2012

Spring Wheat Variety Trial

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NW CROPS & SOILS PROGRAM

UNIVERSITY OF VERMONT EXTENSION
CULTIVATING HEALTHY COMMUNITIES

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The UNIVERSITY of VERMONT EXTENSION

2012 SPRING WHEAT VARIETY TRIAL

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In April of 2012, the University of Vermont Extension, in collaboration with the University of Maine, began the third 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. Several varieties that did not perform well in previous trial years were eliminated from the 2012 variety trials. 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 a 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.

Spring Wheat Varieties	Type†	Origin and Release Year‡	Seed Source
07SW04	HR	Western Canada	Semican, Canada
AC Barrie	HR	AAFC, Saskatchewan, 1994	Semences RDR, Canada
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 Foundation Seed
Brick	HR	SDAES, 2000	North Dakota Foundation Seed
Faller	HR	NDAES, 2007	Albert Lea Seed House, MN
FBC Dylan	HR	NPSAS/FBC, 2006	2011 Saved trial seed, ME
Fortuna	HR	NDSU, 1966	O.J. Lougheed, WA
Glenn	HR	NDAES, 2005	North Dakota Foundation Seed, ND
Helios	HR	AAFC, Saskatchewan, 2007	2011 Saved trial seed, VT
Jenna	HR	Agripro Syngenta, 2009	2011 Saved trial seed, VT
Kaffé	SW	Semican, Canada	2011 Saved trial seed, VT
Kyle	AD	AAFC, Saskatchewan, 1984	O.J. Lougheed, WA
Magog	HR	Semican Inc.	Semican Atlantic Inc., Canada
McKenzie	HR	SWP/ARD, Saskatchewan, 1997	Semican, Canada
Oklee	HR	MAES, 2003	Minnesota Foundation Seed
RB07	HR	MAES, 2007	Minnesota Foundation Seed
Red Fife	HR	Heritage var., ca. 1860	Ehnes Organic Seed Cleaning Ldt., Canada
Roblin	HR	ACRS, Winnipeg, 2001	2011 Saved trial seed, ME
Sabin	HR	MAES, 2009	Minnesota Foundation Seed
Steele	HR	NDAES, 2004	Albert Lea Seed House, MN
Superb	HR	AAFC, Winnipeg, 2001	Oliver Seed Co., VT
Sy Soren	HR	Agripro Syngenta, 2011	Albert Lea Seed House, MN
Tom	HR	MAES, 2008	Minnesota Foundation Seed
Ulen	HR	MAES, 2005	Minnesota Foundation Seed

† HR = hard red, SW = soft white, AD = Amber Durum ‡ Year of release was not always available. Abbreviations: 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, NPSAS = Northern Plains Sustainable Agriculture Society, PEI = Prince Edward Island, SDAES = South Dakota Agricultural Experiment Station, NDSU = North Dakota State University, SWP = Saskatchewan Wheat Pool, ARD = Agricultural Research and Development.

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 no-till sunflowers. In March 2012, the field was disked and spike-toothed harrowed to prepare for planting. The plots in Alburgh were seeded with a Kincaid Cone Seeder on 6-Apr (Image 1) at seeding rate of 350 live seeds per square meter. Plot size was 6' x 20'. At the Willsboro location, planting of the spring wheat followed a 3 year crop of alfalfa/timothy sod. The sod was plowed in August 2010 and fallow prior to planting. The field was dragged twice during the fallow period to eliminate any remaining alfalfa and perennial grasses. In April 2012, the field was disked and spike-toothed harrowed to prepare for planting. The plots were seeded on 13-Apr with a custom made eight-row cone planter at 350 live seeds per square meter. Plot size was 6' x 16.5'.

Table 2. General plot management of the wheat trials.

Trial Information	**Spring wheat variety trial**	
Location	Alburgh, VT Borderview Research Farm	Willsboro, NY Willsboro Research Farm
Soil type	Benson rocky silt loam	Kingsbury silt clay loam
Previous crop	Sunflowers	Timothy/Alfalfa Sod
Row spacing (in)	6	6
Seeding rate (live seed/m^2)	350	350
Replicates	4	4
Planting date	6-Apr	13-Apr
Harvest date	31-Jul	8-Aug
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

Population and vigor were measured on 16-May in Alburgh and 17-May in Willsboro. Populations were determined by taking two, 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. The flowering dates were approximated to the week of flowering. Throughout the growing season other pertinent observations such as disease and wheat development were recorded.

Image 1. Planting the spring wheat trial in Westfield, VT.

Grain plots were harvested at the Alburgh site with an Almaco SPC50 plot combine on 31-Jul, the harvest area was 5' x 20'. In Willsboro, plots were harvested on 8-Aug with a Hege plot combine; the plot area harvested was 4'x 13'. At the time of harvest, plant heights were measured excluding the awns. A visual estimate of what percent a plot was lodged and the severity of lodging was recorded based on a visual rating with a 0 – 5 scale, where 0 indicates no lodging and 5 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 12-15% protein. Protein was calculated on a 12% moisture and 14% moisture basis. The determination of falling number (AACC Method 56-81B, AACC Intl., 2000) was measured on the Perten FN 1500 Falling Number Machine (Image 2). 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 350 indicate low enzymatic activity and sound quality wheat. A falling number lower than 200 indicates high enzymatic activity and poor quality wheat. Deoxynivalenol (DON) analysis was analyzed using Veratox DON 5/5 Quantitative 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.

