sciences, Cornell University
Sherrie Norman, Department of Plant Breeding and Genetics, Cornell University
Laraine Ericson, Department of Plant Breeding and Genetics, Cornell University
Keith Payne, Department of Plant Breeding and Genetics, Cornell University
Judy Singer Department of Plant Breeding and Genetics, Cornell University

Cooperating Producers:
Jon Greenwood, St. Lawrence County
Ron Robbins, Jefferson County

Background:

Corn is the primary row crop grown in northern New York (NNY), harvested from about 139,500 acres in 2009. It provides essential feed for the dairy industry. Over 73,000 acres of this total were harvested as grain in 2009, representing 53% of total corn acreage in NNY. This was the first year where acres harvested as grain in the region were greater than acres harvested as silage – the result of a trend towards increasing grain acreage in the region (see Figure 1). With ethanol production facilities in NY on-line, corn grain production and marketing opportunities for NNY farmers continue to grow. The grain produced by corn hybrids also is a major contributor to silage yield, so grain yield evaluation provides an indication of which hybrids would be good candidates for silage use. It is important to evaluate silage quality on these hybrids as well, but seed companies will often enter their hybrids into grain evaluation trials as a first step in determining what is worth marketing at all in the region. Thus grain yield evaluations of commercial hybrids provide essential comparative information to farmers interested in grain production in NNY and to seed companies who make marketing decisions based initially on performance in grain yield trials, and may or may not do subsequent silage evaluations. Since NNY farmers spend about $5 million annually on corn seed for grain production, these evaluations are critical to the profitability as well as the productivity of this important agricultural enterprise. As corn seed prices continue to climb rapidly, it becomes more and more important to provide growers with the information that allows them to choose hybrids that are well adapted and likely to be productive in the NNY region.

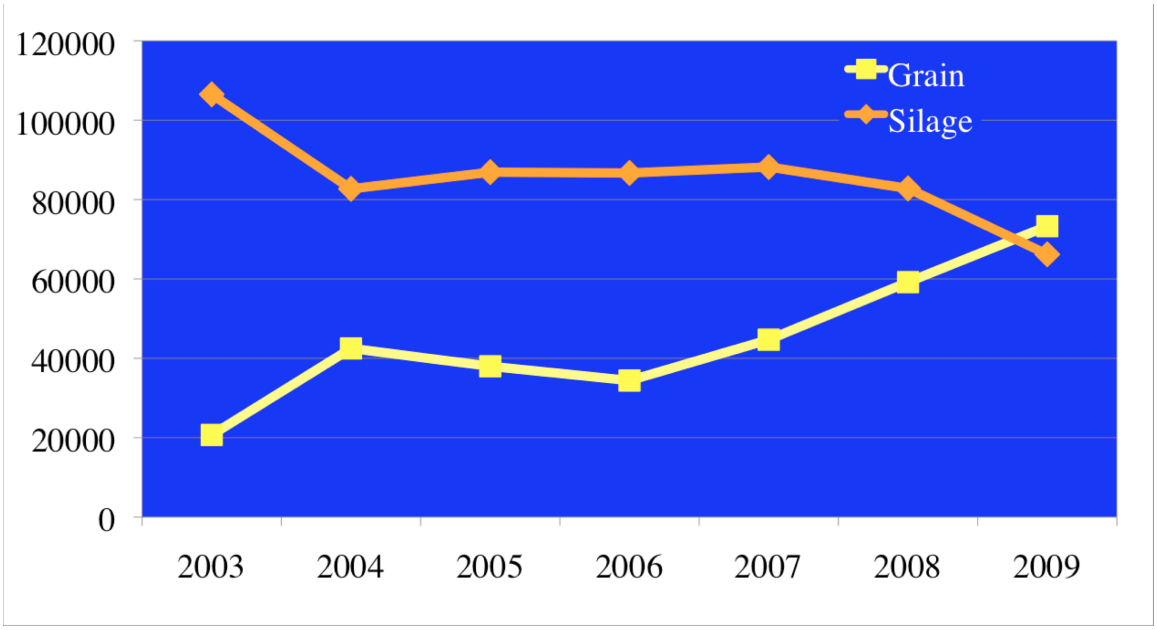

Figure 1. Acres harvested as corn grain (yellow) line and corn silage (orange line) in Northern New York from 2003 through 2009.

