Northern New England
Local Bread Wheat Project

THE UNIVERSITY OF MAINE Cooperative Extension

UNIVERSITY OF VERMONT EXTENSION
CULTIVATING HEALTHY COMMUNITIES

2012 Maine and Vermont
Organic Spring Wheat Variety Trial Results

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Bread wheat is a new crop option for farmers in Northern New England due to increasing consumer demand for locally grown food. In 2010, the University of Maine and University of Vermont began a series of trials evaluating varieties of hard red wheat to identify those that perform well in northern New England under organic production. This publication presents results for spring wheat varieties tested in 2012, and for select data, results from 2010 and 2011, as well. Separate publications of prior years' full results are available for spring and winter wheat (www.umaine.edu/localwheat and www.uvm.edu/extension/cropsoil).

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Planting the spring wheat variety trial at Rainbow Valley Farm in Sidney, ME.

Table 1. Spring wheat varieties planted in ME, VT, and NY in 2012.

Variety	Type†	Origin and Year of Release‡	Seed Source
07SW04§	HR	Semican, Canada, 2013	Semican, Canada
Ada	HR	MAES, 2006	Alberta Lea Seed House, MN
Barlow	HR	NDAES, 2009	ND Foundation Seed
AC Barrie	HR	AAFC#, Saskatchewan, 1994	Semences RDR, Quebec
Brick	HR	SDAES, 2000	ND Foundation Seed
Faller	HR	NDAES, 2007	Alberta Lea Seed House, MN
FBC Dylan	HR	NPSAS/FBC, 2006	Research farm saved seed
Fortuna	HR	NDSU, 1966	O.J. Lougheed, WA
Glenn	HR	NDAES, 2005	ND Foundation Seed
Helios	HR	AAFC, Saskatchewan, 2007	Research farm saved seed
Jenna	HR	Agripro Syngenta, 2009	Research farm saved seed
Kaffé	SW	Semican, Canada	Research farm saved seed
Kyle	AD	AAFC, Saskatchewan, 1984	O.J. Lougheed, WA
McKenzie	HR	SWP/ARD, 1997	Semican, Canada
Magog	HR	Semican, Canada, 2009	Semican, Canada
Oklee	HR	MAES, 2003	MN Foundation Seed
RB07	HR	MAES, 2007	MN Foundation Seed
Red Fife	HR	Heritage var., ca. 1860	Ehnes Org. Seed Cleaning Ldt
Roblin	HR	ACRS, Winnipeg, 2001	Research farm saved seed
Sabin	HR	MAES, 2009	MN Foundation Seed
Steele	HR	NDAES, 2004	Alberta Lea Seed House, MN
Superb	HR	AAFC, Winnipeg, 2001	Oliver Seeds, VT
Sy Soren	HR	Agripro Syngenta, 2011	Albert Lea Seed House, MN
Tom	HR	MAES, 2008	MN Foundation Seed
Ulen	HR	MAES, 2005	MN Foundation Seed
AC Walton	HR	AAFC, PEI, 1995	Grands Falls Milling, NB

†HR = hard red , SW = soft white , AD = amber durum ‡Year of release not always available.
§To be released in 2013 under the name "Yorkton".
#Abbreviations: AAFC = Agric. & Agri-Food Canada, ACRS = Agric. Canada Rsrch. Station, FBC = Farmer Breeder Club, MAES = Minnesota Agric. Expt. Station, NDAES = North Dakota Agric. Expt. Station, NDSU = North Dakota State Univ., NPSAS = North Plains Sustatinable Agric. Society, PEI = Prince Edward Island, SDAES = South Dakota Agric. Expt. Station, WSU = Washington State Univ.

TRIAL DESIGN AND VARIETIES

Trials were established at four locations in the Northeast: the University of Maine Smith Farm in Old Town, ME; Rainbow Valley Farm, a commercial organic dairy farm in Sidney, ME; the Borderview Research Farm in Alburgh, VT; and Willsboro Research Farm in Willsboro, NY. The experimental design was a randomized complete block with four replications, which means that each variety was planted in four separate plots at each location. The spring wheat varieties that were evaluated are listed in Table 1. All but two are hard red types. Hard red wheat is preferred for bread flour.

WEATHER CONDITIONS

Seasonal precipitation and temperature were recorded at or near trial locations (Table 2). The Alburgh, Old Town, and Willsboro locations had weather stations in close proximity to the trial sites, while the Sidney location had a weather station within 8 miles. Early spring conditions (March and April) were substantially warmer and drier than normal for all locations, allowing for early planting. The VT and NY locations also experienced above average temperatures during the middle and later part of the growing season. The two ME sites had above average precipitation prior to and

