2011 SPRING WHEAT VARIETY TRIAL

In 2011, the University of Vermont Extension in collaboration with the University of Maine began the second year of extensive organic variety trials evaluating hard red spring wheat in order to determine which varieties thrive in our northern climate. The trials were established at the Borderview Research Farm in Alburgh, Vermont and at Cornell University's Willsboro Research Farm in Willsboro, New York. This trial is one of several in a USDA Organic Research Education Initiative grant focused on the production of high quality organic bread wheat in New England.

MATERIALS AND METHODS

The experimental plot design was randomized complete block with four replications. Spring wheat varieties evaluated and their sources are listed in Table 1.

Table 1. Spring wheat varieties planted in Alburgh, VT and Willsboro, NY.

Varieties	Type†	Origin and Release Year‡	Seed Source
07SW04	HR	Western Canada	Semican, Canada
AC Barrie	HR	AAFC§, Saskatchewan, 1994	Farm-saved seed, ME
AC Walton	HR	AAFC, PEI, 1995	Grand Falls Milling Co., Canada
Ada	HR	MAES, 2006	Albert Lea Seed House, MN
Barlow	HR	NDAES, 2009	North Dakota State University, ND
Batiscan	HR	Semican, Canada	Semican, Canada
Brick	HR	SDAES, 2000	North Dakota State University, ND
Cabernet	HR	Resource Seed, PNW, 2001	Tri-State Seeds, WA
Faller	HR	NDAES, 2007	North Dakota State University, ND
FBC Dylan	HR	NPSAS/FBC, 2006	University of Vermont, VT
Glenn	HR	NDAES, 2005	Johnny's Selected Seeds, ME
Helios	HR	AAFC, Saskatchewan, 1996	La Coop de Fédérée
Howard	HR	NDAES, 2006	North Dakota State University, ND
Jenna	HR	Agripro Syngenta, 2009	Albert Lea Seed House, MN
Kaffé	SW	Semican, Canada	Semican Atlantic Inc., Canada
Kelse	HR	WSU, 2008	University of Vermont, VT
Kingsey	HR	Semican, Canada	Semican Atlantic Inc., Canada
Magog	HR	Semican, Canada	Semican Atlantic Inc., Canada
Malbec	HR	Agripro Syngenta, PNW	Tri-State Seeds, WA
McKenzie	HR	1997	Semican, Canada
Nick	SW	Western Plant Breeders, 2004	Washington State University, WA
Oklee	HR	MAES, 2003	University of Minnesota, MN
RB07	HR	MAES, 2007	University of Minnesota, MN
Red Fife	HR	Heritage var., ca. 1860	Fedco Seeds, ME
Roblin	HR	ACRS, Winnipeg, 1986	University of Vermont, VT
Sabin	HR	MAES, 2009	University of Minnesota, MN
Steele	HR	NDAES, 2004	Albert Lea Seed House, MN
Superb	HR	AAFC, Winnipeg, 2001	Seedway, NY
Tom	HR	MAES, 2008	University of Minnesota, MN
Ulen	HR	MAES, 2005	University of Minnesota, MN

† HR = hard red, SW = soft white

‡ Year of release was not always available.

§ ACRS, Agriculture Canada Research Station; AAFC, Agriculture and Agri-Food Canada; FBC, Farmer Breeder Club; MAES, Minnesota Agricultural Experiment Station; NDAES, North Dakota Agricultural Experiment Station; PEI, Prince Edward Island; SDAES, South Dakota Agricultural Experiment Station; WSU, Washington State Univ.

The seedbed at both the Alburgh and Willsboro locations were prepared by conventional tillage methods. All plots were managed with practices similar to those used by producers in the surrounding areas (Table 2). The previous crop planted at the Alburgh site was winter wheat. In September 2010, 2 tons $ac^{-1}$of Giroux's composted poultry manure (2-3-2) was applied to the area and incorporated. In April 2011, the field was disked and spike tooth harrowed to prepare for planting. The plots in Alburgh were seeded with a Kincaid Cone Seeder on May 2, 2011 (Image 1) at seeding rate of 350 live seeds per square meter. Plot size was 5' x 20'. The plots were tine weeded with a 12ft Kovar Tine Weeder on May 27, 2011 and again on June 4, 2011. The plots were fertilized with 'Pro-Gro' at a rate of 50 lbs of available N to the acre on June 16, 2011. The OMRI approved 'Pro-Gro' is a fertilizer manufactured for North Country Organics in Bradford, VT. The blended fertilizer is composed of vegetable and animal meal. It has a guaranteed analysis of 5-3-4.

Image 1. Planting Spring wheat trial-Alburgh, VT

At the Willsboro location, planting of the spring wheat followed a 3 year crop of alfalfa/timothy sod. The sod was plowed in August 2009 and fallow prior to planting. The field was dragged twice during the fallow period to eliminate any remaining alfalfa and perennial grasses. In April 2011, the field was disked and spike tooth harrowed to prepare for planting. The plots were seeded on May 13, 2011with a custom made eight-row cone planter at 350 live seeds per square meter. Plot size was 4' x 13.'

Image 2. Biomass sampling spring wheat trial-Willsboro, NY

Population and vigor were measured on June 6, 2011 in Alburgh and June 7, 2011 in Willsboro. Populations were determined by taking three, 0.3 meter counts per plot. Vigor was based on a visual rating using a 0 – 5 scale, where 5 represents excellent stand density, and 0 represents no stand. Flowering dates of the wheat were recorded when at least 50% of the spikes were in bloom. At the Willsboro site flowering dates were approximated to the week of flowering because daily observations could not be recorded due to location. On July 28 and 29, 2011 in Alburgh and July 28, 2011 in Willsboro, when most of the wheat varieties were in the soft dough stage, plant heights were measured, excluding the awns. At the Alburgh location wheat biomass samples were taken on August 2, 2011 and on July 28, 2011 in Willsboro (Image 2). The sample area was 0.3 m^2, wheat in this area was clipped 0.5 inch above the soil surface, placed in a cloth bag and dried in order to calculate dry matter yield. At the same time weed pressure was assessed by a visual rating using a 0 – 5 scale, where 0 represents no weeds, and 5 represents severe weed pressure. Throughout the growing season other pertinent observations of disease and wheat development were recorded.

