



Organic Seed Alliance

*Advancing the ethical development and stewardship
of the genetic resources of agricultural seed*

PO Box 772, Port Townsend, WA 98368

2013 California North Coast Organic Wheat Trials



COLUMBIA FOUNDATION
Founded 1940

In partnership with University of California
Cooperative Extension

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Introduction

Organic wheat is a rapidly expanding specialty crop in California. According to the 2009 organic survey from the USDA Economic Research Service, organic wheat acreage increased 50-fold in California between 1997 and 2008, from 727 acres in 1997 to 36,115 acres in 2008. In California's North Coast, a few grain growers began to produce wheat and other grains around 2009. Since then, the expansion of organic wheat production on the North Coast has coincided with increased interest in local grain, including local and regional sourcing of wheat by many independent bakeries and supermarkets.

One of the key pieces in successfully increasing the production and profitability of organic wheat on the North Coast is identifying appropriate varieties. In many ways the needs of organic producers are similar to those of conventional producers: both need reliably high yields of high-quality wheat. However, organic production practices do differ from typical conventional practices and those differences will influence variety selection. For example, many organic wheat producers rely on slow-releasing forms of nitrogen, such as cover crops, manure and previous legume crops. Also organic farmers rely on mechanical cultivation and crop competitiveness for weed control. These differences in production practices can lead to differences in relative variety performance between conventional and organic systems

To assist organic producers with identifying appropriate varieties for their production system, the North Coast Wheat Variety project conducted a grower survey about variety choices. The project then carried out replicated variety trials.

The survey was conducted to determine the varieties and harvested yield of small grains grown in the coastal counties of Marin, Sonoma, Mendocino, Lake, and Humboldt.

Organic wheat variety trials took place on two certified organic farms: one in Humboldt County and one in Sonoma County. The trial at each location was conducted as a randomized complete block design (RCBD) with four replications of eight varieties. (For more information on what replicated trials are and how to use them to find appropriate varieties, see Organic Seed Alliance's publication, *On-farm Variety Trials*, available at seedalliance.org/publications.) During the season, data was collected for lodging, rust, plant height, yield, moisture, and protein. Informal baking trials were also conducted with the harvested wheat.

Materials and Methods

Trial Design and Locations

The first trial site was the College of the Redwoods Farm (CR) in Shively, Humboldt County. The soil at the CR site is a Shively flat silt loam, with a previous crop of four years of alfalfa. No fertilizer or supplemental irrigation was applied at this site. The planting rate was approximately 100 pounds/acre. The trial was planted on March 27, 2013, and harvested on September 7, 2013.

The second site was Front Porch Farm (FPF) in Healdsburg, Sonoma County. The soil at the FPF site is Yolo sandy loam, with a previous crop of oat and bell bean cover crop. The trial was amended with about 10 tons/acre farm-made compost and overhead irrigated with 2 inches of water. The planting rate was approximately 100 pounds/acre. The trial was planted on March 14, 2013, (See Figure 1 below) and harvested on August 24, 2013.



Figure 1: Photos of College of the Redwoods Farm (left) and Front Porch Farm (right)

A third site in Marin County was discarded because of unacceptably low plant populations due to poor emergence in a dry and inadequately prepared seedbed.

The trial at each location was conducted as a randomized complete block design (RCBD) with four replications of eight varieties. Each plot contained one variety and was 8 feet wide by 100 feet long (see Figures 2 and 3).



Figure 2: Photo of trial at Front Porch Farm, taken at planting (3/14/13). Photo credit: Organic Seed Alliance



Figure 3: Trial layout for 2013 organic wheat trial at Front Porch Farm in Healdsburg, CA.

Materials

The eight varieties included in the trials are listed in Table 1.

Number	Name	Type	Seed Source
1	Turkey Red	Hard Red Winter	Heartland Mills
2	Yecora Rojo	Hard Red Spring	UC Foundation Seed
3	Canus	Hard Red Spring	Nash's Organic Produce
4	Lassik	Hard Red Spring	UC Foundation Seed
5	Red Fife	Hard Red Spring	Camp Grant Ranch
6	Alturas	Soft White Spring	Idaho Foundation Seed
7	Diva	Soft White Spring	Tri-State Seed
8	Foisy	Soft White Spring	Camp Grant Ranch

Table 1: Varieties included in the trials.

