



2018 Hard Red Wheat / Hard White Wheat Crop Quality Report

California Wheat

California's wheat growing regions are defined by climate, value of alternative crops, and distinct differences in variety selection.

Five of the six wheat classes grown in the United States are produced in California, with Hard Red wheat accounting for 76%, Durum 11%, Hard White 7%, and Soft White 6% of planted acres this year. Total planted acres was ~

Overall, the 2018 crop had medium to high protein. Consistent with other years, 2018 crop had low moisture, high flour extraction, and strong baking performance — all of which make California wheat suitable for blending.

Most California hard wheat is planted from October to January and harvested in the months of June and July. With the strong demand for new crop wheat in the domestic marketplace, importers are encouraged to express their interest in purchasing California wheat in early spring. For Hard White wheat, buyers should consider communicating with grain handlers and contracting for acres before planting time.

California hard wheat varieties are known for their low moisture and large and uniform kernel size. Because wheat is predominantly grown under irrigation, growers achieve high yields and consistent quality.

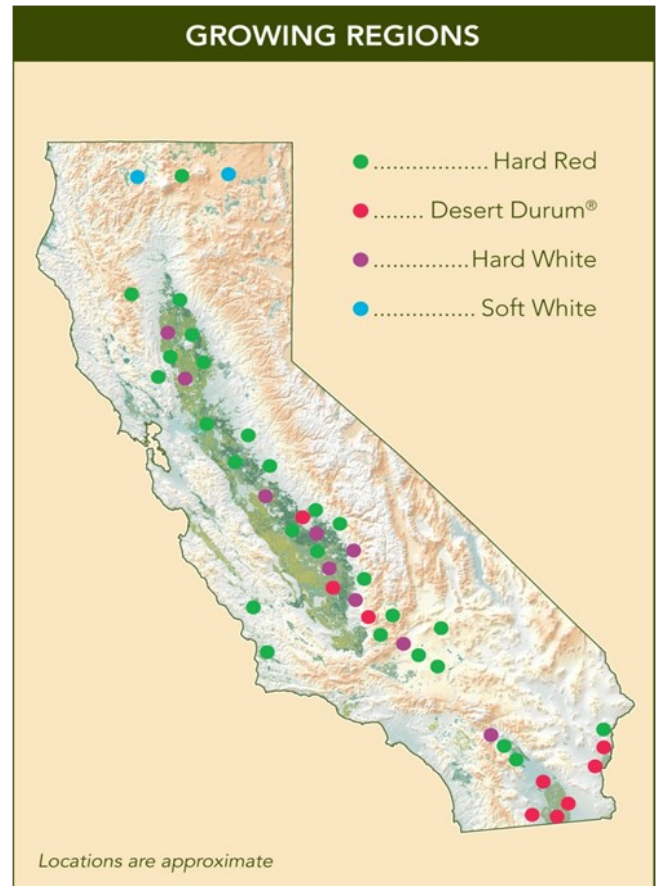
2018 Crop Conditions

California had dry and warm early season conditions with low disease incidence during 2017-2018. Seasonal rainfall totals were slightly below average. Mild weather during grain filling contributed to better than average yields in most of the Central Valley.

Data in this Report

Samples for this year's report were collected from grain handlers and producers around the state. This program collects samples throughout the harvest season, resulting in a crop quality report that is highly representative of the crop. Averages are reported as weighted averages for each growing region: Sacramento and San Joaquin Valleys.

Crop Quality values cannot be used to compare varieties since they are harvested from different fields. Weather, soil, and cultural practices can influence the quality of all varieties between years and of particular lots of any one variety.



PRODUCTION HISTORY*		
YEAR	METRIC TONS (1,000 MT's)	SHORT TONS (1,000 ST's)
2018	231	255
2017	270	299
2016	361	398
2015	336	370
2014	392	432
2013	751	828
2012	706	778

*All common wheat (excluding Durum).

