

# Preferred variety list

**Objective:** Increase the value of California wheat by establishing a simple classification system that informs growers and industry which available CA varieties have desirable or undesirable breadmaking quality characteristics.

## **Non statistical decisions:**

1. Number of classes
2. Proportion of commercial varieties that we would like to see in each class
3. Selection of a board to review the classification suggested by stats

## **Statistical aspects:**

1. Complexity of the approach
2. Contribution of each trait to the final index
3. Statistical criteria for inclusion or exclusion

# Number of classes

## Non statistical decisions:

### 1. Number of classes

1. Needs to be simple
2. We propose three classes: **recommended, acceptable and not recommended**

### 2. Proportion of commercial varieties in each class

1. We suggest to keep a reasonable number to give growers options within its region and companies the opportunity to have one line in the preferred class
2. We suggest to keep approximately equal parts in the recommended, acceptable and non recommended categories at the start. As we increase quality overall we can expand the first two classes.

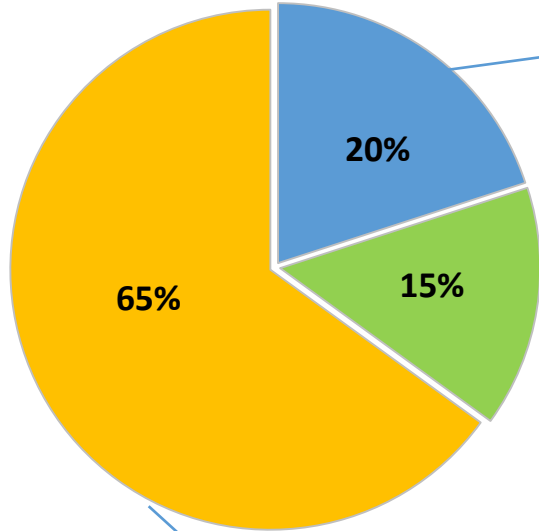
### 3. Selection of a board to review the classification suggested by stats

1. We suggest a rotating board with industry, growers and CWC representation.

# Contribution of the different traits

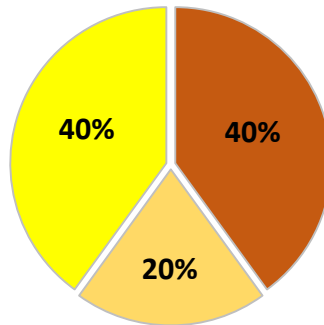
## Contribution of grain, milling & baking scores

■ Grain score ■ Milling score ■ Baking score



### BAKING SCORE

■ Loaf Volume ■ Bake Abs. ■ Dough score



Dough score = MPI x MIXSCORE

MPI: mixing peak integral

MIXSCORE

If mtime < 2.0 then MIXSCORE = 0

If 2.0 ≤ mtime ≤ 2.5 then MIXSCORE = mtime \* 2 - 4

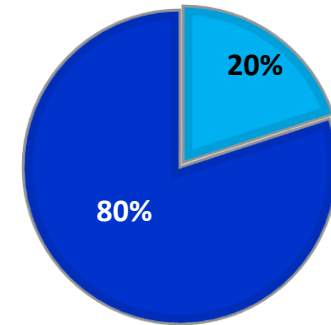
If 2.5 ≤ mtime ≤ 4.5 then MIXSCORE = 1

If 4.5 ≤ mtime ≤ 5.5 then MIXSCORE = mtime \* -1 + 5.5

If 5.5 < mtime then MIXSCORE = 0

## GRAIN SCORE

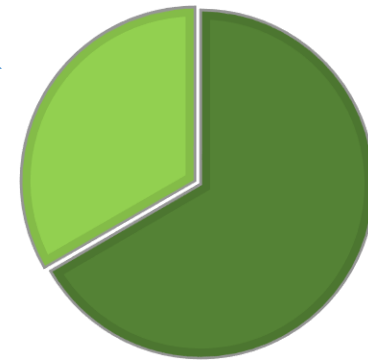
■ Test weight ■ Grain protein



Leco Combustion Analyzer

## MILLING SCORE

■ Milling Yield ■ ASH



Experimental Flour Milling – Brabender Quad

$$\text{Milling score} = ((100 - (0.75 + (80 - [\text{FYELD}])) + 50 * ([\text{FASH}] - 0.30))) * 1.045 - 3.438$$

**Flour yield is weighted 2 x more than flour ash**

# Statistical analysis

1. Grain , milling, baking and an **overall quality scores** are calculated based on individual location per year.

2. Within each environment scores 1-2-3 are assigned for each test.

**Score 1** if  $< \text{average} - 0.6 * \text{STDEV.}$  (~25%)

**Score 2** if between  $\text{average} \pm 0.6 \text{ STDEV.}$  (~50%)

**Score 3** if  $> \text{average} + 0.6 * \text{STDEV.}$  (~25%)

3. An overall average score is calculated across locations using adjusted means to account for missing data and unbalanced data.