Varieties were selected for inclusion in the trial based on: yield potential under organic coastal management, rust resistance, protein, lodging resistance, weed competitiveness, and quality.

They were selected based on recommendations by:

- Kent Brittan and Lee Jackson, University of California Cooperative Extension
- Michael Flowers, Oregon State University
- Kevin Murphy and Steven Jones, Washington State University
- Local farmers

Evaluation

Throughout the season, we recorded the following information about each plot.

Initial Stand Density – At approximately two weeks after planting, the average number of plants per row foot was recorded based on a five-foot sample.

Stripe Rust Incidence – At approximately the time of heading, stripe rust incidence was recorded as a percentage of leaf area affected. No significant incidence of stripe rust was found at Front Porch Farm. Therefore, this trait was not measured at that site.

Relative Maturity – Approximately two weeks after the first varieties begin to yellow from maturity, relative maturity was recorded. Maturity was based on the progress of senescence on a 1 - 9 scale relative to the varieties in the trial at that site, with 1 representing the earliest maturing plot and 9 representing the latest maturing plot.

Lodging – At harvest, lodging was measured as a visual rating on a 1 - 9 scale, with 1 being the entire plot on the ground and 9 being no lodging.

Plant Height – Plant height in inches at harvest was recorded based on a visual average of the plot average height from soil surface to the maximum height of the plants.

Yield – At harvest, yield was measured in pounds for each plot. Plots were harvested at both sites with a Hege plot combine. Later, the yield was adjusted for moisture content and calculated as pounds per acre.

Moisture, Test Weight, and Protein – These traits were based on analysis of 2-pound subsamples sent to the California Wheat Commission Laboratory.

Data Analysis and Significant Differences

The traits measured can vary based on differences in soil conditions or weather, among other reasons, including the genetic differences of the variety. Replications and statistical analysis were used to determine whether differences between varieties are real. (For more information on statistical analysis of variety trials, refer to OSA's *On-farm Variety Trials*.) The trait datasets were also analyzed to see if the ranks of the varieties stayed the same at both sites. If the ranks of varieties for a given trait were statistically the same at both locations, averages were calculated across both sites.

Baking Tests

After harvest, samples of the eight varieties were sent to the following locations for formal and informal baking tests:

- The California Wheat Commission Baking Lab, Woodland
- Brickmaiden Breads, Point Reyes
- Lost Coast Bakery, Ferndale
- Beck's Bakery, Arcata

The lab and three bakeries each used their own criteria to evaluate the quality of the wheat.

Grower Survey

A total of 26 growers were surveyed in 2010 - 2011 and again in 2012 - 2013. These surveys were conducted to compile the experiences of North Coast growers and to initiate sharing of lessons learned. Specifically the surveys asked growers to list the varieties of grains they were cultivating, share where they sourced their seed, and relate their experiences, including the problems and benefits of each variety.

In the first year, the survey was mailed to growers and follow-up phone calls were made to encourage participation. In the second year, the survey was administered online and emailed to growers with follow-up phone calls to encourage participation. In addition, project team members participated in a growers meeting on May 18, 2013, sharing the survey and how to participate. Despite these efforts, the level of response, both in the number of participants and completeness of the responses, was disappointing. A total of 12 growers responded in 2010 - 2011 and five growers in 2012 - 2013.

Participating growers indicated that they cultivated 48 varieties of wheat, 11 varieties of barley, three varieties of rye, and four varieties of oats (Table 2). This list includes small 2' X 2' trials to larger, multiple acreage farm production. In terms of the number of farmers growing the varieties, the most popular wheat varieties grown were Sonora, Foisy, and Red Fife with six, four, and four farmers growing them, respectively. Growers made multiple comments that Sonora displayed lodging, Foisy appeared to be well-adapted and a good producer for the North Coast, and Red Fife produced a reasonable yield. It is important to point out that in many cases these three varieties were grown by these farmers as an introduction to wheat production, and while grown by the majority of farmers, other varieties were grown on greater acreages. The remaining varieties were grown by three farmers or less.