Table 2. Precipitation, temperature, and growing degree day at the test sites.†

Location	March	April	May	June	July	August	Total
Old Town, ME							
Total Precipitation (in.)	1.95	3.68	4.30	6.03	0.99	2.81	---
Departure from Normal (in.)	-2.10	-0.07	0.46	1.98	-2.57	-0.50	---
Average Temperature (°F)	36.1	43.9	54.8	60.9	67.9	68.5	---
Departure from Normal (°F)	6.6	2.4	2.3	-0.6	0.4	3.0	---
Growing Degree Days§	126	356	707	867	1114	1096	4266
Waterville, ME							
Total Precipitation (in.)	1.71	3.34	3.48	‡	0.57	3.69	---
Departure from Normal (in.)	-1.75	-0.14	-0.31	---	-2.98	0.24	---
Average Temperature (°F)	37.3	45.6	56.7	62.8	71.6	70.7	---
Departure from Normal (°F)	5.3	2.6	2.2	-1.2	2.1	2.7	---
Growing Degree Days§	162	408	766	924	1227	1202	4689
Alburgh, VT							
Total Precipitation (in.)	1.5	2.64	3.90	3.22	3.78	---	---
Departure from Normal (in.)	-0.8	-0.18	0.45	-0.47	-0.37	---	---
Average Temperature (°F)	39.7	44.9	60.5	67.0	71.4	---	---
Departure from Normal (°F)	8.60	0.10	4.10	1.20	0.80	---	---
Growing Degree Days§	331	396	884	1046	1221	---	3878
Willsboro, NY							
Total Precipitation (in.)	1.0	2.8	4.4	3.2	3.8	2.9	---
Departure from Normal (in.)	-1.2	0.0	0.9	-0.5	-0.4	-1.0	---
Average Temperature (°F)	43.2	46.1	61.6	67.8	73.0	72.0	---
Departure from Normal (°F)	12.1	1.3	5.2	2.0	2.4	3.2	---
Growing Degree Days§	411	411	435	917	1072	1271	4517

† Based on National Weather Service data from cooperative observer stations in close proximity to field trials available at http://www.ncdc.noaa.gov/crn/report. Historical averages are for 30 years (1981-2010) available at http://cdo.ncdc.gov/cgi-bin/climatenormals.pl

‡ Monthly average not availble due to missing data points.

§ Base 32°F

during wheat flowering (June) and experienced drier and warmer than average conditions during grain fill and harvest (July to early August).

CULTURAL PRACTICES

Plots were managed following practices similar to those used by farmers in New England (see Table 3).

University of Maine Smith Farm - Old Town, ME - The previous crop in this field was silage corn . The site was moldboard plowed on April 4. Solid dairy manure was spread at a rate of 25 tons/acre on April 10 and immediately incorporated with a Perfecta harrow. Plots were planted on April 12 with an Almaco cone seeder at a rate of 51 live seeds/ft^2. The plots were top-dressed on June 8 with 100 lbs/acre of Chilean nitrate. The plots were harvested on August 7 with a Wintersteiger Classic plot combine. Harvest area was 4' x 33'.

Rainbow Valley Farm - Sidney, ME - The previous crop in this field was high moisture ear corn. The site was moldboard plowed on April 5. Solid dairy manure was then applied at a rate of 20 ton/acre and immediately incorporated with a disk harrow. On April 13, the field was spring-tooth harrowed and planted on April 14 with an Almaco cone seeder at a rate of 51 seeds/ft^2. The plots were harvested on July 31 with a Wintersteiger Classic plot combine. Harvest area was 4' x 33'.

Borderview Research Farm - Alburgh, VT - The previous crop in this field was no-till sunflowers/grass sod. The field was disked and spike-tooth harrowed in March prior to planting. Plots were seeded on April 6 using a Kincaid Cone Seeder at a rate of 33 live seeds/ft^2. The plots were harvested on July 31 with an Almaco SPC50 plot combine. Harvest area was 5' x 20'.

Willsboro Research Farm - Willsboro, NY - The previous crop in this field was winter wheat. A 3-year old timothy/alfalfa sod was plowed in August 2010 prior to planting of the winter wheat. In April 2012, the field was disked and spike-tooth harrowed. Plots were seeded on April 13 using a custom eight-row cone seeder. The plots were seeded at a rate of 33 live seeds/ft^2. The plots were harvested on August 8 with a Hege plot combine. Harvest area was 4' x 13'.

Table 3. General plot management of the 2012 spring wheat trials.

	University of Maine Smith Farm Old Town, ME	Rainbow Valley Farm Sidney, ME	Borderview Research Farm Alburgh, VT	Willsboro Research Farm Willsboro, NY
Soil type	Stetson fine sandy loam, Colton gravelly sandy loam	Buxton silt loam	Benson rocky silt loam	Kingsbury silt clay loam
Previous crop	Silage corn	High moisture ear corn	Sunflowers/Grass sod	Winter wheat
Tillage operations	Moldboard plow, perfecta harrow	Moldboard plow, disk harrow, spring tooth harrow	Fall plow, spring disk & spike-toothed harrow	Fall plow, spring disk & spike-toothed harrow
Fertility source	Solid dairy manure (25 tons/acre) Top-dressed chilean nitrate (16 lbs N/acre)	Solid dairy manure (20 tons/acre)	Grass sod	Timothy/Alfalfa sod
Estimated available nitrogen (lbs/acre)	90	55‡	65-75	65-75
Seeding rate (live seeds/ft^2)†	51	51	33	33
Planting date	4/12/12	4/14/12	4/6/12	4/13/12
Harvest date	8/7/12	7/31/12	7/31/12	8/8/12
Row spacing (in)	6.5	6.5	6	6
Harvest area	4' x 33'	4' x 33'	5' x 20'	4' x 13'

† The target seeding rate was calculated to achieve the same plant density for each variety. This translated to 150-273 lbs seed/acre (average 191), and depended on the seed weight and germination of each variety.

‡ The intended rate of N application was about 70 lbs/acre but the N content of the manure used was lower than usual for this farm.

MEASUREMENTS AND METHODS

Flowering date was recorded for each variety where possible. Plant heights were measured at physiological maturity in ME and at harvest in VT and NY. Prior to harvest, the incidence and severity of lodging was noted for each variety.