Grain plots were harvested at the Alburgh site with an Almaco SPC50 plot combine on August 17, 2011. In Willsboro, plots were harvested on August 19, 2011 with a Hege plot combine. At the time of harvest the severity of lodging was recorded based on a visual rating using a 1 – 4 scale, where 1 indicates minor plant lodging, wheat could still be combined and 4 indicates severe lodging and a complete crop loss. In addition, grain moisture, test weight, and yield were calculated.

Following harvest, seed was cleaned with a small Clipper cleaner (A.T. Ferrell, Bluffton, IN). An approximate one pound subsample was collected to determine quality. Quality measurements included standard testing parameters used by commercial mills. Test weight was measured by the weighing of a known volume of grain. Generally the heavier the wheat is per bushel, the higher baking quality. The acceptable test weight for bread wheat is 56-60 lbs per bushel. Once test weight was determined, the samples were then ground into flour using the Perten LM3100 Laboratory Mill. At this

time flour was evaluated for its protein content, falling number, and mycotoxin levels. Grains were analyzed for protein content using the Perten Inframatic 8600 Flour Analyzer. Grain protein affects gluten strength and loaf volume. Most commercial mills target 14-15% protein. The determination of falling number (AACC Method 56-81B, AACC Intl., 2000) was measured on the Perten FN 1500 Falling Number Machine. The falling number is related to the level of sprout damage that has occurred in the grain. It is measured by the time it takes, in seconds, for a stirrer to fall through a slurry of flour and water to the bottom of the tube. Falling numbers greater than 250 indicate low enzymatic activity and sound quality wheat. A falling number lower than 250 indicates high enzymatic activity and poor quality wheat. Deoxynivalenol (DON) analysis was analyzed using Veratox DON 5/5 Quantitaive test from the NEOGEN Corp. This test has a detection range of 0.5 to 5 ppm. Samples with DON values greater than 1 ppm are considered unsuitable for human consumption.

All data was analyzed using a mixed model analysis where replicates were considered random effects. The LSD procedure was used to separate cultivar means when the F-test was significant ($P< 0.10$). There were significant differences among the two locations for most parameters and therefore data from each location is reported independently.

Table 2. General plot management of the wheat trials.

Trial Information	**Spring wheat variety trial**	
Location	Alburgh, VT Borderview Farm	Willsboro, NY Willsboro Research Farm
Soil type	Benson rocky silt loam	Kingsbury silt clay loam
Previous crop	Winter wheat	Timothy/Alfalfa Sod
Row spacing (in)	6	6
Seeding rate (live seed/m^2)	350	350
Planting date	5-2-11	5-13-11
Harvest date	8-17-11	8-19-11
Harvest area (ft)	5 x 20	4 x 13
Tillage operations	Fall plow, spring disk & spike-toothed harrow	Fall plow, spring disk & spike-toothed harrow
Weed management (Tineweed)	5-27-11 and 6-4-11	None
Fertility (Pro-Gro 5-3-4)	6-16-11	None

Variations in yield and quality can occur because of variations in genetics, soil, weather, and other growing conditions. Statistical analysis makes it possible to determine whether a difference among varieties is real or whether it might have occurred due to other variations in the field. At the bottom of each table a LSD value is presented for each variable (e.g. yield). Least Significant Differences at the 10% level of probability are shown. Where the difference between two varieties within a column is equal to or greater than the LSD value at the bottom of the column, you can be sure in 9 out of 10 chances that there is a real difference between the two varieties. In the example below variety A is significantly different from variety C but not from variety B. The difference between A and B is equal to 725 which is less than the LSD value of 889. This means that these varieties did not differ in yield. The difference between A and C is equal to 1454 which is greater than the LSD value of 889. This means that the yields of these varieties were significantly different from one another. The asterisk indicates that variety B was not significantly lower than the top yielding variety.

Variety	**Yield**
A	3161
B	3886*
C	**4615***
LSD	**889**

RESULTS

Seasonal precipitation and temperature recorded at weather stations in close proximity to the 2011 sites are shown in Table 3. This growing season brought extreme weather conditions. In April and May, both sites received 10 inches above normal rainfall amounts. The saturated soils led to a delayed planting at both locations. In Alburgh the increased rain levels forced us to relocate the trial to a location with better drainage. The heavy rains still caused soil crusting which hindered seedling emergence and most likely increased nutrient leaching (Image 3). From one extreme to the other; in July and August there were several weeks with very little rain and higher than normal temperatures causing drought like conditions and putting further stress upon the wheat.

Image 3. Soil crusting due to the heavy spring rains- Alburgh, VT

Table 3. Temperature and precipitation summary for Alburgh, VT and Willsboro, NY, 2011.

