2017-18 Regional Common Wheat & Triticale, Durum Wheat, and Barley Performance Tests in California

Authors: Taylor Nelsen, Michael Rodriguez, Nicholas George, Mark Lundy

Contributions: K. Mathesius, M. Leinfelder-Miles, M. Galla, S. Light, N. Clark, B. Marsh, S. Wright, F. Maciel, R. Solorio, R. Wilson, D. A. Culp, E. McCullough, T. Becker, M. Sandate-Reyes, S. Spivak, T. Zerrouk, J. Slocum, J. Henriquez, A. Krill-Brown

1. INTRODUCTION

This report summarizes the results of small grains variety tests conducted by the University of California Cooperative Extension Small Grains Program during the 2017-18 season. It also includes multi-year summaries of trials conducted between the 2015-16 and 2017-18 growing seasons. The 2017-18 experiments had the following objectives: 1) Measure crop productivity, quality, disease resistance, and agronomic characteristics for commercially available small grain varieties and advanced breeding lines across a range of environmental and management conditions that represent Californian agro-ecosystems; 2) Study the magnitude of management effects on variety performance by directly manipulating crop water and nitrogen availability at a subset of trial locations; 3) Measure in-season changes, and variety-specific differences in growth directly via crop-phenotyping platforms; 4) Apply multi-level statistical models to trial data to better understand and communicate varietal differences due to genotypic, environmental, and management effects, and; 5) Report results of the research and analysis on our program website, at extension meetings, and in other agricultural forums.

General Seasonal Overview

The 2017-18 California small grain crop consisted of approximately 485 thousand planted acres of wheat, triticale and barley. Approximately 35% of the planted area of wheat was harvested for grain. Total wheat production was down 28% over the previous year and total small grain acres in California were at their lowest in a decade. The declines in grain acreage are due to low grain prices and opportunity costs associated with other cropping system options, including the market for small grain forage.

For fall-planted crops, the early season was marked by below average rainfall and infrequent precipitation events, which resulted in some early drought stress and weak stands, particularly in dryland areas. After a warmer than average early-season, from mid-February to early-March there were several multi-day periods with daily low temperatures below freezing for multiple hours. As a result, some frost damage was observed in the Northern San Joaquin Valley and the Sacramento Valley. Above average precipitation in March and April helped to return the annual rainfall total to within a few inches of normal in much of the state. Relative to the previous season, disease incidence in the state was low, with minimal occurrence of barley yellow dwarf virus, stripe rust, and false black chaff. Statewide common wheat yields averaged 4,620 lb ac^{-1}, durum wheat yields averaged 5,700 lb ac^{-1}, and barley yields averaged lb ac^{-1}. Within UC small grain variety testing trials, average grain yields were 5,975 lb ac^{-1}, which is approximately 105% of the 5-year average in these trial.

2. METHODS

2.1 UC Statewide Variety Trials

Entries & test locations

Commercially available and advanced breeding lines of common wheat, durum wheat, triticale, and barley were grown in statewide multi-environment trials between 2015-16 and 2017-18 (Table 1). Tests were conducted at University of California research stations or in fields of cooperating growers.

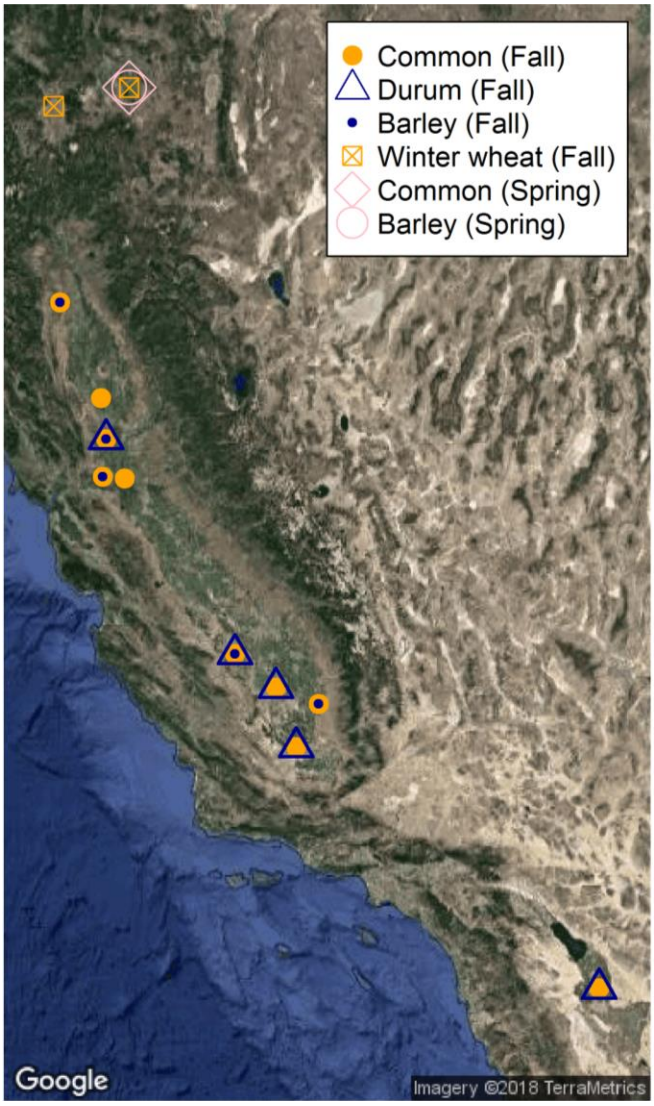


Figure 1. Map depicting the California small grain regional trial test locations used in the 2017-18 season.

Table 1. The number of unique entries of each species tested in the statewide regional trials in each season at each location.

Location	Season	Barley	Common Wheat	Durum Wheat	Triticale	Wheat (Spring-planted)	Wheat (Fall-planted)
Clarksburg	2015-16	34	41		8		
Colusa	2015-16		41		8		
Colusa	2016-17		45		9		
Colusa	2017-18		41		9		
Davis	2015-16	34	41	28	8		
Davis	2016-17	12	45	27	9		
Davis	2017-18	17	41	30	9		
Delta	2015-16		41		8		
Delta	2016-17		43		9		
Delta	2017-18		39		7		
Fresno	2015-16	34	41	28	8		
Fresno	2016-17	12	45	28	9		
Fresno	2017-18	17	41	30	9		
Fresno2	2015-16		41	28	8		
Imperial	2015-16		41	28	7		
Imperial	2016-17		45	28	9		
Imperial	2017-18		41	30	9		
Kern	2015-16		41	28	8		
Kern	2016-17		45	28	9		
Kern	2017-18		41	30	9		
Kings	2016-17		45	28	9		
Kings	2017-18		41	28	9		
Siskiyou	2015-16						46
Siskiyou	2016-17						42
Siskiyou	2017-18						40
Slo	2015-16	34					
Solano	2016-17	12	45		9		
Solano	2017-18	11	41		9		
Tehama	2015-16	34					
Tehama	2017-18	17	41		9		
Tulare	2015-16	33	41		7		
Tulare	2016-17	12	45		9		
Tulare	2017-18	17	41		9		
Tulelake	2015-16	41				51	46
Tulelake	2016-17	41				48	41
Tulelake	2017-18	6				59	40

Field methods

Field methods and results are reported for the 2017-18 season. For methodological details regarding earlier field seasons please consult annual reports from those years.

Trial design and establishment

A randomized complete block design with four replications was used at all trial locations. In the 2017-18 season, tests were sown at seeding rates of approximately 1 to 1.2 million seeds/ac for all tests (equivalent to 61 to 107 lbs/acre for common wheat, 78 to 99 lbs/acre for triticale, 75 to 140 lbs/acre for durum wheat and 77 to 113 lbs/acre for

Table 2. The number of unique entries of each species tested in the statewide regional trials in each season.

Region	Crop Type	2015-16	2016-17	2017-18
Non-Intermountain	BARLEY	34	12	17
	COMMON	41	45	41
	DURUM	28	28	30
	TRITICALE	8	9	9
Intermountain	BARLEY	41	41	6
	SPRING WHEAT	51	48	59
	WINTER WHEAT	46	42	40

barley, depending on the variety). Each plot was six or nine drill rows wide (5 to 9-inch row spacing) and 15 to 20 feet long. Grain was harvested with a Wintersteiger Seedmaster Universal 150 plot combine.

Pre-plant soil sampling

Pre-plant soil samples were taken at depths of 0-50 cm and 50-100 cm at all locations unless where limited by distinct profile differences or impenetrable layers. Sample collection was carried out using a manual bucket-type auger system. Three to four samples/ac were placed in paper bags and immediately weighed then allowed to air-dry before further processing. The field methods used for soil sampling were adapted from Schoeneberger *et al.* (2012).

Nitrogen fertilization & irrigation

A range of nitrogen fertilizer types and amounts were used depending on location (Table 5). At the on-farm locations, the variety trial was fertilized along with surrounding small grains crops according to the fertility management program of that specific grower. At high yield potential locations the common and durum wheat trials received between 150 and 200 lb of nitrogen per acre. Less fertilizer was delivered to the barley trials and wheat trials with lower yield potential, such as the rainfed Tehama, Solano and Tulare locations. At the Davis and Fresno locations, the low-nitrogen common wheat trials received no nitrogen fertilization. At the Fresno location the low-water common wheat received a total of 100 lb of nitrogen per acre, relative to 150 lb for the conventionally managed trial. A range of irrigation amounts were applied depending on location (Table 6). At the on-farm locations the irrigation management was in accordance with the typical irrigation management of that specific grower.

Disease observations

When foliar diseases and other disease-like symptoms were present, variety-specific ratings were recorded at relevant locations. Diseases during the 2017-18 season included stripe rust, septoria, and barley yellow dwarf virus. In addition to these, a false black chaff symptom was observed and its incidence rated. When present, diseases were assessed at the soft-to-medium dough stage of growth by estimating the percentages of the penultimate leaf affected (Table 3). Barley Yellow Dwarf Virus assessments were based on the percentage of plants showing symptoms in a plot. Stripe rust samples were sent for race analysis by Xianming Chen, Research Plant Pathologist with the USDA-ARS at Washington State University.

Table 3. Rating scale used for rating the occurrence of the majority of disease and disease-like symptoms in the 2017-18 season.

Rating	Area of penultimate leaf affected
1	0-3 %
2	2-14 %
3	15-29 %
4	30-49%
5	50-69%
6	70-84%
7	85-95%
8	96-100%

Agronomic observations

In-season observations on the timing of heading and maturity were recorded at the Davis and Tulelake locations for the crop-type/seasonal planting timing combinations. Heading is defined as when half the spike is visible in half of the plants in a plot. The stage of grain ripening (milk, soft dough, hard dough, hard kernel, and harvest ripe) for the majority of plants within the plots was recorded. Both days to heading and days to maturity are calculated from January 1st. Early lodging of plants was rated during growing season prior to plant senescenceas the percentage area of plot with lodged plants. At harvest, mean plant height and plot lodging were recorded on an individual plot basis. The lengths of individual plots were measured at harvest for yield determination. Locations at which agronomic traits were recorded are summarized in (Table 7).

Harvest procedures

Whole plots were harvested with a Wintersteiger Seedmaster Universal 150 plot combine. All seed from each plot was collected and weighed in field for the determination of plot yields at harvest moisture. A sub-sample of approximately 2.5lb was then taken from three of the four replicates and weighed in-field before returning the sample to the laboratory for additional processing (detailed below).

Post harvest seed processing & yield estimates

Grain yield, on a lb/acre basis, was estimated based on whole plot grain yield and plot area. The plot area for yield estimation was calculated using the measured plot length and plot width of 4.3 to 5 ft, adjusted for differences between grain drills (detailed below).

Grain sub-samples were stored in seed processing facilities at the University of California, Davis until reaching equilibrium moisture content. Given average conditions in the seed processing facilities, equilibrium moisture content for grain of all species is estimated to have been approximately 10%. Grain sub-samples were re-weighed and differences from the field weight were used to correct plot yields for changes in moisture content since harvest. The sub-sample was then cleaned with an air-blower to remove any chaff or other extraneous material. Weight loss after this cleaning was used to correct estimated final grain yields.

The protein and moisture content of the cleaned grain was measured using a Perten Instruments Inframatic Near Infrared Reflectance (NIR) Grain Analyzer. The two-hundred-seed-weight of clean grain was measured using an Old Mill Company electronic seed counter and the value converted to a thousand seed weight for the purpose of reporting. The test weight of clean grain was determined by weighing the mass of one dry quart of grain (AACCI Method 55-10.01).

Climate measurements

Climate data for each location was obtained from the PRISM Climate Group. Cumulative precipitation and growing degree-days from sowing are estimated for each location and compared to 10-year means. Degree-days were estimated using the corrected single triangle method [6-8]. Temperature thresholds of 87°F (30°C) and 44°F (7°C) were used [6, 9].

Table 4. Test locations used by the statewide regional trials between the 2015-16 and 2017-18 seasons.

Site Name	Season	Trials	Latitude	Longitude	Soil Type	Previous Crop	Planting Date
Clarksburg	2015-16	Barley, Common & Triticale	38.42	-121.57	Omni silty clay		12/1/2015
Colusa	2015-16	Common & Triticale	39.04	-121.87	Scribner silt loam	vineseed	11/14/2015
Colusa	2016-17	Common & Triticale	39.04	-121.85	Grandbend loam	safflower	11/10/2016
Colusa	2017-18	Common & Triticale	38.94	-121.84	Grandbend loam	cucumbers	11/22/2017
Davis	2015-16	Barley, Durum, Common & Triticale	38.54	-121.78	Yolo loam	corn	11/12/2015
Davis	2016-17	Barley, Durum, Common & Triticale	38.53	-121.77	Yolo loam / Yolo silt clay loam	corn	11/15/2016
Davis	2016-17	Common & Triticale	38.53	-121.77	Yolo loam / Yolo silt clay loam	corn	11/17/2016
Davis	2017-18	Common & Triticale	38.54	-121.78	Yolo loam/Yolo silt clay loam	safflower	11/20/2017
Davis	2017-18	Barley, Durum, Common & Triticale	38.54	-121.78	Yolo loam/Yolo silt clay loam	safflower	11/21/2017
Davis	2017-18	Common & Triticale	38.54	-121.78	Yolo loam/Yolo silt clay loam	safflower	11/29/2017
Delta	2015-16	Common & Triticale	37.9	-121.51	Egbert muck	tomato	11/23/2015
Delta	2016-17	Common & Triticale	38.15	-121.53	Ryde clay loam / Rindge much	potatoes	11/18/2016
Delta	2017-18	Common & Triticale	38.13	-121.53	Ryde clay loam/Rindge muck	triticale	11/15/2017
Fresno	2015-16	Barley, Durum, Common & Triticale	36.34	-120.12	Panoche Clay loam	cotton	11/16/2015
Fresno	2016-17	Barley, Common & Triticale	36.34	-120.12	Panoche Clay loam	barley	11/30/2016
Fresno	2016-17	Durum, Common & Triticale	36.34	-120.12	Panoche Clay loam	barley	12/1/2016
Fresno	2016-17	Common & Triticale	36.34	-120.12	Panoche Clay loam	sudan grass	11/30/2016
Fresno	2017-18	Barley, Common & Triticale	36.34	-120.11	Panoche Clay loam	cotton	11/29/2017
Fresno	2017-18	Durum	36.34	-120.11	Panoche Clay loam	cotton	11/30/2017
Fresno2	2015-16	Common & Triticale	36.41	-120.08	Califlax clay loam		
Fresno2	2015-16	Durum, Common & Triticale	36.41	-120.08	Posochanet clay loam	tomato	11/30/2015
Imperial	2015-16	Durum, Common & Triticale	32.81	-115.44	Imperial-Glenbar silty clay loam	sudan grass	11/18/2015
Imperial	2016-17	Durum, Common & Triticale	32.81	-115.44	Imperial silty clay	sudan grass	12/9/2016
Imperial	2017-18	Durum, Common & Triticale	32.81	-115.44	Imperial silty clay		12/13/2017
Kern	2015-16	Durum, Common & Triticale	35.37	-119.33	Westhaven fine sandy loam	cotton	11/18/2015
Kern	2016-17	Common & Triticale	35.38	-119.33	Wasco sandy loam	cotton	11/21/2016
Kern	2016-17	Durum	35.38	-119.33	Wasco sandy loam	cotton	11/21/2019
Kern	2017-18	Durum, Common & Triticale	35.37	-119.33	Westhaven fine sandy loam	cotton	11/28/2017
Kings	2016-17	Durum, Common & Triticale	36	-119.57	Gepford clay		11/29/2016
Kings	2017-18	Durum, Common & Triticale	35.99	-119.59	Gepford clay	cotton	12/5/2017
Siskiyou	2015-16	Winterwheat	41.79	-122.44	Montague clay	fallow	10/26/2015
Siskiyou	2016-17	Winterwheat	41.77	-122.45	Jenny clay		11/14/2016
Siskiyou	2017-18	Winterwheat	41.79	-122.44	Jenny clay		10/26/2017
Slo	2015-16	Barley	35.66	-120.41	Pico fine sandy loam	pasture	11/28/2015
Solano	2016-17	Barley, Common & Triticale	38.14	-121.74	Diablo-Ayar clays	fallow	11/16/2016
Solano	2017-18	Barley, Common & Triticale	38.15	-121.82	Nacimiento-Altamont complex	pasture	11/21/2017
Tehama	2015-16	Barley	39.87	-122.38	Newville gravelly loam	fallow	11/30/2015
Tehama	2017-18	Barley, Common & Triticale	39.88	-122.36	Arbuckle gravelly loam	pasture	12/15/2017
Tulare	2015-16	Barley, Common & Triticale	35.81	-119.05	Centerville clay	fallow	11/19/2015
Tulare	2016-17	Barley, Common & Triticale	35.82	-119.06	Centerville clay	fallow	11/29/2016
Tulare	2017-18	Barley, Common & Triticale	35.82	-119.04	Centerville clay	fallow	11/28/2017
Tulelake	2015-16	Barley	41.97	-121.47	Tulebasin mucky silty clay loam		
Tulelake	2015-16	Winterwheat	41.97	-121.47	Tulebasin mucky silty clay loam	sudan grass	10/30/2015
Tulelake	2015-16	Springwheat	41.97	-121.47	Tulebasin mucky silty clay loam	sudan grass	
Tulelake	2016-17	Winterwheat	41.96	-121.47	Tulebasin mucky silty clay loam	sudan grass	10/21/2016
Tulelake	2016-17	Barley, Springwheat	41.96	-121.47	Tulebasin mucky silty clay loam	sudan grass	5/5/2017
Tulelake	2017-18	Springwheat	41.97	-121.47	Tulebasin mucky silty clay loam	sudan grass	4/26/2018
Tulelake	2017-18	Winterwheat	41.97	-121.47	Tulebasin mucky silty clay loam	sudan grass	10/30/2017
Tulelake	2017-18	Barley	41.97	-121.47	Tulebasin mucky silty clay loam	sudan grass	4/26/2018

Table 5. Nitrogen fertilizer management details for the regional trial test locations in the 2017-18 season.

Site Name	Trial	N Fertilizer Management
Delta	WHEAT	124 units as UN32 preplant
Fresno	BARLEY	50 lbs 46-00-00 (2/16/18)
Fresno	WHEAT, DURUM	100 lbs 46-00-00 (2/26/18), 50 lbs 46-00-00 (4/5/18)
Fresno	WHEAT (WATER STRESS)	100 lbs 46-00-00 (3/20/18)
Fresno	WHEAT (NITROGEN STRESS)	
Imperial	WHEAT, DURUM	50 lbs N as Urea (12/14/17), 100 lbs N as NH3 (1/19/18), 50 lbs N as NH3 (2/13/18), 50 lbs N as NH3 (3/7/18)
Kern	WHEAT, DURUM	105 units UN32 (planting), 145 lbs/ 67 units Urea (late tillering/Late feb)
Kings	WHEAT, DURUM	Preplant 80 units NH3, 11-52-0 150 lbs pre plant, 30s unit NH3 all irrigations irrigation, 20 units N UAN 32 humic acid flown on in Feb.
Solano	WHEAT	preplant 50 lbs N as ammonia
Tulare	WHEAT, BARLEY	
Tehama	BARLEY	50-60 units of N as urea preplant (2/22/18), 75 untis of N as urea
Tehama	WHEAT	50-60 units of N as urea preplant (2/22/18), 100 units of N as urea
Colusa	WHEAT	Preplant 40 gallons of aqua/acre (62lbs N/acre), Top Dress Urea 2/28/18 112.89lbs/acre (52 lbs N/acre)
Tulelake	BARLEY	60 lbs N / acre at tillering (6/6/2018)
Tulelake	COMMON (WINTER WHEAT)	50 lbs N/acre at planting (10/25/2017), 50 lbs N/acre UAN32 late-tillering (5/2/2018), 50 lbs N/acre UAN32 jointing-early boot (5/18/2018)
Tulelake	COMMON (SPRING HARD WHEAT)	60 lbs N/acre at tillering (6/6/2018), 90 lbs N/acre split applied from jointing-early heading (6/14/2018 and 6/20/2018), 20 lbs N/acre at flowering (6/28/2018)
Tulelake	COMMON (SPRING SOFT WHEAT)	60 lbs N/acre at tillering (6/6/2018), 90 lbs N/acre split applied from jointing-early heading (6/14/2018 and 6/20/2018)
Siskiyou	COMMON	
Davis	WHEAT, WHEAT (WATER STRESS), DURUM	50 lbs N /acre as Urea N (11/22/17), 100 lbs N /acre as Am Sulfate (2/20/18), 50 lbs N /acre as urea (4/5/18)
Davis	WHEAT (NITROGEN STRESS)	
Davis	BARLEY	25 lbs N /acre as Urea (11/22/17), 75 lbs N /acre as Am Sulfate (2/20/2018)

Table 6. Irrigation management details for the regional trial test locations in the 2017-18 season.