All varieties were harvested on the same day at each site once the latest maturing variety threshed free in hand tests and weather and logistics allowed. Following harvest, grain was cleaned with a small Clipper cleaner and weights were recorded. Harvest moisture and test weights were determined using DICKEY-john GAC 2100 grain moisture meters.

Subsamples were ground into flour using a Perten LM3100 Laboratory Mill. The ground material was then analyzed for crude protein, falling number, and mycotoxin levels. Protein content was determined using a Perten Inframatic 8600 Flour Analyzer. Most commercial mills target 12-14% protein. Falling number was determined on a Perten FN 1500 Falling Number Machine. The falling number is related to the level of sprout damage that has occurred in the grain due to enzymatic activity. It is measured as the time it takes, in seconds, for a plunger to fall through a slurry of flour and water to the bottom of the tube. Falling numbers less than 200 seconds indicate high enzymatic activity and poor quality wheat. Concentrations of deoxynivalenol (DON), a mycotoxin produced by the fungus that causes Fusarium head blight, were determined using the Veratox DON 2/3 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.

All data were analyzed using mixed model Analysis of Variance (ANOVA) in which replicates were considered random effects. The LSD procedure was used to detect whether differences among variety averages were statistically significant and was only conducted if the ANOVA F-test was significant ($P<0.05$) (see box). There were significant differences between the locations for most parameters, so results from each location are reported independently.

WHAT IS A SIGNIFICANT DIFFERENCE?

Variations in yield and quality can occur not only due to genetics but also due to variability in soil, weather, and other growing conditions. Statistical analysis makes it possible to determine whether a difference between two varieties is real or whether it might have occurred due to other variability in the field. The Least Significant Difference (LSD) is the minimum difference needed between two averages to consider them statistically different. LSDs at the 5% level of probability are presented at the bottom of each table for each measure. Where the difference between two varieties within a column is equal to or greater than the LSD value, you can be sure in 19 out of 20 chances that there is a real difference between the two varieties.

In the example below, variety A is significantly different from variety C because the difference between their yields (1454) is greater than the LSD value (889). Variety A is not significantly different from variety B because the difference between their yields (725) is less than the LSD value (889).

Throughout this bulletin, the greatest value at each site for each measure is indicated with an underline and bold type. Varieties that are not significantly different from the greatest value are also in bold type. Using the example below, variety C had the highest measured yield (underlined and bolded) but it was not significantly different than the yield of variety B (bolded).

Example Table

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

RESULTS

Growth and Development

Due to the warm, dry weather in March, all locations were planted two to three weeks earlier than what is considered normal for the region. This allowed for good early growth, limited weed pressure, and good to excellent yields and overall quality.

Flowering occurred early in 2012 (Table 4), on average two weeks earlier than in 2011. Brick and Roblin were the first varieties to flower at all three locations; AC Walton was one of the latest.

Plant heights ranged from 28 to 51 inches (Table 4). Red Fife was the tallest variety, while RB07, Jenna and Sabin were the shortest. Ada and Sy Soren, planted at the Alburgh and Willsboro sites, were also among the shortest varieties.

Lodging occured in some varieties. Helios and Sabin had some of the highest lodging rates at the Alburgh site, while Fortuna and Kyle experienced lodging at the Willsboro location. At Old Town, Red Fife experienced lodging, which may have been exacerbated by high fertility rates.

Yield

Yields for 2012, 2011, and 2010 are presented in Table 5. Yields from 2012 are also presented in graphical form in Figure 1 to easily compare varieties.

A typical yield for organic hard red spring wheat grown in this region is about 2,000 to 2,500 lbs/acre (Matt Williams, personal communication, 2011). Alburgh, Old Town, and Willsboro all produced yields well above average while yields at the Sidney location were more in line with typical yields. Over all of the locations in 2012, Faller, Jenna, Magog, Tom, and AC Walton were among the highest yielding varieties, whereas Red Fife, Roblin, and Glenn were among the lowest yielding varieties. Faller and Tom have been among the higher yielding varieties for all sites over the three years of trialing.

Table 4. Estimated wheat flowering date and plant height at Old Town, ME, Alburgh, VT, and Willsboro, NY.

Variety	Estimated Flowering Date			Plant Height (inches)		
	Old Town, ME	Alburgh, VT	Willsboro, NY	Old Town, ME	Alburgh, VT	Willsboro, NY
07SW04	21-Jun	<18-Jun	<22-Jun	40	41	38
Ada	---	<18-Jun	<22-Jun	---	30	31
Barlow	21-Jun	<18-Jun	<13-Jun	38	36	35
AC Barrie	21-Jun	<25-Jun	<22-Jun	41	40	37
Brick	19-Jun	<11-Jun	<13-Jun	40	39	36
Faller	21-Jun	<18-Jun	<22-Jun	38	34	34
FBC Dylan	20-Jun	<18-Jun	<22-Jun	40	37	32
Fortuna	---	<18-Jun	<22-Jun	---	37	41
Glenn	20-Jun	<18-Jun	<22-Jun	41	38	36
Helios	---	<18-Jun	<22-Jun	---	39	40
Jenna	23-Jun	<25-Jun	<22-Jun	34	32	28
Kaffé†	---	<25-Jun	<22-Jun	---	45	38
Kyle†	---	<18-Jun	<22-Jun	---	42	41
McKenzie	22-Jun	<18-Jun	<22-Jun	44	36	38
Magog	22-Jun	<25-Jun	<22-Jun	44	42	40
Oklee	22-Jun	<18-Jun	<13-Jun	38	34	31
RB07	20-Jun	<18-Jun	<22-Jun	32	33	32
Red Fife	24-Jun	<25-Jun	<22-Jun	51	47	42
Roblin	19-Jun	<11-Jun	<13-Jun	44	41	38
Sabin	21-Jun	<18-Jun	<22-Jun	35	35	30
Steele	21-Jun	<18-Jun	<22-Jun	38	35	32
Superb	21-Jun	<25-Jun	<22-Jun	37	38	35
Sy Soren	---	<18-Jun	<22-Jun	---	31	29
Tom	20-Jun	<18-Jun	<22-Jun	37	34	33
Ulen	21-Jun	<11-Jun	<13-Jun	38	35	31
AC Walton	24-Jun	<25-Jun	<28-Jun	45	43	39

† Variety is not a hard red type.