Alburgh, VT	April	May	June	July	August
Average Temperature (F)	46.6	58.7	67.1	74.4	70.4
Departure from Normal	3.10	2.10	1.30	3.30	1.60
Precipitation (inches)	7.88	8.67	3.52	3.68	10.2
Departure from Normal	5.00	5.35	0.09	-0.29	6.38
Growing Degree Days (base 32)	465	826	1088	1314	1121
Departure from Normal	120	63.6	74.1	104	-26.3

Willsboro, NY	April	May	June	July	August
Average Temperature (F)	45.7	58.3	66.2	73	69.6
Departure from Normal	1.80	3.90	0.90	2.90	2.10
Precipitation (inches)	6.59	7.81	2.81	1.80	5.78
Departure from Normal	5.27	4.61	-5.30	-1.58	1.68
Growing Degree Days (base 32)	423	808	1064	1277	1181
Departure from Normal	79.7	49.0	55.9	-9.40	56.8

*Based on National Weather Service data from cooperative observer stations in close proximity to field trials. Historical averages are for 30 years of data (1971-2000)

Spring Wheat Growth and Development:

During the 2011 growing season several observations and measurements were recorded on spring wheat development. Relative flowering date was recorded when at least 50% of the plot was in bloom for each of the varieties (Table 4). In Alburgh all varieties were in full bloom by July 5. At the Willsboro site all of the varieties bloomed by the second week of July (Image 4). Planting at the Willsboro site was over a week later than at the Alburgh site causing a slight delay in wheat flowering. Bird deterrents; squawk boxes and coyote decoys, were place in and around the plot area which reduced bird damage at the Alburgh plots. There was significant bird, primarily turkey, damage in several of the plots at the Willsboro location which reduced yields. Lodging amongst the varieties trialed, in general was minimal. Two varieties, Kingsey and Bastican, were noted to be heavily leaning but harvestable at both locations.

Table 4. Relative flowering date of spring wheat.

	Alburgh, VT	Willsboro, NY
Variety	**Flowering date**	**Flowering date**
07SW04	1-Jul	<15-Jul
AC Barrie	5-Jul	<15-Jul
AC Walton	1-Jul	<15-Jul
Ada	5-Jul	<15-Jul
Barlow	5-Jul	<8-Jul
Batiscan	1-Jul	<8-Jul
Brick	5-Jul	<8-Jul
Cabernet	5-Jul	<15-Jul
Faller	5-Jul	<8-Jul
FBC Dylan	5-Jul	<8-Jul
Glenn	5-Jul	<8-Jul
Helios	5-Jul	<8-Jul
Howard	5-Jul	<8-Jul
Jenna	5-Jul	<15-Jul
Kaffé	5-Jul	<15-Jul
Kelse	5-Jul	<15-Jul
Kingsey	5-Jul	<15-Jul
Magog	5-Jul	<15-Jul
Malbec	5-Jul	<15-Jul
McKenzie	5-Jul	<15-Jul
Nick	1-Jul	<8-Jul
Oklee	5-Jul	<8-Jul
RB07	5-Jul	<8-Jul
Red Fife	1-Jul	<15-Jul
Roblin	5-Jul	<8-Jul
Sabin	5-Jul	<8-Jul
Steele	1-Jul	<8-Jul
Superb	5-Jul	<15-Jul
Tom	5-Jul	<8-Jul
Ulen	5-Jul	<8-Jul

Image 4. Flowering wheat- Willsboro, NY

Image 5. Loose smut infect wheat- Willsboro, NY

Loose smut caused by the fungus, *Ustilago tritici*, was observed at both locations. At the Alburgh location, thirteen varieties; Steele, Roblin, Sabin, AC Barrie, Batsican, Cabernet, Jenna, Kaffé, Oklee, Kelse, RB07, Glenn, and FBC Dylan infected plants were observed, and in Willsboro loose smut was found in the Steele, FBC Dylan, Nick, Oklee, and Glenn plots (Image 5). The loose smut fungus is carried as dormant mycelium within healthy-looking seed and is spread by planting infected seed. A smut-infected seed or plant cannot be distinguished from an uninfected one until the head starts to emerge. The disease is most obvious just after the time of heading by the characteristic dusty black appearance of diseased heads. The spores are dispersed by the wind during wheat flowering and can infect healthy plants.

Plant height, weed severity, and whole plant wheat biomass are reported in Tables 5 and 6. Plant hieghts were significantly different among varieties. Red Fife was the tallest variety at the Alburgh location. Batsican, Kingsey, and Kaffé were among the tallest varieties for both locations. There was considerable variation in the amount of weed severity in the plots. This was most likely related to varying weed seed banks across the test area and the later planting dates at both locations. In addition, we observed that many of the wheat plants produced very few tillers and were shorter than in past year, thus reducing plant cover and allowing more area for weeds to take hold. Due to this variation in weed severity we did not observe significant differences among treatments at the Willsboro site. The weed pressure was significant at the Alburgh location and was severe. There was no correlation between weed severity and wheat height. We had predicted that taller wheat would be better able to suppress weed growth. However, we observed that some of shorter wheat varieties had the lowest weed biomass. Early season vigor may be another factor that has influence over weed

severity in our fields. Wheat varieties differed significantly in wheat biomass at both locations (Table 5; 6). In general, the wheat dry matter yields were lower than past years; this could be attbributed to the lack of wheat tillering. Interestingly, high biomass wheat varieties at Alburgh were generally not high biomass varieties at Willsboro. This may indicate that some varieties are better adapted to production in the heavy clay soils at Willsboro.