Methods:

We evaluated early maturing hybrids (1400-1900 growing degree days, 70-90 days relative maturity) at two locations in NNY and medium-early maturing hybrids (1900-2400 growing degree days, 85-100 days relative maturity) at one NNY location, to identify hybrids that can meet the grain and silage needs of farmers in the region. Seed companies marketing corn in New York were contacted to request entry of their early and medium-early maturing commercial hybrids into evaluation tests. Hybrids were compared for grain yield, maturity, stalk and root quality, and disease and insect resistance. Early maturity hybrids were evaluated at Madrid in St. Lawrence and Chazy in Clinton counties and medium-early maturing hybrids at Sackets Harbor in Jefferson County. Each hybrid was planted in three replications per location, with each replication consisting of a 1/500 acre plot (two rows, 17.5' long). Plots were thinned at the 6- to 7-leaf stage to a density of 28,000 to 30,000 plants/acre. Data was collected at thinning time (late June to early July) on plant counts and unusually high or low vigor (reported as "early vigor"). In September, plots were evaluated for reaction to any disease or insect pests that occur at each site (we were able to evaluate northern leaf blight and eyespot reaction at Madrid), for ability to maintain green leaf area (reported as "stay green"), and for early-season stalk lodging, root lodging, and animal damage. At harvest time (October or November), data were collected on final stalk and root lodging, animal damage, grain weight, and grain moisture. These data were used to calculate grain yield per acre and yield:moisture ratio (a measure of hybrid efficiency in producing high yield under short-season conditions). Evaluation results were published in the 2010 Corn Report (annual data) and will be included in the 2012 Cornell Guide for Integrated Field Crop Management (multiple year results).

Results:

The 2010 growing season in northern New York as a whole tended to be a bit warmer and considerably wetter than average. Temporal and spatial variation in precipitation (particularly) created some distinct stresses at each testing site and different challenges for field operations. Lower than average rainfall in May allowed our corn evaluation plots to be planted early at all sites (30 April in Madrid, 11 May in Sackets Harbor, and 12 May in Chazy). Above-average heat unit accumulation in May got the crop off to a good start at all three sites. Warm temperatures with adequate moisture in July and August helped set the stage for excellent ear size and grain set. September brought twice the normal rainfall in Madrid and Sackets Harbor (largely due to a severe storm right at the end of the month) along with somewhat warmer temperatures than normal (which moved grain maturity along at these sites). Another severe storm in early October resulted in twice normal rainfall again in Madrid, 50% above normal at Chazy, and 25% above normal at Sackets Harbor. Despite wet conditions late in the season, grain fill and dry-down had been accelerated by season-long warmth and harvest was very timely in Madrid (18 October) and Chazy (28 October). The wet soil conditions resulting from September and October rains in Sackets Harbor, followed by continuing very rainy weather through November, meant that we were unable to get into the field to harvest until 9 December. The generally rapid crop development at all three sites meant that grain moistures at harvest were lower this year than what we often encounter in our trials.

State average grain yields reported for New York were excellent at 150 bu/acre – 16 bu/acre above last year's average and 6 bu/acre above the previous record for the state. This was the eighth year in a row that reported NY corn yields have topped 100 bu/acre and they appear to have climbed steadily in recent years. At our NNY locations, average yields for our hybrid tests were excellent and ranged from 164 bu/acre to 242 bu/acre.

Results from the hybrid evaluation trials are shown in Table 1 through Table 4. Table 1 shows the over-locations analysis for early maturity hybrids that tested at Madrid and Chazy. Table 2 shows data from Madrid, Table 3 from Chazy, and Table 4 shows the medium-early maturity hybrids evaluated at Sackets Harbor. The quality of our testing data this year was excellent, as reflected in the low coefficients of variation (CVs) for yield in the trials (5% at Madrid, 11% at Chazy, and 15% at Sackets Harbor). The higher value at Sackets Harbor probably results from variation introduced into the plots as we awaited conditions that would allow us to harvest. The very low CVs for yield indicate that the values in these tables are quite reliable and not overly influenced by random variation in the testing fields. Generally, a yield CV below 15% is considered evidence of high quality data.