HARD RED WHEAT GRADE HARVEST DATA

		2018	2017	2016	2015	2014
Test Weight:	lb/bu	62.6	62.8	63.8	63.7	63.4
	kg/hl	82.3	82.6	83.8	83.7	83.4
Moisture (%)		9.6	8.7	8.5	8.6	9.1
Damaged (%)		0.1	0.1	0.2	0.2	0
Foreign Material* (%)		0.1	0.1	0.5	0.2	0.4
Shrunken/Broken* (%)		0.8	0.8	0.8	0.5	0.7
Total Defects (%)		1.0	1.0	1.2	0.9	1.1
Dockage* (%)		1.1	1.0	1.2	0.9	0.7
Total Screenings (%)		2.0	1.9	2.5	1.6	1.8
Net Wheat (%)		88.6	88.5	89.2	89.9	89.3
CTW (%)		105.5	105.3	106.2	107.1	106.3
MWVI (%)		94.8	94.9	94.2	93.4	94.1

Harvest year = Calendar year. *Total Screenings are those factors represented on the grade certificate that are cleaned out in the flour mill. Test weight conversion from lb/bu to kg/hl according to FGIS-PN-97-5, $(1.292 \times \text{lb/bu}) + 1.419$. Net Wheat = $(100\% - (\text{FM} + \text{SHBN} + \text{Dockage})) \times (100\% - \text{Moisture}) / 100\%$. Clean, Tempered Wheat (CTW%) = $(100\% - (\text{FM} + \text{SHBN} + \text{Dockage})) \times (100\% - \text{Moisture}) / (100\% - 16\% (\text{temper moisture}))$. Millable Wheat Value Index (MWVI) = $100\% / \text{CTW}$.

Varietal Descriptions

HARD RED WHEAT

Cal Rojo (HRS) is a widely adapted, high yielding variety for both the San Joaquin and Sacramento Valleys. It is mid-early maturing and receives good scores for grain, milling, and baking quality.

Summit 515 (HRS) is a variant of the variety Summit with two effective genes for stripe rust resistance added by marker assisted selection. Summit 515 has very high yield potential in both the San Joaquin and Sacramento Valleys.

WB-9229 (HRS) is adapted to both the San Joaquin and Sacramento Valleys. It has medium to high protein and test weight and has excellent milling and baking properties. It is moderately resistant to Septoria and is resistant to the current races of stripe rust.

WB-Joaquin Oro (HRS) is adapted to the San Joaquin Valley and has high protein and test weight with excellent milling and baking properties, similar to the variety Joaquin. In addition, WB-Joaquin Oro carries two genes for stripe rust resistance, one of which is effective against all current races.

WB-9350 (HRS) is hard red spring wheat, is a medium-early maturing and has excellent straw strength. It is short in plant height. Its main characteristic is the high yield potential while maintaining excellent protein level, excellent test weight, disease package and wide adaptation. At the time of release, it was resistant to stripe rust (2 out of 1-9 scale with

1= excellent and 9=poor), moderately resistant to Septoria tritici leaf blotch, and very good leaf rust resistance. It is for late fall planting in the Central Valley and surrounding areas, the south-central coast, and the southern desert regions of California. It has PVP and patent protection with a limited use license agreement required.

HARD WHITE WHEAT

Patwin 515 (HWW) is a high yielding variety with high protein levels, and is adapted to both the Sacramento and San Joaquin Valleys. Patwin 515 is a variant of Patwin with the addition of stripe rust resistance genes *Yr5* and *Yr15*.