Table 5. Plant heights & weed biomass, Alburgh, VT

Alburgh,VT			
Variety	**Plant height**	**Weeds**	**Wheat biomass**
	inches	1-5 scale	DM lbs ac^{-1}
07SW04	32.5	3.75*	2894
AC Barrie	33.0	4.75	3107
AC Walton	35.6	4.50	3518
Ada	28.3	4.63	2684
Barlow	28.8	4.88	2582
Batiscan	37.3	4.25*	5175*
Brick	32.7	4.13*	4944*
Cabernet	23.0	5.00	2132
Faller	27.5	4.50	4708*
FBC Dylan	29.2	4.00*	3082
Glenn	30.5	4.25*	3877
Helios	33.8	**3.63***	5026*
Howard	27.2	4.50	2960
Jenna	25.2	4.25*	3600
Kaffé	36.1	4.00*	3758
Kelse	28.6	4.75	3525
Kingsey	37.8	4.00*	4619*
Magog	34.9	4.00*	4096
Malbec	25.6	4.38*	4118
McKenzie	34.7	**3.63***	3348
Nick	26.3	5.00	3111
Oklee	27.5	5.00	2816
RB07	27.4	4.75	3031
Red Fife	**40.7***	4.75	3669
Roblin	31.6	4.88	2790
Sabin	27.5	4.75	3428
Steele	28.3	4.75	**5706***
Superb	29.2	4.25*	4973*
Tom	30.7	4.63	3306
Ulen	28.9	4.63	2226
LSD (0.10)	2.47	0.80	1575
Trial Mean	30.7	4.44	3627

Table 6. Plant heights & weed biomass, Willsboro, NY

Willsboro, NY			
Variety	**Plant height**	**Weeds**	**Wheat biomass**
	inches	1-5 scale	DM lbs ac^{-1}
07SW04	29.1	0.88	5870*
AC Barrie	29.6	1.50	4734*
AC Walton	28.2	2.38	3282
Ada	22.7	1.00	4747*
Barlow	25.1	1.25	4929*
Batiscan	**34.5***	0.88	6271*
Brick	28.5	1.75	4816*
Cabernet	17.6	2.25	3051
Faller	24.0	2.00	4141
FBC Dylan	25.8	1.75	**6328***
Glenn	24.1	1.25	4920*
Helios	30.8	1.50	5310*
Howard	21.8	2.13	3733
Jenna	21.4	1.63	5042*
Kaffé	30.0	1.63	4672*
Kelse	24.7	2.50	3129
Kingsey	31.4	1.88	3990
Magog	31.0	1.88	5106*
Malbec	20.9	**0.75**	4769*
McKenzie	29.2	2.00	4043
Nick	20.0	1.88	4610*
Oklee	22.6	2.13	3644
RB07	25.1	1.25	4566*
Red Fife	29.4	2.13	3507
Roblin	28.6	1.75	2675
Sabin	21.1	2.75	2480
Steele	20.9	3.25	2562
Superb	26.0	1.75	4446*
Tom	25.8	1.50	5128*
Ulen	25.1	1.13	5407*
LSD (0.10)	2.30	NS	1894
Trial Mean	25.8	1.74	4397

* Wheat varieties that are not significantly different than the top performing variety in a column are indicated with an asterisk.
NS - None of the varieties were significantly different from one another

Spring Wheat Yield:

At both locations, spring wheat yields were lower than past years. The average yield across locations was just above 1000 lbs ac^{-1}. The highest yielding variety at both locations was Batsican. In Alburgh, it yielded 1382 lbs ac^{-1} and 1864 lbs ac^{-1} in Willsboro (Table 7, 8 and Figure 1, 2). Other top yielding varieties at the Alburgh location included Helios, Kaffé, and Kingsey. The lowest yielding variety was Cabernet, 351 lbs ac^{-1}. The severe weather conditions, weed pressure, and lack of wheat tillering at this location severely impacted grain yields. The other top yielding varieties at the Willsboro location include; Glenn, Brick, and Faller (Table 8 and Figure 2). Red Fife was the lowest yielding in Willsboro 477 lbs ac^{-1}. Bird damage in several of the plots did reduce yields at this location. At harvest, most varieties were at moistures higher than

the desired 14% necessary for storage. In Alburgh, Kingsey had the highest test weight, 56.0 lbs bu^{-1} and in Willsboro Howard had the highest test weight, 58.3 lbs bu^{-1}. In general, the test weights were higher at the Willsboro location. The majority of the varieties from both trial sites reached the optimal 55 to 60 lb bu^{-1} test weight for wheat.

Table 7. Harvest data of the 30 spring wheats, Alburgh, VT

Variety	Harvest moisture	Test weight	Yield @13.5% moisture
	%	lbs bu^{-1}	lbs ac^{-1}
07SW04	16.4	55.3	799
AC Barrie	16.8	55.0	711
AC Walton	17.9*	55.0	847
Ada	16.4	55.9	992
Barlow	17.4	55.9	894
Batiscan	16.8	55.8	**1382***
Brick	17.4	55.3	1102*
Cabernet	**18.1***	55.0	351
Faller	16.7	55.3	965
FBC Dylan	16.8	55.8	796
Glenn	17.2	55.5	730
Helios	17.3	55.5	1353*
Howard	17.1	55.0	708
Jenna	16.9	55.5	1168*
Kaffé	17.5*	52.8	1307*
Kelse	17.2	55.5	834
Kingsey	16.9	**56.0**	1297*
Magog	17.9*	55.5	1013
Malbec	17.2	55.8	979
McKenzie	16.1	55.0	847
Nick	17.6*	55.8	830
Oklee	17.0	55.8	813
RB07	16.1	55.0	695
Red Fife	17.6*	55.6	788
Roblin	16.5	55.0	758
Sabin	16.9	55.8	940
Steele	17.3	55.5	749
Superb	17.6*	55.0	1226*
Tom	17.5*	55.8	1267*
Ulen	16.9	55.3	900
LSD (0.10)	0.63	NS	298
Trial Mean	17.1	55.3	935