Hybrids showed highly significant variation for grain yield and moisture at all locations. Stalk lodging values were very low at Madrid but higher and variable at Chazy and Sackets Harbor. Much of the lodging at Chazy was caused by animal damage. At Sackets Harbor, the very late harvest date exposed the trial to considerable bad weather and standability pressure.

Yield and grain moisture values varied among the three locations, resulting in a range of values for the yield:moisture ratio. This measure, which is an indicator of hybrid

efficiency in producing high yield under short-season conditions, is one of the best guides to choosing a hybrid with excellent yield potential and appropriate maturity. The absolute value of the yield:moisture ratio at any given site is not important, but rather the relative values of the hybrids at that site. Thus hybrids like Hyland HLB 32R and TA Seeds TA370-11 looked especially good this year in the early maturity group, and similarly Growmark FS 5667GT3, Hyland R265, and Doebler's RPM 435HRQ all looked especially good in the medium-early group. As a cautionary note, growers should choose hybrids based on multi-year data whenever possible, since any hybrid can have a "banner year" but not necessarily hold up as strongly over a range of different growing seasons. The data that will be assembled in the upcoming Cornell Guide for Integrated Field Crop Management will provide that multi-year summary.

The results in Tables 1 through 4 provide information on a broad array of commercially available hybrids, allowing farmers and seedsmen to compare data from NNY on productivity and adaptation of hybrids from various seed companies.

Conclusions/Outcomes/Impacts:

Data in the hybrid production tables in this report shows a number of hybrids that had excellent performance in NNY in 2010. However, hybrid choices should always be made based on the most comprehensive data available, usually multi-year and/or multi-location data. Multi-year data is available in the Cornell Guide for Integrated Field Crop Management and this publication should be consulted, in combination with the individual test data presented here, when making hybrid choices.

Outreach:

Results of 2009 testing were published in the 2009 Hybrid Corn Grain Performance Trials report (Plant Breeding Mimeo 2010-1 and available on the web at http://plbrgen.cals.cornell.edu/cals/pbg/programs/departmental/corn/index.cfm) and were incorporated into the tables of recommended hybrids in the 2011 Cornell Guide for Integrated Field Crop Management (Cornell University, 2010 and at http://ipmguidelines.org/Fieldcrops/content/CH03/default-2.asp). These results are available for farmer and seed company use in selecting hybrids best adapted to the challenging soils and climates of NNY. The publications are distributed through extension offices and at various extension and outreach meetings. Results from 2010 trials, which were harvested during October and December, are available in the 2010 Hybrid Corn Grain Performance Trials report (Plant Breeding Mimeo 2011-1 and at http://plbrgen.cals.cornell.edu/cals/pbg/programs/departmental/corn/index.cfm) and will be incorporated into the tables of recommended hybrids in the 2012 Cornell Guide for Integrated Field Crop Management (to be published by Cornell University in fall 2011).

Next steps: In future years when funding is available to support the additional costs of travel to the NNY region, we will plan to continue testing hybrids in NNY to ensure that farmers and seed companies have a solid basis for their choices of corn grain hybrids for this important region of the state.

Acknowledgments:

Funding by the Northern New York Agricultural Development Program and by the participating seed companies is gratefully acknowledged. We also acknowledge some general support for corn breeding and testing from the Cornell University Agricultural Experiment Station through Hatch Project NYC149446, "Breeding Pest Resistant and Stress Tolerant Corn for more Sustainable Production Systems." Collaborating farmers are thanked for in-kind contributions of land, labor, management expertise, and ideas: Jon Greenwood, Madrid, St. Lawrence County and Ron Robbins, Sackets Harbor, Jefferson County. We acknowledge the assistance of Dr. Mike Davis with planting, general management, and harvest of the trial at Miner Institute, Chazy, and Miner Institute for field space.