Problems encountered by growers, as indicated by their comments, offer insight into the problem solving

that is needed for them to be successful in producing wheat organically. This includes careful screening, selection, and preparation of fields to avoid impacts from low pH and low fertility soils. This also includes field preparation to avoid weed competition coupled with identification of taller stature wheat varieties that grow above weeds. Lastly, there is a need to increase growers' understanding of the susceptibility of specific varieties to stripe rust and the advantages and drawbacks to winter versus spring planting in reducing the risk.

Growers are sourcing grain seed from a variety of seed suppliers, grain grower associations, and from each other. Identified sources of seed include: Adams Seed, Grants Pass Grange Co-op, Homestead Organics, Johnny's, Lockwood Seed, Montana Flour and Grain Company, Peaceful Valley Farm Supply, Rubin Seeds, Timeless Seeds, Ukiah Natural Food Store, USDA, Vermont Seed Company, Washington State Crop Improvement Association, Welter Seed Company, and the Whole Grain Connection.

Grain	Variety	Grower Comments
Wheat	Akmolinka	Rust occurred
	Anza	
	Baart	
	Blue Beard	Poor performance – produced ok
	Bolero	
	Buckwheat Mancan	Hardy and yield well
	Canoco	Promising
	Chiddham Blac De Maus	Medium producer
	Chul	
	Currawa	
	Desert King Durum	
	Durum	Poor to average yield
	Durum Iraq	Produced well
	Eaton	
	Emmer	
	Ethiopian Blue Tinge	Weed competition impacted results
	Espresso	Spring planting had good yield – short stature to about 18”
	Foisy	Low yield from acid soils – tall strong plants with good yield otherwise – best producer – Seems well adapted to North Coast and makes nice flour
	Galgalos	
	Goldcoin	
	Hard Federation	
	Hard White Winter	Poorly when planted in spring
	Hollis	
	India Jammu	Produced well
	Kelse	Crop failure from acid soils – “best” yielder
	Ladoga	
	Lynn	
	Marpacha	Ligh rust -- no problems

Grain	Variety	Grower Comments
	Marquis	Seems to produce similarly to Red Fife
	Odessa	
	Pennawawa	
	Red Fife	Crop failure from acid soils – slight rust and reasonable yield – would plant again
	Redwing	
	Soft Winter	
	Senatore	Tall stature overtopped weeds
	Sol	
	Sonora	Reasonable harvest – spring planting usually results in good yield – tendency to lodge – Over winter production increases risk of rust and crop failure – better the soil the better it produced – problem with lodging – lodging problem
	Talimka	
	Thatcher	
	Triple IV	
	Turkey	
	Tuscan	
	White Federation	
	Wit Wolkoring	No rust and a good harvest – poor producer, susceptible to rust and lodging experienced if over wintered
	Yamhill	
	WS-44 (Soft Red)	
	W.B. Cristallo	Flavor is a customer favorite
	W1377	Great yield even with weed pressure
Barley	“McGuire” Canadian Hulless	Smut
	Arabian Blue Hulless	Early yield, great flavor
	Black	Produced poorly
	Bronze	Produced and threshed well
	Conlon Malting	Produced and threshed well – weed pressure impacted production
	Ethiopian Hulless	No smut, reasonable yield -good flavor, light braned – hardy with heavy yield
	Kye	
	Pinnacle	Good yield
	Purple	Medium producer, hard to thresh
	Robust	Smut and low yield
	UC937	
Rye	AGS104	
	MTDA Organic HL 237-10	
	Unknown “Cereal Rye”	Good harvest

Grain	Variety	Grower Comments
Oats	California Red Oats	
	Cayuse hulled	
	Kanota	Good yield
	Rodeo Hulless	Good yield

Table 2: Grain grower survey.

Trial Data

How to Read the Trial Data

The results are presented in two ways: (1) a set of tables showing the overall results, and (2) a set of variety “scorecards” reporting the results for each variety.

Results are only reported for traits where significant differences between varieties were seen. When looking at the overall results, the letters after the value represent groups of varieties whose means are not significantly different for that trait. For example, all the varieties that have a score with an “a” after the number have essentially the same result for that trait. At the bottom of the tables are three numbers for each trait: the average, coefficient of variation (CV), and least significant difference (LSD). The CV is a measure of how variable the data were. Traits with lower CVs were less variable across the plots than those with high CVs. LSD is the smallest amount by which two values can be different and still be considered statistically likely to be different. In other words, if two varieties were measured to be 2 inches different in height on average, and the LSD was 1 inch, then we could say that these varieties were statistically likely to be truly different in height.