Table 8. Harvest data of the 30 spring wheats, Willsboro, NY

Variety	Harvest moisture	Test weight	Yield @13.5% moisture
	%	lbs bu^{-1}	lbs ac^{-1}
07SW04	16.6	57.0*	933
AC Barrie	16.6	57.0*	736
AC Walton	17.8	56.0	534
Ada	14.8	56.8	1579*
Barlow	**20.8**	57.0*	1604*
Batiscan	16.3	56.8	**1864***
Brick	18.8	56.8	1744*
Cabernet	17.0	55.0	597
Faller	18.3	56.3	1634*
FBC Dylan	18.5	56.8	1101
Glenn	15.8	57.5*	1863*
Helios	14.9	58.0*	1165
Howard	17.8	**58.3***	1092
Jenna	16.8	57.3*	1437*
Kaffé	18.6	56.8	1153
Kelse	17.4	57.8*	1006
Kingsey	18.0	57.5*	1243
Magog	18.7	55.0	500
Malbec	12.1	54.6	1223
McKenzie	17.2	57.3*	1593
Nick	17.0	56.0	876
Oklee	19.3	57.0*	1190
RB07	19.8	58.0*	1526*
Red Fife	18.3	55.0	477
Roblin	17.0	57.0*	686
Sabin	19.8	57.0*	863
Steele	19.9	57.0*	882
Superb	18.9	56.8	1536*
Tom	20.6	58.0*	1627*
Ulen	17.6	57.0*	1532*
LSD (0.10)	NS	1.37	440
Trial Mean	17.7	56.8	1193

* Wheat varieties that are not significantly different than the top performing variety in a column are indicated with an asterisk.
NS - None of the varieties were significantly different from one another

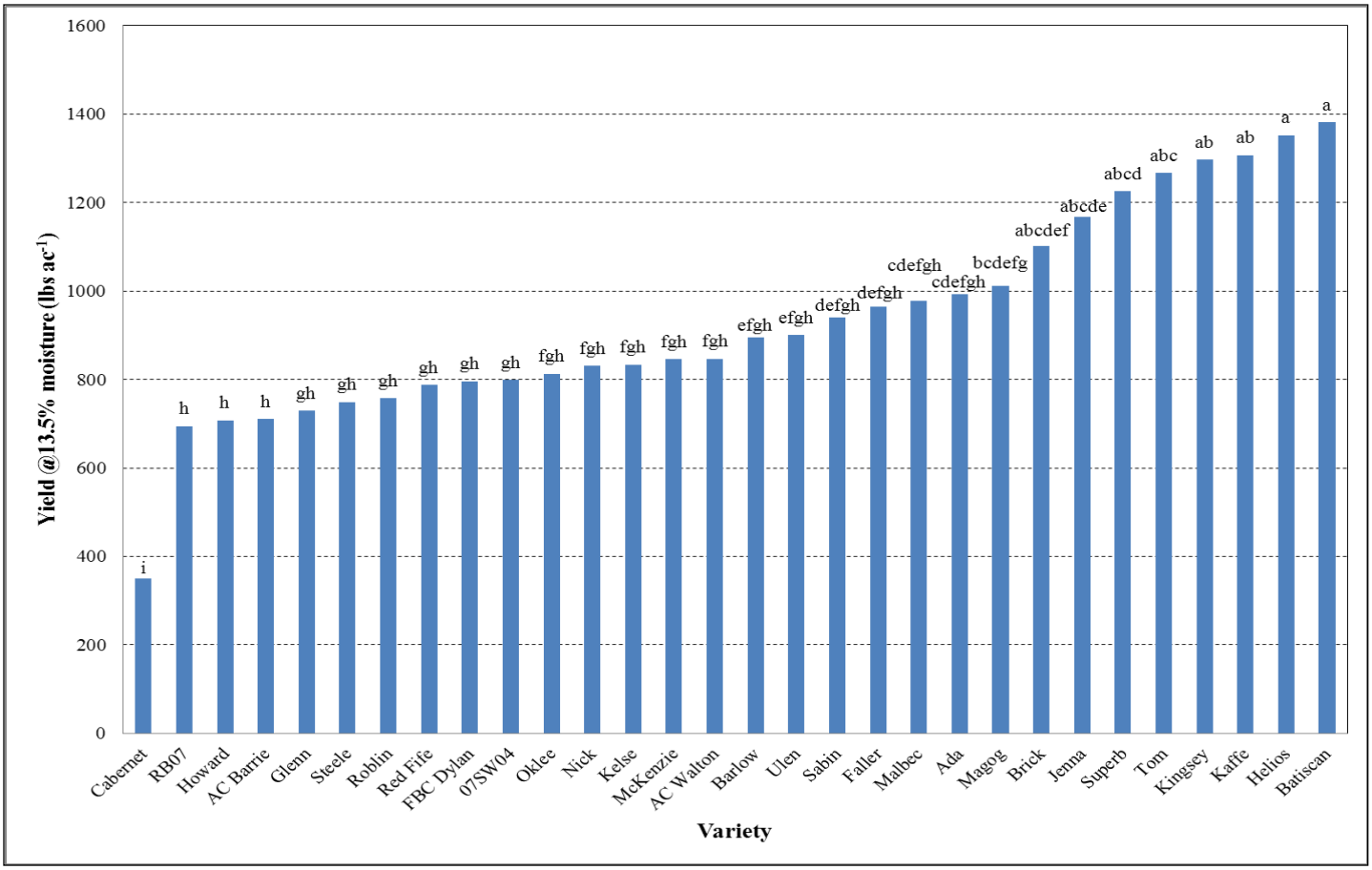

Figure 1. Yields of 30 spring wheat varieties, Alburgh, VT
*Varieties with the same letter did not differ significantly in yield.