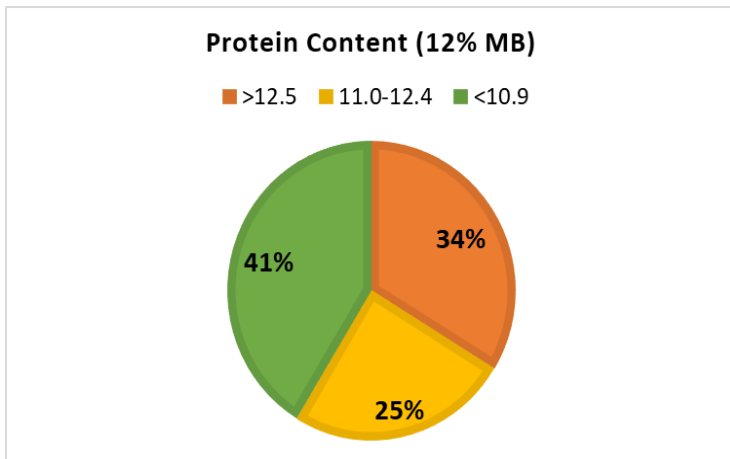
Patwin 515 HP (HWW) is a Hard White Spring wheat variety created by the introduction of the high grain protein content gene into Patwin-515. Patwin-515HP has similar height and heading as Patwin-515 and Blanca Grande-515, slightly better yield, and significantly higher grain protein content. Patwin-515HP has outstanding breadmaking quality and is immune to stripe rust and tolerant to BYDV and septoria tritici blotch. It is the recommended hard white variety by the UC Davis breeding program for irrigated fields in the Sacramento, San Joaquin and Imperial Valleys.

KERNEL QUALITY DATA

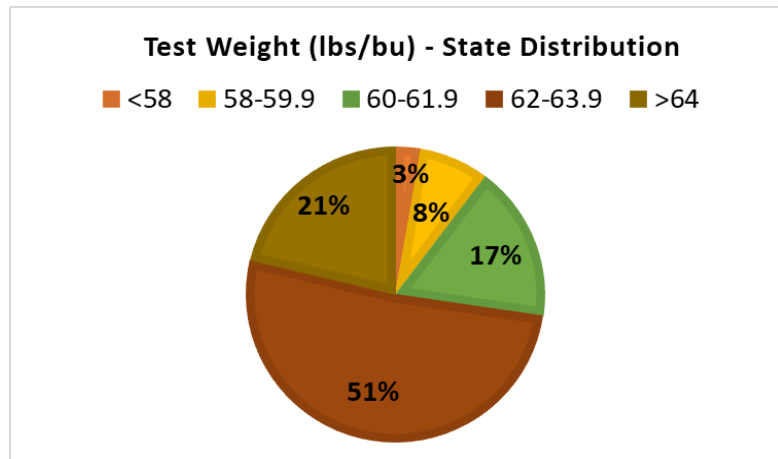
State and Region	Protein	Ash	Falling Number SEC	Test Weight		SKCS	1000	Kernel Size Distribution			Micro	
	(12% moisture)			lbs/bu	Kg/hL	Hardness	Kernel	Large	Medium	Small	Sed	
	%	%		%		Score	Weight	%	%	%	CC	
HARD RED WINTER WHEAT												
Sacramento Valley	12.6	1.57	8.7	379	62.3	82.0	71.7	38.3	81	19	0	50
San Joaquin Valley	12.4	1.58	7.1	403	63.1	83.0	70.4	40.7	86	14	0	47
State Avg. 2018	12.5	1.58	7.9	391	62.7	82.5	71.0	39.5	83	17	0	49

HARD WHITE WHEAT												
Sacramento Valley	12.2	1.63	8.8	403	60.7	79.8	82.5	31.9	63	36	1	46
San Joaquin Valley	12.2	1.52	7.4	378	63.2	83.1	75.5	38.9	83	17	0	49
State Avg. 2018	12.2	1.58	8.1	391	62.0	81.5	79.0	35.4	73	17	0	48