Caveats

A number of cultural and environmental factors may have influenced the performance of the varieties of these trials. These factors are important to keep in mind when interpreting the results. The first factor was the variability in the seeding rate. Due to the equipment available, a single setting was used on the grain drill to plant all the varieties. Because the varieties varied in seed size, some plots could have been planted at a heavier rate. Stand counts were taken to account for that. The analysis showed no significant difference in stand counts between varieties. However, it is possible that the sample sizes used to establish stand counts were insufficient to be accurate. The second factor was the dry conditions at Front Porch Farm. While there was sufficient soil moisture at planting to germinate and establish the plots, the sandy loam soils rapidly dried. One two-inch set of water was applied one month after planting. At the time of harvest, symptoms of drought stress were evident, including poorly developed roots with a possible fungal disease, incompletely filled heads, and low yields.

This project was only able to evaluate a subset of potential varieties, and was only able to evaluate them under the climate stresses of one year and at two locations. Future trials would allow additional varieties to be evaluated, and would allow a better understanding of how well these varieties perform under a wider range of climatic conditions.

Overall Results

Variety	Type	CR	Relative maturity			Plant height			Lodging			Yield @ 13% moisture			Moisture			Test weight			Protein		
			CR	FPF	ALL	CR	FPF	ALL	CR	FPF	ALL	CR	FPF	ALL	CR	FPF	ALL	CR	FPF	ALL	CR	FPF	ALL
		Stripe rust																					
		%	--- 1 to 9 scale ---			----- in -----			1 to 9 scale			----- lbs / acre -----			----- % -----			--- lbs / bu ---			----- % -----		
Yecora Rojo	HRS	76.7a	3.0e	2.8e	2.9e	18.0f	20.0f	19.0e	8.3bc	6.5abc	3265ab	1908a	2587a	13.1cd	11.7a	60.2c	59.6ab	12.6c	10.2e	11.4d			
Cannus	HRS	43.3b	5.0d	5.0d	5.0d	34.0c	30.0bc	32.0b	7.0c	3.0d	2609bc	1392b	2000b	13.1cd	10.8e	62.1b	59.9a	13.3b	13/5bc	13.4bc			
Lassik	HRS	0.0c	4.8d	5.3d	5.0d	25.3d	24.0e	24.7d	8.8ab	8.0ab	3585a	1816a	2701a	12.5d	10.9de	63.9a	60.0a	12.7bc	12.6cd	12.7c			
Red Fire	HRS	63.3a	7.3b	7.0b	7.1b	36.7b	30.5b	33.6b	8.0bc	6.3bc	1901de	616d	1258de	14.0ab	11.1cd	62b	59.9a	13.2b	14.2b	13.7b			
Alturas	SWS	3.3c	5.0d	5.0d	5.0d	22.7e	26.3de	24.5d	7.0c	8.5a	2197cde	949c	1573cd	13.8bc	11.3bc	62.8b	58.1bc	11.1d	11.5de	11.3d			
Divina	SWS	10.0c	6.0c	6.0c	6.0c	25.7d	27.5cd	26.6c	7.3c	5.75c	2465cd	896cd	1680c	13.9bc	11.2c	62.2b	60.2a	11.5d	11.5d	11.5d			
Foisy	SWS	46.7b	9.0a	9.0a	9.0a	45.3a	35.3a	40.3a	9a	7.5abc	1692e	638cd	1165e	14.7a	11.5ab	60.8c	57.8c	15.2a	17.1a	16.2a			
AVE		34.8	5.7	5.7	5.7	29.7	27.6	28.7	2.1	6.5	2531	1173	1852	13.6	11.2	62.0	59.4	12.8	12.9	12.9			
CV (%)		25	5	5	5	6	7	6	45	22	23	18	23	3	2	1	2	3	7	5			
LSD		12.7	0.4	0.4	0.3	2.5	3	1.9	1.4	2.1	791	314	411	0.76	0.3	0.7	1.7	0.5	1.3	0.7			

CR = College of the Redwoods Farm

FPF = Front Port Farm

ALL = Combined results from CR and FPF

Numbers in **bold** are the optimum greatest or least train value or are not significantly different from the optimum