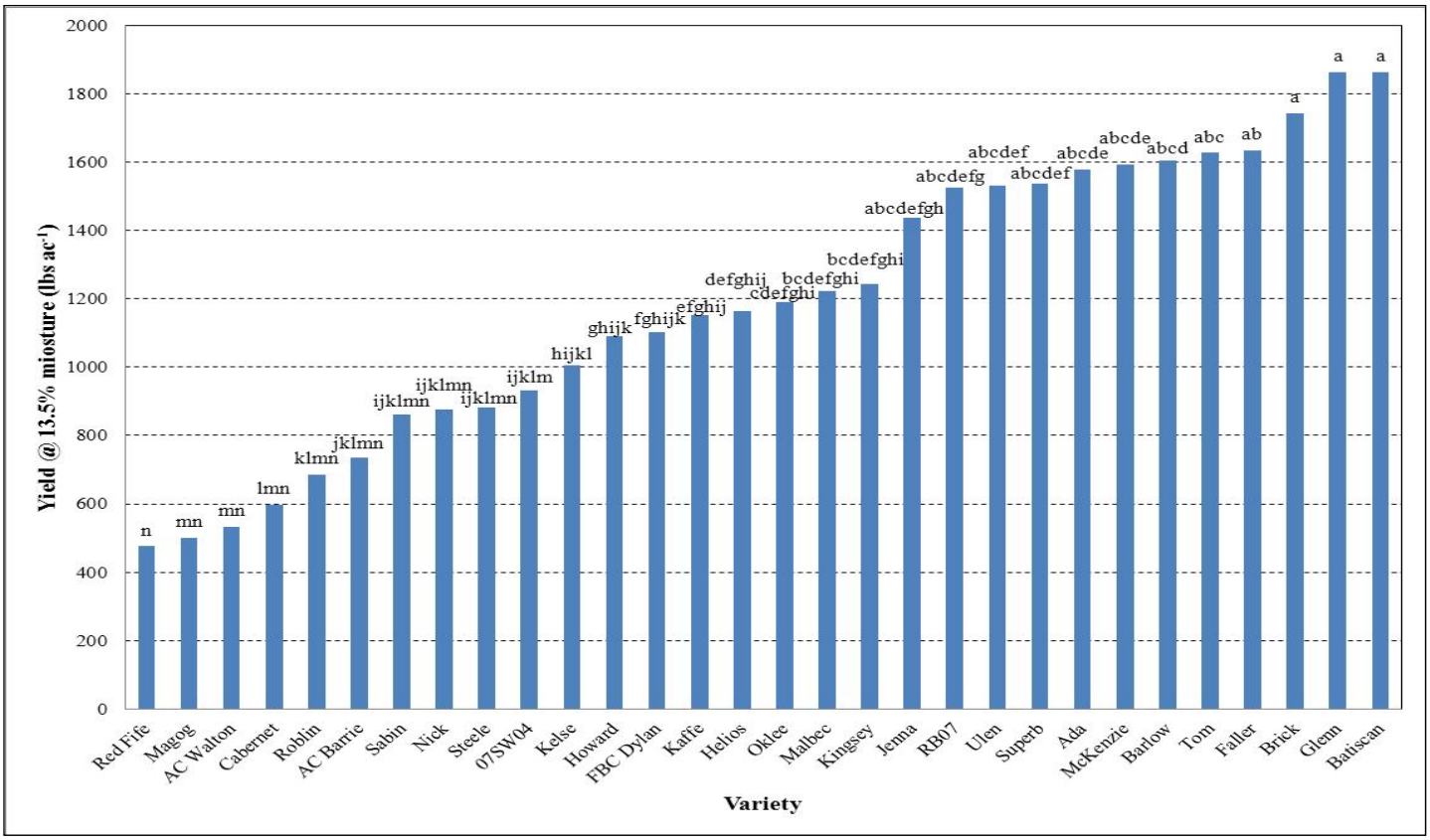

Figure 2. Yields of 30 spring wheat varieties, Willsboro, NY
*Varieties with the same letter did not differ significantly in yield.

Spring Wheat Quality:

The common measures used by commerial mills to evaluate wheat quality are: grain protein, falling number, test weight, and mycotoxin (DON) content. In Alburgh, the variety with the highest protein content was Roblin, 14.7% (Table 9 and Figure 3). Other high protein varieties at this location were Helios and Kelse. In Willsboro, 07SW04 had the highest protein level at 16.6 (Table 10 and Figure 4). Roblin was another high protein variety at this location. In Alburgh O7SW04 had the highest falling number, 413 seconds, and in Willsboro Ada and Helios had the highest at 473 seconds. Both Ada and Helios were amoung the varieties with highest falling numbers at the Alburgh site as well. The variety with the lowest falling number for both locations was Nick, indicating sprout damage. Almost every variety had acceptable protein and falling number levels based on mill standards.

Table 9. Quality analyses of the 30 spring wheat vareities, Alburgh, VT

Variety	Crude protein @ 12% moisture	Falling number @ 14% moisture	DON
	%	seconds	ppm
07SW04	13.4	**413***	0.18*
AC Barrie	13.4	379*	0.30*
AC Walton	12.1	312	0.23*
Ada	12.1	409*	0.23*
Barlow	12.4	313	0.48
Batiscan	11.0	228	0.30*
Brick	13.7	282	0.25*
Cabernet	13.0	287	0.38
Faller	10.9	332	0.25*
FBC Dylan	12.4	345	0.30*
Glenn	12.6	323	0.25*
Helios	14.1*	384*	0.18*
Howard	12.0	344	0.23*
Jenna	13.2	232	0.15*
Kaffé	11.5	235	0.35
Kelse	14.4*	319	0.60
Kingsey	11.2	379*	0.20*
Magog	13.0	362	0.15*
Malbec	13.2	296	0.45
McKenzie	12.0	375	0.15*
Nick	11.9	66	1.65
Oklee	13.5	310	0.48
RB07	12.4	298	0.23*
Red Fife	12.6	300	**0.13***
Roblin	**14.7***	265	0.55
Sabin	13.1	332	0.15*
Steele	13.3	310	0.33*
Superb	13.4	343	0.35
Tom	13.2	380*	0.18*
Ulen	13.1	272	0.33*
LSD (0.10)	1.00	35.6	0.22
Trial Mean	12.7	314	0.33