Image 2. Falling number apparatus, Burlington, VT.

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.

LEAST SIGNIFICANT DIFFERENCE (LSD)

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 2012 sites are shown in Table 3. The growing season this year was marked by higher than normal temperatures and less than normal rainfall, especially in the months of June, July, and August. From April to July there was an accumulation of 3547 Growing Degree Days (GDDs), in Alburgh which is 195 GDDs higher than the 30 year average. In Willsboro, from April through August, there were 4106 accumulated GDDs, which is 628 more GDDs than the long-term average.

Table 3. Temperature and precipitation summary for Alburgh, VT and Willsboro, NY, 2012.

Alburgh, VT	April	May	June	July
Average Temperature (F)	44.9	60.5	67.0	71.4
Departure from Normal	0.10	4.10	1.20	0.80
Precipitation (inches) *	2.64	3.90	3.22	3.78
Departure from Normal	-0.18	0.45	-0.47	-0.37
Growing Degree Days (base 32)	396	884	1046	1221
Departure from Normal	12.0	128	32.0	23.0

Based on weather data from Davis Instruments Vantage pro2 with Weatherlink data logger.
Historical averages for 30 years of NOAA data (1981-2010).
* Precipitation data from June-September 2012 is based on Northeast Regional Climate Center data from an observation station in Burlington, VT.

Willsboro, NY	April	May	June	July	August
Average Temperature (F)	46.1	61.6	67.8	73.0	72.0
Departure from Normal	1.3	5.2	2.0	2.4	3.2
Precipitation (inches)	2.8	4.4	3.2	3.8	2.9
Departure from Normal	0.0	0.9	-0.5	-0.4	-1.0
Growing Degree Days (base 32)	411	435	917	1072	1271
Departure from Normal	285	51	161	58	73

Based on Northeast Region Climate Center data from observation stations in Burlington, VT.
Historical averages for 30 years of NOAA data (1981-2010).

Spring Wheat Growth and Development:

During the 2012 growing season, several observations and measurements were recorded on spring wheat development. The flowering date was recorded when at least 50% of the plot was in bloom for each of the varieties (Table 4). The majority of the varieties at the Alburgh location were in full bloom by 18-Jun and in Willsboro by 22-Jun. Planting at the Willsboro site was a week later than in Alburgh causing a slight delay in wheat flowering. In general, there was minimal bird damage in Alburgh. However, moderate turkey damage was observed in several plots at the Willsboro location. Several varieties in Alburgh were observed to have lodged in varying degrees. Two varieties, Helios and Sabin were the most severely lodged at this site, and Fortuna and Kyle were noted to have lodged at the Willsboro site. Overall, weed pressure at both locations was minimal.

Table 4. The approximate flowering dates of spring wheat in Alburgh, VT and Willsboro, NY.

Variety	Alburgh, VT Flowering Date	Willsboro, NY Flowering Date
07SW04	18-Jun	22-Jun
AC Barrie	25-Jun	22-Jun
AC Walton	25-Jun	28-Jun
Ada	18-Jun	22-Jun
Barlow	18-Jun	13-Jun
Brick	11-Jun	13-Jun
Faller	18-Jun	22-Jun
FBC Dylan	18-Jun	22-Jun
Fortuna	18-Jun	22-Jun
Glenn	18-Jun	22-Jun
Helios	18-Jun	22-Jun
Jenna	25-Jun	22-Jun
Kaffé	25-Jun	22-Jun
Kyle	18-Jun	22-Jun
Magog	25-Jun	22-Jun
McKenzie	18-Jun	22-Jun
Oklee	18-Jun	13-Jun
RB07	18-Jun	22-Jun
Red Fife	25-Jun	22-Jun
Roblin	11-Jun	13-Jun
Sabin	18-Jun	22-Jun
Steele	18-Jun	22-Jun
Superb	25-Jun	22-Jun
Sy Soren	18-Jun	22-Jun
Tom	18-Jun	22-Jun
Ulen	11-Jun	13-Jun

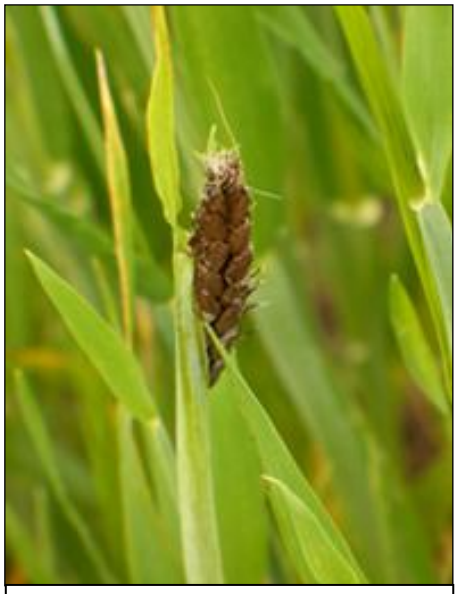

Image 3. Loose smut infected grain head, Alburgh, VT.