Letters after trait value indicate groups of varieties whose means are not significantly different for that trait

Variety Scorecards

Yecora Rojo

		CR	FPF	ALL	Rank (out of 7)	Equivalent to
Stripe Rust	% Incidence	76.7				Red Fife
Height	Inches	18	20	19	7	
Maturity	1-9 relative rank	3	2.8	2.9	1	
Lodging	1-9 relative rank	8.25	6.5			
Yield	lbs / acre @ 13% moisture	3265	1908	2587	2	Lassik
Moisture	%	13.1	11.7			
Test Weight	lbs / bushel	60.2	59.6			
Protein	%	12.6	10.2	11.4	6	Alturas, Diva

Baking Trials

<i>CWC Lab:</i>		CR	FPF
Flour Ash	%	0.34	0.5
Falling Number	Seconds	469	378
Bread Volume	Cubic centimeters	855	800
Crumb Grain	1-10 scale	7	5
Crumb Texture	1-10 scale	7	4
Bread Score		7	5
Notes (from CR sample)	Average baking quality, good protein		
<i>Beck's Bakery:</i>		CR	FPF
Time to Gluten Window	Minutes	5.75	
Gluten Quality	1-5, not sticky to sticky	4	4
Extensibility	Inches	20	
Bake Quality			Tallest

<i>Brickmaiden:</i>	Accepts and holds water well, develops quickly into dough. Best oven spring out of all the flours tested. Strong in shaping and easy to work with. Good quality bread flour. Balanced flavor.
<i>Lost Coast Bakery:</i>	No additional adjustments to the formula were necessary, about 10 minutes to development of the gluten. Here a distinct smell of apple cider came through in the mixing. The baked result was a clean and pleasant flavor. One out of three tasters chose this as the best out of the 3 reds. Personally all worked for me. Mixing, rising, baking, slicing, flavors remained pleasantly nutty, good shelf life.



Planting stock

CR plot

FRF plot

Canus

		CR	FPF	ALL	Rank (out of 7)	Equivalent to
Stripe Rust	% Incidence	43.3			4	Foisy
Height	Inches	34	30	32	3	Red Fife
Maturity	1-9 relative rank	5	5	5	2	Lassik, Alturas
Lodging	1-9 relative rank	7	3			
Yield	lbs / acre @ 13% moisture	2609	1392	2000	3	
Moisture	%	13.1	10.8			
Test Weight	lbs / bushel	62.1	59.9			
Protein	%	13.3	13.5	13.4	3	Red Fife

Baking Trials

<i>CWC Lab:</i>		CR	FPF
Flour Ash	%	0.35	0.44
Falling Number	Seconds	431	488
Bread Volume	Cubic centimeters	850	925
Crumb Grain	1-10 scale	7	8
Crumb Texture	1-10 scale	7	8
Bread Score		7	8
Notes (from CR sample)	Second best of this group; good gluten and extensibility; good proofing time		
<i>Beck's Bakery:</i>		CR	FPF
Time to Gluten Window	Minutes	6.5	4.5
Gluten Quality	1-5, not sticky to sticky	3.5	3.5-4
Extensibility	Inches	21.5	
Bake Quality			Tallest
<i>Brickmaiden:</i>	Accepts a high hydration, around 100%. Strong gluten and easy to work with. Makes a chewy crumb and a decent rise. Slightly fruity notes.		
<i>Lost Coast Bakery:</i>	The most porous of all; used additional flour during mixing and took the longest time to develop gluten, about 6 minutes longer than the usual time (about 10 minutes). I have a fast and hard driven old mixer. The first rise was slow about 3 hours. The rise after shaping was what I call normal, about one and a half hours. Crust crispy, nutty, crumb soft sliced well. Overall taste best of all 3 hard reds.		