Site Name	Trial (s)	Total Irrigation	Irrigation management
Delta	Wheat		
Fresno	Barley	5.97	.33" (12/6/17), 1.33" (12/7/17), .66" (12/14/17), 3.65" Avg. (2/20/18)
Fresno	Wheat, Wheat (Nitrogen Stress), Durum	9.27	.33" (12/6/17), 1.33" (12/7/17), .66" (12/14/17), 3.65" Avg. (2/20/18), 3.3" (4/10/18)
Fresno	Wheat (Water Stress)	5.97	.33" (12/6/17), 1.33" (12/7/17), .66" (12/14/17), 3.65" Avg. (2/20/18)
Imperial	Wheat, Durum	64	7" (12/14/17), 3" (1/19/18), 7" (2/13/18), 4" (3/7/18), 7" (3/27/18), 9" (4/13/18)
Kern	Wheat, Durum	24	Irrigated up, second irrigated Jan, third irrigation early march, end April 6" each time
Kings	Wheat, Durum	18	Sprinklers 24 hrs 4" December 15th Three subsequent irrigations first 6" then 4" and 4" Jan, Feb, March approx. end of mor
Solano	Wheat, Barley	0	Rainfed
Tulare	Wheat, Barley	0	Rainfed
Tehama	Wheat, Barley	0	Rainfed
Colusa	Wheat	0	Rainfed
Tulelake	Barley	11.94	solid-set irrigation: 0.63 (5/2), 1.54 (5/4), 0.63 (5/9), 0.63 (5/14), 2.52 (6/6), 1.37 (6/14), 2.1 (6/22), 2.52 (6/29)
Tulelake	Common (Winter Wheat)	8.72	solid-set irrigation: 0.63 (5/2), 1.68 (5/11), 2.52 (5/18), 2.52 (6/8), 1.37 (6/14)
Tulelake	Common (Spring Hard Wheat)	14.25	solid-set irrigation: 0.63 (5/2), 1.54 (5/4), 0.63 (5/14), 2.52 (6/6), 1.37 (6/14), 2.1 (6/20), 2.52 (6/29), 1.89 (7/12), 1.05 (7/20)
Tulelake	Common (Spring Soft Wheat)	13.83	solid-set irrigation: 0.63 (5/2), 1.54 (5/4), 0.63 (5/9), 0.63 (5/14), 2.52 (6/6), 1.37 (6/14), 2.1 (6/20), 2.52 (6/29), 1.89 (7/12)
Siskiyou	Common		
Davis	Wheat, Wheat (Nitrogen Stress), Durum		0.75-1.0" (12/14/17), 4-6" (2/21/18), 8.5-9" (4/20/18)
Davis	Wheat (Water Stress)		0.75-1.0" (12/14/17), 4-6" (2/21/18)
Davis	Barley		0.75-1.0" (12/12/17), 4-6" (2/21/18), 4-6" (2/21/18)

Table 7. The locations where agronomic traits were recorded in the 2017-18 season.

Site Name	Trial	Yield	Protein	Test Weight	Thousand Kernal Weight	Plant Height	Lodging (soft dough)	Lodging (harvest)	Shattering
Colusa	WHEAT	X	X	X	X	X	X	X	
Davis	BARLEY	X	X	X	X	X	X	X	
Davis	DURUM	X	X	X	X	X	X	X	
Davis	WHEAT	X	X	X	X	X	X	X	
Delta	WHEAT	X	X	X	X	X	X	X	
Fresno	BARLEY	X	X	X	X	X		X	
Fresno	DURUM	X	X	X	X	X		X	
Fresno	WHEAT	X	X	X	X	X		X	
Imperial	DURUM	X	X	X		X		X	
Imperial	WHEAT	X	X	X		X		X	
Kern	DURUM	X	X	X	X	X	X	X	
Kern	WHEAT	X	X	X	X	X	X	X	
Kings	DURUM	X	X	X	X	X	X	X	
Kings	WHEAT	X	X	X	X	X	X	X	
Siskiyou	WINTERWHEAT	X	X	X		X			
Solano	BARLEY	X	X	X	X				
Solano	WHEAT	X	X	X	X	X		X	
Tehama	BARLEY	X	X	X	X	X		X	
Tehama	WHEAT	X	X	X	X	X		X	
Tulare	BARLEY	X	X						
Tulare	WHEAT	X	X		X				
Tulelake	BARLEY	X	X	X		X			
Tulelake	SPRINGWHEAT	X	X	X		X		X	
Tulelake	WINTERWHEAT	X	X	X		X		X	

Grain & flour quality analyses

Grain samples from all trials the conventionally managed common wheat trials at the Davis and Fresno locations, and from the durum wheat trials at the Fresno and Kern locations, were analyzed for grain and flour quality by the California Wheat Commission. Grain quality analyses for both common and durum wheat included protein content, ash content, kernel weight, kernel diameter, kernel hardness, 1000 kernel weight, and kernel size distribution. Flour quality analyses for the common wheat included flour yield, protein content, ash content, falling number, gluten index, wet gluten, absorption, development time, stability, MTI, baking, mixing time, loaf volume, dough handling, crumb color, crumb grain, crumb texture, and bread symmetry. Flour quality analyses for the durum wheat included semolina extract, ash content, specks, protein, gluten index, falling number, alveograph values, semolina color, and the color, weight, loss and firmness of pasta.

Soil analyses

Soil samples were air-dried in the laboratory until the weight stabilized, which took approximately one week for an unconsolidated sample of around 1 kg. The mass difference before and after drying was used to determine the gravimetric soil water content above the air dry point. Air-dry soils were stored for future nitrogen analyses. A sub-sample of the soil was then oven dried to determine the total soil water content. Soil bulk density was used to convert total soil water content to soil volumetric water content. Soil water content above the soil wilting point was assumed to be the plant available soil water content. Published values were used to determine the approximate wilting point for the different soil types. Pre-plant soil nitrogen content was measured using both WaterWorks nitrate/nitrite test strips (https://sensafe.com/) and the nitrate quick test method described on our program website http://smallgrains.ucanr.edu/files/256250.pdf), and the soil nitrate method of Doane and Horwath (2003) modified to use potassium chloride rather than ammonium chloride. Other soil handling and analytical methods were developed from Schoeneberger et al. (2013).

Table 8. The analytical procedures used by the California Wheat commission laboratory to measure grain and flour quality of common and durum wheat grain samples.

QUALITY TRAIT	METHOD
COMMON WHEAT	
GRAIN ANALYSIS	
Moisture	AACCI 44-15.02
Test Weight	AACCI 55-10.01
Protein	AACCI 46-30.01
Single Kernel Characterization (SKCS)	AACC 54-31.01 using Perten SKCS 4100
Ash	AACCI 08-01.01
Falling Number	AACCI 56-81.03
Sedimentation	AACC 56-63.01
Kernel Sizing	Wheat is sifted using a RoTap Sifter using U.S. No 7 and U.S. No. 10 Sieves. No. 7 Sieves (Large), No. 10 Sieves (medium), anything that passes through number 10 is small kernels.
FLOUR ANALYSIS	
Moisture	AACCI 44-15.02
Protein	AACCI 46-30.01
Ash	AACCI 08-01.01
Wet Gluten & Gluten Index	AACCI 38-12.02
Farinograph	AACC 54-21.02
Alveograph	Modified AACC 54-30-.02
BAKING ANALYSIS	
Puploaf baking	AACC 10-10.03
DURUM WHEAT	
GRAIN ANALYSIS	
Moisture	AACCI 44-15.02
Test Weight	AACCI 55-10.01
Protein	AACCI 46-30.01
Single Kernel Characterization (SKCS)	AACC 54-31.01 using Perten SKCS 4100
Ash	AACCI 08-01.01
Falling Number	AACCI 56-81.03
Sedimentation	AACC 56-63.01
Kernel Sizing	Wheat is sifted using a RoTap Sifter using U.S. No 7 and U.S. No. 10 Sieves. No. 7 Sieves (Large), No. 10 Sieves (medium), anything that passes through number 10 is small kernels.
SEMOLINA ANALYSIS	
Moisture	AACCI 44-15.02
Protein	AACCI 46-30.01
Ash	AACCI 08-01.01
Wet Gluten & Gluten Index	AACCI 38-12.02
Farinograph	AACC 54-21.02
Alveograph	Modified AACC 54-30-.02

2.2 Collaborative quality trials

In the 2017-18 season, stands of advanced experimental varieties of both common wheat and durum wheat were established at the Davis, Fresno, and Imperial locations to produce bulk quantities of grain to supply to domestic millers and bakers for independent baking tests. Eleven varieties of common wheat were grown at the Davis and Fresno locations, and 5 varieties of durum wheat at the Fresno and Imperial locations (Table 9). The plots of individual varieties were approximately 10 ft wide by 80 ft long. The commercial common wheat varieties Blanca Grande 515 (hard white) and Cal Rojo (hard red), and the commercial durum wheat variety APB Kronos, where grown as check lines. The check lines were replicated three times and remaining varieties were replicated once. Other trial establishment and management details were comparable to the conventionally managed common and durum wheat regional trials conducted at the same locations. The performance of the varieties in the collaborative trials was compared to the performance of the same varieties in the regional trials at the same location.

Table 9. Common wheat and durum varieties included in the collaborative quality trials conducted in the 2017-18 season.

Crop Type	Name	UC Entry Number	Seed Source
DURUM	APB KRONOS	951	Arizona Plant Breeders
COMMON	SY CAL ROJO	1478	Syngenta
COMMON	SY BLANCA GRANDE 515	1657	Syngenta
COMMON	UC 15010 27	1815	UC
COMMON	UC CENTRAL RED	1817	UC
COMMON	SY SIENNA	1835	Syngenta
COMMON	WB 9433	1847	Westbred/Monsanto
DURUM	APB 450311	1863	Arizona Plant Breeders
DURUM	APB 471400	1864	Arizona Plant Breeders
DURUM	POWELL	1868	Second Nature
DURUM	SHASTA	1869	Second Nature
COMMON	APB 510477	1874	Arizona Plant Breeders
COMMON	SY 11200064-1-9	1876	Syngenta
COMMON	SY 11200083-1-3	1877	Syngenta
COMMON	YECORA ROJO 515	1879	UC
COMMON	UC 1880	1880	UC

2.3 Repeat harvests for crop growth model testing

To quantify biomass accumulation, and the timing of key phonological stages throughout the growing season, repeated harvests were taken from eight common wheat and triticale varieties, Bag New Dirkwin, CIM 121, CIM 152, NA Camelot, OC815388, SY Blanca Grande 515, SY Cal Rojo, and WB Patron at the Davis and Fresno locations. The varieties were grown under conventional management. A SY Blanca Grande 616 and SY Cal Rojo were grown under nitrogen stress and water stress conditions at the Davis location. Trial establishment and management methods were the same as for the conventional, low nitrogen management, and low water management common wheat regional trials except for a smaller plot size of approximately 10 ft in length.

The design for the repeat harvest was randomized by row. Each row had 4 replicated of each variety. A single row was harvested per harvest date. Harvests were conducted on eight occasions throughout the season in Davis (February 16th, March 7th, April 3rd, April 11th, April

17th, April 26th, May 4th, May 14th) and on 3 occasions throughout the season in Fresno (April 4th, April 18th, May 7th).

At each harvest, the total aboveground biomass was cut with a 3-ft cutting bar attached to a BCS PowerSafe 749 tractor. The entire plot was removed and weighed. A sub-sample was taken and weighed before and after oven drying at approximately 50°C for one week. This was used to estimate the total aboveground yield of dry biomass for the whole plot sample.

2.4 Repeated reflectance measurements

Canopy spectral reflectance was obtained throughout the growing season using both hand-held GreenSeekers and a DJI Matrice 100 small Unmanned Aircraft System (sUAS) with a Micasense RedEdge-M. sUAS cameras were calibrated using a MicaSense Calibrated Reflectance Panel.

GreenSeekers record normalized difference vegetation index (NDVI), and provide a measure of photosynthetic activity. At the Davis location, NDVI was recorded for all plots in the conventionally managed common wheat and durum wheat regional trials. Measurements were also taken in conventional and low nitrogen management treatments of Blanca Grande 515 and Cal Rojo. Measurements were taken at approximately weekly intervals from January 2017 to May 2018. At the Fresno location, NDVI measurements were taken in all plots of the low water common wheat regional trial at nine intervals: January 30th, Febuary 9th, Febuary 20th, March 5th, March 16th, April 6th, April 18th, May 2nd, and May 23rd. At the Colusa location, NDVI measurements were taken in all plots of SY Cal Rojo, SY Balnca Grande 51, Bag New Dirkwin, NS Camelot, UC 3183, UC 3184, WB Patron, Yecora Rojo, SY Summit 515, UC Patwin 515, LCS Atomo, WB Joaquin Oro, WB 7566, and UC Central Red at two intervals: January 29th and February 9th. NDVI measurement were taken from the same varieties at the Kings and Kern site on January 24th. NDVI measurement were taken from the same varieties at the Solano site at nine intervals: January 31st, February 12th, February 28th, March 9th, March 19th, April 5th, April 19th, May 2nd, and May 30th.

A RedEdge-M camera collects data centered at the blue (475 nm) green (560 nm), red (668 nm), red edge (717 nm), and NIR (840 nm) wavelengths. Data was collected from the Davis location on a 7-10 day basis; at the Fresno site on February 7th, April 4th, and April 18th; at the Corcoran site on April 19th; at the Delta site on May 30th; at the Colusa site on January 29th, March 28th, May 3rd, and May 24th; at the Tehama site on May 3rd; at the Buttonwillow site on April 19th; and at the Ducor site on April 19th. The software programs PIX4D, R, and QGIS [17-19] were used to capture, compile, and extract plot-level spectral data from images using a modified method of Haghighattalab *et al.* [20].

2.5 Data summarization & analytical procedures

Single season summaries of regional trial data

Yield and protein data, corrected for chaff and moisture content, were standardized to 12% moisture. Mean and standard deviations of the data were then derived for individual varieties and species at each trial location. If the yield of a plot was found to be more than two standard deviations from either the variety mean or trial mean at a location, it was flagged as a potential outlier and the data checked for potential errors. Following this quality control step, the coefficient of variation for individual trials was used to assess overall data quality for that location [21, 22]. The “inter-variety method” for estimating coefficient of variation was used – whereby the coefficient of variation for a variety trial is calculated by averaging across the

coefficient of variation estimated for individual varieties within the trial. A coefficient of variation of 16% was used as a threshold to indicate potential data quality problems with data from a specific location. Data from the location with a coefficient of variation of 16% or greater was then subject to further quality checks. Note that coefficient of variation was not used as the sole justification for excluding trial data. Simple arithmetic means across replicates were calculated for the purpose of summarizing yield, protein content, test weights, thousand kernel weights, plant height, days to heading, and days to maturity for individual varieties at each test location. All data manipulation and analyses were conducted using the program R. Tables summarizing data for individual test locations in the 2017-18 season are available on the Small Grains website (http://smallgrains.ucanr.edu/Variety_Results/2018/), but are not presented within the body of this report.

Summary & analysis of multi-location & multi-year data

Multi-environment summary & analysis

To generate estimates of variety performance, data were analyzed and summarized across multiple years and locations using linear mixed models and least squares means. All data manipulation and analyses were conducted using the computer program R. For the purpose of reporting and summarizing variety trial results, the UC Small Grains program has historically divided California into different sub-regions: the Sacramento Valley, the San Joaquin Valley, and the Imperial Valley. Variety evaluations conducted in the Intermountain region generally include a different population of varieties to other regions of California, and therefore the Intermountain region has also been summarized separately. Genotype by environment patterns in the trial data suggest that the Northern and Southern San Joaquin Valleys may require different variety recommendations. Small grain performance in California is therefore currently summarized by grouping the test locations as follows: the Sacramento Valley (Chico, Clarksburg, Colusa, Davis, Delta, Solano, and Tehama locations); the North Central San Joaquin Valley San Joaquin Valley (Fresno and Kings locations); the South San Joaquin Valley (Tulare and Kern location); the Imperial Valley (Imperial location); and the Intermountain region (Lassen, Siskiyou, and Tulelake locations). Within these regional groupings, variety performance was modeled as a fixed effect, with replication nested within location nested within year modeled as a random effect.

For the purposes of discussing trial results we used the UC Small Grain Program web tool (http://smallgrainselection.plantsciences.ucdavis.edu/) to identify the top-performing fall-planted commercial varieties in each sub-region. This tool develops least squares means from the mixed linear model. From this tool higher than average yields (95% confidence), lower than average protein (70% confidence) were determined, and further modified to select varieties with no stripe rust susceptibility. For general discussion we focus on the top five highest yielding varieties of each species in each location.

Genotype-by-environment analysis

To explore the yield performance patterns of small grain varieties across California a *Genotype plus Genotype-by-Environment* (GGE) analysis was conducted, using the R package *gge*, with the *Genotype plus Genotype-by-Block of Environments* method of Laffont *et al.* (2013). The groups used to summarize the data were the Sacramento, the North Central San Joaquin Valley, the South San Joaquin Valley, and the Imperial Valley. The Intermountain region could not be included in the analysis because the varieties tested in the region differ from those tested in the

rest of California. A GGE analysis using the block of environments method provides a way of exploring the performance patterns of small grain varieties across California, and also an initial test of the Sacramento Valley, the North Central San Joaquin Valley, the South San Joaquin Valley, and the Imperial Valley represent regions of California that require different variety recommendations.

Terminal Drought and N Stress summaries

Yield, protein yield and protein stability of common wheat and triticale varieties was measures as the normalized percentage change in yield for a given variety when it is grown under conditions of stress compared to when water and nitrogen are managed for high yields. Terminal drought and N stress responses are based on averages of 3 and 4 site-years of data, respectively. The normalized stress response is calculated as: [Ai / mean(A)] + [([mean(A) – mean(B)] / mean(A)) – ((Ai – Bi) / mean(A))], where A is a fully watered/fertilized control, B is a managed stress trial grown at the same location, and i is an individual variety. Stress trials were managed identically except for the exclusion of irrigation after the vegetative growth period (terminal drought) or the exclusion of N fertilizer additions throughout the season (N stress). Managed stress trials were carried out during the 2016-17 and 2017-18 seasons at the Davis and Fresno trial locations. The 2016-17 rainfall total at the Davis location was abnormally high and exceeded estimated crop ET demand; therefore the terminal drought stress trial from this site-year was not included in the stress summaries. Only varieties present in stress trials from all site-years were summarized.

Summary of disease incidence & agronomic traits

For single season summaries, the disease incidences and agronomic ratings are reported as the 90th percentile of all plot-level observations for a given variety at a single location. The 90th percentile is used because it increases the likelihood of detecting susceptibility to a disease (or deleterious trait such as lodging), particularly if varieties have only been in the trial for short periods of time, but avoids potential bias from false-positives that could arise by using the maximum observed value. For the purpose of discussion a disease rating of 3 or greater in a single season is considered problematic threshold.

For the multi-environment summaries, the quartiles of the data for all 90th percentile values for each disease and agronomic trait across all locations in the five years prior to and including 2017-18 were calculated. The four quartiles were assigned to the following classes: S = Susceptible; MS = Moderately Susceptible; MR = Moderately Resistant; and R = Resistant.

Collaborative trials

Yields for the collaborative trials were estimated using the same methods as described for the regional trials. Yields for the replicated check varieties are simple arithmetic means. The error variance for the replicated check lines were assumed to represent the likely error variance for the whole trial. The representativeness of the data from collaborative trials was judged by comparing the results to the performance of the same varieties in the regional trials on a multi-year and multi-location basis.

Repeated reflectance measures

Plot-specific canopy reflectance values measured as a time-series across the season, were summarized quantitatively using the segmented() and randomForest() packages in R. For each variety, a 3-slope, 2-breakpoint model was fit with initial breakpoints values that were average

days to heading and initiation of senescence across all varieties. The variety-specific parameter values resulting from these broken-line regression models were then used as quantitative variables to describe the variance in crop productivity among varieties in a multiple regression environment.

2.6 Extension of results

Results of the analyses were published on the UC Small Grains website (http://smallgrains.ucanr.edu/Variety/) and announcements of the availability of newly available results were made on the UC Small Grains Blog (http://ucanr.edu/blogs/smallgrains/). The webtools available on the UC Small Grains Research and Information Center website (http://smallgrainselection.plantsciences.ucdavis.edu/; and http://smallgrainselection.plantsciences.ucdavis.edu/explore/) can be used for summarizing and customizing results and assisting with variety selection in an interactive environment. In addition, presentations of results of the research were made at outdoor field meetings, indoor grower meetings and other extension forums throughout the 2017-18 season.