Image 4. Bleached wheat head, Willsboro, NY.

Loose smut caused by the fungus, *Ustilago tritici*, was observed at both locations. At the Alburgh location, nine varieties (Ada, Barlow, Faller, Glenn, Kaffé, Oklee, Steele, Roblin, and Red) had infected plants, and in Willsboro loose smut was found in the varieties AC Superb, Glenn, Faller, Roblin, Steele, and Tom (Image 3). 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.

There were several observations of bleached grain heads in many of the plots in Willsboro which is associated with the presence of *Fusarium* head blight (Image 4). In the Northeast, *Fusarium* head blight (FHB) 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 greater than 1ppm poses a health risk to both humans and livestock.

Plant heights were significantly different among varieties at both locations (Table 5 and Image 5). Red Fife was the tallest variety at both trial sites, measuring 47.1 inches in Alburgh and 41.9 inches in Willsboro. Other tall varieties in Willsboro were Fortuna and Kyle. Interestingly, these were the two varieties that were observed to have lodged at this location. Red Fife, an heirloom variety, was not observed to have severly lodged at either trial sites.

Image 5. Maturing spring wheat in Alburgh, VT.

Image 6. Harvesting wheat plots in Alburgh, VT.

Table 5. Plant heights in Alburgh, VT and Willsboro, NY.

Variety	Alburgh, VT **Plant height**	Willsboro, NY **Plant height**
	inches	inches
07SW04	41.2	37.7
AC Barrie	40.3	36.9
AC Walton	42.8	39.2
Ada	30.4	30.5
Barlow	35.9	34.6
Brick	38.9	36.1
Faller	33.5	33.7
FBC Dylan	37.3	31.9
Fortuna	36.8	41.2*
Glenn	37.5	36.4
Helios	38.5	39.7
Jenna	31.7	28.1
Kaffé	44.8*	37.9
Kyle	41.8	40.5*
Magog	41.9	39.4
McKenzie	35.5	37.8
Oklee	33.5	30.8
RB07	32.7	31.9
Red Fife	**47.1***	**41.9***
Roblin	41.0	37.6
Sabin	34.7	30.1
Steele	35.1	32.4
Superb	38.3	35.4
Sy Soren	31.2	28.5
Tom	34.0	32.5
Ulen	35.1	31.2
LSD (0.10)	2.97	1.73
Trial Mean	37.3	35.1

Values shown in bold are of the highest value or top performing.
*Wheat varieties that are not significantly different than the top performing variety in a column are indicated with an asterisk.

Spring Wheat Yields:

The 2012 yields were higher than those in 2011 (Image 6). The average yield across sites was ~3400 lbs ac^{-1}. The highest yielding variety in Alburgh was Sy Soren (4294 lbs ac^{-1}) and in Willsboro, Barlow (3989 lbs ac^{-1}) yielded the highest (Table 6, 7 and Figure 1, 2). Other top yielding varieties at the Alburgh location included Tom, Magog, Faller, Kaffé, Jenna, RB07, Ulen and Ada. In Willsboro, additional top yielders were Helios, Faller, Glenn, RB07, Kyle, Sy Soren, Tom, AC Walton and Brick. The lowest yielding variety in Alburgh was McKenzie (2191 lbs ac^{-1}) and in Willsboro, AC Barrie (2755 lbs ac^{-1}) and Oklee (2757 lbs ac^{-1}) yielded the lowest. The variety with the lowest moisture at the time of harvest was Roblin (9.68%) in Alburgh. All the varieties at the Alburgh site had harvest moistures below 14%. The lowest moisture at the Willsboro trial site was AC Barrie (15.1%). All of the varieties harvested in Willsboro had to be dried down to below 14% moisture, necessary for optimal grain storability. In Alburgh, Glenn had the highest test weight of 64.1 lbs bu^{-1} and in Willsboro, Barlow had the highest test weight of 60.0 lbs bu^{-1}. All of the varieties from both trial sites reached or were above the optimal 56 to 60 lb bu^{-1} test weight for wheat.

Table 6. Harvest data of the 26 spring wheat, Alburgh, VT.

Variety	Harvest moisture	Test weight	Yield @13.5% moisture
	%	lbs bu^{-1}	lbs ac^{-1}
07SW04	10.4*	61.0	3592
AC Barrie	11.8	60.8	3022
AC Walton	13.0	56.6	3339
Ada	11.8	61.8	3733*
Barlow	12.8	61.1	3609
Brick	11.9	61.6	3578
Faller	11.4	60.8	3998*
FBC Dylan	11.5	60.9	3168
Fortuna	11.3	59.3	2706
Glenn	12.6	**64.1***	3260
Helios	10.5*	60.0	3156
Jenna	12.0	60.5	3865*
Kaffé	11.2	59.9	3919*
Kyle	13.2	60.3	2843
Magog	12.1	60.6	4048*
McKenzie	11.4	61.0	2191
Oklee	12.0	61.3	3131
RB07	10.9	59.6	3776*
Red Fife	11.7	60.9	2604
Roblin	**9.68***	59.4	3026
Sabin	11.1	59.4	2666
Steele	11.6	61.9	3367
Superb	12.1	61.1	3658
Sy Soren	11.2	61.5	**4294***
Tom	12.7	61.5	4159*
Ulen	10.8	60.5	3755*
LSD (0.10)	1.03	0.90	592
Trial Mean	11.6	60.7	3402

Table 7. Harvest data of the 26 spring wheat, Willsboro, NY.