4. Variability of the data is computed and a probability is calculated for each variety to be significantly different from the average of all varieties.

## Figure multiple environments

**Dark red is best quality**

**Dark green in worst quality**

**SCORES ARE RELATIVE WITHIN ENVIRONMENT**

**SCORES ARE CONSISTENT ACROSS ENVIRONMENTS**

VARIETY	Davis	Fresno	Delta	Colusa	Solano	Kern	Tulare	Kings	Imperial	Average	P.VALUE
WB JOAQUIN ORO	2.29	2.68		2.61	2.09	2.76	2.15	2.37	2.98	2.49	0.0000
SY BLANCA GRANDE 515	2.61	2.02	2.21	2.93	2.56	2.24	2.08	2.44	2.53	2.40	0.0000
WB 9229	2.63	2.18	2.26	2.42	2.39	2.61	2.02	2.37	2.61	2.38	0.0000
SY 13W00886	2.32	1.93	2.37	2.61	2.24	2.24	2.26	2.54	2.00	2.28	0.0002
YECORA ROJO	2.24	2.08		2.16	2.61	2.37	2.17	2.37	2.23	2.28	0.0000
UC 16010-32	2.30	2.45		2.24	2.70	2.08	1.76	2.54	2.00	2.26	0.0186
APB 500709	2.54	1.00	2.61	1.98	2.24	2.21	2.21	2.67	2.47	2.21	0.2231
APB 410117	2.54	2.21	2.00	2.00	2.01	1.76	2.44	2.23	2.67	2.21	0.0456
APB 510453	2.37	2.29	2.37	2.37	2.00	2.23	2.00	2.00	2.23	2.20	0.0003
WB 9112	2.21	2.18	2.02	2.56	1.61	2.26	2.11	2.39	2.24	2.17	0.0637
LCS STAR	2.02	1.85	1.77	2.24	2.46	2.24	2.35	2.51	2.00	2.16	0.0939
WB 9904	2.23	1.94	2.32	1.85	2.42	2.15	2.30	2.07	1.62	2.10	0.3239
UC UC 15014-4	2.34	2.36	1.92	2.07	2.26	1.76	2.00	2.02	2.16	2.10	0.2155
XA9301	2.32	2.17	2.37	2.00	2.00	1.87	2.24	1.85	2.00	2.09	0.2437
UC PATWIN 515 HP	1.62	2.42	1.70	1.96	2.35	2.16	1.84	2.24	2.47	2.08	0.5250
WB 9350	2.43	2.09	2.61	2.39	1.76	2.24	1.76	1.63	1.85	2.08	0.5689
UC UC 15010-27	2.32	2.29	1.64	2.00	1.83	2.45	2.22	2.00	2.00	2.08	0.4444
WB PATRON	2.22	2.46	2.24	1.87	1.76	2.06	2.30	1.72	2.09	2.08	0.4586
SY REDWING	2.21	1.92	2.19	2.00	2.00	1.76	2.59	2.14	1.85	2.07	0.4940
XA9503	2.32	2.17	1.42	2.09	2.13	2.24	2.13	1.78	2.24	2.05	0.6898
SY SUMMIT 515	2.23	2.08	2.37	1.97	2.16	1.99	2.16	1.85	1.69	2.05	0.6004
WB 7566	2.23	1.93	2.09	1.92	2.40	2.00	1.76	2.09	2.00	2.04	0.6682
XA9501	1.61	2.30	1.93	2.30	2.00	2.30	1.96	2.22	1.76	2.04	0.7923
SY 13W00850	2.00	2.00	2.37	2.00	2.00	1.76	1.93	2.00	2.21	2.03	0.8512
APB 501089	2.07	2.23	1.83	1.85	2.31	1.76	1.64	2.65	1.93	2.03	0.9374
XA9502	1.87	2.17	2.26	2.06	1.87	2.11	2.00	2.02	1.87	2.02	0.9390
SY BLANCA ROYALE	2.00	1.93	1.85	1.56	2.54	1.69	2.61	2.16	1.85	2.02	0.9926
SY 314	1.88	2.00	2.19	2.00	2.21	2.17	2.00	2.00	1.70	2.02	0.9490
XA9302	2.11	2.17	2.26	2.11	1.90	1.87	1.69	1.87	2.08	2.00	0.7735
SY CAL ROJO	1.91	1.91	2.00	2.00	2.09	1.53	2.61	2.00	1.98	2.00	0.8387
UC PATWIN 515	1.62	2.61	1.70	2.61	1.34	2.14	2.16	1.62	2.00	1.97	0.7519
UC 16010-20	2.32	1.78	2.02	1.61	1.43	2.02	2.55	1.78	2.23	1.97	0.6535
LCS 12SB0224	1.77	2.00	1.79	2.00	2.16	2.24	2.00	1.64	2.00	1.95	0.2853
UC LASSIK	1.40	2.35	2.37	1.34	1.85	2.00	2.00	2.06	2.00	1.93	0.4195
UC YUROK	1.27	2.27	2.13	1.94	2.00	1.78	1.61	1.48	2.06	1.84	0.0775
LCS 12SB0197	1.77	1.93	1.85	2.00	1.59	1.98	2.00	1.83	1.55	1.83	0.0005
SY ULTRA	1.76	2.08	1.64	1.42	2.08	1.76	2.32	1.76	1.61	1.82	0.0290
UC UC 15080-49	1.70	1.91	1.94	1.70	1.70	1.70	1.55	1.70	1.94	1.76	0.0000
LCS ATOMO	1.70	2.10	1.72	1.80	2.16	1.55	1.62	1.41	1.72	1.75	0.0005
SY VACA	1.24	1.75	2.05	1.75	2.12	1.88	1.39	1.87	1.73	1.75	0.0029
UC UC 14657-170	2.30	1.91	1.55	1.31	1.70	1.55	1.55	1.55	2.00	1.71	0.0013
ANZA	1.62	1.70	2.08	1.40	1.87	1.64	1.95	1.40	1.62	1.70	0.0000
NEW DIRKWIN	1.59	1.83	1.54	1.30	1.75	1.67	1.79	1.97	1.51	1.66	0.0000
TAM204	1.83	1.00	1.93	1.46	1.85	1.69	2.08	1.62	1.23	1.63	0.0004
FV 2808	1.64	1.34	2.00	2.37	1.49	1.10	1.42	1.25	1.40	1.55	0.0001