3. RESULTS

Statewide variety trials

Site conditions

The 2017-18 growing season started out warmer and drier than usual, with infrequent rainfall events from November through February and precipitation totals that were roughly half of historical totals (Figure 2). This was accompanied by warmer than average temperatures over the same period, which resulted in more rapid development of small grain crops during the vegetative period of growth than would be the case in a normal year (Figure 3). In contrast, March and April were rainier and cooler than normal (Figures 4, 5). This helped bring annual precipitation totals closer to average, although most of the wheat growing regions in the state still received below-average precipitation for the season. Also, the rate of crop development slowed during the late-vegetative and early reproductive stages of growth, with growing degree days (GDD) for wheat accumulating more slowly than average during this period for most of the wheat growing regions of the state. Patterns of precipitation and rates of development compared to the 10-year historical average at the UC Small Grain Trial locations are depicted in Figures 6a – 6t.

The combination of dry, warm temperatures early in the season had the most negative impact at the dryland sites in Tehama, Solano and Tulare counties. The crops at these sites had poor vegetative growth, significant weed competition and varying degrees of drought stress, including some crop failure at the Tulare location. There were also freezing temperatures for several stretches of days from mid-February to early-March in many small grain growing areas, and frost damage was observed at locations in the Sacramento and San Joaquin Valleys. More information and discussion on this can be found on the March 7th 2018 post of the UC Small Grains Blog. Disease incidence throughout the was limited, with some isolated cases of crown and root rot in non-trial locations, and stripe rust infection and barley yellow dwarf virus within the UC trials.

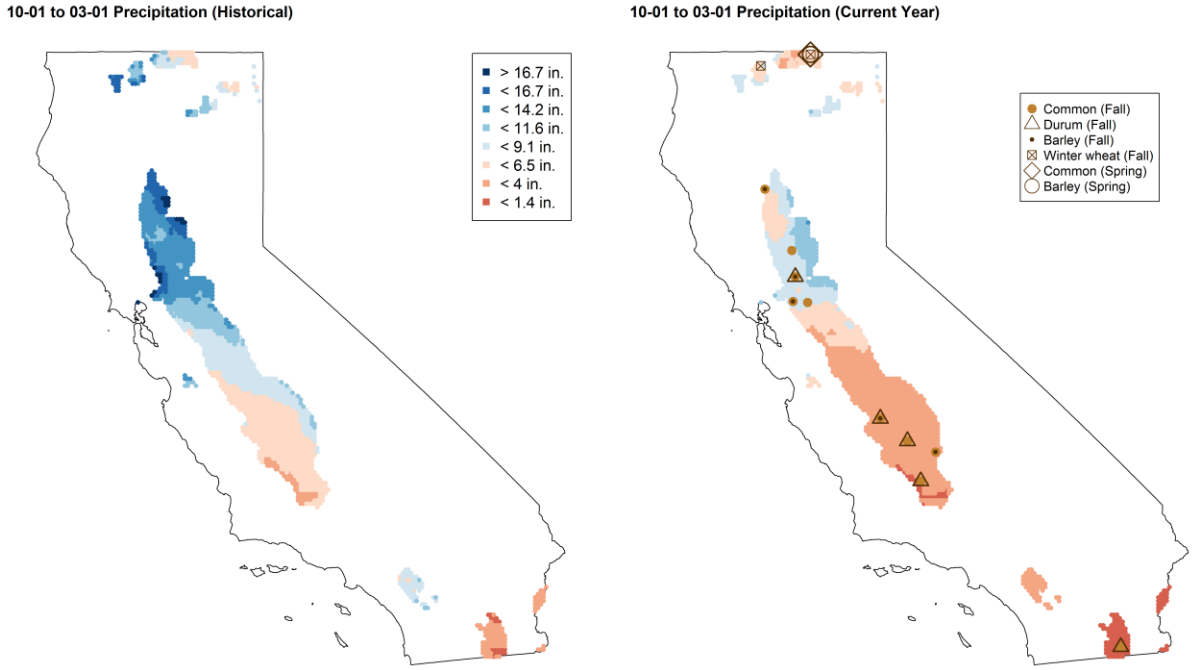


Figure 2. Historical precipitation (10-year average, left) compared to rainfall totals during the 2017-18 season (right) between 10/1/2017 and 3/1/2018. Also indicated are UC Small Grain Testing Program trial locations for various crop types (right).

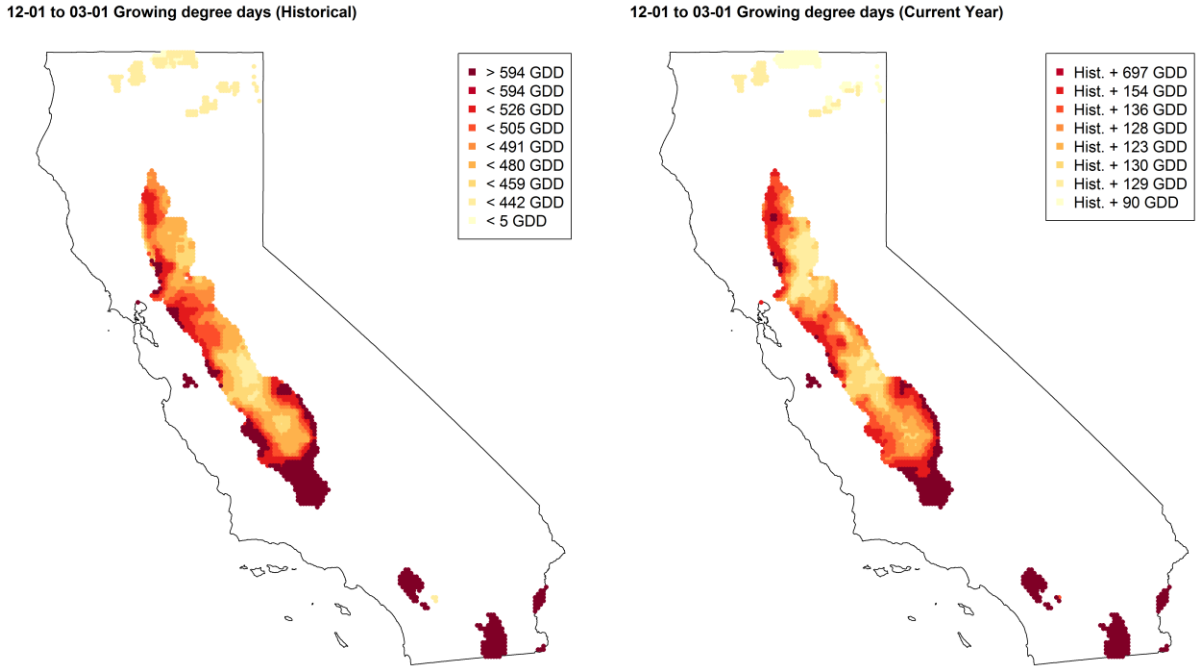


Figure 3. Historical growing degree day accumulation (GDD: 86F max, 45F min; 10-year average, left) compared to GDD during the 2017-18 season (right) between 12/1/2017 and 3/1/2018.

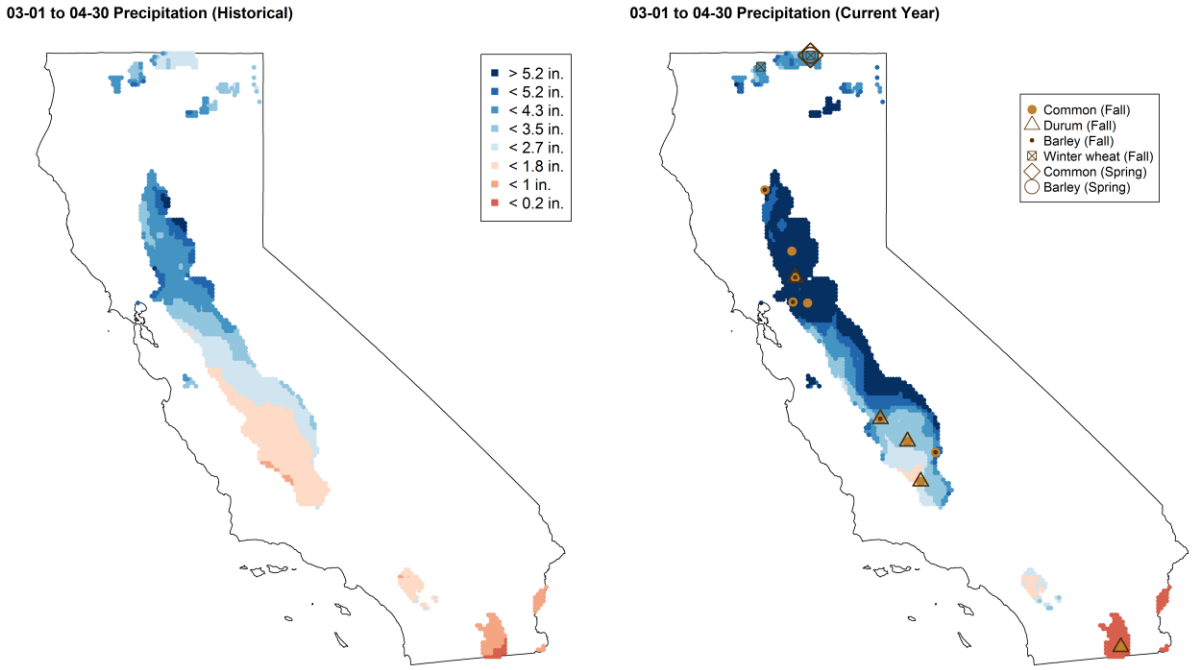


Figure 4. Historical precipitation (10-year average, left) compared to rainfall totals during the current season (right) between 3/1/2018 and 4/30/2018. Also indicated are UC Small Grain Testing Program trial locations for various crop types (right).

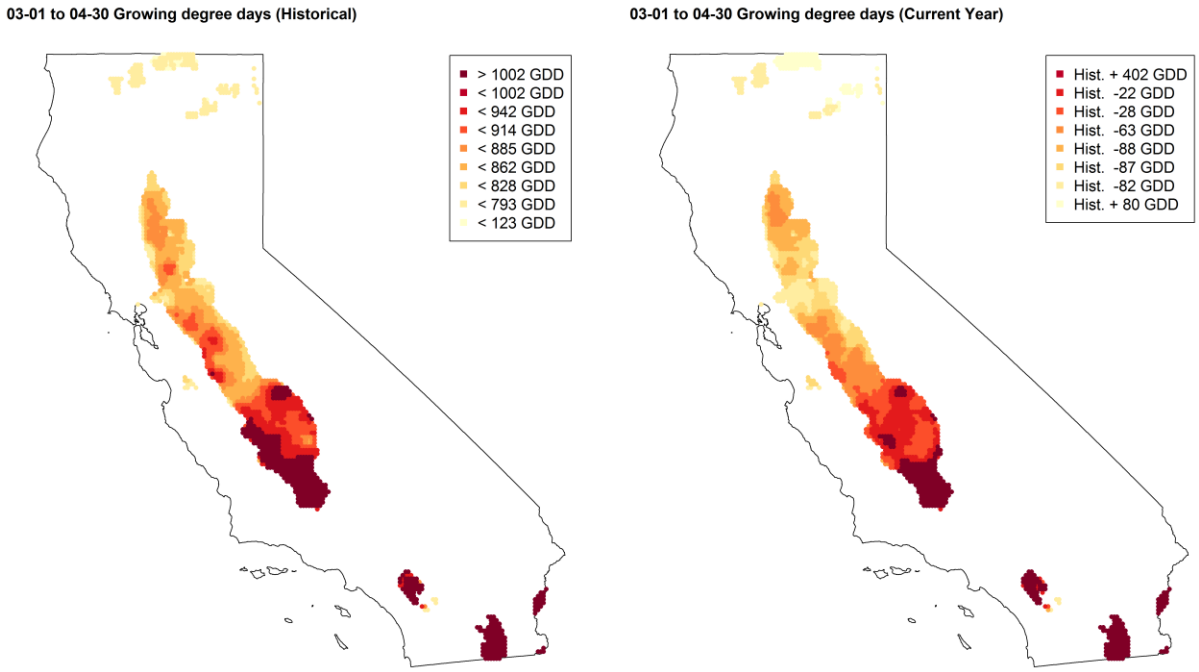


Figure 5. Historical growing degree day accumulation (GDD: 86F max, 45F min; 10-year average, left) compared to GDD during the current season (right) between 3/1/2018 and 4/30/2018.

Figure 6a.

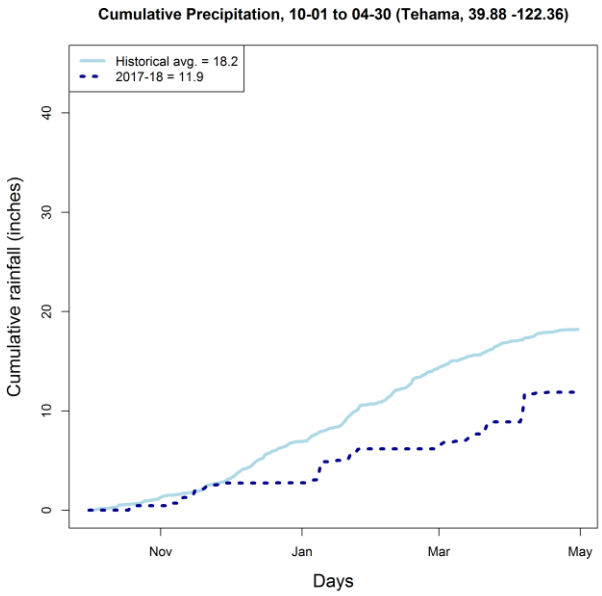


Figure 6b.

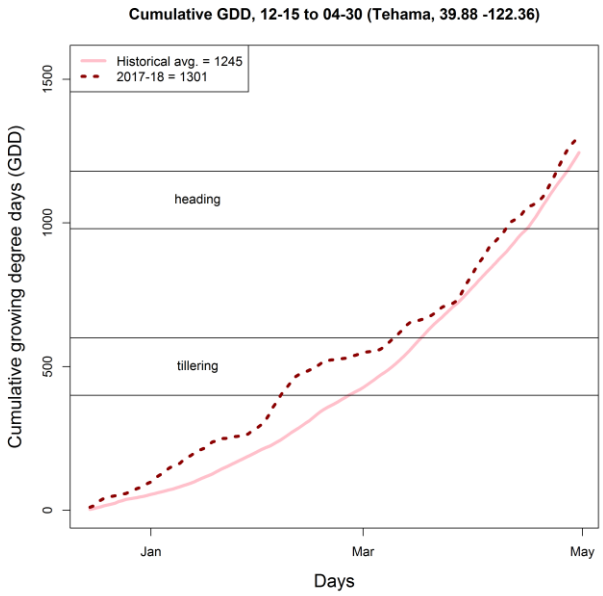


Figure 6c.

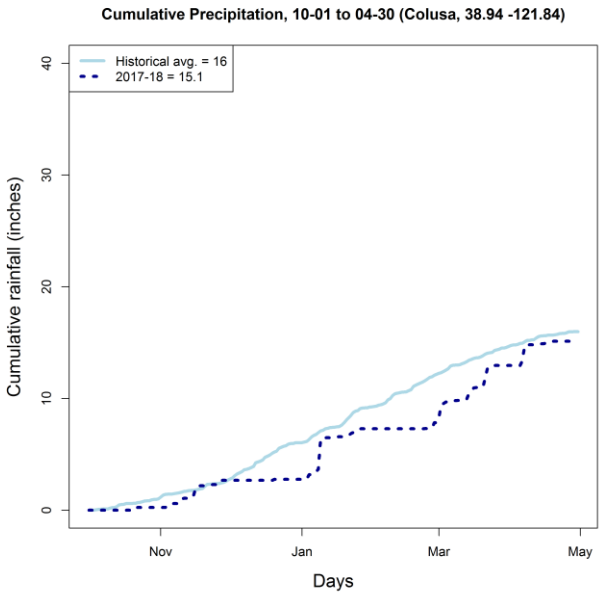


Figure 6d.

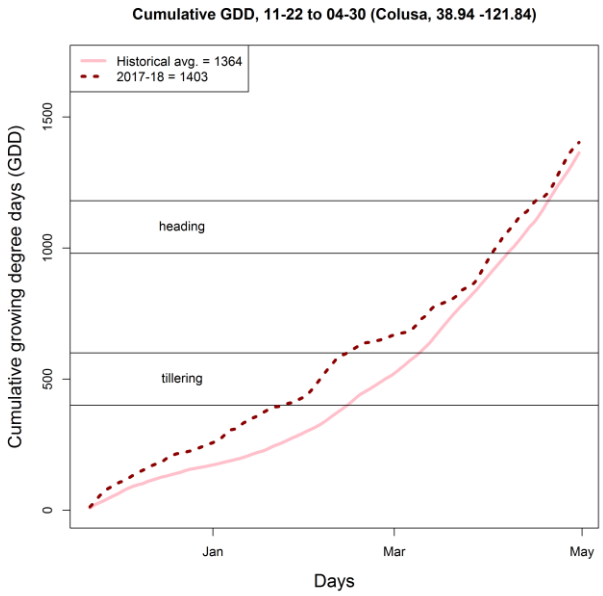


Figure 6e.

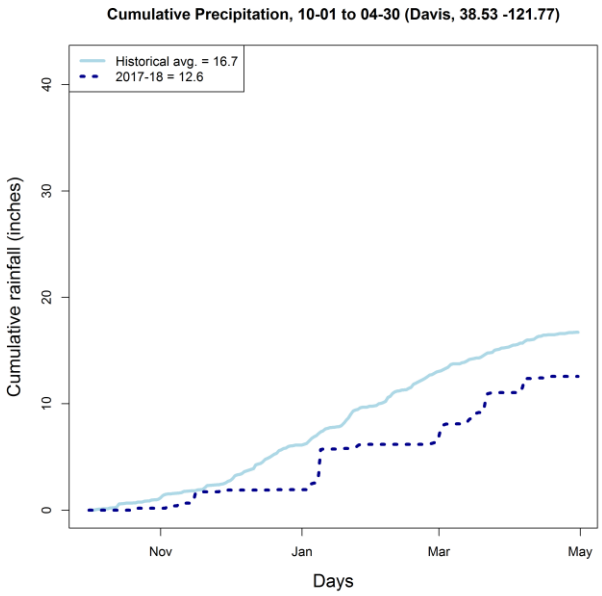


Figure 6f.

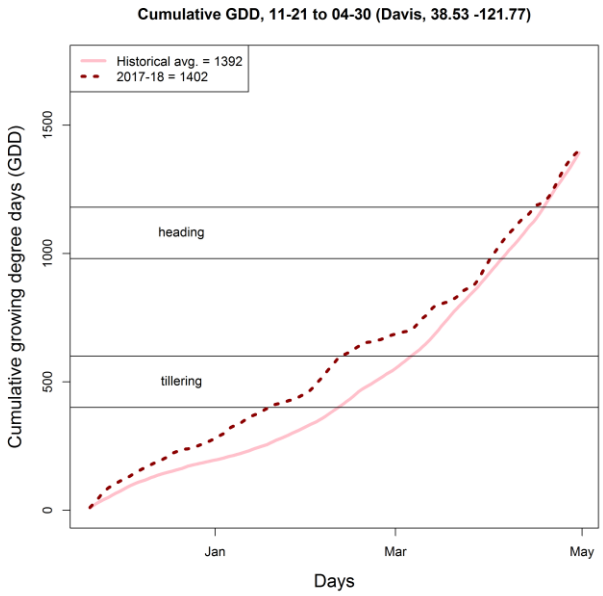


Figure 6g.

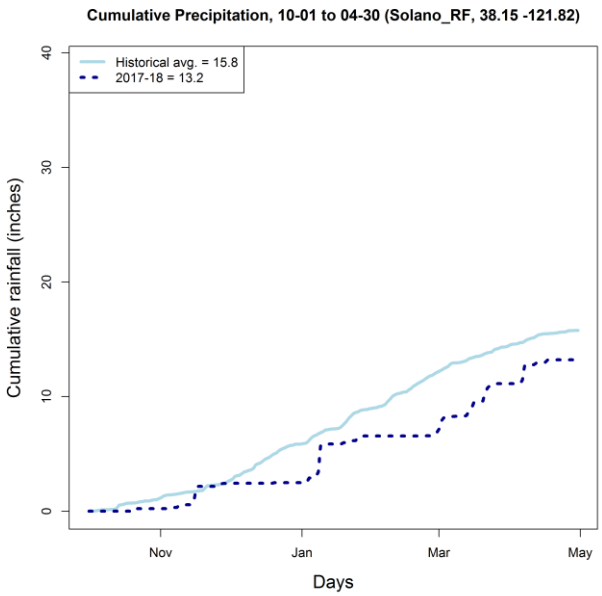


Figure 6h.