Variety	Harvest moisture	Test weight	Yield @13.5% moisture
	%	lbs bu^{-1}	lbs ac^{-1}
07SW04	16.0*	58.6	3263
AC Barrie	**15.1***	59.1*	2755
AC Walton	16.9	56.6	3669*
Ada	15.2*	59.9*	3488
Barlow	17.2	**60.0***	**3989***
Brick	17.1	58.9*	3582*
Faller	16.3	58.4	3981*
FBC Dylan	15.8*	58.6	3227
Fortuna	16.5	58.9*	3319
Glenn	17.0	59.5*	3864*
Helios	16.4	58.0	3976*
Jenna	16.2	57.8	3453
Kaffé	17.4	57.3	3568*
Kyle	18.3	58.9*	3687*
Magog	16.8	58.8*	3351
McKenzie	15.7*	57.1	3472
Oklee	16.2	57.8	2757
RB07	16.4	57.3	3774*
Red Fife	17.1	58.8*	2937
Roblin	15.3*	57.6	3455
Sabin	16.1	57.1	2882
Steele	16.0	57.9	3260
Superb	16.5	58.0	3363
Sy Soren	15.7*	59.4*	3513*
Tom	16.4	59.1*	3600*
Ulen	15.6*	58.6	2817
LSD (0.10)	0.85	1.30	489
Trial Mean	16.3	58.4	3423

Values shown in bold are of the highest value or top performing.

* Wheat varieties that are not significantly different than the top performing variety in a column are indicated with an asterisk.