PROTEIN (12% MOISTURE) STATE DISTRIBUTION



TEST WEIGHT (Lbs/bu) STATE DISTRIBUTION



FLOUR QUALITY DATA

State and Region	Lab Mill	Protein	Ash	Gluten Index	Wet			Water/ 50% Sucrose	5% Lactic Acid/ 5% NA ₂ CO ₃	Falling
	Yield	(14% moisture)			Gluten	SRC	Number			
	%	%	%		%	GPI	SEC			
HARD RED WINTER WHEAT										
Sacramento Valley	67.8	11.4	0.51	93.2	30.9	0.71	68/111	141/87	428	
San Joaquin Valley	69.0	11.2	0.51	92.6	30.8	0.67	67/111	132/87	393	
State Avg. 2018	68.4	11.3	0.51	92.9	30.8	0.69	68/111	137/87	411	

HARD WHITE WHEAT										
Sacramento Valley	65.8	11.4	0.54	97.1	29.2	0.58	71/115	124/98	412	
San Joaquin Valley	68.7	10.6	0.52	92.4	28.9	0.60	69/112	123/92	413	
State Avg. 2018	67.3	11.0	0.53	94.7	29.1	0.59	70/113	123/95	413	

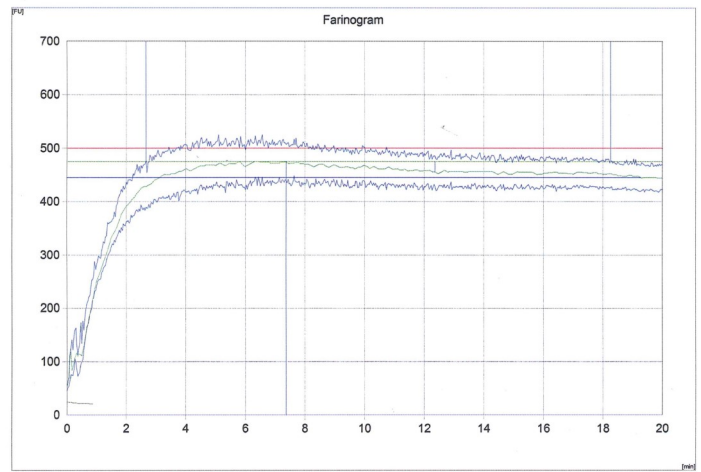
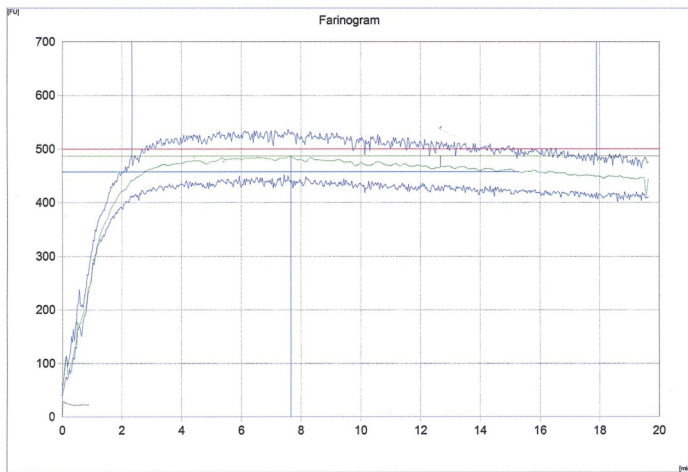
PHYSICAL DOUGH QUALITY

State and Region	Farinograph Development				Alveograph			W Joules X 10 ⁴
	Absorption %	Time MIN	Stability MIN	MTI B.U.	P MM	L MM	P/L Ratio	
HARD RED WINTER WHEAT								
Sacramento Valley	64.1	7.1	16.1	18	125	87	1.53	359
San Joaquin Valley	64.6	9.3	18.2	18	118	83	1.48	341
State Avg. 2018	64.3	8.2	17.1	18	121	85	1.51	350
HARD WHITE WHEAT								
Sacramento Valley	63.8	5.3	13.6	20	131	66	2.21	308
San Joaquin Valley	65.3	5.4	10.6	31	128	71	2.15	307
State Avg. 2018	64.6	5.3	12.1	26	130	69	2.18	307