Wheat Quality

Commercial mills use a variety of measurements to determine if a particular lot of wheat is suitable for bread flour, including grain protein, test weight, falling number, and mycotoxin (DON) concentration.

Crude protein levels were good in 2012, with levels at or above 12% at all sites (Table 7 and Figure 2). Roblin, Glenn, and the experimental variety 07SW04 had the highest protein levels across all locations. AC Walton, FBC Dylan, and Faller had the lowest protein levels in ME, in NY and VT, Kaffé had the lowest protein levels.

The standard test weight for wheat is 58 lbs/bushel, with an acceptable range of 56-60 lbs/bushel. In 2012, most varieties had good to excellent test weights, with the exception of Red Fife and AC Walton in Sidney. Glenn, Brick, Barlow, and Tom had the highest test weights across locations (Table 6).

Table 5. Yield of spring wheat, ME, VT, and NY.

Variety	Yield at 13.5% Moisture (lbs/acre)†											
	Old Town, ME			Sidney, ME			Alburgh, VT			Willsboro, NY		
	2012	2011	2010	2012	2011	2010	2012	2011	2010	2012	2011	2010
07SW04	3963	2560	---	2140	2502	---	3592	799	---	3263	933	---
Ada	---	2917	2098	---	3030	2382	**3733**	992	1011	3488	**1579**	2215
Barlow	4324	2922	---	**2530**	**3170**	---	3609	978	---	**3989**	**1604**	---
AC Barrie	3796	2578	2077	2221	2606	1987	3022	711	845	2755	736	1864
Brick	4450	2748	---	2143	2763	---	3578	**1102**	---	**3582**	**1744**	---
Faller	**5086**	**3221**	**3575**	2166	**3653**	**3260**	**3998**	965	1580	**3981**	**1634**	**3235**
FBC Dylan	**4588**	2900	2987	**2587**	2945	2566	3168	796	1286	3227	1101	2202
Fortuna	---	---	---	---	---	---	2706	---	---	3319	---	---
Glenn	3948	2644	2334	1860	2695	2200	3260	730	1063	**3864**	**1863**	2001
Helios	---	---	---	---	---	---	3156	**1353**	1148	**3976**	1165	2016
Jenna	**4781**	**3338**	---	**2861**	**3355**	---	**3865**	**1168**	---	3453	**1437**	---
Kaffé§	---	---	---	---	---	---	**3919**	**1307**	**2009**	**3568**	1153	2653
Kyle§	---	---	---	---	---	---	2843	---	---	**3687**	---	---
McKenzie	4135	2218	---	2127	2508	---	2191	847	1146	3472	**1593**	2527
Magog	**4779**	2695	2396	**2849**	**3257**	**2765**	**4048**	1013	1281	3351	500	2582
Oklee	4361	**3134**	**3353**	2291	2771	**2943**	3131	813	1130	2757	1190	2147
RB07	4115	**3047**	2766	2303	**3281**	2716	**3776**	695	1113	**3774**	**1526**	2136
Red Fife	3368	2278	2036	2119	2529	1993	2604	788	1083	2937	477	2325
Roblin	3921	2289	2523	2065	2793	2071	3026	758	1097	3455	686	1838
Sabin	4393	2692	2986	1911	3058	**2920**	2666	940	1247	2882	863	2599
Steele	**4653**	2759	2829	1777	**3110**	2643	3367	749	1222	3260	882	2183
Superb	4440	2650	3168	2190	2996	**2807**	3658	**1226**	1297	3363	**1536**	2429
Sy Soren	---	---	---	---	---	---	**4294**	---	**---**	**3513**	---	**---**
Tom	4488	**3087**	**3684**	**3082**	**3179**	**3050**	**4159**	**1267**	1298	**3600**	**1627**	1980
Ulen	4358	2816	2969	2142	2755	2679	**3755**	900	1277	2817	**1532**	1916
AC Walton	**4919**	2736	2699	2377	3001	---	3339	847	1222	**3669**	534	2872
Site Average	*4343*	*2773*	*2780*	*2287*	*2950*	*2599*	*3402*	*945*	*1229*	*3423*	*1213*	*2301*
LSD (0.05)	*588*	*417*	*453*	*661*	*561*	*515*	*592*	*359*	*473*	*489*	*525*	*352*

† All varieties at each site were harvested on the same day.
‡ For all measures, bolded values are not significantly different from the highest value, which is indicated with an underline.
§ Variety is not a hard red type.