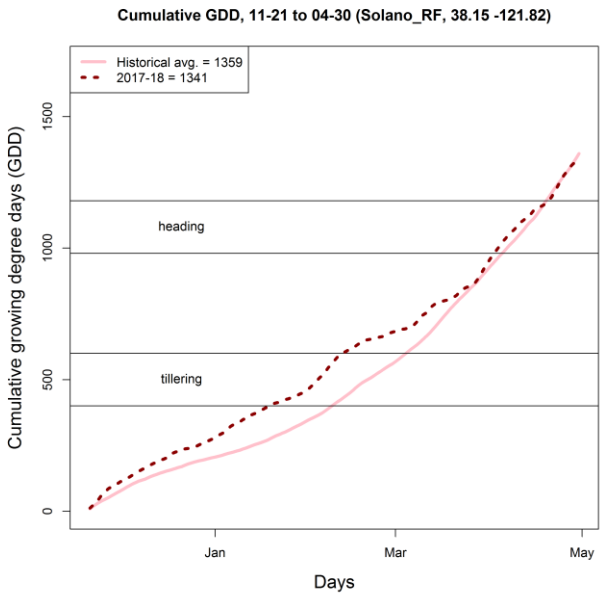
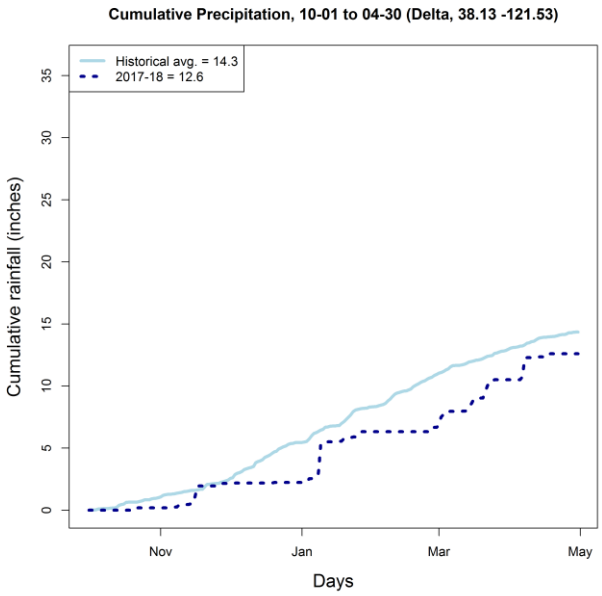


Figure 6i.



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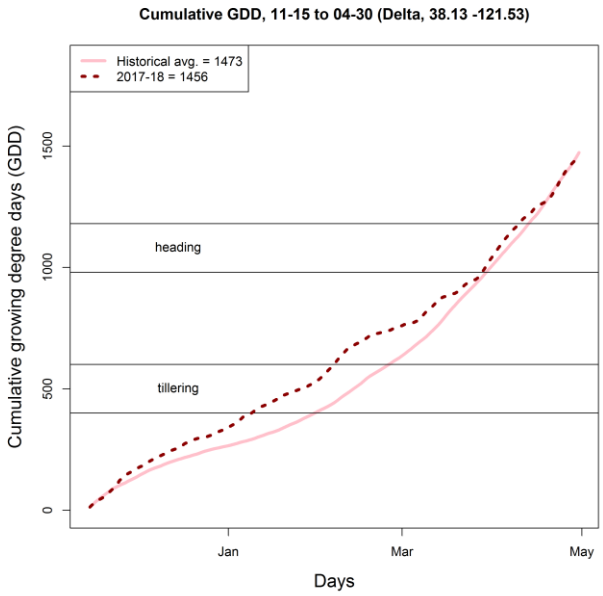


Figure 6k.

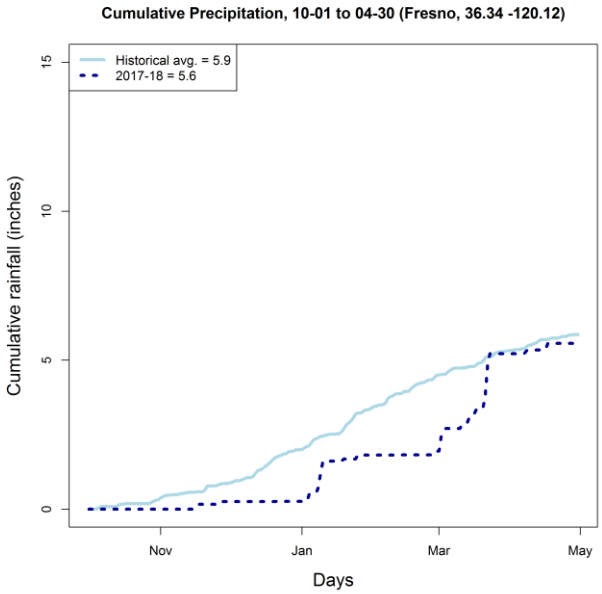


Figure 6l.

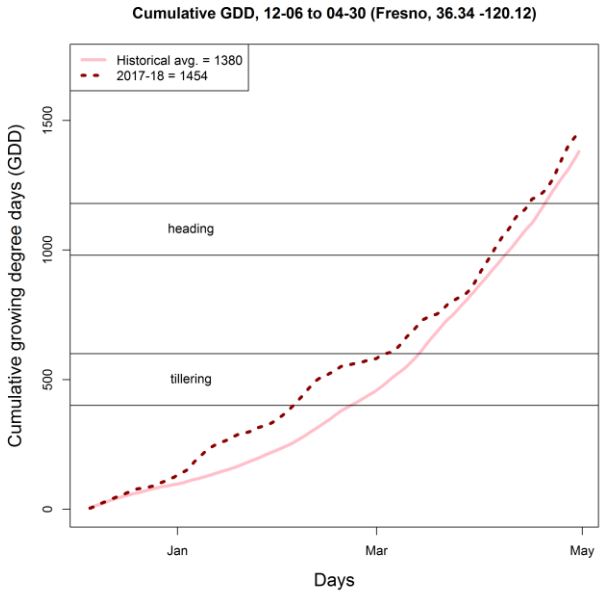


Figure 6m.

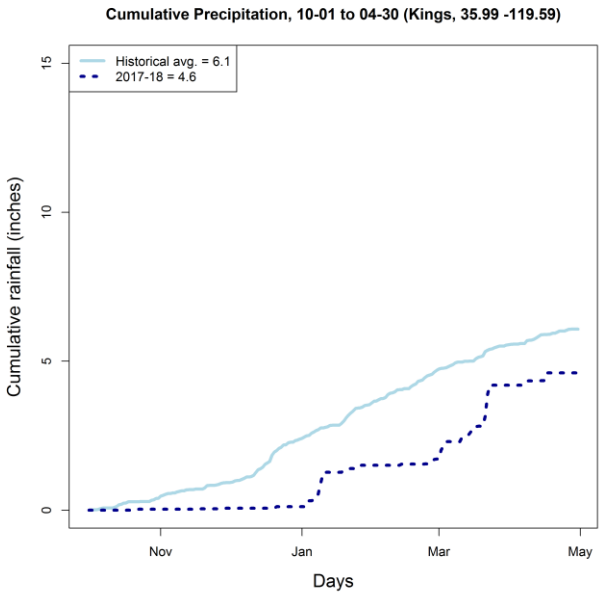


Figure 6n.

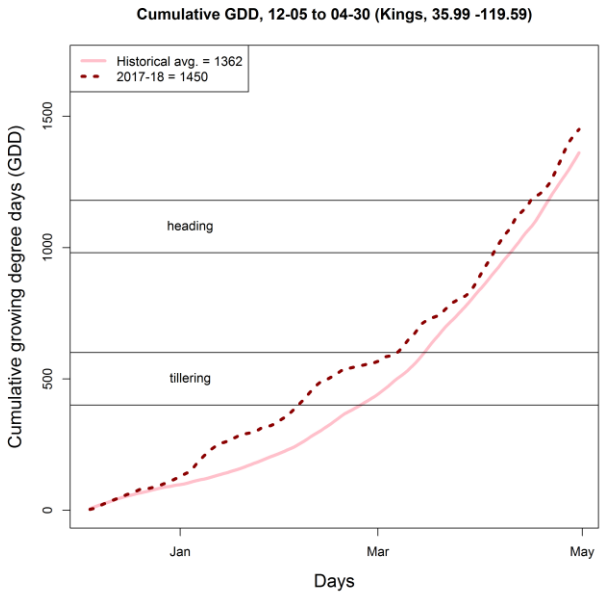


Figure 6o.

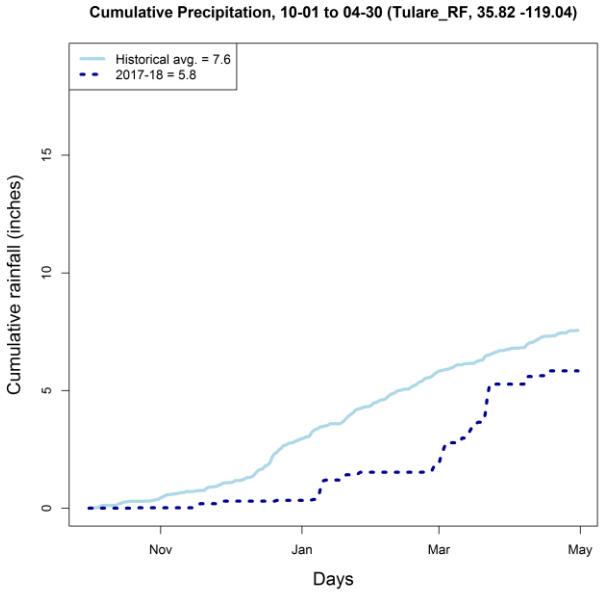


Figure 6p.

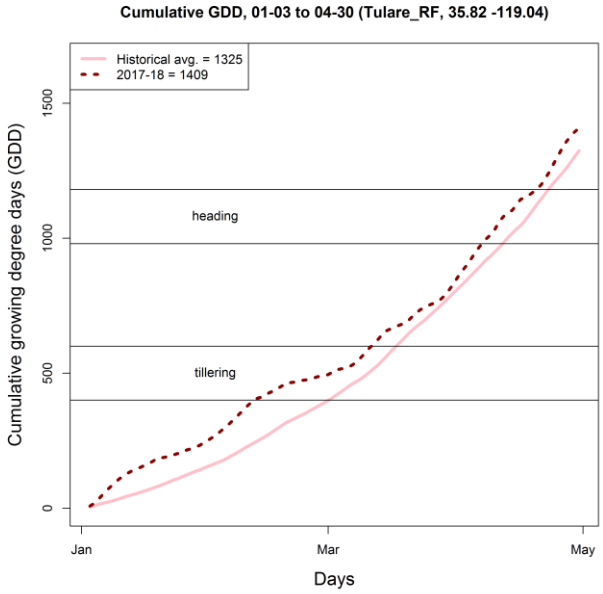


Figure 6q.

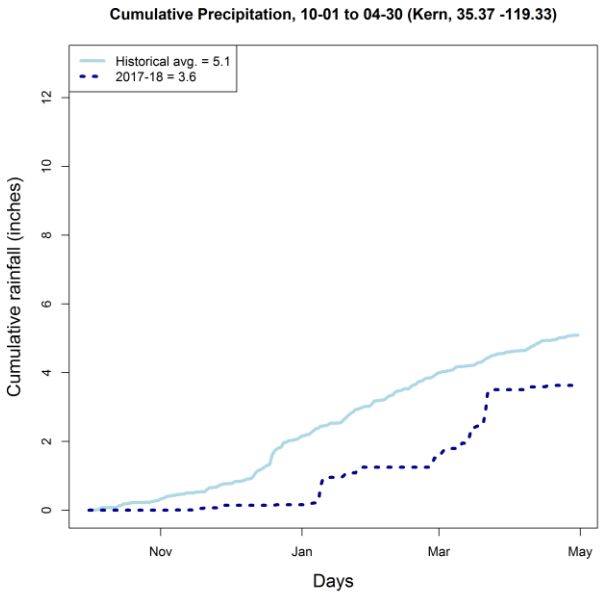


Figure 6r.

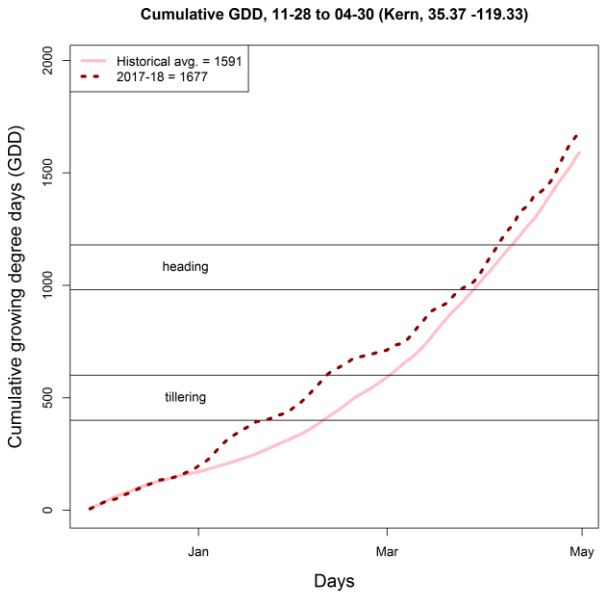


Figure 6s.

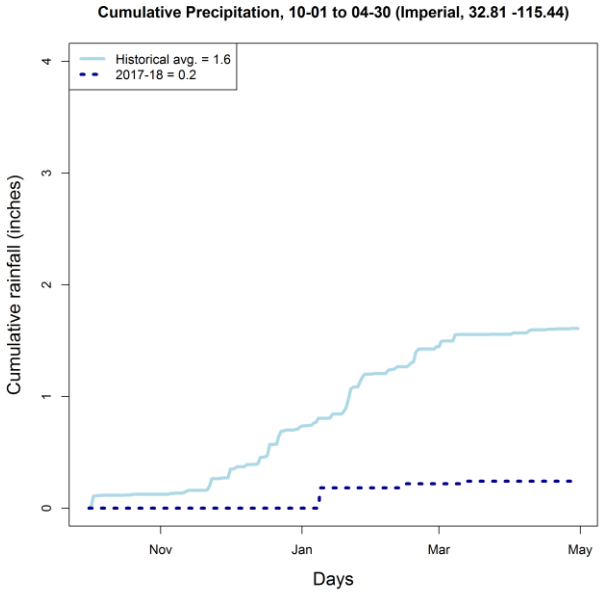
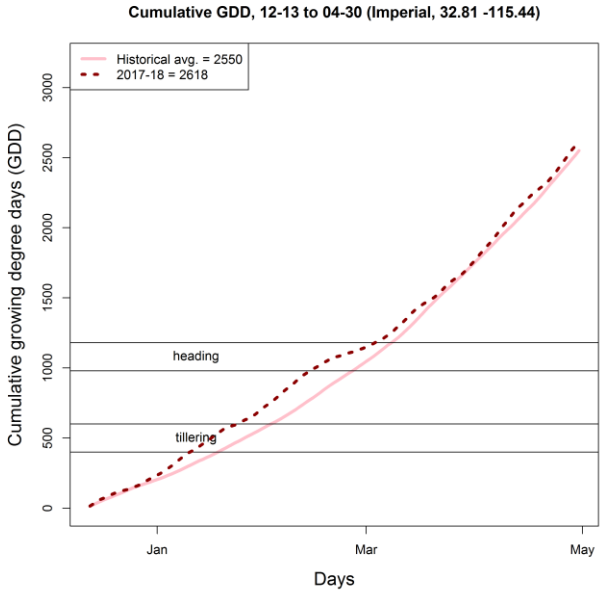


Figure 6t.



Plant available soil water content at sowing (Table 10) and the pre-plant soil nitrate concentrations in the top 12 inches of the soil profile (Table 11) varied considerably across the test locations.

Table 10. Approximate soil moisture by depth at planting and harvest for 2017-18 test locations.

Sample Time	Location	0 - 50 cm	50 - 100 cm	100 - 150 cm
Planting	Buttonwillow	0.05	0.07	
	Colusa	0.19	0.09	
	Davis	0.07	0.06	0.04
	Delta	0.13	1.78	
	Ducor	0.07	0.07	
	Fresno	0.04	0.05	
	Kings	0.11	0.16	
	Rio Vista	0.03		
	Russell Ranch	0.09	0.11	
	Tehama	0.05	0.07	
Harvest	Colusa	0.07	0.05	
	Davis Wheat	0.07	0.10	
	Davis Wheat (Nitrogen Stress)	0.09	0.11	
	Davis Wheat (Water Stress)	0.06	0.08	
	Delta	0.38	0.63	
	Fesno Wheat (Water Stress)	0.06	0.06	
	Fresno Durum	0.10	0.11	
	Fresno Wheat	0.06	0.11	
	Fresno Wheat (Nitrogen Stress)	0.08	0.15	
	Kern	0.05	0.07	
	Kings	0.23		
	Russell Ranch	0.06	0.09	
	Solano	0.03		
	Tehama	0.02		

Table 11. Soil nitrate concentration in the top 50 cm of soil.

Location	ppm NO3-N in OD soil
Buttonwillow	5.4
Colusa	24.3
Davis	4.8
Delta	21.6
Ducor	13.6
Kings	15.6
Russell Ranch	0.5
Tehama	2.8
Fresno	11.3

Performance summaries

Overall performance summary

As a gauge of overall seasonal conditions, the mean yields per location for the past five season are presented in Table 12. In most cases, yields in the 2017-18 were similar to or higher than previous seasons where such data is available. The yield at the Solano and Tulare sites were considerable lower due to weed pressure and water stress.

Variety Performance

Table 13 reports top-performing varieties delineated by crop type and region. Top performing varieties met

Table 12. The mean yield by location in the regional trials for each species over the past five seasons

Crop Type	Site Name	2013-14	2014-15	2015-16	2016-17	2017-18
BARLEY	Chico		3670			
	Clarksburg	5527	6243	4268		
	Davis	4233	6296	4647	5954	6388
	Fresno	5115	4670	6164	4569	5054
	Lassen	2839	4250			
	Siskiyou		2891			
	Slo			3201		
	Solano				4992	1986
	Tehama	2570	1337	1650		2929
	Tulare			2140	2745	721
	Tulelake	4182	4083	4691	6456	7260
COMMON	Clarksburg	4264	4084	6210		
	Colusa	6836		6336	7355	8604
	Davis	4737	5443	5848	7810	6896
	Davis (Nitrogen Stress)				3996	4234
	Davis (Water Stress)	3678	5242	5035		6032
	Delta	5515	6257	5836	2799	6773
	Fresno	5339	5690	7059	6715	8622
	Fresno (Nitrogen Stress)				1723	6449
	Fresno (Water Stress)				5784	4938
	Fresno2			6914		
	Fresno2 (Water Stress)			7447		
	Imperial	4428	5952	6807	5991	6725
	Kern	5630	6093	5926	9208	6617
	Kings	6429	4844		6447	6622
	Solano (Rainfed)				4587	2868
	Tehama (Rainfed)					3342
	Tulare (Rainfed)			2135	3421	130
DURUM	Davis	4773	6752	6091	7853	8030
	Fresno	5934	6666	7425	6283	7282
	Fresno2			8065		
	Imperial	6252	6646	7022	6211	7318
	Kern	7035	5710	5203	7955	6527
	Kings	6496	5647		6515	7259
TRITICALE	Clarksburg	5455	4837	5552		
	Colusa	8322		6687	9017	9844
	Davis	5241	5471	6579	8547	8454
	Davis (Nitrogen Stress)				3954	5101
	Davis (Water Stress)	3693	5373	5585		6282
	Delta	7861	7535	6890	2946	8813
	Fresno	5250	5812	7835	6621	8542
	Fresno (Nitrogen Stress)				1931	7080
	Fresno (Water Stress)				5867	4915
	Fresno2			8335		
	Imperial	6056	5917	6980	6199	6592
	Kern	6854	5286	5942	9838	7418
	Kings	6537	5065		7705	7222
	Solano (Rainfed)				5051	2818
	Tehama (Rainfed)					3174
	Tulare (Rainfed)			1822	3180	37
SPRING WHEAT	Lassen	2999	4179			
	Siskiyou		3637			
	Tulelake	6760	5235	7256	6845	9394
WINTER WHEAT	Siskiyou	2105	5174	8389	8247	5576
	Tulelake	6425	3900	9116	8271	10064

the following criteria for common wheat and durum wheat: commercial varieties with higher than average yields (80% confidence), average or above average protein (70% confidence), and no stripe rust susceptibility. For barley and triticale, there criteria were the same except that no protein parameter was included. Comprehensive variety performance is reported in Tables 14 – 33.

Table 13. Top performing commercial varieties by region in the 2015-2016 through 2017-18 seasons.