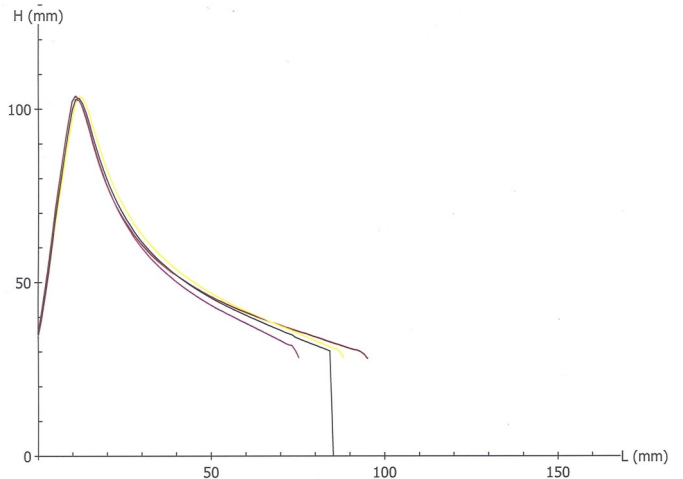
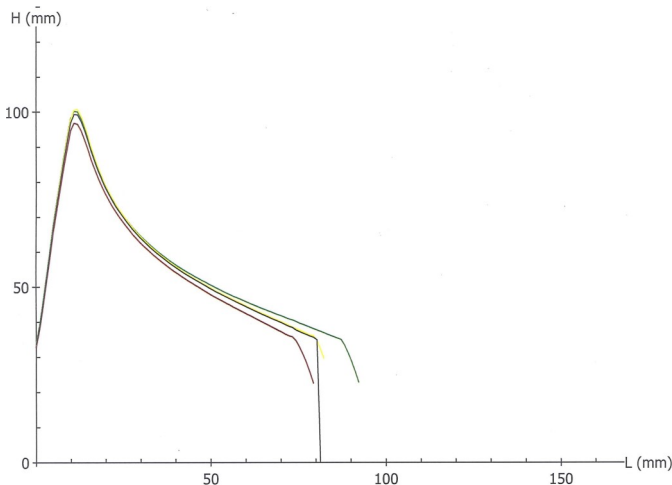
HARD RED WINTER WHEAT

HARD WHITE WHEAT

2018 AVERAGE FARINOGRAM



2018 AVERAGE ALVEOGRAM



BAKING QUALITY DATA

State and Region	Baking Absorption %	Loaf Volume CC	Dough Handling (1-10)	Crumb Color (1-10)	Crumb Grain (1-10)	Crumb Texture (1-10)	Bread Symmetry (1-10)
HARD RED WINTER WHEAT							
Sacramento Valley	64.3	990	6.7	7.6	7.4	7.4	8.2
San Joaquin Valley	65.2	982	7.7	8.0	7.6	7.8	8.2
State Avg. 2018	64.8	986	7.2	7.8	7.5	7.6	8.2
HARD WHITE WHEAT							
Sacramento Valley	63.9	971	8.0	7.1	7.7	7.4	8.4
San Joaquin Valley	65.5	956	7.3	7.6	7.1	7.2	7.9
State Avg. 2018	64.7	963	7.6	7.4	7.4	7.3	8.1