Table 10. Quality analyses of the 30 spring wheat vareities, Willsboro, NY

Variety	Crude protein @ 12% moisture	Falling number @ 14% moisture	DON
	%	seconds	ppm
07SW04	**16.6***	431	0.08
AC Barrie	15.3	441	0.03
AC Walton	15.0	345	**0.00**
Ada	14.2	**473***	0.05
Barlow	15.3	390	0.03
Batiscan	11.9	315	0.03
Brick	15.5	353	0.03
Cabernet	14.1	373	0.10
Faller	13.9	393	0.05
FBC Dylan	13.8	460*	0.03
Glenn	15.6	386	0.05
Helios	14.3	**473***	0.05
Howard	14.7	378	0.05
Jenna	13.9	401	0.03
Kaffé	12.9	233	0.13
Kelse	15.4	394	0.13
Kingsey	13.1	405	0.08
Magog	15.0	432	0.03
Malbec	13.8	410	0.13
McKenzie	14.0	412	0.03
Nick	12.1	132	0.10
Oklee	14.8	387	0.05
RB07	14.3	398	0.10
Red Fife	14.4	359	0.05
Roblin	15.8*	381	0.03
Sabin	14.5	437	0.10
Steele	15.2	378	0.13
Superb	14.5	415	0.03
Tom	14.7	445*	0.05
Ulen	14.6	372	0.05
LSD (0.10)	0.75	30.5	NS
Trial Mean	14.4	387	0.06

* Wheat that did not perform significantly lower than the top performing variety in a particular column are indicated with an asterisk.
NS - None of the varieties were significantly different from one another

In the Northeast, *Fusarium* head blight is predominantly caused by the species *Fusarium graminearum*. This disease is very destructive and causes yield loss, low test weights, low seed germination and contamination of grain with

mycotoxins. A vomitoxin called deoxynivalenol (DON) is considered the primary mycotoxin associated with FHB. The spores are usually transported by air currents and can infect plants at flowering through grain fill. Eating contaminated grain, >1ppm, poses a health risk to both humans and livestock. Nick at the Alburgh location was the only variety with DON levels above 1ppm, all others from both sites were below the FDA's 1ppm limit. Even though we had a very wet spring, the weather conditions during flowering were warm and dry.

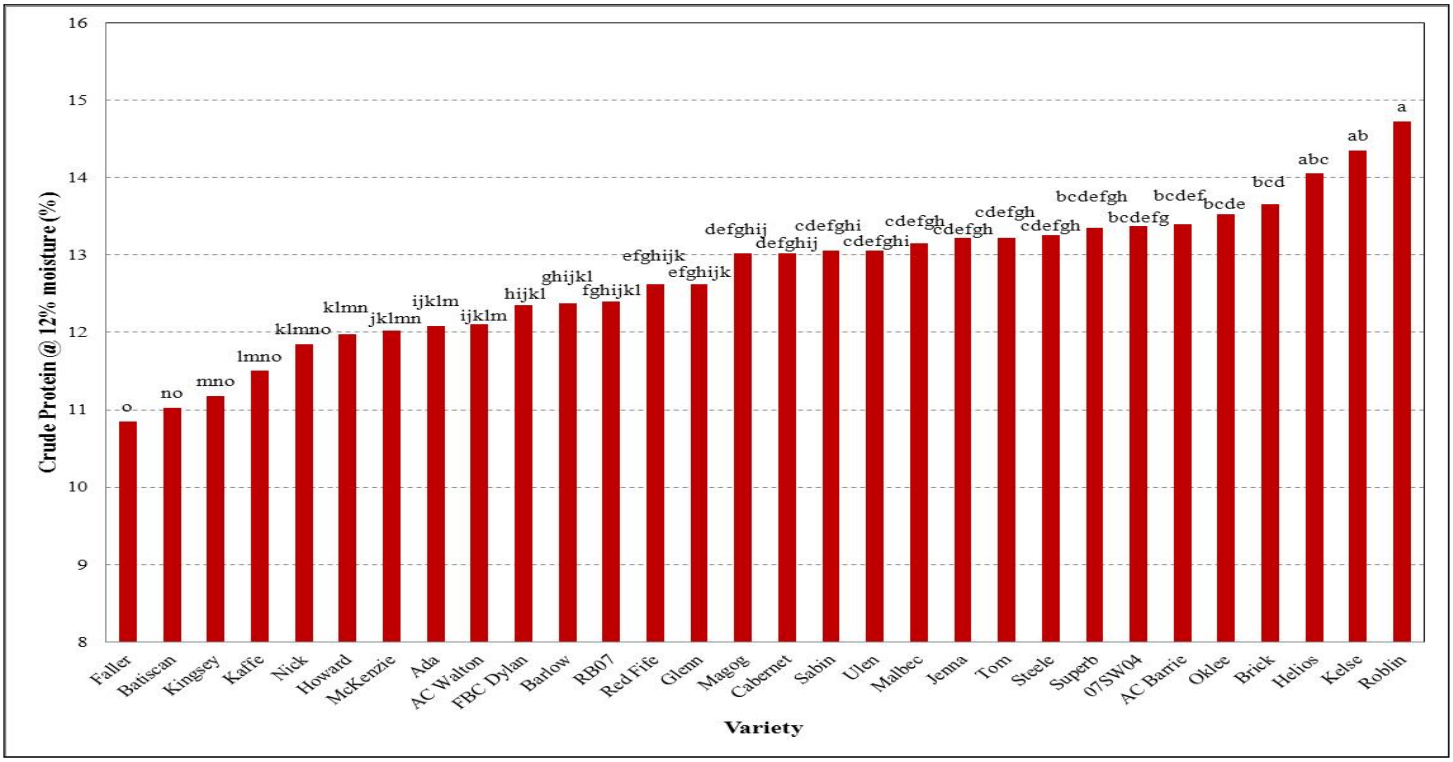

Figure 3. Crude protein of 30 spring wheat varieties, Alburgh, VT
*Varieties with the same letter did not differ significantly in protein content.