Crop Type	Region	Top-performing varieties
Common Wheat	Sacramento Valley	WB 9350, WB 9433, UC CENTRAL RED, SY SUMMIT 515, UC PATWIN 515
	Northern Central San Joaquin Valley	WB 9433, WB 7566, UC PATWIN 515, WB 9350, SY SIENNA, SY 314
	Southern San Joaquin Valley	SY BLANCA GRANDE 515, SY SIENNA, SY SUMMIT 515, WB 9433
	Imperial Valley	WB 9433
	Intermountain Region (Fall planted)	BOBTAIL, MARY
	Intermountain Region (Spring planted)	-
Durum Wheat	Sacramento Valley	DPG PLATINUM, UC MIWOK
	Northern Central San Joaquin Valley	SHASTA, UC DESERT KING, UC DESERT GOLD, TIBURON
	Southern San Joaquin Valley	-
	Imperial Valley	TIBURON, UC MIWOK
Triticale	Sacramento Valley	NS GOLD RUSH 91, WB PACHECO
	Northern Central San Joaquin Valley	NS GOLD RUSH 91
	Southern San Joaquin Valley	NS GOLD RUSH 91, WB PACHECO
	Imperial Valley	WB PACHECO
Barley	Sacramento Valley	ISHI
	Northern Central San Joaquin Valley	ISHI
	Southern San Joaquin Valley	-
	Intermountain Region (Spring planted)	-

Variety performance tables (Tables 14 – 34)

(Continued on following 19 pages)

All tables herein are also available in .pdf and .xls formats at:

http://smallgrains.ucanr.edu/Variety_Results/2018/

In addition to the multi-year summary tables included here and at the above website single site data for the 2018 season are available .pdf and .xls formats at the following web locations:

Fall planted Common Spring Wheat:
http://smallgrains.ucanr.edu/Variety_Results/Common_Wheat_2018_Variety_Results_Single_Site/
Fall planted Durum Wheat:
http://smallgrains.ucanr.edu/Variety_Results/Durum_2018_Variety_Results_Single_Site/
Fall planted Triticale:
http://smallgrains.ucanr.edu/Variety_Results/Tritcale_2018_Variety_Results_Single_Site/
Fall planted Barley:
http://smallgrains.ucanr.edu/Variety_Results/Barley_2018_Variety_Results_Single_Site/
Winter Wheat:
http://smallgrains.ucanr.edu/Variety_Results/Winter_Wheat_2018_Variety_Results_Single_Site/
Fall-planted Common Spring Wheat and Barley (Organic Growing Conditions):
http://smallgrains.ucanr.edu/Variety_Results/Organic_Low_Input_2018_Variety_Results/
Spring planted spring wheat:
http://smallgrains.ucanr.edu/Variety_Results/2018/
Spring planted spring barley:
http://smallgrains.ucanr.edu/Variety_Results/2018/

Common performance tables

Table 14. Sacramento Valley region, common wheat yield and protein from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2018 Protein (%)	2018 St.Err.Protein (%)	2018 Protein Rank	Status
SacV	COMMON	HWS	2016-2018	UC 15013 15	1816	6347	468	1	806	205	0	-	-	-	11.18	0.61	64	-0.69	0.4	0.32	-	-	-	
SacV	COMMON	HWS	2016-2018	LCS ATOMO	1723	6336	436	2	794	120	0	6188	810	2	11.47	0.52	57	-0.4	0.24	0.32	10.98	0.73	33	Released
SacV	COMMON	HRS	2016-2018	UC 15010 5	1814	6134	468	3	592	205	0.02	-	-	-	12.12	0.62	20	0.24	0.41	0.74	-	-	-	
SacV	COMMON	HRS	2016-2018	WB 9350	1842	6132	445	4	590	149	0	6114	810	3	11.53	0.55	49	-0.34	0.29	0.49	11.14	0.73	30	Released
SacV	COMMON	HRS	2016-2018	XA 9501	1845	6107	473	5	565	216	0.03	-	-	-	11.51	0.63	52	-0.36	0.43	0.59	-	-	-	
SacV	COMMON	HRS	2016-2018	WB 9433	1847	6106	446	6	564	151	0	6104	811	4	11.51	0.55	50	-0.36	0.29	0.49	10.83	0.73	39	Released
SacV	COMMON	HRS	2016-2018	XA 9502	1846	6102	476	7	560	222	0.03	-	-	-	11.06	0.64	65	-0.81	0.44	0.29	-	-	-	
SacV	COMMON	HRS	2016-2018	WB 9699	1888	6071	465	8	529	201	0.03	6009	810	10	11.4	0.6	59	-0.47	0.39	0.49	10.93	0.73	34	
SacV	COMMON	HWS	2016-2018	WB 7566	1802	6061	439	9	520	129	0	6055	819	6	11.38	0.52	61	-0.49	0.25	0.23	10.85	0.74	35	Released
SacV	COMMON	HRS	2016-2018	SY 11200024-1-4	1878	6058	479	10	516	229	0.06	6012	816	9	11.93	0.64	28	0.06	0.44	0.97	11.2	0.74	26	
SacV	COMMON		2016-2018	APB 8238	1821	6011	470	11	470	210	0.06	-	-	-	11.76	0.62	37	-0.11	0.41	0.89	-	-	-	
SacV	COMMON	HRS	2016-2018	LCS 12SB0197	1830	5999	437	12	458	122	0	6066	812	5	11.23	0.52	63	-0.64	0.24	0.05	10.84	0.73	38	
SacV	COMMON	HWS	2016-2018	UC 15010 27	1815	5996	436	13	455	121	0	6052	811	7	11.61	0.52	46	-0.26	0.24	0.5	11.17	0.73	28	
SacV	COMMON	HWS	2016-2018	LCS 12SB0224	1831	5991	436	14	449	120	0	5976	811	11	11.47	0.52	55	-0.4	0.23	0.32	10.85	0.73	36	
SacV	COMMON	HWS	2016-2018	WB 7390	1750	5948	468	15	407	205	0.1	-	-	-	11.63	0.62	44	-0.25	0.41	0.74	-	-	-	
SacV	COMMON	HRS	2016-2018	UC CENTRAL RED	1817	5939	436	16	397	119	0	5844	809	12	12.07	0.52	22	0.2	0.24	0.61	11.68	0.73	14	Released
SacV	COMMON	HRS	2016-2018	SY ULTRA	1590	5905	446	17	364	151	0.04	-	-	-	11.77	0.55	36	-0.1	0.3	0.89	-	-	-	Released
SacV	COMMON	HRS	2016-2018	XA 9302	1844	5889	476	18	347	222	0.22	-	-	-	10.98	0.65	66	-0.89	0.46	0.25	-	-	-	
SacV	COMMON	HRS	2016-2018	XB 9512	1886	5857	470	19	315	211	0.24	5776	812	15	11.47	0.6	56	-0.4	0.39	0.51	11.08	0.73	31	
SacV	COMMON	HRS	2016-2018	SY SUMMIT 515	1658	5826	436	20	284	120	0.04	5777	810	14	11.94	0.52	27	0.07	0.23	0.89	11.56	0.73	17	Released
SacV	COMMON	HWS	2016-2018	WB 7618	1749	5789	468	21	248	205	0.38	-	-	-	12.41	0.61	11	0.54	0.4	0.47	-	-	-	Released
SacV	COMMON	HRS	2016-2018	APB 500709	1819	5787	447	22	245	153	0.22	-	-	-	11.91	0.55	29	0.04	0.3	0.97	-	-	-	
SacV	COMMON	HRS	2016-2018	WB 9490	1887	5779	472	23	238	216	0.4	5691	813	19	10.77	0.62	68	-1.11	0.41	0.05	10.5	0.73	41	
SacV	COMMON	HWS	2016-2018	UC PATWIN 515	1680	5765	436	24	223	121	0.14	6232	812	1	11.85	0.52	34	-0.02	0.24	0.97	11.17	0.73	27	Released
SacV	COMMON	HRS	2016-2018	UC 1880	1880	5762	465	25	221	201	0.4	5719	810	17	12.24	0.6	18	0.37	0.39	0.54	11.65	0.73	15	
SacV	COMMON	HRS	2016-2018	SY 13W00850	1834	5758	473	26	217	216	0.43	-	-	-	11.96	0.63	26	0.09	0.43	0.92	-	-	-	
SacV	COMMON	HRS	2016-2018	SY 11200064-1-9	1876	5753	467	27	211	205	0.43	5667	811	21	12.35	0.61	13	0.48	0.4	0.49	11.91	0.73	6	
SacV	COMMON	HRS	2016-2018	SY REDWING	1521	5737	438	28	195	127	0.23	5827	815	13	11.58	0.52	47	-0.29	0.25	0.49	11.31	0.73	24	Released
SacV	COMMON	HRS	2016-2018	UC 1884	1884	5721	470	29	179	211	0.5	5697	812	18	11.91	0.63	30	0.04	0.43	0.97	11.43	0.73	21	
SacV	COMMON	HWS	2016-2018	SY BLANCA ROYALE	1522	5684	437	30	142	123	0.4	5474	812	27	11.62	0.52	45	-0.25	0.24	0.51	11.71	0.73	13	Released
SacV	COMMON	HRS	2016-2018	APB 510453	1841	5678	479	31	136	229	0.67	-	-	-	12.26	0.64	17	0.39	0.44	0.58	-	-	-	
SacV	COMMON	HRS	2016-2018	SY SIENNA	1835	5675	446	32	134	151	0.49	5675	810	20	12.26	0.55	16	0.39	0.29	0.47	11.84	0.73	9	Released
SacV	COMMON	HRS	2016-2018	XA 9301	1843	5671	482	33	130	236	0.69	-	-	-	11.38	0.67	60	-0.49	0.48	0.51	-	-	-	
SacV	COMMON	HWS	2016-2018	LCS STAR	1688	5661	438	34	119	126	0.45	5297	816	30	11.81	0.52	35	-0.06	0.24	0.89	11.76	0.73	12	Released
SacV	COMMON	HWS	2016-2018	UC PATWIN 515HP	1743	5658	436	35	117	118	0.44	5202	810	34	12.76	0.52	6	0.89	0.23	0	12.29	0.73	3	Released
SacV	COMMON	HWS	2016-2018	UC 1883	1883	5631	462	36	89	192	0.74	5576	809	22	12.37	0.6	12	0.5	0.39	0.49	11.88	0.73	7	
SacV	COMMON	HRS	2016-2018	SY CAL ROJO	1478	5596	436	37	55	121	0.74	5499	811	26	11.48	0.52	54	-0.4	0.23	0.32	10.74	0.73	40	Released
SacV	COMMON	HRS	2016-2018	SY 11200083-1-3	1877	5593	470	38	52	211	0.88	5522	812	24	11.74	0.61	38	-0.14	0.4	0.89	11.3	0.73	25	
SacV	COMMON	HRS	2016-2018	APB 510477	1874	5580	470	39	38	211	0.91	5513	812	25	12.29	0.61	15	0.41	0.4	0.51	11.86	0.73	8	
SacV	COMMON	HRS	2016-2018	UC 1882	1882	5572	465	40	30	201	0.91	5541	810	23	12.43	0.6	9	0.55	0.39	0.45	11.82	0.73	10	
SacV	COMMON		2016-2018	APB 501129	1820	5571	468	41	29	205	0.91	-	-	-	11.7	0.61	40	-0.17	0.4	0.86	-	-	-	
SacV	COMMON	HRS	2016-2018	WB 9904	1751	5564	436	42	22	120	0.91	5423	811	28	11.69	0.52	41	-0.18	0.24	0.65	11.08	0.73	32	Released
SacV	COMMON	HRS	2016-2018	UC LASSIK	1495	5531	437	43	-11	123	0.93	6022	812	8	11.48	0.52	53	-0.39	0.25	0.35	11.14	0.73	29	Released
SacV	COMMON	HRS	2016-2018	UC YUROK	1745	5528	436	44	-14	119	0.92	5723	810	16	11.64	0.52	43	-0.23	0.24	0.53	10.84	0.73	37	Released
SacV	COMMON	HRS	2016-2018	APB 501089	1828	5493	446	45	-49	151	0.83	-	-	-	11.46	0.55	58	-0.41	0.29	0.46	-	-	-	
SacV	COMMON	HRS	2016-2018	UC 16010 20	1838	5439	473	46	-103	216	0.74	-	-	-	11.87	0.63	32	0	0.43	1	-	-	-	
SacV	COMMON	HWS	2016-2018	SY BLANCA GRANDE 515	1657	5431	440	47	-111	132	0.5	5254	816	33	12.15	0.53	19	0.28	0.25	0.5	11.6	0.74	16	Released
SacV	COMMON	HRS	2016-2018	SY 314	1660	5416	447	48	-125	155	0.51	-	-	-	11.38	0.55	62	-0.49	0.3	0.35	-	-	-	Released
SacV	COMMON	HRS	2016-2018	WB 9112	1748	5407	436	49	-134	119	0.4	5398	809	29	12.03	0.52	24	0.16	0.23	0.68	11.39	0.73	23	Released
SacV	COMMON	SRS	2016-2018	ASSL TAM 204	1778	5388	437	50	-154	125	0.37	4539	816	39	11.55	0.52	48	-0.32	0.25	0.48	11.41	0.74	22	Released
SacV	COMMON	HRS	2016-2018	WB 9229	1730	5350	436	51	-191	121	0.22	5269	812	32	12.48	0.52	8	0.61	0.24	0.07	11.99	0.73	4	Released
SacV	COMMON	HRS	2016-2018	UC 1885	1885	5331	467	52	-211	205	0.43	5284	811	31	11.9	0.62	31	0.03	0.41	0.97	11.48	0.73	19	
SacV	COMMON	HWS	2016-2018	UC 16010 32	1839	5291	482	53	-251	236	0.42	-	-	-	12.42	0.67	10	0.55	0.48	0.49	-	-	-	
SacV	COMMON	HRS	2016-2018	APB 410117	1840	5276	479	54	-265	229	0.4	-	-	-	11.85	0.65	33	-0.02	0.46	0.98	-	-	-	
SacV	COMMON	HRS	2016-2018	APB 511829	1875	5274	467	55	-268	205	0.34	5188	811	35	12.3	0.6	14	0.43	0.38	0.49	11.79	0.73	11	
SacV	COMMON	HRS	2016-2018	WB PATRON	1731	5196	436	56	-345	121	0.02	5153	810	36	12.09	0.52	21	0.22	0.23	0.54	11.46	0.73	20	Released
SacV	COMMON	SRS	2016-2018	SY VACA	1766	5175	446	57	-366	151	0.04	-	-	-	10.5	0.55	70	-1.37	0.3	0	-	-	-	Released
SacV	COMMON	HRS	2016-2018	UC ANZA	20	5122	447	58	-419	153	0.02	-	-	-	10.77	0.55	67	-1.1	0.3	0	-	-	-	Released
SacV	COMMON	HRS	2016-2018	UC 15014 35	1818	5092	468	59	-449	205	0.06	-	-	-	13.1	0.62	4	1.23	0.41	0.02	-	-	-	
SacV	COMMON		2016-2018	APB 8155	1829	5013	468	60	-528	205	0.03	-	-	-	12.69	0.61	7	0.82	0.4	0.22	-	-	-	
SacV	COMMON	HRS	2016-2018	WB ROCKLAND	1650	4994	468	61	-548	205	0.03	-	-	-	13.24	0.62	3	1.37	0.41	0.01	-	-	-	Released
SacV	COMMON	HRS	2016-2018	UC 14657 170	1836	4974	479	62	-568	229	0.04	-	-	-	12.06	0.65	23	0.19	0.46	0.86	-	-	-	
SacV	COMMON	HRS	2016-2018	DPG FV 2808	1608	4967	445	63	-575	149	0	-	-	-	10.67	0.55	69	-1.2	0.3	0	-	-	-	Released
SacV	COMMON	HRS	2016-2018	APB 501189	1807	4821	468	64	-721	205	0	-	-	-	11.71	0.61	39	-0.16	0.4	0.86	-	-	-	
SacV	COMMON	HRS	2016-2018	WB JOAQUIN ORO	1728	4781	438	65	-761	127	0	4842	812	37	13.02	0.52	5	1.15	0.25	0	12.7	0.73	2	Released
SacV	COMMON	HWS	2016-2018	UC 15080 49	1837	4673	479	66	-869	229	0	-	-	-	13.26	0.65	2	1.39	0.46	0.02	-	-	-	
SacV	COMMON	HRS	2016-2018	YECORA ROJO	112	4649	454	67	-893	173	0	4601	815	38	11.98	0.58	25	0.11	0.35	0.89	11.94	0.74	5	Released
SacV	COMMON	HRS	2016-2018	YECORA ROJO 515	1879	4315	465	68	-1227	201	0	4272	810	40	14.41	0.62	1	2.54	0.41	0	13.95	0.73	1	
SacV	COMMON	HRS	2016-2018	WB TRIPLE IV	1550	4095	470	69	-1447	210	0	-	-	-	11.68	0.63	42	-0.19	0.43	0.86	-	-	-	Released
SacV	COMMON	SWS	2016-2018	BAG NEW DIRKWIN	1667	4094	437	70	-1448	125	0	3873	811	41	11.51	0.52	51	-0.36	0.24	0.41	11.49	0.73	18	Released