2018 HARD RED VARIETY SPECIFIC INFORMATION

	Summit 515		WB-9229		WB-9350	Cal Rojo	Joaquin Oro
	Sacramento Valley	San Joaquin Valley	Sacramento Valley	San Joaquin Valley	San Joaquin Valley	Sacramento Valley	San Joaquin Valley
WHEAT							
Protein (12% MB)	12.2	12.4	13.0	12.1	12.0	13.2	12.9
Ash (12% MB)	1.53	1.59	1.62	1.54	1.58	1.60	1.58
Moisture (%)	8.6	7.2	8.6	7.9	6.4	9.5	7.3
Falling Number (sec)	328	356	428	396	505	424	411
Micro Sedimentation (CC)	48	46	53	54	45	49	49
Test Weight							
lb/bu	62.5	62.3	62.7	65.0	63.4	60.6	63.7
kg/hl	82.2	81.9	82.5	85.4	83.3	79.7	83.8
SKCS Hardness Score	71	70	77	74	69	60	72
1000 Kernel Weight (g)	41.6	40.2	35.1	40.9	42.7	36.2	39.7
Kernel Size Distribution							
Large/Medium/Small	88/12/0	84/16/0	77/23/0	90/10/0	91/9/0	68/32/0	83/17/0
FLOUR							
Lab Mill Yield (%)	68.2	68.3	67.1	69.2	70.8	68.7	68.9
Protein (14% MB)	11.0	11.3	11.8	10.9	10.8	11.9	11.7
Ash (14% MB)	0.50	0.52	0.53	0.51	0.49	0.52	0.51
Gluten Index	88.5	87.1	97.9	96.7	99.6	96.6	96.1
Wet Gluten (14% MB)	30.8	31.5	31.2	29.3	28.1	30.5	32.7
SRC: GPI	0.66	0.62	0.68	0.67	0.64	0.71	0.68
Water/ 50% Sucrose	70/116	70/112	73/116	71/117	69/110	65/113	73/115
5% Lactic Acid/5% Na ₂ CO ₃	136/90	127/92	144/95	140/93	128/90	136/79	139/91
ALVEOGRAPH							
P (mm)	125	125	137	154	118	89	140
L (mm)	85	81	81	66	85	136	99
P/L ratio	1.61	1.76	1.69	2.40	1.39	0.69	1.44
W (10 ⁻⁴ Joules)	346	331	405	376	369	413	456
MIXOGRAPH							
Absorption (%)	64.0	64.0	65.5	67.0	64.0	59.4	66.9
Peak Time (min)	2.9	3.0	4.4	4.0	6.3	3.9	4.0
Peak Height (mu)	6	5	6	6	5	6	7
M.T. Score (1-8)	3	3	5	5	7	4	4
FARINOGRAPH							
Absorption (%)	64.2	64.1	65.7	66.2	62.9	59.0	66.4
Peak Time (min)	5.8	5.3	7.2	8.3	20.8	11.0	7.3
Stability (min)	12.2	10.9	17.6	15.5	38.6	25.1	15.5
M.T.I.	22.2	23.0	15.5	19.7	6.7	13.5	17.1
BAKING RESULTS							
Baking Absorption (%)	64.6	64.4	65.8	67.4	65.0	59.4	66.4
Bread Volume (cc)	968	970	1001	978	983	1032	1014
Crumb Grain & Texture	8.1	7.9	8.4	8.3	8.0	8.3	8.9

Wheat samples were collected by handlers. Wheat and Flour Protein: Leco Combustion Nitrogen Analyzer Model TruSpec, Lab mill yield: Brabender Quadro-mat Sr. Mill, modified in 1997; Bread Volume: AACCI Method 10-10B; Test weight conversion from lb/bu to kg/hl according to FGIS PN-97-5, {(1.292 x (lb/bu) + 1.419)}.