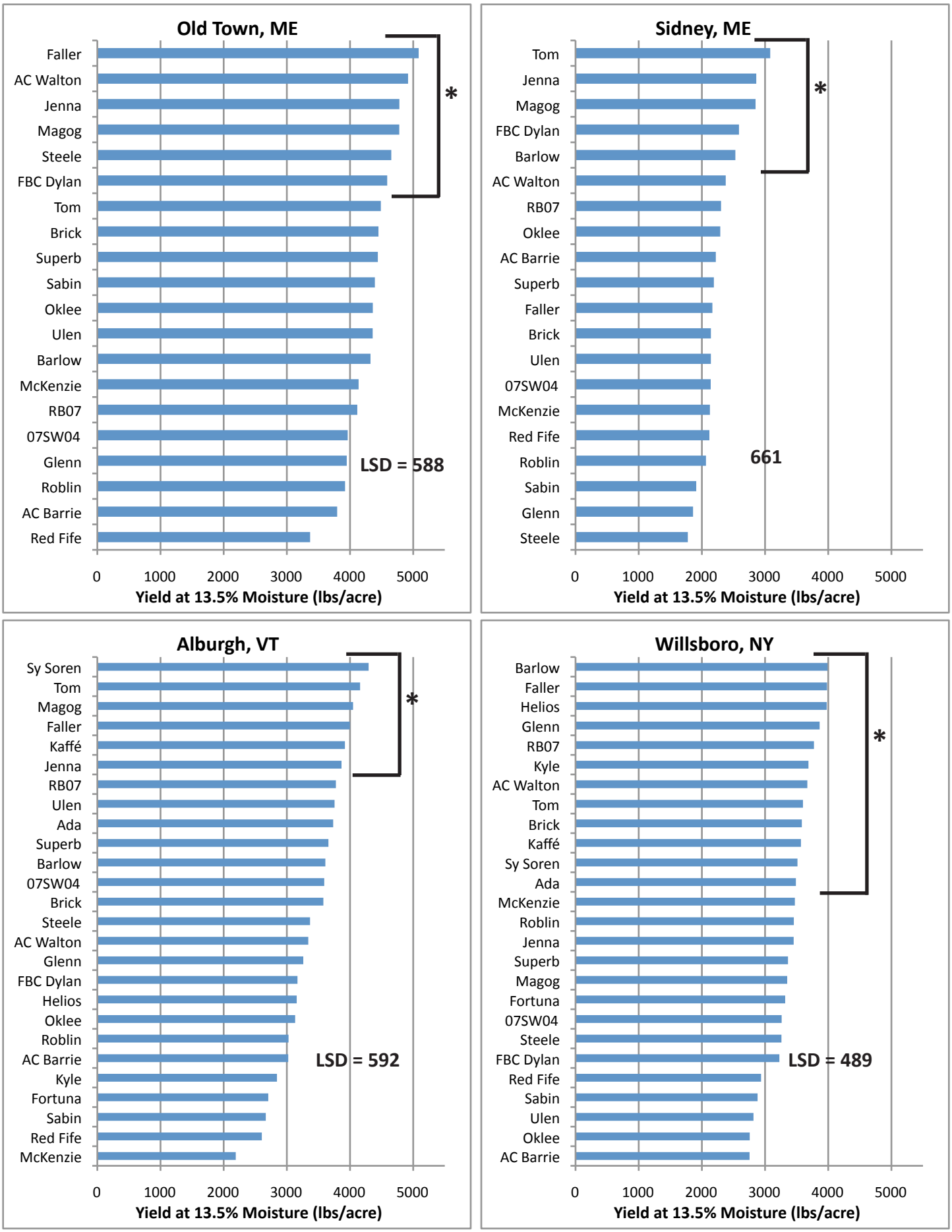

Figure 1. Yield of spring wheat varieties, 2012.

* Varieties under this bar did not perform significantly lower than the top performing variety.

Falling number values were well above the acceptable level (250 seconds) for all of the varieties grown at each location with the exception of Ulen at the Old Town site (Table 6).

Fusarium head blight, which produces the mycotoxin deoxynivalenol (DON), is a disease of major concern for wheat growers in northern New England. It primarily infects the plant during flowering and is favored by cool, humid weather. The United States Food and Drug Administration has established a maximum DON guideline of 1 ppm for finished human products. Millers may accept grain with slightly higher DON levels because, through cleaning, they can remove some of the infected grain and reduce DON levels. DON levels were low at the Alburgh and Willsboro locations (Table 8), with only one variety, Kyle, testing at 1 ppm. In Maine, DON levels were moderate compared to

Table 6. Test weight and Falling number of spring wheat in ME, VT, and NY.

Variety	Test Weight (lbs/bu)				Falling Number at 14% Moisture (seconds)			
	Old Town, ME	Sidney, ME	Alburgh, VT	Willsboro, NY	Old Town, ME	Sidney, ME	Alburgh, VT	Willsboro, NY
	2012				2012			
07SW04	61	**59**	61	59	479	500	**461**	**462**
Ada	---	---	62	60	---	---	**464**	**481**
Barlow	**64**	**60**	61	**60**	398	371	399	395
AC Barrie	61	**59**	61	**59**	491	461	453	447
Brick	63	**60**	62	**59**	423	437	410	357
Faller	62	58	61	58	453	440	432	417
FBC Dylan	62	**59**	61	59	456	486	**479**	**476**
Fortuna	---	---	59	**59**	---	---	408	440
Glenn	**64**	**60**	**64**	**60**	422	403	379	393
Helios	---	---	60	58	---	---	**485**	**465**
Jenna	61	57	61	58	472	411	422	371
Kaffé	---	---	60	57	---	---	374	322
Kyle	---	---	60	**59**	---	---	**467**	**452**
McKenzie	61	58	61	57	470	442	421	407
Magog	61	58	61	**59**	520	520	**464**	**474**
Oklee	63	**59**	61	58	474	475	425	432
RB07	61	**59**	60	57	394	421	401	377
Red Fife	60	54	61	**59**	372	383	377	359
Roblin	60	58	59	58	467	434	389	382
Sabin	61	58	59	57	458	496	**468**	**483**
Steele	62	58	62	58	392	423	410	408
Superb	60	58	61	58	395	501	433	400
Sy Soren	---	---	62	**59**	---	---	432	430
Tom	62	**59**	62	**59**	445	449	450	448
Ulen	60	58	61	59	295	340	393	375
AC Walton	60	54	57	57	444	430	434	431
Site Average	*61*	*58*	*61*	*58*	*436*	*441*	*428*	*419*
LSD (0.05)	*0.49*	*1.24*	*0.9*	*1.3*	---	---	*29.0*	*31.8*