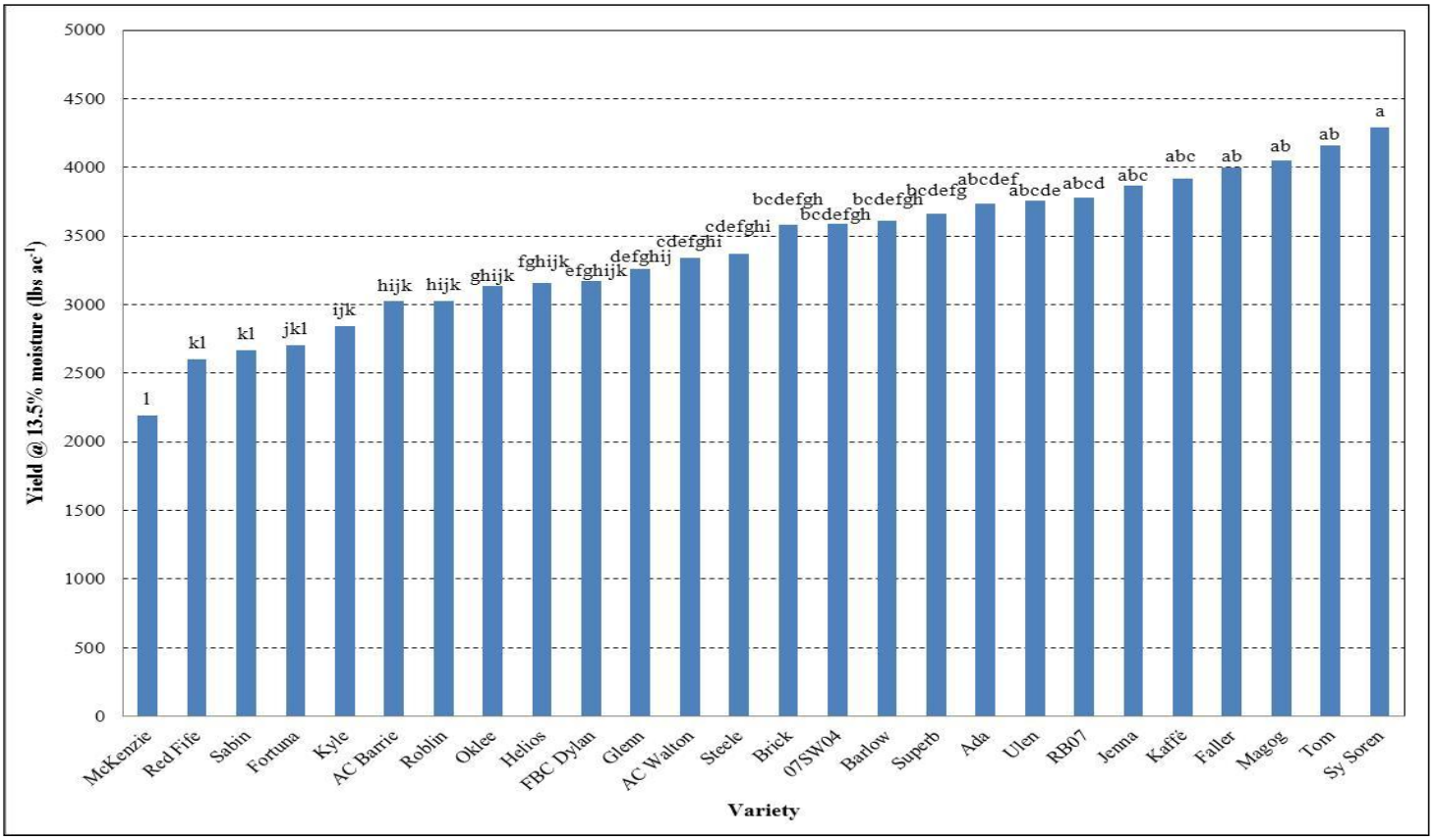

Figure 1. Yields of 26 spring wheat varieties, Alburgh, VT.
Varieties with the same letter did not differ significantly in yield.

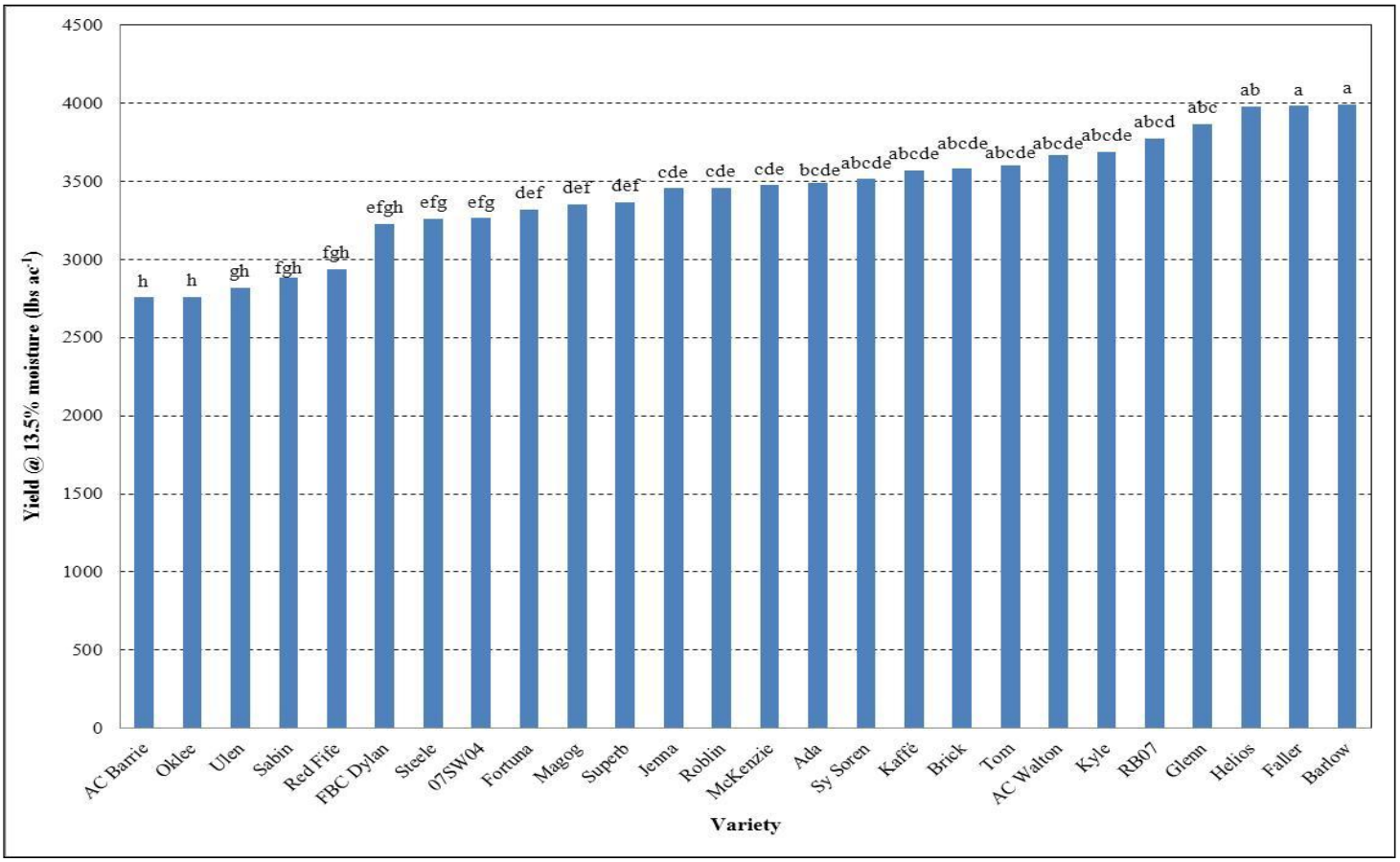

Figure 2. Yields of 26 spring wheat varieties, Willsboro, NY.
Varieties with the same letter did not differ significantly in yield.