2018 HARD WHITE VARIETY SPECIFIC INFORMATION

WHEAT	Patwin 515		Patwin 515 HP
	Sacramento Valley	San Joaquin Valley	Sacramento Valley
Protein (12% MB)	13.2	12.2	11.4
Ash (14% MB)	1.70	1.52	1.57
Moisture (%)	8.4	7.4	9.1
Falling Number (sec)	398	378	408
Micro Sedimentation (CC)	50	49	43
Test Weight			
lb/bu	59.0	63.2	62.1
kg/hl	77.7	83.1	81.6
SKCS Hardness Score	83	75	82
1000 Kernel Weight (g)	29.1	38.9	34.2
Kernel Size Distribution			
Large/Medium/Small	50/49/1	83/17/0	74/26/0
FLOUR			
Lab Mill Yield (%)	64.5	68.7	66.9
Protein (14% MB)	12.1	10.6	10.8
Ash (14% MB)	0.56	0.52	0.53
Gluten Index	97.2	92.4	96.9
Wet Gluten (14% MB)	31.2	28.9	27.6
SRC: GPI	0.59	0.60	0.57
Water/ 50% Sucrose	70/116	69/112	72/114
5% Lactic Acid/5% NA ₂ CO ₃	127/97	123/92	122/98
ALVEOGRAPH			
P (mm)	120	128	139
L (mm)	69	71	64
P/L ratio	1.80	2.15	2.50
W (10 ⁻⁴ Joules)	293	307	317
MIXOGRAPH			
Absorption (%)	62.7	63.3	63.8
Peak Time (min)	3.5	3.1	3.8
Peak Height (mu)	5	5	5
M.T. Score (1-8)	4	3	4
FARINOGRAPH			
Absorption (%)	64.4	65.3	63.3
Peak Time (min)	5.9	5.4	4.8
Stability (min)	15.3	10.6	12.2
M.T.I.	19.0	31.2	20.5
BAKING RESULTS			
Baking Absorption (%)	64.4	65.5	63.5
Bread Volume (cc)	983	956	961
Crumb Grain & Texture	9	8	8

Wheat samples were collected by handlers. Wheat and Flour Protein: Leco Combustion Nitrogen Analyzer Model TruSpec, Lab mill yield: Brabender Quadromat Sr. Mill, modified in 1997; Bread Volume: AACCI Method 10-10B; Test weight conversion from lb/bu to kg/hl according to FGIS PN-97-5, $\{(1.292 \times (\text{lb/bu}) + 1.419)\}$.

Technical and Laboratory Services



*CWC Executive Director Claudia Carter and Laboratory Manager Teng Vang
Photo credit: Matt Salvo, California Farm Bureau Federation*

The California Wheat Commission laboratory has the equipment necessary for evaluation of common and durum wheat milling quality, flour chemical analysis, physical dough testing, semolina analysis, bake and noodle production tests, and pasta analysis.

The Commission's staff is available to work with customers in the area of quality assurance, product development, problem solving, quality control training, and research. The lab order test form is available on the California Wheat Commission website, please use when requesting services.

Customer Assistance and Support

The Commission is available to answer technical questions about California's wheat quality, including recommendations for blending and appropriate end-use. The Commission conducts specialized training programs in milling, baking, semolina, pasta, and quality control. These specific programs may be customized to meet the customers' needs.

Crop and Export Survey

California produces five of the six classes of U.S. wheat: Hard Red Winter (HRW), Desert Durum®, Hard White, Soft White and Hard Red Spring. While HRW, Hard White, and Durum are the predominately produced and exported classes, information and contacts for all the above classes of wheat are available by contacting the Commission office. Every effort is made to provide an accurate assessment of quality to buyers. With greater amounts of wheat being sold by variety, varietal specific information is emphasized in Commission surveys.

Varietal Development

Private and public breeding programs play an important role in the development of new varieties available to California wheat producers. The Commission analyzes hundreds of samples each year to support these programs and encourages the release of new varieties that will meet the customers' needs. New varieties are evaluated by commercial mills through the California Wheat Collaborator program.

Research

The Commission laboratory is available for flour, semolina, milling, end-product, and new-product research. Technical expertise is available in hearth breads, pasta, Asian food products, standard loaf bread, steamed bread, Asian noodles, cookies, tortillas and Middle Eastern flat breads.



*CWC Laboratory Manager Teng Vang
Photo credit: Matt Salvo, California Farm Bureau Federation*



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