† All varieties at each site were harvested on the same day.
‡ For all measures, bolded values are not significantly different from the highest value, which is indicated with an underline.
§ Variety is not a hard red type.

previous years, with half of the varieties testing below 1 ppm, and variety performance being fairly consistent among locations. The varieties Jenna and Superb had the highest levels in 2012 at both Maine sites, as well as in prior years. Varieties that have consistently shown lower than average DON levels over the three years of these trials include AC Barrie, Faller, Glenn, Sabin and the experimental variety 07SW04.

Table 7. Protein concentration of spring wheat in ME, VT, and NY.

Variety	Crude Protein at 12% Moisture (%)											
	Old Town, ME			Sidney, ME			Alburgh, VT			Willsboro, NY		
	2012	2011	2010	2012	2011	2010	2012	2011	2010	2012	2011	2010
07SW04	14.1	11.7	---	**14.7**	**13.6**	---	**15.0**	13.3	---	**14.3**	**16.6**	---
Ada	---	11.4	16.0	---	13.3	12.6	13.0	12.3	14.6	12.5	14.2	15.0
Barlow	13.0	11.3	---	13.4	**13.5**	---	14.1	13.0	---	12.9	15.3	---
AC Barrie	14.0	11.6	**16.0**	**14.3**	**13.1**	14.5	**15.1**	13.3	16.8	12.7	15.3	16.1
Brick	13.2	10.5	---	13.0	12.1	---	14.0	**13.8**	---	12.7	15.5	---
Faller	10.9	10.8	14.9	11.4	11.0	12.2	12.9	11.0	14.4	11.4	13.9	14.4
FBC Dylan	12.3	10.5	14.6	11.3	11.2	11.7	13.6	12.3	13.8	11.4	13.8	14.1
Fortuna	---	---	---	---	---	---	14.1	---	---	12.7	---	---
Glenn	**14.7**	12	**16.4**	**13.8**	**13.8**	**15.4**	14.9	12.5	16.0	14.1	15.6	17.0
Helios	---	---	---	---	---	---	14.3	**13.8**	16.0	12.6	14.3	17.3
Jenna	13.3	10.9	---	13.0	11.7	---	13.9	13.0	---	11.7	13.9	---
Kaffé	---	---	---	---	---	---	12.0	11.3	13.7	11.1	12.9	14.2
Kyle	---	---	---	---	---	---	13.7	---	---	11.8	---	---
McKenzie	12.7	10.9	---	12.2	11.8	---	13.1	11.8	15.3	11.9	14.7	15.3
Magog	11.9	10.5	15.6	12.7	12.1	12.6	13.1	13.0	15.9	12.6	15.0	14.9
Oklee	13.7	11.5	15.7	13.7	12.6	12.5	14.6	**13.5**	15.6	12.9	14.8	16.1
RB07	13.4	11.4	15.8	13.1	12.7	**14.3**	13.7	12.5	15.2	12.3	14.3	15.8
Red Fife	11.2	**12.2**	**16.4**	12.2	12.4	**14.2**	13.6	12.8	16.2	12.5	14.4	15.3
Roblin	**15.3**	**12.8**	**16.6**	**13.9**	**13.5**	**14.8**	**15.7**	**15.0**	16.0	**15.1**	**15.8**	18.0
Sabin	12.3	10.9	15.7	12.1	11.9	12.0	13.6	13.0	16.9	11.6	14.5	14.7
Steele	13.7	11.7	15.8	12.6	12.6	13.7	13.9	13.3	15.2	12.4	15.2	16.2
Superb	13.4	11.7	16.0	12.6	**13.0**	13.4	13.4	**13.5**	15.0	13.0	14.5	16.0
Sy Soren	---	---	---	---	---	---	14.1	---	---	13.3	---	---
Tom	13.8	10.7	14.6	12.7	**13.1**	13.2	14.4	13.3	13.6	12.7	14.7	15.6
Ulen	**14.6**	11.9	**16.0**	13.5	**13.2**	**14.4**	14.1	13.0	15.3	12.3	14.6	16.7
AC Walton	10.8	10.9	15.6	12.1	11.0	---	13.8	12.3	15.7	12.1	15.5	13.7
Site Average	*13.1*	*11.3*	*15.7*	*12.9*	*12.5*	*13.4*	*13.9*	*12.9*	*15.3*	*12.6*	*14.8*	*15.6*
LSD (0.05)	*0.95*	*0.6*	*0.8*	*0.97*	*0.8*	*1.4*	*0.8*	*1.3*	---	*0.8*	*0.8*	---

† For all measures, bolded values are not significantly different from the highest value, which is indicated with an underline.
‡ Variety is not a hard red type.
§ Average value taken from one sample per variety instead of four.