Table 15. North Central San Joaquin Valley region, common wheat yield and protein from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2018 Protein (%)	2018 St.Err.Protein (%)	2018 Protein Rank	Status
NCenSJV	COMMON	HRS	2016-2018	XA 9501	1845	6894	611	1	817	184	0	-	-	-	11.1	0.88	62	-0.59	0.51	0.63	-	-	-	
NCenSJV	COMMON	HRS	2016-2018	WB 9699	1888	6878	615	2	801	197	0	7323	805	2	11.44	0.88	47	-0.25	0.51	0.91	11.97	1.27	30	
NCenSJV	COMMON	HRS	2016-2018	LCS 12SB0197	1830	6728	594	3	651	119	0	7011	805	7	11.21	0.78	56	-0.48	0.32	0.5	12.09	1.27	26	
NCenSJV	COMMON	HWS	2016-2018	UC 15010 27	1815	6702	594	4	625	118	0	7053	804	4	11.41	0.78	49	-0.28	0.32	0.81	11.88	1.27	33	
NCenSJV	COMMON	HRS	2016-2018	WB 9433	1847	6696	597	5	619	132	0	7377	804	1	11.41	0.8	50	-0.28	0.36	0.85	11.98	1.27	29	Released
NCenSJV	COMMON	HRS	2016-2018	SY ULTRA	1590	6694	601	6	617	150	0	-	-	-	11.32	0.83	55	-0.38	0.42	0.79	-	-	-	Released
NCenSJV	COMMON	HWS	2016-2018	WB 7390	1750	6592	639	7	515	259	0.1	-	-	-	11.54	1.02	37	-0.15	0.72	0.97	-	-	-	
NCenSJV	COMMON	HRS	2016-2018	SY 13W00850	1834	6575	611	8	498	184	0.02	-	-	-	11.82	0.88	22	0.13	0.51	0.97	-	-	-	
NCenSJV	COMMON	HWS	2016-2018	WB 7566	1802	6572	594	9	495	118	0	6819	804	17	11.14	0.78	60	-0.55	0.32	0.41	11.61	1.27	36	Released
NCenSJV	COMMON	HRS	2016-2018	WB 9490	1887	6571	615	10	494	197	0.03	7016	805	5	10.74	0.88	66	-0.95	0.51	0.4	11.27	1.27	40	
NCenSJV	COMMON	HRS	2016-2018	SY REDWING	1521	6546	594	11	468	119	0	6927	805	12	11.73	0.78	25	0.04	0.32	0.97	12.62	1.27	9	Released
NCenSJV	COMMON	HRS	2016-2018	XA 9301	1843	6544	611	12	467	184	0.03	-	-	-	11.02	0.88	65	-0.67	0.51	0.58	-	-	-	
NCenSJV	COMMON	HWS	2016-2018	LCS ATOMO	1723	6532	594	13	455	119	0	7183	805	3	11.15	0.78	59	-0.54	0.32	0.41	11.56	1.27	38	Released
NCenSJV	COMMON	HRS	2016-2018	SY 11200024-1-4	1878	6529	615	14	452	197	0.05	6957	805	11	10.57	0.89	68	-1.12	0.54	0.29	11.21	1.27	41	
NCenSJV	COMMON	HRS	2016-2018	XB 9512	1886	6522	615	15	445	197	0.06	6958	805	10	11.07	0.88	64	-0.62	0.51	0.63	11.6	1.27	37	
NCenSJV	COMMON	HWS	2016-2018	UC PATWIN 515	1680	6513	594	16	436	118	0	7010	804	8	11.66	0.78	32	-0.03	0.32	0.97	12.35	1.27	17	Released
NCenSJV	COMMON	HWS	2016-2018	LCS 12SB0224	1831	6500	594	17	422	118	0	6864	804	15	11.14	0.78	61	-0.55	0.32	0.41	11.44	1.27	39	
NCenSJV	COMMON	HRS	2016-2018	WB 9350	1842	6465	597	18	388	132	0.01	6970	804	9	11.18	0.8	58	-0.51	0.36	0.53	11.72	1.27	35	Released
NCenSJV	COMMON	HRS	2016-2018	SY SIENNA	1835	6457	597	19	379	134	0.02	6839	805	16	11.77	0.8	24	0.08	0.36	0.97	12.01	1.27	28	Released
NCenSJV	COMMON	HRS	2016-2018	SY 11200064-1-9	1876	6446	620	20	369	212	0.15	6873	810	14	11.73	0.91	28	0.04	0.56	0.97	12.49	1.27	13	
NCenSJV	COMMON		2016-2018	APB 8238	1821	6433	639	21	356	259	0.27	-	-	-	11.95	1.02	19	0.26	0.72	0.95	-	-	-	
NCenSJV	COMMON	HRS	2016-2018	APB 510453	1841	6429	611	22	352	184	0.11	-	-	-	11.51	0.88	41	-0.18	0.51	0.95	-	-	-	
NCenSJV	COMMON	HRS	2016-2018	APB 501089	1828	6400	601	23	323	150	0.07	-	-	-	11.38	0.83	52	-0.32	0.42	0.85	-	-	-	
NCenSJV	COMMON	HRS	2016-2018	SY 314	1660	6400	601	24	322	150	0.07	-	-	-	11.36	0.83	53	-0.33	0.42	0.85	-	-	-	Released
NCenSJV	COMMON	HRS	2016-2018	UC 1880	1880	6367	615	25	290	197	0.25	6795	805	18	11.72	0.91	29	0.03	0.56	0.97	12.48	1.27	15	
NCenSJV	COMMON	HRS	2016-2018	XA 9502	1846	6332	611	26	255	184	0.27	-	-	-	11.2	0.88	57	-0.5	0.51	0.77	-	-	-	
NCenSJV	COMMON	HWS	2016-2018	WB 7618	1749	6325	639	27	248	259	0.46	-	-	-	12.12	1.02	14	0.43	0.72	0.91	-	-	-	Released
NCenSJV	COMMON	HRS	2016-2018	UC 15010 5	1814	6297	639	28	219	259	0.52	-	-	-	11.62	1.02	33	-0.07	0.72	0.97	-	-	-	
NCenSJV	COMMON	HRS	2016-2018	APB 500709	1819	6287	601	29	210	150	0.27	-	-	-	11.45	0.83	46	-0.24	0.43	0.91	-	-	-	
NCenSJV	COMMON	HRS	2016-2018	UC 1884	1884	6267	613	30	190	190	0.45	6707	804	21	12.49	0.88	9	0.8	0.51	0.47	13.02	1.27	4	
NCenSJV	COMMON	HRS	2016-2018	XA 9302	1844	6263	611	31	186	184	0.45	-	-	-	11.1	0.88	63	-0.59	0.51	0.63	-	-	-	
NCenSJV	COMMON	HRS	2016-2018	SY 11200083-1-3	1877	6225	617	32	148	204	0.58	6687	808	22	11.61	0.89	35	-0.09	0.54	0.97	12.23	1.27	20	
NCenSJV	COMMON	HRS	2016-2018	UC YUROK	1745	6200	594	33	123	118	0.44	6904	804	13	11.87	0.78	21	0.18	0.32	0.91	12.17	1.27	22	Released
NCenSJV	COMMON		2016-2018	APB 501129	1820	6191	639	34	114	259	0.71	-	-	-	11.61	1.02	34	-0.08	0.72	0.97	-	-	-	
NCenSJV	COMMON	HWS	2016-2018	UC 1883	1883	6176	613	35	99	190	0.69	6616	804	23	11.73	0.88	27	0.04	0.51	0.97	12.26	1.27	19	
NCenSJV	COMMON	HRS	2016-2018	SY CAL ROJO	1478	6176	594	36	98	119	0.52	6283	804	35	11.52	0.78	40	-0.17	0.33	0.91	12.41	1.27	16	Released
NCenSJV	COMMON	HRS	2016-2018	APB 511829	1875	6174	613	37	97	190	0.69	6613	804	24	11.4	0.88	51	-0.29	0.51	0.91	11.93	1.27	32	
NCenSJV	COMMON	HRS	2016-2018	UC 1882	1882	6166	613	38	89	190	0.71	6606	804	26	11.95	0.88	20	0.25	0.51	0.91	12.48	1.27	14	
NCenSJV	COMMON	HRS	2016-2018	SY SUMMIT 515	1658	6153	594	39	76	118	0.64	6609	804	25	11.69	0.78	31	0	0.32	1	11.95	1.27	31	Released
NCenSJV	COMMON	HWS	2016-2018	SY BLANCA ROYALE	1522	6147	594	40	69	121	0.67	6230	805	36	11.73	0.79	26	0.04	0.34	0.97	12.78	1.27	6	Released
NCenSJV	COMMON	HRS	2016-2018	APB 510477	1874	6147	615	41	69	197	0.77	6592	805	27	11.78	0.88	23	0.09	0.51	0.97	12.31	1.27	18	
NCenSJV	COMMON	HWS	2016-2018	UC PATWIN 515HP	1743	6130	594	42	53	118	0.71	6523	804	28	12.65	0.78	6	0.96	0.32	0.04	13.42	1.27	2	Released
NCenSJV	COMMON	HWS	2016-2018	LCS STAR	1688	6117	596	43	40	126	0.79	7012	810	6	11.57	0.79	36	-0.12	0.33	0.95	12.74	1.27	8	Released
NCenSJV	COMMON	HRS	2016-2018	UC LASSIK	1495	6111	594	44	34	118	0.79	6440	804	31	11.36	0.78	54	-0.33	0.33	0.75	11.84	1.27	34	Released
NCenSJV	COMMON	HWS	2016-2018	SY BLANCA GRANDE 515	1657	6073	594	45	-4	119	0.97	6785	805	19	12.07	0.78	16	0.38	0.32	0.63	12.04	1.27	27	Released
NCenSJV	COMMON	SRS	2016-2018	ASSL TAM 204	1778	6072	594	46	-5	118	0.97	6456	804	30	11.45	0.78	45	-0.24	0.33	0.85	12.22	1.27	21	Released
NCenSJV	COMMON	HRS	2016-2018	WB 9904	1751	6013	594	47	-65	118	0.68	5916	804	38	11.49	0.78	43	-0.2	0.32	0.91	12.1	1.27	24	Released
NCenSJV	COMMON	HRS	2016-2018	UC 1885	1885	5967	613	48	-110	190	0.67	6407	804	32	12.06	0.88	17	0.37	0.51	0.85	12.59	1.27	11	
NCenSJV	COMMON	HRS	2016-2018	WB 9229	1730	5930	594	49	-147	118	0.32	6355	804	33	12.29	0.78	11	0.6	0.33	0.4	13.06	1.27	3	Released
NCenSJV	COMMON	HRS	2016-2018	APB 410117	1840	5919	611	50	-158	184	0.51	-	-	-	11.5	0.88	42	-0.19	0.51	0.95	-	-	-	
NCenSJV	COMMON	HWS	2016-2018	UC 16010 32	1839	5914	611	51	-163	184	0.5	-	-	-	12.55	0.88	8	0.86	0.51	0.41	-	-	-	
NCenSJV	COMMON	HRS	2016-2018	WB 9112	1748	5906	594	52	-171	119	0.27	6743	804	20	12.21	0.79	12	0.52	0.34	0.47	12.74	1.27	7	Released
NCenSJV	COMMON	HRS	2016-2018	UC 16010 20	1838	5892	611	53	-185	184	0.45	-	-	-	12.43	0.88	10	0.74	0.51	0.51	-	-	-	
NCenSJV	COMMON	HRS	2016-2018	DPG FV 2808	1608	5864	601	54	-213	150	0.27	-	-	-	10.41	0.83	69	-1.28	0.42	0.04	-	-	-	Released
NCenSJV	COMMON	HRS	2016-2018	UC CENTRAL RED	1817	5847	594	55	-230	118	0.1	6103	804	37	12.12	0.78	15	0.43	0.32	0.58	12.61	1.27	10	Released
NCenSJV	COMMON	HRS	2016-2018	YECORA ROJO	112	5835	597	56	-242	134	0.14	6466	804	29	12.03	0.81	18	0.34	0.38	0.79	12.58	1.27	12	Released
NCenSJV	COMMON	HRS	2016-2018	WB PATRON	1731	5807	594	57	-270	119	0.06	6310	805	34	11.72	0.78	30	0.03	0.33	0.97	12.13	1.27	23	Released
NCenSJV	COMMON	HWS	2016-2018	UC 15013 15	1816	5751	639	58	-326	259	0.32	-	-	-	11.53	1.02	39	-0.16	0.72	0.97	-	-	-	
NCenSJV	COMMON	HRS	2016-2018	UC ANZA	20	5626	601	59	-451	150	0.01	-	-	-	10.7	0.83	67	-0.99	0.42	0.18	-	-	-	Released
NCenSJV	COMMON		2016-2018	APB 8155	1829	5523	639	60	-554	259	0.07	-	-	-	12.57	1.02	7	0.88	0.72	0.63	-	-	-	
NCenSJV	COMMON	HRS	2016-2018	UC 15014 35	1818	5475	639	61	-602	259	0.05	-	-	-	13.47	1.02	1	1.78	0.72	0.16	-	-	-	
NCenSJV	COMMON	HRS	2016-2018	UC 14657 170	1836	5453	611	62	-624	184	0	-	-	-	12.2	0.89	13	0.51	0.53	0.77	-	-	-	
NCenSJV	COMMON	HRS	2016-2018	YECORA ROJO 515	1879	5363	615	63	-714	197	0	5804	805	39	13.42	0.88	2	1.73	0.51	0.03	13.96	1.27	1	
NCenSJV	COMMON	HRS	2016-2018	WB ROCKLAND	1650	5361	639	64	-716	259	0.02	-	-	-	13.28	1.02	3	1.59	0.72	0.24	-	-	-	Released
NCenSJV	COMMON	HWS	2016-2018	UC 15080 49	1837	5059	611	65	-1018	184	0	-	-	-	12.68	0.88	5	0.99	0.51	0.38	-	-	-	
NCenSJV	COMMON	HRS	2016-2018	WB JOAQUIN ORO	1728	5019	594	66	-1058	119	0	5604	804	40	12.91	0.78	4	1.22	0.33	0.02	13.02	1.27	5	Released
NCenSJV	COMMON	SRS	2016-2018	SY VACA	1766	4733	603	67	-1344	156	0	-	-	-	10.32	0.83	70	-1.37	0.43	0.03	-	-	-	Released
NCenSJV	COMMON	SWS	2016-2018	BAG NEW DIRKWIN	1667	4698	594	68	-1379	121	0	5160	808	41	11.47	0.78	44	-0.22	0.33	0.87	12.09	1.27	25	Released
NCenSJV	COMMON	HRS	2016-2018	WB TRIPLE IV	1550	4244	639	69	-1833	259	0	-	-	-	11.53	1.02	38	-0.16	0.72	0.97	-	-	-	Released
NCenSJV	COMMON	HRS	2016-2018	APB 501189	1807	4188	639	70	-1889	259	0	-	-	-	11.43	1.02	48	-0.26	0.72	0.95	-	-	-	

Table 16. South San Joaquin Valley region, common wheat yield and protein from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2018 Protein (%)	2018 St.Err.Protein (%)	2018 Protein Rank	Status
SoSJV	COMMON	HRS	2016-2018	APB 501189	1807	6676	1276	1	1197	288	0	-	-	-	13.22	0.61	68	-1.06	0.46	0.12	-	-	-	
SoSJV	COMMON	HRS	2016-2018	XB 9512	1886	6541	1309	2	1061	407	0.03	7759	484	4	13.75	0.88	56	-0.53	0.78	0.71	13.09	0.64	36	
SoSJV	COMMON	HRS	2016-2018	XA 9301	1843	6457	1276	3	977	288	0.01	-	-	-	14.05	0.61	42	-0.23	0.46	0.77	-	-	-	
SoSJV	COMMON	HRS	2016-2018	XA 9302	1844	6308	1276	4	828	288	0.02	-	-	-	13.69	0.61	57	-0.59	0.46	0.5	-	-	-	
SoSJV	COMMON	HWS	2016-2018	UC 16010 32	1839	6303	1276	5	823	288	0.02	-	-	-	14.39	0.61	30	0.11	0.46	0.9	-	-	-	
SoSJV	COMMON	HWS	2016-2018	WB 7390	1750	6268	1276	6	789	288	0.02	-	-	-	13.5	0.61	63	-0.79	0.46	0.34	-	-	-	
SoSJV	COMMON	HWS	2016-2018	LCS ATOMO	1723	6205	1256	7	726	182	0	7566	484	6	13.98	0.49	45	-0.3	0.3	0.54	14.17	0.54	15	Released
SoSJV	COMMON	HRS	2016-2018	XA 9501	1845	6200	1276	8	720	288	0.04	-	-	-	13.46	0.61	65	-0.82	0.46	0.31	-	-	-	
SoSJV	COMMON	HWS	2016-2018	SY BLANCA GRANDE 515	1657	6158	1256	9	679	182	0	7737	484	5	13.99	0.49	44	-0.3	0.29	0.54	13.51	0.54	29	Released
SoSJV	COMMON	HRS	2016-2018	SY SIENNA	1835	6157	1265	10	677	234	0.02	7807	484	3	14.74	0.54	15	0.46	0.37	0.5	13.87	0.54	21	Released
SoSJV	COMMON	HRS	2016-2018	XA 9502	1846	6131	1276	11	652	288	0.07	-	-	-	13.56	0.61	60	-0.72	0.46	0.38	-	-	-	
SoSJV	COMMON	HRS	2016-2018	UC 1884	1884	6126	1309	12	647	407	0.24	7344	484	8	15.02	0.76	11	0.73	0.64	0.51	14.44	0.54	10	
SoSJV	COMMON	HRS	2016-2018	APB 500709	1819	6099	1259	13	620	204	0.01	-	-	-	13.81	0.51	54	-0.47	0.32	0.44	-	-	-	
SoSJV	COMMON	HRS	2016-2018	SY SUMMIT 515	1658	6075	1257	14	596	187	0.01	7931	543	1	13.85	0.49	52	-0.43	0.29	0.43	13.4	0.54	33	Released
SoSJV	COMMON	HWS	2016-2018	LCS 12SB0224	1831	6069	1256	15	589	182	0.01	7829	484	2	14.32	0.49	32	0.04	0.29	0.96	13.51	0.54	30	
SoSJV	COMMON	HWS	2016-2018	UC 15010 27	1815	6058	1256	16	579	182	0.01	6643	484	19	14.07	0.49	41	-0.21	0.29	0.71	13.9	0.54	19	
SoSJV	COMMON	HRS	2016-2018	UC CENTRAL RED	1817	6027	1257	17	547	187	0.01	6887	484	15	13.37	0.49	67	-0.91	0.29	0.02	10.42	0.54	41	Released
SoSJV	COMMON	HRS	2016-2018	WB 9433	1847	5999	1265	18	520	234	0.07	7204	484	10	14.54	0.54	24	0.26	0.37	0.71	13.81	0.54	22	Released
SoSJV	COMMON	HWS	2016-2018	UC 15013 15	1816	5994	1276	19	515	288	0.17	-	-	-	13.68	0.61	59	-0.61	0.46	0.5	-	-	-	
SoSJV	COMMON	HRS	2016-2018	APB 410117	1840	5950	1276	20	470	288	0.22	-	-	-	14.54	0.61	25	0.25	0.46	0.75	-	-	-	
SoSJV	COMMON	HWS	2016-2018	WB 7618	1749	5890	1276	21	411	288	0.31	-	-	-	14.55	0.61	22	0.27	0.46	0.75	-	-	-	Released
SoSJV	COMMON	HRS	2016-2018	APB 511829	1875	5877	1330	22	398	467	0.59	7054	543	11	14.26	0.88	36	-0.03	0.78	0.97	13.59	0.64	27	
SoSJV	COMMON		2016-2018	APB 8238	1821	5824	1276	23	345	288	0.4	-	-	-	13.95	0.61	46	-0.33	0.46	0.71	-	-	-	
SoSJV	COMMON	HRS	2016-2018	WB 9350	1842	5801	1267	24	322	245	0.37	6823	484	17	14.14	0.54	39	-0.14	0.37	0.83	13.8	0.54	23	Released
SoSJV	COMMON	HRS	2016-2018	APB 501089	1828	5742	1259	25	263	204	0.37	-	-	-	13.76	0.51	55	-0.53	0.32	0.37	-	-	-	
SoSJV	COMMON	HRS	2016-2018	SY 11200064-1-9	1876	5738	1309	26	258	407	0.65	6955	484	14	15.19	0.76	8	0.91	0.64	0.46	14.62	0.54	6	
SoSJV	COMMON	HRS	2016-2018	SY REDWING	1521	5689	1257	27	210	187	0.43	6829	543	16	14.4	0.49	28	0.12	0.3	0.83	13.79	0.64	24	Released
SoSJV	COMMON	HRS	2016-2018	SY 314	1660	5677	1261	28	197	211	0.53	-	-	-	13.89	0.51	51	-0.4	0.32	0.5	-	-	-	Released
SoSJV	COMMON	HRS	2016-2018	UC 15010 5	1814	5676	1276	29	197	288	0.63	-	-	-	14.42	0.61	27	0.13	0.46	0.88	-	-	-	
SoSJV	COMMON	HRS	2016-2018	SY 13W00850	1834	5676	1276	30	196	288	0.63	-	-	-	14.02	0.61	43	-0.27	0.46	0.75	-	-	-	
SoSJV	COMMON	HRS	2016-2018	APB 510453	1841	5667	1276	31	188	288	0.64	-	-	-	14.67	0.61	18	0.39	0.46	0.65	-	-	-	
SoSJV	COMMON	HRS	2016-2018	UC LASSIK	1495	5625	1257	32	146	187	0.62	6980	543	13	13.48	0.49	64	-0.8	0.3	0.06	12.9	0.64	40	Released
SoSJV	COMMON	HRS	2016-2018	SY CAL ROJO	1478	5617	1256	33	138	182	0.63	6292	484	25	13.94	0.49	48	-0.34	0.29	0.5	13.55	0.54	28	Released
SoSJV	COMMON	HRS	2016-2018	WB 9112	1748	5613	1258	34	134	197	0.63	6168	644	32	13.93	0.49	49	-0.35	0.3	0.5	13.76	0.64	25	Released
SoSJV	COMMON	HRS	2016-2018	UC 15014 35	1818	5559	1276	35	79	288	0.86	-	-	-	14.85	0.61	12	0.56	0.46	0.5	-	-	-	
SoSJV	COMMON	HWS	2016-2018	UC PATWIN 515HP	1743	5554	1256	36	74	182	0.79	6473	484	23	15.33	0.49	5	1.05	0.29	0.01	14.97	0.54	4	Released
SoSJV	COMMON	HRS	2016-2018	WB TRIPLE IV	1550	5522	1276	37	42	288	0.92	-	-	-	13.22	0.61	69	-1.06	0.46	0.12	-	-	-	Released
SoSJV	COMMON		2016-2018	APB 8155	1829	5504	1276	38	24	288	0.96	-	-	-	13.93	0.61	50	-0.36	0.46	0.69	-	-	-	
SoSJV	COMMON	HRS	2016-2018	WB JOAQUIN ORO	1728	5487	1257	39	7	187	0.97	6566	543	22	14.6	0.49	19	0.32	0.29	0.51	14.4	0.54	11	Released
SoSJV	COMMON	HRS	2016-2018	WB 9699	1888	5465	1309	40	-15	407	0.97	6682	484	18	15.61	0.76	2	1.33	0.64	0.2	15.04	0.54	3	
SoSJV	COMMON	HRS	2016-2018	UC YUROK	1745	5448	1256	41	-32	182	0.91	7545	484	7	13.52	0.49	61	-0.76	0.29	0.06	12.93	0.54	39	Released
SoSJV	COMMON	HWS	2016-2018	SY BLANCA ROYALE	1522	5439	1258	42	-41	192	0.89	5887	644	35	14.79	0.49	13	0.5	0.3	0.34	14.22	0.64	14	Released
SoSJV	COMMON	HRS	2016-2018	LCS 12SB0197	1830	5412	1256	43	-67	182	0.8	6612	484	20	14.31	0.49	34	0.03	0.29	0.96	13.49	0.54	31	
SoSJV	COMMON	HRS	2016-2018	UC 16010 20	1838	5399	1276	44	-80	288	0.86	-	-	-	14.54	0.61	23	0.26	0.46	0.75	-	-	-	
SoSJV	COMMON	HWS	2016-2018	WB 7566	1802	5385	1256	45	-94	182	0.73	7240	484	9	13.94	0.49	47	-0.34	0.29	0.5	13.16	0.54	35	Released
SoSJV	COMMON	HRS	2016-2018	WB ROCKLAND	1650	5362	1276	46	-118	288	0.79	-	-	-	14.69	0.61	17	0.4	0.46	0.64	-	-	-	Released
SoSJV	COMMON	HRS	2016-2018	SY ULTRA	1590	5329	1259	47	-150	204	0.63	-	-	-	14.08	0.51	40	-0.2	0.32	0.74	-	-	-	Released
SoSJV	COMMON	HRS	2016-2018	WB PATRON	1731	5327	1256	48	-152	182	0.59	5885	484	36	14.36	0.49	31	0.08	0.29	0.89	14.01	0.54	17	Released
SoSJV	COMMON		2016-2018	APB 501129	1820	5278	1276	49	-202	288	0.63	-	-	-	13.82	0.61	53	-0.47	0.46	0.54	-	-	-	
SoSJV	COMMON	HWS	2016-2018	LCS STAR	1688	5244	1256	50	-236	182	0.37	6590	484	21	15.19	0.49	7	0.91	0.29	0.02	14.46	0.54	9	Released
SoSJV	COMMON	HRS	2016-2018	UC 1880	1880	5243	1330	51	-237	467	0.73	6456	543	24	14.58	0.88	20	0.3	0.78	0.83	13.98	0.64	18	
SoSJV	COMMON	HRS	2016-2018	WB 9904	1751	5212	1257	52	-268	187	0.31	6238	543	28	13.68	0.49	58	-0.6	0.29	0.2	13.18	0.54	34	Released
SoSJV	COMMON	HRS	2016-2018	WB 9229	1730	5090	1257	53	-390	187	0.09	6038	543	33	14.39	0.49	29	0.11	0.29	0.83	14.23	0.54	13	Released
SoSJV	COMMON	HRS	2016-2018	SY 11200083-1-3	1877	5053	1309	54	-426	407	0.47	6271	484	26	15.15	0.76	9	0.87	0.64	0.49	14.58	0.54	7	
SoSJV	COMMON	HRS	2016-2018	APB 510477	1874	5012	1309	55	-468	407	0.42	6229	484	29	14.47	0.76	26	0.19	0.64	0.88	13.9	0.54	20	
SoSJV	COMMON	HRS	2016-2018	WB 9490	1887	4984	1309	56	-496	407	0.39	6201	484	30	13.52	0.76	62	-0.77	0.64	0.5	12.94	0.54	38	
SoSJV	COMMON	HWS	2016-2018	UC 15080 49	1837	4972	1276	57	-508	288	0.18	-	-	-	15.47	0.61	4	1.19	0.46	0.06	-	-	-	
SoSJV	COMMON	HRS	2016-2018	SY 11200024-1-4	1878	4970	1309	58	-510	407	0.38	6187	484	31	14.26	0.76	35	-0.02	0.64	0.97	13.69	0.54	26	
SoSJV	COMMON	HRS	2016-2018	UC 1882	1882	4904	1371	59	-576	570	0.49	6257	644	27	15.14	0.88	10	0.86	0.78	0.51	14.48	0.64	8	
SoSJV	COMMON	HWS	2016-2018	UC PATWIN 515	1680	4859	1257	60	-620	187	0.01	4912	484	40	15.25	0.49	6	0.97	0.29	0.01	15.6	0.54	2	Released
SoSJV	COMMON	HRS	2016-2018	DPG FV 2808	1608	4838	1259	61	-641	204	0.01	-	-	-	12.5	0.51	70	-1.78	0.32	0	-	-	-	Released
SoSJV	COMMON	HRS	2016-2018	YECORA ROJO	112	4815	1272	62	-665	270	0.04	5901	644	34	14.32	0.58	33	0.03	0.42	0.96	14.33	0.64	12	Released
SoSJV	COMMON	HRS	2016-2018	UC ANZA	20	4619	1259	63	-860	204	0	-	-	-	13.42	0.51	66	-0.86	0.32	0.06	-	-	-	Released
SoSJV	COMMON	HWS	2016-2018	UC 1883	1883	4578	1309	64	-901	407	0.07	5796	484	38	15.53	0.76	3	1.24	0.64	0.25	14.95	0.54	5	
SoSJV	COMMON	SRS	2016-2018	ASSL TAM 204	1778	4526	1257	65	-953	187	0	7007	484	12	14.78	0.49	14	0.5	0.29	0.34	13.43	0.54	32	Released
SoSJV	COMMON	HRS	2016-2018	UC 14657 170	1836	4470	1276	66	-1010	288	0	-	-	-	14.24	0.61	37	-0.04	0.46	0.96	-	-	-	
SoSJV	COMMON	HRS	2016-2018	UC 1885	1885	4456	1330	67	-1024	467	0.07	5805	543	37	14.73	0.76	16	0.45	0.64	0.71	14.16	0.54	16	
SoSJV	COMMON	HRS	2016-2018	YECORA ROJO 515	1879	4225	1309	68	-1255	407	0.01	5442	484	39	16.67	0.76	1	2.39	0.64	0.01	16.1	0.54	1	
SoSJV	COMMON	SRS	2016-2018	SY VACA	1766	3214	1259	69	-2265	204	0	-	-	-	14.56	0.51	21	0.27	0.32	0.65	-	-	-	Released
SoSJV	COMMON	SWS	2016-2018	BAG NEW DIRKWIN	1667	2899	1256	70	-2581	182	0	4867	484	41	14.22	0.49	38	-0.06	0.29	0.91	13.07	0.54	37	Released