Planting stock

CR plot

FRF plot

Lassik

		CR	FPF	ALL	Rank (out of 7)	Equivalent to
Stripe Rust	% Incidence	0			1	Alturas, Diva
Height	Inches	25.3	24	24.7	5	Alturas
Maturity	1-9 relative rank	4.8	5.3	5	2	Alturas, Canus
Lodging	1-9 relative rank	8.8	8			
Yield	lbs / acre @ 13% moisture	3585	1816	2701	1	Yecora Rojo
Moisture	%	12.5	10.9			
Test Weight	lbs / bushel	63.9	60			
Protein	%	12.7	12.6	12.7	4	Canus

Baking Trials

<i>CWC Lab:</i>		CR	FPF
Flour Ash	%	0.45	0.44
Falling Number	Seconds	435	415
Bread Volume	Cubic centimeters	880	900
Crumb Grain	1-10 scale	8	8
Crumb Texture	1-10 scale	8	8
Bread Score		7	8
Notes (from CR sample)	Excellent, good protein, mixing time, gluten strength, dough light and fluffy		
<i>Beck's Bakery:</i>		CR	FPF
Time to Gluten Window	Minutes	7.5	6
Gluten Quality	1-5, not sticky to sticky	3	
Extensibility	Inches	22.5	18
Bake Quality			High profile
<i>Brickmaiden:</i>	Accepts a higher amount of water initially, but at 100% weeps moisture out of the dough later in the ferment. Forms strong gluten and produces a good rise. Dough feels softer and is weaker than Yecora Rojo. Strong in shaping and a bit sticky.		
<i>Lost Coast Bakery:</i>	Normal amount of hydration, gluten development was fairly rapid through mixing and required no adjustments of flour or water in the formula which I normally use for my sandwich sourdough made with hollis. Over spring here was nice, even, and a bit lighter in texture but hardly.		



Planting stock

CR plot

FRF plot

Red Fife

		CR	FPF	ALL	Rank (out of 7)	Equivalent to
Stripe Rust	% Incidence	63.3			6	Yecora Rojo
Height	Inches	36.7	30.5	33.6	2	Canus
Maturity	1-9 relative rank	7.3	7	7.1	6	
Lodging	1-9 relative rank	8	6.3			
Yield	lbs / acre @ 13% moisture	1901	616	1258	6	Alturas, Foisy
Moisture	%	14	11.1			
Test Weight	lbs / bushel	62	59.9			
Protein	%	13.2	14.2	13.7	2	Canus

Baking Trials

<i>CWC Lab:</i>		CR	FPF
Flour Ash	%	0.4	0.44
Falling Number	Seconds	383	462
Bread Volume	Cubic centimeters	850	930
Crumb Grain	1-10 scale	6	8
Crumb Texture	1-10 scale	7	7
Bread Score		7	8
Notes (from CR sample)	Similar to Lassik		
<i>Beck's Bakery:</i>		CR	FPF
Time to Gluten Window	Minutes	4	5
Gluten Quality	1-5, not sticky to sticky	3.5-4	3
Extensibility	Inches	21.5	30
Bake Quality			High profile
<i>Brickmaiden:</i>	Accepts less water; at 90% hydration the dough seeps moisture. Slow to develop dough and makes a dense, weak, spongy crumb in the baked loaf. Flatter loaves. Noted for complex crust flavor.		



Planting stock

CR plot

FRF plot

Alturas

		CR	FPF	ALL	Rank (out of 7)	Equivalent to
Stripe Rust	% Incidence	3.3			2	Lassik, Diva
Height	Inches	22.7	26.3	24.5	6	Lassik
Maturity	1-9 relative rank	5	5	5	2	Lassik, Canus
Lodging	1-9 relative rank	7	8.5			
Yield	lbs / acre @ 13% moisture	2197	949	1573	5	Diva, Red Fife
Moisture	%	13.8	11.3			
Test Weight	lbs / bushel	62.8	58.1			
Protein	%	11.1	11.5	11.3	7	Yecora Rojo, Diva

Baking Trials

CWC Lab:		CR	FPF
Flour Ash	%	0.38	0.45
Falling Number	Seconds	422	391
Bread Volume	Cubic centimeters	790	820
Crumb Grain	1-10 scale	5	5
Crumb Texture	1-10 scale	4	4
Bread Score		5	5
Notes (from CR sample)	Poor, stiff gluten, poor proofing, hard to mold		
Beck's Bakery:		CR	FPF
Time to Gluten Window	Minutes	7	7
Gluten Quality	1-5, not sticky to sticky	3	1
Extensibility	Inches	26	24
Bake Quality			Tallest

Brickmaiden:	Absorbs water quickly and holds it well. Close to 90% hydration. Gluten strength and extensibility are good—comparable to D. Slightly tacky dough, and a little fragile in shaping. Lively rise in oven. Good flavor and texture. Our favorite of the soft whites.
Lost Coast Bakery:	Wow, the mixing was crazy, almost immediate gluten development becoming stringy within minutes. First rise was of course faster than normal, about two and a half hours. Then it was jumping off the table, took a lot of work to shape it down. The rise was about ½ the time as the reds. The crust was pale, okay but not great crumb structure, passable flavor. Would work for an all round purpose flour as it made nice pie crust and muffins.