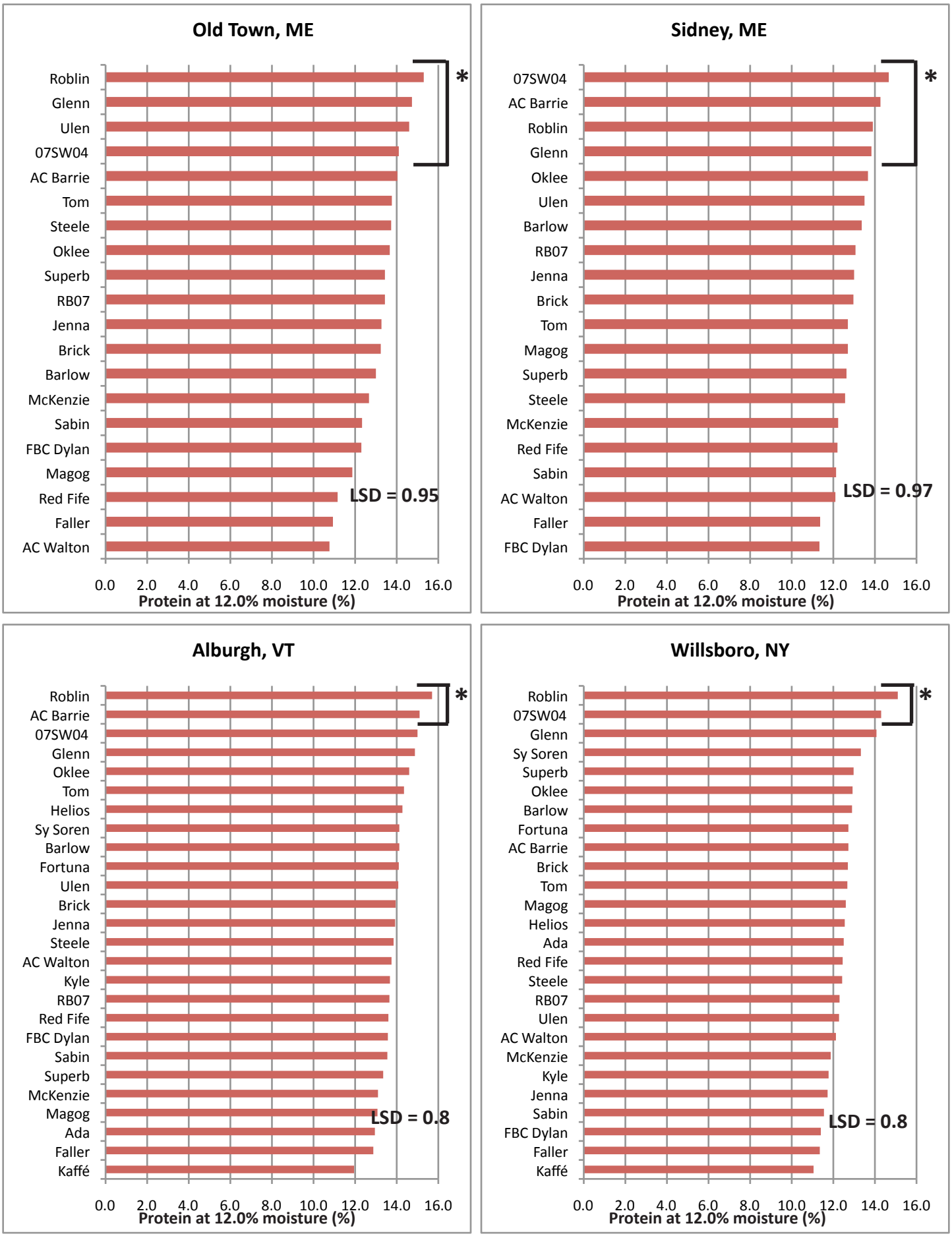

Figure 2. Protein concentration in spring wheat varieties.

* Varieties under this bar did not perform significantly lower than the top performing variety.

DISCUSSION

Wheat grain sold for bread flour can receive up to twice the pay price as grain sold for livestock feed in New England, but the grain must meet higher quality standards. Therefore, when choosing which varieties to plant, it is important to consider their potential to produce grain with acceptable protein, test weight, falling number, and DON levels, as well as their ability to produce high yields.

Overall the 2012 growing season was a good one for spring cereals. A very mild winter with little snow pack and a drier and warmer than normal March allowed for early planting of the trials. Wet weather in June (before and during flowering) did lead to DON levels above 1 ppm in some cases in Maine, but July and early August were drier than normal allowing for excellent conditions during ripening. Due to early plant-

Table 8. DON level for spring wheat in ME, VT, and NY.