Table 17. Imperial Valley region, common wheat yield and protein from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2018 Protein (%)	2018 St.Err.Protein (%)	2018 Protein Rank	Status
ImpV	COMMON	HRS	2016-2018	XA 9301	1843	8120	465	1	1618	361	0	-	-	-	11.87	0.41	64	-0.82	0.38	0.1	-	-	-	
ImpV	COMMON	HRS	2016-2018	XA 9501	1845	7748	465	2	1246	361	0	-	-	-	12.38	0.41	43	-0.31	0.38	0.52	-	-	-	
ImpV	COMMON	HRS	2016-2018	APB 500709	1819	7605	387	3	1104	255	0	-	-	-	13.01	0.32	23	0.32	0.29	0.38	-	-	-	
ImpV	COMMON	HRS	2016-2018	APB 510453	1841	7272	465	4	770	361	0.12	-	-	-	13.06	0.41	22	0.37	0.38	0.45	-	-	-	
ImpV	COMMON	HWS	2016-2018	UC 15010 27	1815	7267	357	5	765	208	0	6735	492	17	12.64	0.28	31	-0.05	0.24	0.87	12.9	0.8	15	
ImpV	COMMON	HRS	2016-2018	XA 9502	1846	7256	465	6	754	361	0.12	-	-	-	11.12	0.41	68	-1.57	0.38	0	-	-	-	
ImpV	COMMON	HRS	2016-2018	WB 9433	1847	7166	387	7	664	255	0.04	7210	492	6	12.37	0.32	44	-0.32	0.29	0.38	13.25	0.8	9	Released
ImpV	COMMON	HRS	2016-2018	APB 510477	1874	7123	466	8	621	362	0.26	7292	492	3	12.11	0.47	57	-0.57	0.44	0.31	12.23	0.8	34	
ImpV	COMMON	HRS	2016-2018	UC 1885	1885	7120	466	9	618	362	0.26	7289	492	4	12.5	0.47	38	-0.19	0.44	0.76	12.61	0.8	25	
ImpV	COMMON	HRS	2016-2018	SY 11200024-1-4	1878	7101	466	10	599	362	0.26	7270	492	5	13.82	0.47	7	1.13	0.44	0.04	13.93	0.8	2	
ImpV	COMMON	HRS	2016-2018	SY REDWING	1521	7095	357	11	593	208	0.02	7461	492	2	12.23	0.28	50	-0.46	0.24	0.15	12.8	0.8	17	Released
ImpV	COMMON	HRS	2016-2018	SY ULTRA	1590	7058	387	12	556	255	0.11	-	-	-	11.84	0.32	65	-0.85	0.29	0.02	-	-	-	Released
ImpV	COMMON	HWS	2016-2018	WB 7390	1750	6989	466	13	487	362	0.42	-	-	-	11.98	0.47	61	-0.7	0.44	0.22	-	-	-	
ImpV	COMMON	HRS	2016-2018	APB 511829	1875	6975	466	14	474	362	0.43	7145	492	7	11.97	0.47	62	-0.71	0.44	0.22	12.09	0.8	38	
ImpV	COMMON	HRS	2016-2018	YECORA ROJO	112	6961	387	15	460	255	0.23	7823	492	1	12.63	0.32	32	-0.06	0.29	0.87	12.6	0.8	26	Released
ImpV	COMMON	HRS	2016-2018	SY 13W00850	1834	6917	465	16	416	361	0.48	-	-	-	12.16	0.41	53	-0.53	0.38	0.28	-	-	-	
ImpV	COMMON	HWS	2016-2018	UC 15013 15	1816	6871	466	17	369	362	0.55	-	-	-	11.42	0.47	67	-1.27	0.44	0.02	-	-	-	
ImpV	COMMON	HRS	2016-2018	UC LASSIK	1495	6851	357	18	349	208	0.26	6684	492	22	12.12	0.28	56	-0.57	0.24	0.07	12.34	0.8	31	Released
ImpV	COMMON	HRS	2016-2018	SY 11200083-1-3	1877	6845	466	19	343	362	0.6	7015	492	10	12.55	0.47	36	-0.13	0.44	0.83	12.67	0.8	24	
ImpV	COMMON	HRS	2016-2018	SY SUMMIT 515	1658	6841	357	20	339	208	0.27	6152	492	37	12.93	0.28	25	0.24	0.24	0.44	13.72	0.8	5	Released
ImpV	COMMON	HRS	2016-2018	WB 9904	1751	6829	357	21	327	208	0.28	7123	492	8	12.03	0.28	59	-0.66	0.24	0.03	12.73	0.8	20	Released
ImpV	COMMON	HRS	2016-2018	UC 15010 5	1814	6810	466	22	309	362	0.67	-	-	-	13.22	0.47	17	0.53	0.44	0.35	-	-	-	
ImpV	COMMON	HRS	2016-2018	WB 9350	1842	6796	387	23	294	255	0.48	6880	492	12	12.17	0.32	52	-0.51	0.29	0.17	13.16	0.8	12	Released
ImpV	COMMON	HRS	2016-2018	UC 14657 170	1836	6764	465	24	262	361	0.72	-	-	-	13.81	0.41	8	1.12	0.38	0.02	-	-	-	
ImpV	COMMON	HWS	2016-2018	UC PATWIN 515	1680	6744	357	25	243	208	0.48	6633	492	27	12.39	0.28	41	-0.29	0.24	0.35	11.92	0.8	39	Released
ImpV	COMMON	HWS	2016-2018	WB 7566	1802	6731	357	26	229	208	0.5	6677	492	23	12.52	0.28	37	-0.17	0.24	0.61	13.2	0.8	11	Released
ImpV	COMMON	HWS	2016-2018	UC 15080 49	1837	6728	465	27	226	361	0.78	-	-	-	14.76	0.41	2	2.07	0.38	0	-	-	-	
ImpV	COMMON		2016-2018	APB 501129	1820	6698	466	28	196	362	0.83	-	-	-	12.48	0.47	39	-0.2	0.44	0.75	-	-	-	
ImpV	COMMON	HWS	2016-2018	WB 7618	1749	6677	466	29	175	362	0.83	-	-	-	13.45	0.47	12	0.76	0.44	0.19	-	-	-	Released
ImpV	COMMON		2016-2018	APB 8238	1821	6655	466	30	153	362	0.87	-	-	-	12.82	0.47	28	0.13	0.44	0.83	-	-	-	
ImpV	COMMON	HWS	2016-2018	LCS 12SB0224	1831	6654	357	31	152	208	0.72	6589	492	29	12.13	0.28	55	-0.56	0.24	0.07	11.36	0.8	41	
ImpV	COMMON	HRS	2016-2018	UC YUROK	1745	6648	357	32	146	208	0.72	7114	492	9	12.3	0.28	47	-0.39	0.24	0.22	12.72	0.8	21	Released
ImpV	COMMON	HRS	2016-2018	UC 1882	1882	6640	466	33	138	362	0.88	6810	492	13	12.06	0.47	58	-0.62	0.44	0.27	12.18	0.8	35	
ImpV	COMMON	HRS	2016-2018	WB 9112	1748	6608	357	34	106	208	0.83	6700	492	20	13.13	0.28	20	0.44	0.24	0.16	12.51	0.8	28.5	Released
ImpV	COMMON	HWS	2016-2018	LCS ATOMO	1723	6607	357	35	105	208	0.83	5807	492	41	12.3	0.28	46	-0.38	0.24	0.22	12.58	0.8	27	Released
ImpV	COMMON	HRS	2016-2018	WB 9229	1730	6606	357	36	104	208	0.83	6433	492	33	13.47	0.28	11	0.78	0.24	0.01	12.98	0.8	14	Released
ImpV	COMMON	HRS	2016-2018	UC 1884	1884	6589	466	37	87	362	0.9	6758	492	16	12.39	0.47	42	-0.29	0.44	0.61	12.51	0.8	28.5	
ImpV	COMMON	HRS	2016-2018	APB 501089	1828	6561	387	38	59	255	0.9	-	-	-	12.25	0.32	49	-0.44	0.29	0.24	-	-	-	
ImpV	COMMON	HWS	2016-2018	SY BLANCA GRANDE 515	1657	6560	357	39	59	208	0.9	6483	492	32	13.16	0.28	19	0.48	0.24	0.13	13.33	0.8	7	Released
ImpV	COMMON	HRS	2016-2018	SY SIENNA	1835	6558	387	40	57	255	0.9	6809	492	14	12.92	0.32	26	0.24	0.29	0.52	13.06	0.8	13	Released
ImpV	COMMON	HRS	2016-2018	WB 9490	1887	6539	466	41	37	362	0.95	6708	492	19	12.62	0.47	33	-0.06	0.44	0.9	12.74	0.8	19	
ImpV	COMMON	HRS	2016-2018	UC CENTRAL RED	1817	6523	357	42	22	208	0.95	5943	492	39	13.27	0.28	16	0.59	0.24	0.06	13.76	0.8	3	Released
ImpV	COMMON	HWS	2016-2018	UC PATWIN 515HP	1743	6485	357	43	-17	208	0.95	6350	492	36	12.99	0.28	24	0.31	0.24	0.33	11.9	0.8	40	Released
ImpV	COMMON	HWS	2016-2018	UC 1883	1883	6478	466	44	-23	362	0.95	6648	492	26	13.63	0.47	9	0.95	0.44	0.1	13.75	0.8	4	
ImpV	COMMON	HRS	2016-2018	UC ANZA	20	6467	387	45	-35	255	0.95	-	-	-	10.68	0.32	69	-2.01	0.29	0	-	-	-	Released
ImpV	COMMON	HRS	2016-2018	XA 9302	1844	6460	465	46	-42	361	0.95	-	-	-	11.89	0.41	63	-0.8	0.38	0.11	-	-	-	
ImpV	COMMON	HRS	2016-2018	SY 314	1660	6428	387	47	-74	255	0.9	-	-	-	12.45	0.32	40	-0.24	0.29	0.52	-	-	-	Released
ImpV	COMMON	HRS	2016-2018	APB 501189	1807	6415	466	48	-87	362	0.9	-	-	-	13.35	0.47	14	0.66	0.44	0.24	-	-	-	
ImpV	COMMON	HRS	2016-2018	YECORA ROJO 515	1879	6383	466	49	-118	362	0.9	6553	492	30	12.28	0.47	48	-0.41	0.44	0.47	12.39	0.8	30	
ImpV	COMMON	HRS	2016-2018	UC 1880	1880	6376	466	50	-125	362	0.9	6546	492	31	12.19	0.47	51	-0.5	0.44	0.38	12.3	0.8	32	
ImpV	COMMON	HRS	2016-2018	WB ROCKLAND	1650	6366	466	51	-136	362	0.88	-	-	-	14.08	0.47	6	1.4	0.44	0.01	-	-	-	Released
ImpV	COMMON	HRS	2016-2018	SY CAL ROJO	1478	6331	362	52	-171	217	0.7	5957	539	38	12.13	0.28	54	-0.56	0.24	0.07	12.11	0.8	36	Released
ImpV	COMMON	HRS	2016-2018	WB 9699	1888	6247	466	53	-255	362	0.72	6416	492	34	13.59	0.47	10	0.91	0.44	0.11	13.71	0.8	6	
ImpV	COMMON	HWS	2016-2018	SY BLANCA ROYALE	1522	6238	357	54	-264	208	0.44	6700	492	21	12.02	0.28	60	-0.66	0.24	0.03	12.11	0.8	37	Released
ImpV	COMMON	HRS	2016-2018	WB PATRON	1731	6232	357	55	-270	208	0.43	6657	492	25	12.71	0.28	29	0.03	0.24	0.92	12.23	0.8	33	Released
ImpV	COMMON	HRS	2016-2018	XB 9512	1886	6206	466	56	-296	362	0.69	6375	492	35	13.11	0.47	21	0.43	0.44	0.45	13.23	0.8	10	
ImpV	COMMON	HRS	2016-2018	LCS 12SB0197	1830	6168	357	57	-333	208	0.28	6726	492	18	12.32	0.28	45	-0.37	0.24	0.24	12.72	0.8	22	
ImpV	COMMON	HWS	2016-2018	UC 16010 32	1839	6087	465	58	-414	361	0.48	-	-	-	13.21	0.41	18	0.52	0.38	0.29	-	-	-	
ImpV	COMMON	HRS	2016-2018	WB JOAQUIN ORO	1728	5817	357	59	-685	208	0.01	6632	492	28	14.16	0.28	3	1.47	0.24	0	12.77	0.8	18	Released
ImpV	COMMON	SRS	2016-2018	ASSL TAM 204	1778	5790	357	60	-711	208	0	6804	492	15	12.64	0.28	30	-0.04	0.24	0.88	12.68	0.8	23	Released
ImpV	COMMON	HRS	2016-2018	DPG FV 2808	1608	5732	387	61	-770	255	0.01	-	-	-	10.58	0.32	70	-2.11	0.29	0	-	-	-	Released
ImpV	COMMON	HRS	2016-2018	APB 410117	1840	5676	465	62	-826	361	0.09	-	-	-	13.31	0.41	15	0.62	0.38	0.22	-	-	-	
ImpV	COMMON	HRS	2016-2018	SY 11200064-1-9	1876	5675	466	63	-827	362	0.09	5844	492	40	14.1	0.47	5	1.41	0.44	0.01	14.21	0.8	1	
ImpV	COMMON	HWS	2016-2018	LCS STAR	1688	5640	377	64	-861	240	0	6950	492	11	12.59	0.3	34	-0.1	0.27	0.8	12.85	0.8	16	Released
ImpV	COMMON	SWS	2016-2018	BAG NEW DIRKWIN	1667	5579	357	65	-923	208	0	6673	492	24	11.81	0.28	66	-0.88	0.24	0	13.29	0.8	8	Released
ImpV	COMMON		2016-2018	APB 8155	1829	5531	466	66	-971	362	0.04	-	-	-	14.12	0.47	4	1.43	0.44	0.01	-	-	-	
ImpV	COMMON	SRS	2016-2018	SY VACA	1766	5225	387	67	-1277	255	0	-	-	-	12.55	0.32	35	-0.13	0.29	0.75	-	-	-	Released
ImpV	COMMON	HRS	2016-2018	WB TRIPLE IV	1550	4884	466	68	-1618	362	0	-	-	-	12.82	0.47	27	0.13	0.44	0.83	-	-	-	Released
ImpV	COMMON	HRS	2016-2018	UC 16010 20	1838	4637	465	69	-1865	361	0	-	-	-	13.42	0.41	13	0.73	0.38	0.14	-	-	-	
ImpV	COMMON	HRS	2016-2018	UC 15014 35	1818	3867	510	70	-2635	416	0	-	-	-	15	0.56	1	2.31	0.54	0	-	-	-	