Spring Wheat Quality:

The common measures used by commercial mills to evaluate wheat quality are: grain protein, falling number, test weight, and mycotoxin (DON) content. The variety with the highest protein content at both locations was Roblin, 15.7% in Alburgh and 15.1% in Willsboro (Table 8, 9 and Figure 3, 4). Another high protein variety at both trial sites was 07SW04. All varieties at the Alburgh location had protein levels that met or exceeeded industry standards of 12-14% . Most of the protein levels from the Willsboro locations met industry standards. All of the falling numbers in both locations were above 250 seconds. The highest falling number in Alburgh was Helios (485 seconds) and in Willsboro, Sabin had the highest falling number (483 seconds). Other varieties from both locations with high falling numbers were 07SW04, Ada, FBC Dylan, Kyle, and Magog. Almost every variety had acceptable protein and falling number levels based on mill standards. Kyle 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.

Table 8. Quality analyses of the 26 spring wheat varieties, Alburgh, VT.

Variety	Crude protein @ 12% moisture	Crude protein @ 14% moisture	Falling number @ 14% moisture	DON
	%	%	seconds	ppm
07SW04	15.0*	14.7*	461*	0.18*
AC Barrie	15.1*	14.7*	453	0.20*
AC Walton	13.8	13.5	434	0.15*
Ada	13.0	12.7	464*	0.35*
Barlow	14.1	13.8	399	0.63
Brick	14.0	13.6	410	0.45*
Faller	12.9	12.6	432	**0.13***
FBC Dylan	13.6	13.3	479*	0.63
Fortuna	14.1	13.8	408	0.55
Glenn	14.9	14.6*	379	0.20*
Helios	14.3	14.0	**485***	0.45*
Jenna	13.9	13.6	422	0.23*
Kaffé	12.0	11.7	374	0.28*
Kyle	13.7	13.4	467*	1.03
Magog	13.1	12.8	464*	0.18*
McKenzie	13.1	12.8	421	0.38*
Oklee	14.6	14.3	425	0.70
RB07	13.7	13.4	401	0.55
Red Fife	13.6	13.3	377	0.28*
Roblin	**15.7***	**15.3***	389	0.53
Sabin	13.6	13.2	468*	0.38*
Steele	13.9	13.5	410	0.60
Superb	13.4	13.1	433	0.65
Sy Soren	14.1	13.8	432	0.43*
Tom	14.4	14.0	450	0.28*
Ulen	14.1	13.8	393	0.68
LSD (0.10)	0.75	0.73	29.0	0.40
Trial Mean	13.9	13.6	428	0.42

Table 9. Quality analyses of the 26 spring wheat varieties, Willsboro, NY.

Variety	Crude protein @ 12% moisture	Crude protein @ 14% moisture	Falling number @ 14% moisture	DON
	%	%	seconds	ppm
07SW04	14.3*	14.0*	462*	0.28
AC Barrie	12.7	12.5	447	0.23
AC Walton	12.1	11.8	431	0.15
Ada	12.5	12.2	481*	0.25
Barlow	12.9	12.6	395	0.23
Brick	12.7	12.4	357	0.15
Faller	11.4	11.1	417	0.15
FBC Dylan	11.4	11.2	476*	0.15
Fortuna	12.7	12.5	440	0.08
Glenn	14.1	13.7	393	0.55
Helios	12.6	12.3	465*	0.33
Jenna	11.7	11.5	371	0.13
Kaffé	11.1	10.8	322	0.25
Kyle	11.8	11.5	452*	0.28
Magog	12.6	12.3	474*	0.03
McKenzie	11.9	11.6	407	0.30
Oklee	12.9	12.6	432	0.23
RB07	12.3	12.0	377	0.50
Red Fife	12.5	12.2	359	**0.00**
Roblin	**15.1***	**14.8***	382	0.20
Sabin	11.6	11.3	**483***	0.83
Steele	12.4	12.2	408	0.18
Superb	13.0	12.7	400	0.28
Sy Soren	13.3	13.0	430	0.18
Tom	12.7	12.4	448	0.20
Ulen	12.3	12.0	375	0.20
LSD (0.10)	0.82	0.81	31.8	NS
Trial Mean	12.6	12.3	419	0.24

Values shown in bold are of the highest value or top performing.

* 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.