Variety	DON (ppm)											
	Old Town, ME			Sidney, ME			Alburgh, VT			Willsboro, NY		
	2012	2011	2010	2012	2011	2010	2012	2011	2010	2012	2011	2010
07SW04	0.5	1.3	---	< 0.5	< 0.5	---	< 0.5	< 0.5	---	< 0.5	< 0.5	---
Ada	---	4.1	1.6	---	1.0	0.6	< 0.5	< 0.5	3.3	< 0.5	< 0.5	0.8
Barlow	1.0	3.4	---	1.1	1.5	---	0.6	< 0.5	---	< 0.5	< 0.5	---
AC Barrie	< 0.5	2.2	0.8	0.5	< 0.5	---	< 0.5	< 0.5	3.3	< 0.5	< 0.5	< 0.5
Brick	0.6	1.8	---	< 0.5	0.7	---	< 0.5	< 0.5	---	< 0.5	< 0.5	---
Faller	0.5	1.8	1.2	0.6	0.5	1.3	< 0.5	< 0.5	2.3	< 0.5	< 0.5	0.7
FBC Dylan	0.7	4.1	2.6	0.6	0.6	1.5	0.6	< 0.5	2.8	< 0.5	< 0.5	0.6
Fortuna	---	---	---	---	---	---	0.6	---	---	< 0.5	---	---
Glenn	0.7	1.8	3.2	0.8	0.6	0.7	< 0.5	< 0.5	2.0	0.6	< 0.5	0.6
Helios	---	---	---	---	---	---	< 0.5	< 0.5	2.3	< 0.5	< 0.5	0.6
Jenna	1.6	4.2	---	4.0	1.0	---	< 0.5	< 0.5	---	< 0.5	< 0.5	---
Kaffé	---	---	---	---	---	---	< 0.5	< 0.5	4.1	< 0.5	< 0.5	< 0.5
Kyle	---	---	---	---	---	---	1.0	---	---	< 0.5	---	---
McKenzie	1.5	1.5	---	1.9	< 0.5	---	< 0.5	< 0.5	2.2	< 0.5	< 0.5	0.5
Magog	0.7	1.7	1.2	1.0	< 0.5	1.0	< 0.5	< 0.5	3.1	< 0.5	< 0.5	< 0.5
Oklee	1.1	4.1	1.6	0.9	0.8	1.1	0.7	0.5	3.8	< 0.5	< 0.5	0.9
RB07	0.7	3.6	2.5	0.5	0.7	1.3	0.6	< 0.5	2.4	0.5	< 0.5	0.6
Red Fife	1.5	1.5	1.9	1.5	1.1	1.2	< 0.5	< 0.5	2.1	< 0.5	< 0.5	< 0.5
Roblin	0.5	3.8	0.8	0.5	0.8	1.3	0.5	0.6	2.3	< 0.5	< 0.5	< 0.5
Sabin	< 0.5	1.1	< 0.5	< 0.5	0.5	1.3	< 0.5	< 0.5	1.6	< 0.5	< 0.5	< 0.5
Steele	1.5	3.9	< 0.5	2.7	1.1	1.4	0.6	< 0.5	3.4	< 0.5	< 0.5	1.3
Superb	4.2	5.1	---	2.6	2.0	---	0.7	< 0.5	4.9	< 0.5	< 0.5	2.1
Sy Soren	---	---	---	---	---	---	< 0.5	---	---	< 0.5	---	---
Tom	0.7	2.4	0.7	0.7	< 0.5	1.7	< 0.5	< 0.5	1.7	< 0.5	< 0.5	0.8
Ulen	1.7	4.4	2.2	2.1	0.9	1.4	0.7	< 0.5	3.1	< 0.5	< 0.5	0.7
AC Walton	1.4	1.7	3.3	1.5	< 0.5	---	< 0.5	< 0.5	2.1	< 0.5	< 0.5	< 0.5
Site Average	*1.1*	*2.8*	*1.6*	*1.2*	*0.8*	*1.2*	*< 0.5*	*< 0.5*	*2.8*	*0.2*	*< 0.5*	0.7

† For all measures, bolded values are not significantly different from the highest value, which is indicated with an underline.
‡ Variety is not a hard red type.
§ No significant difference among varieties.

ing, weeds were not a problem at any location. The Alburgh, Old Town, and Willsboro sites produced yields well above the historical average. Average protein levels were adequate at all sites.

There is often a tradeoff between yield potential and protein potential. For instance, in Maine in 2012, Faller and AC Walton had impressive yields but also the lowest protein levels. In contrast, Glenn, Roblin, and AC Barrie produced lower than average yields but had among the highest protein levels. Over the three years that these variety trials have been conducted, a number of varieties have produced average or above-average yields and also maintained adequate protein levels. These include AC Superb, Oklee, Jenna, RB07, Tom, and the experimental variety 07SW04 (to be released in 2013 under the name "Yorkton").

Fusarium head blight can be a major issue in our region. Options for managing the disease in organic systems are limited and include rotating with non-grain crops (i.e., avoid planting wheat after wheat, corn, barley, and rye), burying any disease-carrying debris, and choosing less susceptible varieties. While none of the current wheat varieties is resistant to Fusarium head blight, some have better tolerance to the disease than others. In trials conducted in North Dakota and Minnesota where disease and moisture levels were controlled to maximize disease incidence, Brick, Glenn, and RB07 had the best tolerance to Fusarium. In our trials, varieties that have most consistently shown below average DON levels over the last three years include AC Barrie, Faller, Glenn, Magog, Sabin, and Tom. As well, Brick and the experimental variety 07SW04 had below average DON levels over the two years they were tested. Choosing a more tolerant variety may provide some protection against Fusarium, but conditions at flowering drive infection and may still result in high DON levels. One management strategy is to plant two or three tolerant varieties that have different maturity dates, and hence flowering dates, to hedge against wet weather at flowering.

It may be helpful to compare these ME, VT, and NY results with results from variety trails conducted in other regions. Ultimately, though, it is important to evaluate data from test sites that are similar to your farm and region when deciding which varieties to grow.

Full reports of the 2010 and 2011 results are available as separate publications available at:
- www.umaine.edu/extension/localwheat, and
- www.uvm.edu/extension/cropsoil.

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