Reports and/or articles in which results of this project have been published:

Smith, M.E. 2011. 2010 New York Hybrid Corn Grain Performance Trials. Cornell University, Cornell Cooperative Extension, Plant Breeding and Genetics 2011-1. 11 pp.

Smith, M.E. 2010. Hybrid selection for corn grain hybrids. pp. 51-53. In: Cox, W.J. and L. Smith (eds.) 2011 Cornell Guide for Integrated Field Crop Management. Pesticide Management Education Program, Cornell University, Ithaca NY. 156 pp.

For more information:

Margaret E. Smith or Judy Singer
Dept. of Plant Breeding and Genetics, Cornell University
G42 Emerson Hall
Ithaca NY 14853
Tel. 607-255-1654 (Smith), 607-255-5461 (Singer)
e-mail mes25@cornell.edu (Smith), jls10@cornell.edu (Singer)
Websites: http://plbrgen.cals.cornell.edu/cals/pbg/people/faculty.cfm?netId=mes25
http://plbrgen.cals.cornell.edu/cals/pbg/programs/departmental/corn/index.cfm

Mike Davis
Willsboro Research Farm
48 Sayward Lane, Willsboro, NY 12996
Tel. 518-963-7492

Jon Greenwood
1087 State Highway 310, Canton, NY 13617
Tel. 315-386-3231

Ron Robbins
14471 County Route 145, Sackets Harbor, NY 13685
Tel. 315-583-5737

Table 1. 2010 Early Maturity Hybrids, summary data from Madrid and Chazy.

Brand	Hybrid	Yield, bu/acre	Grain Moisture, %	Yield: Moist. Ratio	Stalk Lodging, %
Hyland	HL B32R	246	19.8	12.4	10
Hyland	HL 4227	225	20.2	11.1	5
Hyland	8234	231	20.6	11.2	5
Doebler's	281XY	226	20.7	11.0	10
Growmark FS	3703VT3	222	20.7	10.7	7
Hyland	HL CVR48	231	21.1	11.0	5
T A Seeds	TA370-11	257	21.4	12.0	6
T A Seeds	TA327-20	248	21.4	11.6	4
Growmark FS	3989VT3	243	21.4	11.4	4
Cornell	EX0102	244	21.9	11.1	9
Doebler's	362GR	256	22.8	11.2	9
T A Seeds	TA451-11	249	23.7	10.6	7
Dyna-Gro	51V57	247	24.7	10.1	7

Table 2. 2010 Early Maturity Hybrids, Madrid, St. Lawrence County.

Brand	Hybrid	Yield, bu/ acre	Grain Mois-ture, %	Yield: Mois-ture Ratio	Stalk Lod-ging, %	Early Vigor, 1-6 scale*	Stay-Green, 1-5 scale*	Eye-spot, 0-5 scale*	North-ern Leaf Blight, 0-5 scale*
Hyland	HL B32R	247	19.1	12.9	1	5.0	3.2	1	2
Hyland	HL 4227	209	19.2	10.9	0	5.8	2.5	2	3
Doebler's	281XY	231	19.4	11.9	2	4.5	2.8	0	2
Hyland	8234	245	20.0	12.3	0	5.3	2.3	1	3
T A Seeds	TA370-11	244	20.0	12.2	0	4.0	2.3	1	1
T A Seeds	TA327-20	238	20.3	11.7	0	4.0	3.0	1	1
Hyland	HL CVR48	231	20.3	11.4	0	6.0	2.9	1	1
Growmark FS	3703VT3	234	20.8	11.3	0	4.0	1.3	3	1
T A Seeds	TA451-11	244	20.9	11.7	0	3.5	2.2	1	1
Growmark FS	3989VT3	251	21.0	12.0	0	5.7	2.3	2	0
Cornell	EX0102	223	21.1	10.6	0	4.3	3.2	2	2
Doebler's	362GR	250	21.8	11.5	1	4.0	2.2	1	2
Dyna-Gro	51V57	251	22.5	11.2	0	6.0	2.3	2	0
	Mean	238	20.5	11.6	0.3	4.8	2.5	2	1
	CV, %	5	5.1						
	LSD, P<.05	20	1.7						
	Std. Dev.	12	1.0						

Table 3. 2010 Early Maturity Hybrids, Chazy, Clinton County.