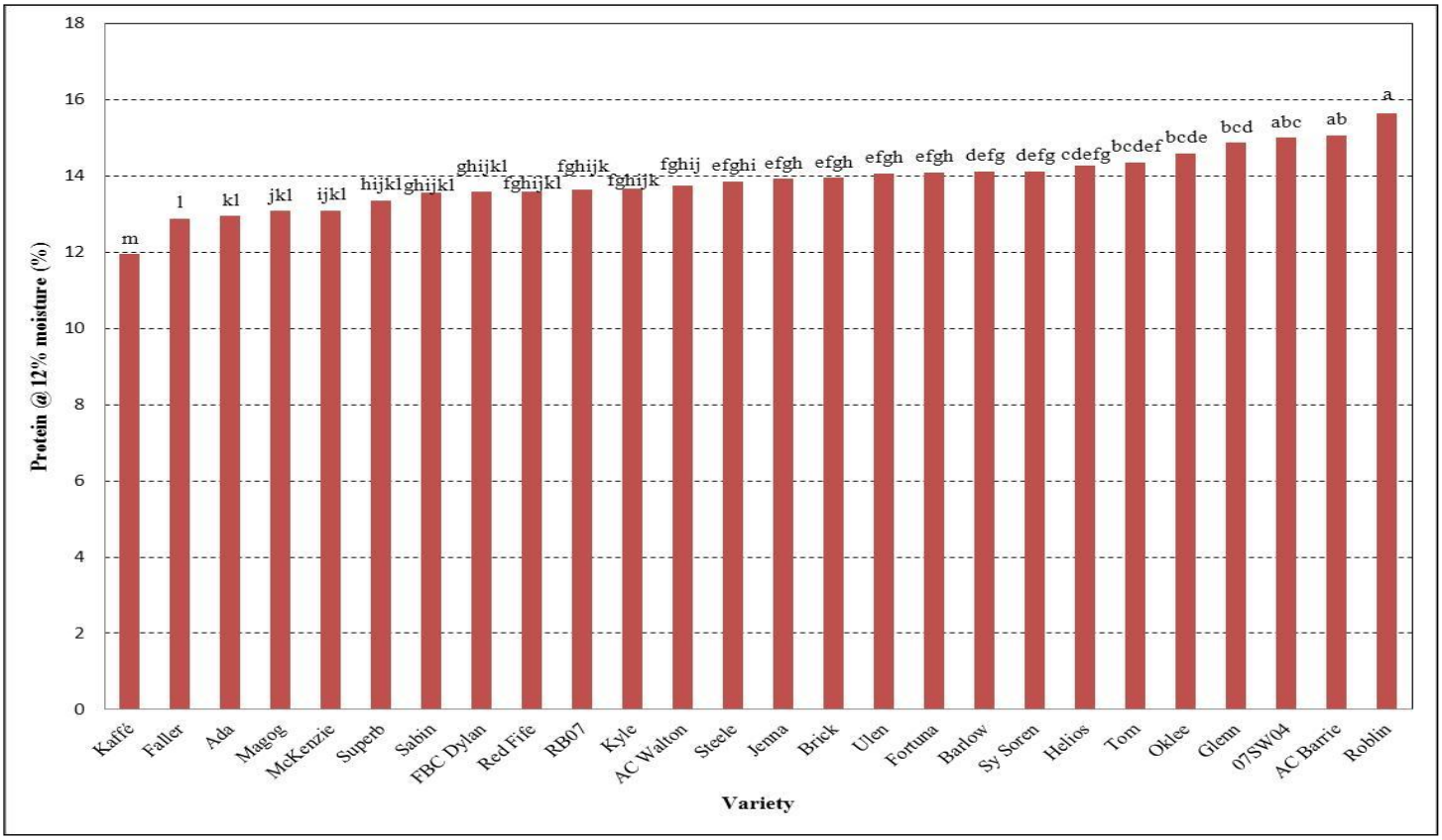

Figure 3. Crude protein of 26 spring wheat varieties, Alburgh, VT.
Varieties with the same letter did not differ significantly in protein content.