Planting stock

CR plot

FRF plot

Diva

		CR	FPF	ALL	Rank (out of 7)	Equivalent to
Stripe Rust	% Incidence	10			3	Lassik, Alturas
Height	Inches	25.7	27.5	26.6	4	
Maturity	1-9 relative rank	6	6	6	2	
Lodging	1-9 relative rank	7.3	5.75			
Yield	lbs / acre @ 13% moisture	2465	896	1680	4	Alturas
Moisture	%	13.9	11.2			
Test Weight	lbs / bushel	62.2	60.2			
Protein	%	11.5	11.5	11.5	5	Alturas, Diva

Baking Trials

CWC Lab:		CR	FPF
Flour Ash	%	0.34	0.42
Falling Number	Seconds	457	471
Bread Volume	Cubic centimeters	675	745
Crumb Grain	1-10 scale	3	5
Crumb Texture	1-10 scale	4	4
Bread Score		4	4
Notes (from CR sample)	Weak gluten, poor fermentation and proofing, "dead dough"		
Beck's Bakery:		CR	FPF
Time to Gluten Window	Minutes	7.5	4
Gluten Quality	1-5, not sticky to sticky	3	
Extensibility	Inches	31	23
Bake Quality		Med/tall	Blow out, underproof

Brickmaiden:	Slow to absorb water but holds moisture well. Strong gluten structure. Works with higher hydration than F, closer to 90%. Cohesive dough, nice to work with, not tacky in shaping. Crumb is slightly gummy with a crumbly cell structure.
Lost Coast Bakery:	Similar mixing and kneading characteristics as Alturas. It was difficult to keep on the table for shaping. Baked on loaf with only 10 minutes and 2nd rise. Puffed up in the middle, but baked off similar to the rest of the batch which had risen for about 50 minutes. This bread was noted to greatly improve in flavor by the next day. I was not pleased by the color, pale again, though the crunch of the bran crust was pleasant and the tasters liked it.



Planting stock

CR plot

FRF plot

Foisy

		CR	FPF	ALL	Rank (out of 7)	Equivalent to
Stripe Rust	% Incidence	46.7			5	Canus
Height	Inches	45.3	35.3	40.3	1	
Maturity	1-9 relative rank	9	9	9	7	
Lodging	1-9 relative rank	9	7.5			
Yield	lbs / acre @ 13% moisture	1692	638	1165	7	Red Fife
Moisture	%	14.7	11.5			
Test Weight	lbs / bushel	60.8	57.8			
Protein	%	15.2	17.1	16.2	1	

Baking Trials

<i>CWC Lab:</i>		CR	FPF
Flour Ash	%	0.38	0.48
Falling Number	Seconds	422	460
Bread Volume	Cubic centimeters	690	800
Crumb Grain	1-10 scale	4	5
Crumb Texture	1-10 scale	4	4
Bread Score		4	5
Notes (from CR sample)	Very weak gluten		
<i>Beck's Bakery:</i>		CR	FPF
Time to Gluten Window	Minutes	3.5	4
Gluten Quality	1-5, not sticky to sticky	6	2.5
Extensibility	Inches	28	
Bake Quality	Short, gluten was forming after 3 mins, then broke immediately. It was pancake batter. Very difficult dough.		
<i>Brickmaiden:</i>	Accepts a higher amount of water initially, but at 100% weeps moisture out of the dough later in the ferment. Forms strong gluten and produces a good rise. Dough feels softer and is weaker than Yecora Tojo. Strong in shaping and a bit sticky.		



Planting stock

CR plot

FRF plot

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Photos courtesy of Jared Zystro and David Lewis unless otherwise noted

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