Brand	Hybrid	Yield, bu/acre	Grain Moisture, %	Yield: Moist. Ratio	Stalk Lodging, %
Hyland	HL B32R	244	20.4	12.0	18
Growmark FS	3703VT3	210	20.6	10.2	14
Hyland	HL 4227	241	21.2	11.4	10
Hyland	8234	217	21.2	10.2	9
Growmark FS	3989VT3	234	21.7	10.8	8
Hyland	HL CVR48	231	21.8	10.6	9
Doebler's	281XY	221	22.0	10.0	18
T A Seeds	TA327-20	257	22.4	11.5	7
T A Seeds	TA370-11	270	22.7	11.9	11
Cornell	EX0102	264	22.7	11.6	18
Doebler's	362GR	261	23.7	11.0	16
T A Seeds	TA451-11	253	26.4	9.6	13
Dyna-Gro	51V57	243	26.8	9.1	13
	Mean	242	22.6	10.8	13
	CV, %	11	6.6		
	LSD, P<0.05	41	2.5		
	Std. Deviation	25	1.5		

Table 4. 2010 Medium-early Maturity Hybrids, Sackets Harbor, Jefferson County.

Brand	Hybrid	Yield, bu/ acre	Grain Mois-ture, %	Yield: Mois-ture Ratio	Stalk Lodg-ing, %	Early Vigor, 1-6 scale*	Stay-Green, 1-5 scale*
Dyna-Gro	D32RR29	170	16.7	10.2	8	5.7	1.5
Hubner	H5099VT3	158	16.8	9.4	10	4.0	1.7
Hyland	8454	156	16.8	9.3	32	5.3	2.0
Hubner	H5135VT3	173	16.9	10.2	3	4.3	1.5
Dyna-Gro	54V78	139	16.9	8.2	49	5.0	1.7
Hyland	HL CVR54	129	16.9	7.6	44	5.0	1.7
ChannelBio	193-46VT3	159	17.0	9.4	8	4.7	2.2
T A Seeds	TA525-13V	157	17.0	9.2	7	3.3	1.8
Growmark FS	4501VT3	143	17.0	8.4	33	6.0	2.3
Doebler's	RPM 435HRQ	184	17.1	10.8	9	4.3	1.8
Hyland	R265	188	17.2	10.9	5	5.7	1.5
Growmark FS	4707VT3	162	17.2	9.4	20	4.5	2.2
Dyna-Gro	D27GC19	157	17.2	9.1	7	5.5	3.0
ChannelBio	196-06VT3	183	17.3	10.6	17	4.5	1.8
Doebler's	553GR-B	172	17.3	9.9	14	4.7	1.8
Growmark FS	5005VT3	155	17.3	9.0	31	4.7	2.5
Growmark FS	5099VT3	153	17.3	8.8	33	4.7	2.3
Hyland	CVR74	177	17.4	10.2	5	4.7	1.5
T A Seeds	TA531-20	176	17.4	10.1	4	5.7	2.2
Doebler's	RPM 515HXR	173	17.4	9.9	14	5.0	1.8
Growmark FS	5595VT3	168	17.4	9.7	18	4.3	1.7
Dyna-Gro	D40SS09	145	17.4	8.3	29	3.8	2.2
Hyland	CVR68	130	17.4	7.5	21	4.0	2.2
Growmark FS	5667GT3	193	17.5	11.0	4	5.0	1.8
Doebler's	495XY	173	17.5	9.9	5	5.0	1.7
T A Seeds	TA545-20	179	17.6	10.2	5	5.3	2.3
	Mean	164	17.2	9.5	17	4.8	2.0
	CV, %	15	1.6				
	LSD, P<0.05	40	0.4				
	Std. Deviation	25	0.3				