# List of varieties

We evaluated 21 location/year

We included only the varieties for which we had at least 2 years of data

We established the cut-off at  $P < 0.20$

For the brochure we eliminated varieties that are no longer available

VARIETY	Quality Score	SE	t.ratio	P value
WB JOAQUIN ORO	2.66	0.08	10.25	0.000
WB 9229	2.55	0.08	8.89	0.000
SY BLANCA GRANDE 515	2.41	0.08	6.71	0.000
WB 9112	2.36	0.09	5.01	0.000
YECORA ROJO	2.30	0.09	4.59	0.000
SY SIENNA	2.18	0.09	3.07	0.002
LCS STAR	2.17	0.08	3.07	0.002
UC PATWIN 515HP	2.14	0.08	2.62	0.009
APB 500709	2.12	0.10	1.77	0.078
WB 7566	2.12	0.09	1.91	0.057
WB 9433	2.11	0.09	2.08	0.038
UC CENTRAL RED	2.11	0.08	2.16	0.031
UC1815	2.11	0.10	1.65	0.100
SY REDWING	2.06	0.09	1.26	0.209
SY SUMMIT 515	2.05	0.08	1.29	0.197
SY 314	1.99	0.10	0.26	0.799
WB 9350	1.99	0.09	0.31	0.760
APB 501089	1.98	0.09	0.22	0.825
SY CAL ROJO	1.98	0.08	0.22	0.830
LCS 12SB0224	1.93	0.08	-0.61	0.546
UC PATWIN 515	1.90	0.08	-0.95	0.343
UC YUROK	1.90	0.09	-0.87	0.386
SY BLANCA ROYALE	1.89	0.09	-1.01	0.315
UC LASSIK	1.82	0.09	-1.87	0.062
LCS ATOMO	1.80	0.09	-2.07	0.039
LCS 12SB0197	1.76	0.09	-2.63	0.009
WB PATRON	1.75	0.09	-2.80	0.005
WB 9904	1.73	0.08	-3.57	0.000
SY ULTRA	1.69	0.10	-3.27	0.001
SY VACA	1.63	0.10	-3.98	0.000
DPG FV 2808	1.43	0.10	-6.29	0.000
ASSL TAM 204	1.43	0.09	-6.87	0.000
UC ANZA	1.42	0.10	-6.39	0.000
BAG NEW DIRKWIN	1.41	0.09	-7.06	0.000