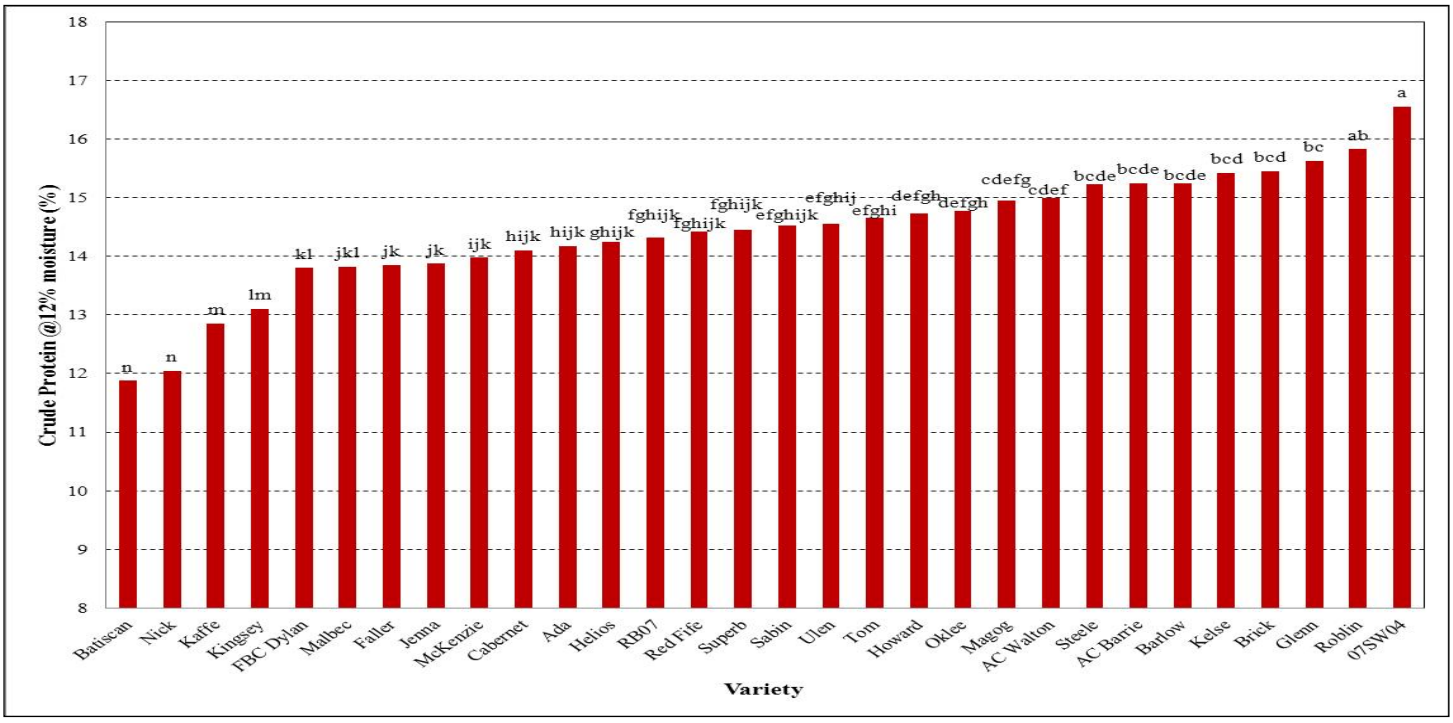

Figure 4. Crude protein of 30 spring wheat varieties, Willsboro, NY
*Varieties with the same letter did not differ significantly in protein content.

DISCUSSION

It is important to remember that the results only represent one year of data. The extreme weather conditions during the 2011 growing season affected both yield and quality in both locations. The heavy rains in the early spring cause delayed planting and soil crusting which delayed plant emergence. This delay allowed the weeds a competitive advantage over the wheat. Even with tineweeding the plots, the high weed pressure at the Alburgh location severely impacted yield. In many cases varieties yielded half as much as compared to the same varieties in Willsboro. It's difficult to make any direct correlations between the two sites since the Alburgh plots were so severely impacted by weeds. While the weeds were not as severe in Willsboro the birds were, several plots were severely damaged by turkeys which decreased yields. The wheat at both locations produced very few tillers, this could be attributed to the soil crusting during plant emergence, soil temperature, lack of nutrients, or other environmental stresses. In general the protein levels were lower than 2010 levels at the Alburgh location possibly do to nitrogen loss from the heavy rains this spring. Interestingly, at the Willsboro site protein levels didn't appear to be as impacted as compared to 2010 results. This could be attributed to the higher level of organic N in the soil from the plow down sod compared to composted poultry manure and topdressed Pro-Gro (5-3-4) applied in Alburgh. It's interesting to note that DON levels were much lower than in 2010. This could be attributed to the later planting date which delayed wheat flowering by a couple of weeks when the environmental conditions were warm and dry. Across both sites, the variety Batsican was top yielding variety but did not rank the highest in quality. Batsican may be best utilized for low protein baking needs or as animal feed. Even though the yields were reduced, there were many varieties that met the high baking quality standards. Varieties such as Helios, Superb, and Jenna were both high yield and quality. It is important, as you make variety choices on your farm, that you evaluate data from test sites that are as similar to your region as possible.

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