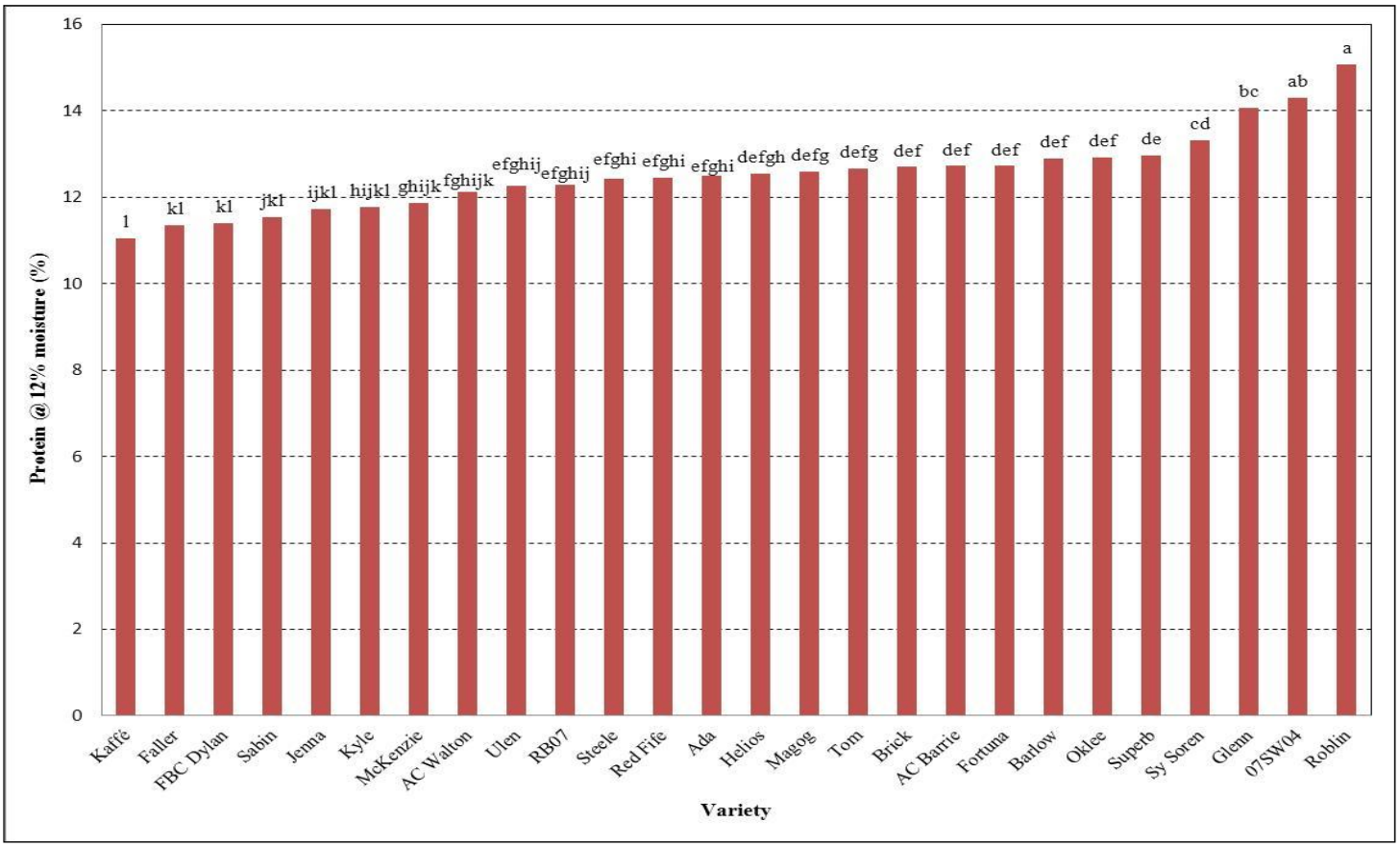

Figure 4. Crude protein of 26 spring wheat varieties, Willsboro, NY.
Varieties with the same letter did not differ significantly in protein content.

DISCUSSION

It is important to remember that the results only represent one year of data. The 2012 growing season was essentially the ideal weather for growing spring wheat. The warm temperatures in March dried the fields out allowing plowing, seedbed prep and planting to occur two weeks earlier than in 2011. As a result, the wheat matured earlier and therefore, the trials were harvested over two weeks before they were 2011. The low weed pressure could also be attributed to the earlier planting date as well. There was a slight issue at the Alburgh site with volunteer sunflowers, which had to be removed by hand. Even with the dry conditions this season, loose smut continues to be an issue in the spring wheat trials. This could be partially attributed to planting saved seed from the 2011 growing season. There was more lodging observed at both locations this year than in 2011. This could be attributed to the slow release of nitrogen from the plow down sod along with the dry conditions reducing nitrogen leaching. This would have provided more nitrogen availability for the plant uptake and increased plant growth. The two varieties, Kyle and Fortuna, were among the tallest varieties in Willsboro and both were observed to have lodged, yet their yields did not appear to have been impacted. However, the two varieties in Alburgh which severely lodged, Helios and Sabin, were difficult to harvest and probably attributed to lower yields. Interestingly, neither of these varieties was among the tallest in Alburgh. Red Fife, an heirloom wheat, was the tallest variety at both locations and was not reported to have lodged. Unfortunately, Red Fife was also one of the lowest yielding varieties at both trial sites. The 2012 average trial yields were much higher in both trial locations. The average yield across both locations was 2400 lbs more than in 2011. Part of this large difference can be explained by the elimination of the low performing varieties from the trials. However, all of varieties grown in both years, yielded much higher in 2012 at both of the trial sites. Overall, the quality results from both locations were similar to those in 2011. The majority of varieties in Vermont and New York had protein levels that met or exceeded the industry standards of 12-14%. The continued dry conditions during wheat dry down resulted in very little sprout damage and very high falling numbers. The falling numbers of several varieties were above 400 seconds and would need to be amended with barley malt to increase enzymatic activity. The DON levels at both locations were below 1 ppm, with the only exception being Kyle from the Alburgh site with a DON level of 1.03 ppm. Since many of these varieties are not currently being grown in Vermont, we will be conducting baking test on some of the top performing varieties this winter.

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. Please keep in mind when reviewing this year's trial results that the climatic conditions were ideal for growing spring wheat; next season could be a completely different.

ACKNOWLEDGEMENTS

The UVM Extension Crops and Soils Team would like to thank the Borderview Research Farm and the Willsboro Research Farm for their generous help with the trials, as well as acknowledge the USDA OREI grants program for their financial support. We would also like to thank Katie Blair, Chantel Cline, and Savanna Kittell-Mitchell for their assistance with data collection and entry. This information is presented with the understanding that no product discrimination is intended and neither endorsement of any product mentioned, nor criticism of unnamed products, is implied.

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