Recommended	Acceptable	Nor Recommended
WB JOAQUIN ORO	SY SUMMIT 515	UC LASSIK
WB 9229	WB 9350	LCS ATOMO
SY BLANCA GRANDE 515	APB 501089	LCS 12SB0197
WB 9112	SY CAL ROJO	WB PATRON
YECORA ROJO	LCS 12SB0224	WB 9904
SY SIENNA	UC PATWIN 515	SY ULTRA
LCS STAR	UC YUROK	ANZA
UC PATWIN 515HP		
APB 500709		
WB 7566		
UC CENTRAL RED		
UC1815 (UC Central White)		

# Brochure

The varieties were analyzed at the California Wheat Commission wheat quality lab for grain, milling, and bread baking qualities.

Quality score data was statistically analyzed by University of California, Davis Breeding and Small Grains Programs.

Varieties must have a minimum of 2 years' data to be published in the ranking list. As more varieties are introduced and analyzed the ranking is subjected to change on a yearly basis.

For specific information on agronomics, consult the wheat certified seed guide: <http://californiawheat.org/resources/> or <http://smallgrains.ucanr.edu/Variety/>.



Company Name  
Street Address  
City, ST, ZIP Code

Name  
ZIP Code

## CALIFORNIA WHEAT VARIETIES

Based on baking quality

The yield data is an average over locations and years for quick reference. For more precise yield and agronomic data by location go to the Small Grains Web site <http://smallgrains.ucanr.edu/>

### 2019 Quality Rankings

Varieties are statistically ranked by bread baking qualities. The varieties are categorized by Recommended, Acceptable and Not Recommended.

Selecting varieties from the preferred class will help to increase the overall quality and desirability of California wheat.

The varieties were planted and harvested from 19 locations across 3 years in California by the University of California, Davis.

**Recommended (R)** – Varieties have high test weight, high protein, excellent milling, and excellent end-use bread baking qualities.

**Acceptable (A)** – Varieties have acceptable test weight, protein, milling, and end-use bread baking qualities.

**Not Recommended (NR)** – Varieties have unacceptable test weight, protein, milling and end-use bread baking qualities.

### RECOMMENDED

VARIETIES	BREEDER	CLASS	YIELD* (lb/acre)
WB Joaquin Oro	WB	HRS	5272
WB 9229	WB	HRS	5917
Blanca Grande515	AP-SYN	HWS	6180
WB 9112	AP-SYN	HWS	5754
Yecora Rojo	UCD	HRS	5276
SY Sienna	AP-SYN	HRS	6535
LCS Star	LCS	HWS	6065
UC Patwin 515HP	UCD	HWS	6351
APB 500709	APB	HRS	6513
WB 7566	WB	HWS	6555
UC Central Red	UCD	HRS	6227
UC 1815	UCD	HWS	6793

### ACCEPTABLE

VARIETIES	BREEDER	CLASS	YIELD* (lb/acre)
SY Summit 515	AP-SYN	HRS	6561
WB 9350	WB	HRS	6635
APB 501089	APB	HRS	6260
SY Cal Rojo	AP-SYN	HRS	6112
LCS 12SB0224	LCS	HWS	6662
UC Patwin 515	UCD	HWS	6439
UC Yurok	UCD	HRS	5936

### NOT RECOMMENDED

VARIETIES	BREEDER	CLASS
UC Lassik	UCD	HRS
LCS Atomo	LCS	HWS
LCS 12SB0197	LCS	HRS
WB Patron	WB	HRS
WB 9904	WB	HRS
SY Ultra	AP-SYN	HRS
UC Anza	UCD	HRS

\*For specific yield and agronomic varietal performance information go to <http://smallgrains.ucanr.edu/Variety/>.

### Abbreviations

AP-SYN	Agripro-Syngenta
APB	Arizona Plant Breeders
DPG	Dunn Plant Genetics
LCS	Limagrain Seeds
TAM	Texas A&M
UCD	Univ. of California, Davis
WB	WestBred
HRS	Hard Red Spring
HWS	Hard White Spring

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