Table 18. Rainfed locations, common wheat yield and protein from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2018 Protein (%)	2018 St.Err.Protein (%)	2018 Protein Rank	Status
Rainfed	COMMON	HWS	2016-2018	LCS ATOMO	1723	5616	649	1	645	142	0	6182	1086	2	12.16	0.84	54	-0.49	0.39	0.87	11.44	0.64	35	Released
Rainfed	COMMON	HRS	2016-2018	WB 9699	1888	5487	675	2	516	233	0.14	6031	1086	4	12.13	0.96	58	-0.52	0.6	0.94	11.46	0.63	34	
Rainfed	COMMON	HRS	2016-2018	WB 9350	1842	5473	653	3	502	162	0.02	6155	1086	3	12.3	0.86	52	-0.35	0.42	0.94	11.6	0.63	32	Released
Rainfed	COMMON	HWS	2016-2018	UC 15013 15	1816	5336	701	4	366	296	0.48	-	-	-	12.24	1.1	53	-0.41	0.81	0.99	-	-	-	
Rainfed	COMMON	HRS	2016-2018	XA 9302	1844	5324	672	5	353	224	0.36	-	-	-	12.15	0.96	56	-0.5	0.6	0.94	-	-	-	
Rainfed	COMMON	HRS	2016-2018	APB 500709	1819	5322	658	6	351	179	0.22	-	-	-	12.44	0.89	46	-0.21	0.48	0.99	-	-	-	
Rainfed	COMMON	HRS	2016-2018	UC 1884	1884	5311	678	7	340	243	0.46	5924	1089	9	12.57	1	39	-0.08	0.66	0.99	11.64	0.65	30	
Rainfed	COMMON	HRS	2016-2018	LCS 12SB0197	1830	5309	650	8	339	146	0.14	6029	1091	5	12.65	0.84	34	0	0.39	1	11.8	0.64	26	
Rainfed	COMMON	HWS	2016-2018	UC 15010 27	1815	5296	649	9	325	144	0.14	5976	1089	6	12.41	0.83	47	-0.24	0.38	0.96	11.73	0.64	27	
Rainfed	COMMON	HRS	2016-2018	UC CENTRAL RED	1817	5290	648	10	319	140	0.14	5876	1084	12	12.77	0.84	23	0.12	0.39	0.99	12.2	0.65	16	Released
Rainfed	COMMON	HRS	2016-2018	APB 510453	1841	5280	675	11	309	232	0.46	-	-	-	12.85	0.96	22	0.21	0.6	0.99	-	-	-	
Rainfed	COMMON	HRS	2016-2018	XA 9502	1846	5278	672	12	307	224	0.46	-	-	-	11.83	0.96	67	-0.82	0.6	0.87	-	-	-	
Rainfed	COMMON	HRS	2016-2018	XA 9501	1845	5269	672	13	298	224	0.46	-	-	-	12.01	0.96	62	-0.64	0.6	0.87	-	-	-	
Rainfed	COMMON	HWS	2016-2018	LCS 12SB0224	1831	5264	649	14	293	144	0.19	5894	1089	10	12.51	0.83	41	-0.14	0.38	0.99	11.48	0.64	33	
Rainfed	COMMON	HRS	2016-2018	WB 9433	1847	5240	654	15	269	165	0.34	5836	1089	14	12.4	0.86	49	-0.25	0.43	0.96	11.23	0.64	38	Released
Rainfed	COMMON	HRS	2016-2018	UC 15010 5	1814	5240	701	16	269	296	0.64	-	-	-	12.51	1.1	40	-0.14	0.81	0.99	-	-	-	
Rainfed	COMMON	HRS	2016-2018	XB 9512	1886	5224	682	17	254	253	0.6	5730	1091	18	11.99	0.96	64	-0.66	0.6	0.87	11.44	0.63	36	
Rainfed	COMMON	HRS	2016-2018	SY SUMMIT 515	1658	5218	649	18	247	142	0.29	5876	1086	13	12.64	0.83	35	-0.01	0.37	1	12.13	0.63	18	Released
Rainfed	COMMON	HWS	2016-2018	UC 16010 32	1839	5197	672	19	226	224	0.6	-	-	-	13.04	0.96	15	0.39	0.6	0.96	-	-	-	
Rainfed	COMMON	HRS	2016-2018	APB 410117	1840	5196	672	20	225	224	0.6	-	-	-	12.74	0.96	27	0.09	0.6	0.99	-	-	-	
Rainfed	COMMON	HRS	2016-2018	SY 11200024-1-4	1878	5193	687	21	223	265	0.64	5760	1095	17	12.76	1	25	0.11	0.66	0.99	11.83	0.65	25	
Rainfed	COMMON	HRS	2016-2018	UC 16010 20	1838	5192	672	22	221	224	0.6	-	-	-	12.87	0.96	20	0.22	0.6	0.99	-	-	-	
Rainfed	COMMON	HWS	2016-2018	LCS STAR	1688	5158	651	23	187	150	0.48	5261	1099	32	13.16	0.84	10	0.51	0.39	0.87	12.59	0.65	6	Released
Rainfed	COMMON	HRS	2016-2018	SY REDWING	1521	5152	650	24	181	146	0.48	5772	1091	16	12.66	0.83	32	0.01	0.38	1	11.95	0.64	21	Released
Rainfed	COMMON		2016-2018	APB 501129	1820	5150	701	25	179	296	0.78	-	-	-	12.4	1.1	48	-0.25	0.81	0.99	-	-	-	
Rainfed	COMMON	HRS	2016-2018	SY ULTRA	1590	5137	658	26	166	179	0.63	-	-	-	12.6	0.89	38	-0.05	0.48	0.99	-	-	-	Released
Rainfed	COMMON	HRS	2016-2018	APB 501189	1807	5136	701	27	165	296	0.78	-	-	-	11.77	1.1	68	-0.87	0.81	0.87	-	-	-	
Rainfed	COMMON		2016-2018	APB 8238	1821	5126	701	28	155	296	0.79	-	-	-	12.5	1.1	42	-0.15	0.81	0.99	-	-	-	
Rainfed	COMMON	HWS	2016-2018	WB 7566	1802	5123	651	29	152	153	0.6	5962	1104	8	12.32	0.85	51	-0.33	0.4	0.94	11.27	0.67	37	Released
Rainfed	COMMON	HRS	2016-2018	XA 9301	1843	5098	672	30	127	224	0.78	-	-	-	12.72	0.96	31	0.07	0.6	0.99	-	-	-	
Rainfed	COMMON	HWS	2016-2018	SY BLANCA GRANDE 515	1657	5084	650	31	114	148	0.67	5322	1095	29	12.73	0.84	28	0.08	0.39	0.99	11.92	0.65	23	Released
Rainfed	COMMON	HWS	2016-2018	WB 7618	1749	5075	701	32	104	296	0.88	-	-	-	13.23	1.1	9	0.58	0.81	0.94	-	-	-	Released
Rainfed	COMMON	HRS	2016-2018	UC 1880	1880	5073	675	33	103	233	0.85	5653	1086	19	13.09	0.96	12	0.44	0.6	0.94	12.23	0.63	15	
Rainfed	COMMON	HRS	2016-2018	SY SIENNA	1835	5070	653	34	100	162	0.78	5881	1086	11	12.76	0.86	24	0.11	0.42	0.99	12.15	0.63	17	Released
Rainfed	COMMON	HWS	2016-2018	UC PATWIN 515	1680	5067	650	35	97	146	0.76	6483	1092	1	12.87	0.84	21	0.22	0.4	0.96	11.86	0.66	24	Released
Rainfed	COMMON	HRS	2016-2018	SY 13W00850	1834	5066	672	36	95	224	0.85	-	-	-	12.44	0.96	45	-0.21	0.6	0.99	-	-	-	
Rainfed	COMMON	HRS	2016-2018	APB 510477	1874	5052	675	37	81	233	0.88	5574	1086	22	13.33	0.96	7	0.68	0.6	0.87	12.62	0.63	5	
Rainfed	COMMON	HWS	2016-2018	UC 1883	1883	5043	670	38	72	218	0.88	5597	1083	20	13.08	0.96	13	0.43	0.6	0.94	12.37	0.63	11	
Rainfed	COMMON	HWS	2016-2018	SY BLANCA ROYALE	1522	5030	649	39	59	144	0.85	5302	1089	30	12.99	0.84	18	0.34	0.39	0.94	12.41	0.65	10	Released
Rainfed	COMMON	HRS	2016-2018	SY 11200064-1-9	1876	5013	678	40	42	242	0.92	5512	1089	24	13.71	0.98	3	1.06	0.63	0.87	13.02	0.64	2	
Rainfed	COMMON	HRS	2016-2018	WB 9490	1887	5011	682	41	40	253	0.92	5517	1091	23	11.54	0.98	70	-1.11	0.63	0.87	11.02	0.64	40	
Rainfed	COMMON	HRS	2016-2018	WB ROCKLAND	1650	5006	701	42	35	296	0.92	-	-	-	13.6	1.1	5	0.96	0.81	0.87	-	-	-	Released
Rainfed	COMMON	HRS	2016-2018	APB 501089	1828	5004	658	43	33	179	0.92	-	-	-	12.13	0.89	57	-0.52	0.48	0.87	-	-	-	
Rainfed	COMMON	HRS	2016-2018	WB 9904	1751	4988	649	44	17	144	0.92	5340	1089	27	12.61	0.84	37	-0.04	0.39	0.99	11.65	0.65	29	Released
Rainfed	COMMON	HRS	2016-2018	UC LASSIK	1495	4985	650	45	14	146	0.92	5970	1091	7	12.16	0.84	55	-0.49	0.39	0.87	11.62	0.65	31	Released
Rainfed	COMMON	HRS	2016-2018	SY CAL ROJO	1478	4950	650	46	-21	146	0.92	5502	1089	25	12.11	0.83	60	-0.54	0.37	0.87	10.94	0.63	41	Released
Rainfed	COMMON	HRS	2016-2018	WB 9112	1748	4932	648	47	-39	138	0.88	5579	1083	21	12.36	0.83	50	-0.29	0.37	0.94	11.71	0.63	28	Released
Rainfed	COMMON	HRS	2016-2018	UC 15014 35	1818	4909	701	48	-62	296	0.92	-	-	-	13.1	1.1	11	0.45	0.81	0.96	-	-	-	
Rainfed	COMMON	HRS	2016-2018	UC 1882	1882	4897	675	49	-74	233	0.88	5495	1086	26	13.35	0.96	6	0.7	0.6	0.87	12.46	0.63	9	
Rainfed	COMMON	HRS	2016-2018	UC YUROK	1745	4889	648	50	-82	140	0.78	5810	1084	15	12.12	0.83	59	-0.53	0.37	0.87	11.17	0.63	39	Released
Rainfed	COMMON	HWS	2016-2018	WB 7390	1750	4886	701	51	-84	296	0.88	-	-	-	12.48	1.1	43	-0.17	0.81	0.99	-	-	-	
Rainfed	COMMON	HRS	2016-2018	SY 314	1660	4818	658	52	-153	179	0.64	-	-	-	12.03	0.89	61	-0.61	0.48	0.87	-	-	-	Released
Rainfed	COMMON	HRS	2016-2018	WB 9229	1730	4817	650	53	-154	146	0.6	5326	1091	28	13.02	0.84	17	0.37	0.4	0.94	12.3	0.66	13	Released
Rainfed	COMMON	HRS	2016-2018	SY 11200083-1-3	1877	4759	678	54	-212	243	0.64	5263	1089	31	12.66	0.98	33	0.01	0.63	1	11.97	0.64	20	
Rainfed	COMMON	HWS	2016-2018	UC PATWIN 515HP	1743	4752	648	55	-219	140	0.36	5098	1084	35	13.64	0.83	4	0.99	0.37	0.26	12.94	0.63	4	Released
Rainfed	COMMON		2016-2018	APB 8155	1829	4728	701	56	-242	296	0.64	-	-	-	12.63	1.1	36	-0.02	0.81	1	-	-	-	
Rainfed	COMMON	HRS	2016-2018	WB TRIPLE IV	1550	4720	701	57	-251	296	0.64	-	-	-	11.89	1.1	66	-0.76	0.81	0.94	-	-	-	Released
Rainfed	COMMON	HRS	2016-2018	APB 511829	1875	4664	678	58	-306	242	0.48	5163	1089	34	13.06	0.94	14	0.41	0.58	0.94	12.36	0.63	12	
Rainfed	COMMON	HRS	2016-2018	DPG FV 2808	1608	4660	658	59	-311	179	0.29	-	-	-	11.57	0.89	69	-1.08	0.48	0.54	-	-	-	Released
Rainfed	COMMON	HRS	2016-2018	WB PATRON	1731	4655	649	60	-316	142	0.14	5013	1086	36	12.74	0.83	26	0.09	0.37	0.99	11.92	0.63	22	Released
Rainfed	COMMON	HRS	2016-2018	UC 1885	1885	4635	678	61	-336	243	0.46	5209	1089	33	13.04	1	16	0.39	0.66	0.96	12.3	0.65	14	
Rainfed	COMMON	HWS	2016-2018	UC 15080 49	1837	4577	672	62	-394	224	0.29	-	-	-	13.94	0.96	2	1.29	0.6	0.54	-	-	-	
Rainfed	COMMON	HRS	2016-2018	UC 14657 170	1836	4542	672	63	-429	224	0.23	-	-	-	12.72	0.96	29	0.07	0.6	0.99	-	-	-	
Rainfed	COMMON	HRS	2016-2018	WB JOAQUIN ORO	1728	4533	649	64	-438	144	0.02	4993	1089	37	13.29	0.84	8	0.65	0.4	0.87	13.01	0.66	3	Released
Rainfed	COMMON	HRS	2016-2018	UC ANZA	20	4477	658	65	-494	179	0.04	-	-	-	11.98	0.89	65	-0.67	0.48	0.87	-	-	-	Released
Rainfed	COMMON	SRS	2016-2018	ASSL TAM 204	1778	4354	651	66	-617	153	0	4092	1104	40	12.93	0.85	19	0.28	0.4	0.94	12.5	0.67	7	Released
Rainfed	COMMON	HRS	2016-2018	YECORA ROJO	112	4338	658	67	-633	178	0	4568	1099	38	12.47	0.89	44	-0.18	0.49	0.99	12.1	0.69	19	Released
Rainfed	COMMON	SRS	2016-2018	SY VACA	1766	4079	659	68	-892	183	0	-	-	-	12.01	0.9	63	-0.64	0.51	0.87	-	-	-	Released
Rainfed	COMMON	HRS	2016-2018	YECORA ROJO 515	1879	3800	675	69	-1171	233	0	4380	1086	39	15.19	1	1	2.54	0.66	0.01	14.39	0.65	1	
Rainfed	COMMON	SWS	2016-2018	BAG NEW DIRKWIN	1667	3385	650	70	-1586	148	0	3549	1089	41	12.72	0.84	30	0.07	0.38	0.99	12.47	0.63	8	Released

Durum performance tables

Table 19. North Central San Joaquin Valley region, durum wheat yield and protein from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2018 Yield (lb/acre)	2018 St.Err. Yield (lb/acre)	2018 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2018 Protein (%)	2018 St.Err.Protein (%)	2018 Protein Rank	Status
NCenSJV	DURUM	DURUM	2016-2018	SHASTA	1869	8003	470	1	837	306	0.04	8114	336	4	11.26	1.45	38	-0.35	0.49	0.7	13.07	0.8	22	Released
NCenSJV	DURUM	DURUM	2016-2018	UC DESERT GOLD	1850	7911	393	2	745	171	0	7304	386	15	11.03	1.39	43	-0.58	0.28	0.23	13.21	0.82	20	Released
NCenSJV	DURUM	DURUM	2016-2018	LCS 13SD0056	1833	7719	470	3	553	306	0.21	-	-	-	10.94	1.45	45	-0.67	0.49	0.48	-	-	-	
NCenSJV	DURUM	DURUM	2016-2018	UC DESERT KING	1375	7711	382	4	546	145	0	8173	336	3	11.35	1.38	36	-0.26	0.23	0.56	13.4	0.8	16	Released
NCenSJV	DURUM	DURUM	2016-2018	UC 15210 24	1826	7677	470	5	512	306	0.24	-	-	-	11.42	1.45	34	-0.19	0.49	0.81	-	-	-	
NCenSJV	DURUM	DURUM	2016-2018	UC 15210 12	1825	7665	470	6	499	306	0.24	-	-	-	11.94	1.45	14	0.33	0.49	0.7	-	-	-	
NCenSJV	DURUM	DURUM	2016-2018	UC 1870	1870	7650	470	7	484	306	0.24	7761	336	5	11.42	1.45	33	-0.19	0.49	0.81	13.23	0.8	19	
NCenSJV	DURUM	DURUM	2016-2018	LCS 12E4006	1832	7606	470	8	440	306	0.31	-	-	-	10.82	1.45	48	-0.79	0.49	0.41	-	-	-	
NCenSJV	DURUM	DURUM	2016-2018	DPG DURAKING	878	7600	470	9	434	306	0.31	7710	336	6	11.49	1.45	31	-0.12	0.49	0.86	13.3	0.8	18	Released
NCenSJV	DURUM	DURUM	2016-2018	UC 15210 11	1824	7583	470	10	417	306	0.33	-	-	-	12.16	1.45	5	0.55	0.49	0.56	-	-	-	
NCenSJV	DURUM	DURUM	2016-2018	ASC 103	1857	7496	405	11	331	196	0.24	-	-	-	10.94	1.4	44	-0.67	0.31	0.23	-	-	-	
NCenSJV	DURUM	DURUM	2016-2018	APB 471400	1853	7485	390	12	319	165	0.19	8182	336	2	10.9	1.39	46	-0.71	0.27	0.09	12.47	0.81	30	
NCenSJV	DURUM	DURUM	2016-2018	DPG TOPPER	1211	7479	470	13	313	306	0.51	7589	336	8	10.77	1.46	49	-0.84	0.53	0.41	12.73	0.81	28	Released
NCenSJV	DURUM	DURUM	2016-2018	UC 14215/9	1796	7478	470	14	312	306	0.51	-	-	-	12.13	1.45	6	0.52	0.49	0.58	-	-	-	
NCenSJV	DURUM	DURUM	2016-2018	APB TIBURON	1640	7469	382	15	303	145	0.17	8227	336	1	11.79	1.38	21	0.18	0.23	0.7	13.52	0.8	12	Released
NCenSJV	DURUM	DURUM	2016-2018	UC 1873	1873	7366	470	16	200	306	0.68	7477	336	11	11.74	1.45	24	0.13	0.49	0.86	13.55	0.8	11	
NCenSJV	DURUM	DURUM	2016-2018	APB 540505	1822	7362	470	17	196	306	0.68	-	-	-	11.32	1.45	37	-0.29	0.49	0.73	-	-	-	
NCenSJV	DURUM	DURUM	2016-2018	APB 540165	1827	7320	396	18	154	178	0.6	-	-	-	11.8	1.39	20	0.19	0.29	0.7	-	-	-	
NCenSJV	DURUM	DURUM	2016-2018	APB 450333	1866	7317	470	19	151	306	0.7	7427	336	12	11.77	1.45	23	0.16	0.49	0.83	13.58	0.8	9	
NCenSJV	DURUM	DURUM	2016-2018	APB 571353	1812	7298	470	20	132	306	0.74	-	-	-	11.49	1.45	30	-0.12	0.49	0.86	-	-	-	
NCenSJV	DURUM	DURUM	2016-2018	LCS KIKO	1697	7290	390	21	124	165	0.64	-	-	-	11.64	1.39	25	0.04	0.26	0.93	-	-	-	Released
NCenSJV	DURUM	DURUM	2016-2018	ASC 100	1854	7288	416	22	122	218	0.7	-	-	-	12.1	1.41	8	0.49	0.36	0.48	-	-	-	
NCenSJV	DURUM	DURUM	2016-2018	DPG PLATINUM	1210	7277	470	23	111	306	0.78	7388	336	13	11.15	1.45	42	-0.45	0.49	0.69	12.96	0.8	25	Released
NCenSJV	DURUM	DURUM	2016-2018	SY VOLANTE	1431	7259	383	24	93	147	0.68	7648	336	7	11.49	1.38	29	-0.11	0.23	0.77	13.1	0.8	21	Released
NCenSJV	DURUM	DURUM	2016-2018	WB ORITA	1215	7251	383	25	85	149	0.7	7000	386	22	11.96	1.38	12	0.35	0.24	0.46	14.43	0.82	4	Released
NCenSJV	DURUM	DURUM	2016-2018	APB ALBERTO	1813	7250	386	26	85	156	0.7	7482	358	10	11.6	1.38	26	-0.01	0.25	0.98	13	0.8	24	Released
NCenSJV	DURUM	DURUM	2016-2018	APB 571217	1810	7247	470	27	81	306	0.84	-	-	-	11.91	1.45	16	0.3	0.49	0.73	-	-	-	
NCenSJV	DURUM	DURUM	2016-2018	ASC 101	1855	7201	405	28	35	196	0.89	-	-	-	11.24	1.4	40	-0.37	0.31	0.56	-	-	-	
NCenSJV	DURUM	DURUM	2016-2018	AS SARAGOLLA	1583	7189	383	29	23	147	0.89	7057	358	21	11.24	1.38	39	-0.37	0.23	0.41	13.06	0.8	23	Released
NCenSJV	DURUM	DURUM	2016-2018	APB 450275	1865	7126	484	30	-40	326	0.9	7215	358	17	11.59	1.46	27	-0.01	0.53	0.98	13.56	0.81	10	
NCenSJV	DURUM	DURUM	2016-2018	SY FORTISSIMO	1429	7092	382	31	-73	145	0.7	7250	336	16	12.02	1.38	9	0.41	0.23	0.41	13.37	0.8	17	Released
NCenSJV	DURUM	DURUM	2016-2018	APB 470442	1852	7004	405	32	-162	196	0.61	-	-	-	12.13	1.4	7	0.52	0.31	0.41	-	-	-	
NCenSJV	DURUM	DURUM	2016-2018	APB HELIOS	1440	6973	470	33	-193	306	0.68	-	-	-	11.94	1.45	13	0.34	0.49	0.7	-	-	-	Released
NCenSJV	DURUM	DURUM	2016-2018	AS MAESTRALE	1582	6967	386	34	-198	156	0.37	6797	386	25	11.41	1.38	35	-0.2	0.25	0.7	13.47	0.81	14	Released
NCenSJV	DURUM	DURUM	2016-2018	UC MIWOK	1690	6944	374	35	-222	124	0.21	6252	212	29	11.87	1.37	17	0.26	0.2	0.48	13.83	0.78	7	Released
NCenSJV	DURUM	DURUM	2016-2018	UC DESERT KING HP	1627	6929	383	36	-237	149	0.24	6048	386	30	12.67	1.38	2	1.06	0.24	0	15.26	0.82	1	Released
NCenSJV	DURUM	DURUM	2016-2018	WB MEAD	1607	6892	382	37	-274	145	0.19	7371	336	14	11.78	1.38	22	0.17	0.23	0.7	14.24	0.8	5	Released
NCenSJV	DURUM	DURUM	2016-2018	WB HAVASU	1479	6892	390	38	-274	165	0.24	-	-	-	11.91	1.39	15	0.3	0.26	0.56	-	-	-	Released
NCenSJV	DURUM	DURUM	2016-2018	APB 450311	1851	6837	392	39	-329	168	0.19	7064	358	20	11.83	1.39	19	0.23	0.27	0.7	13.51	0.81	13	
NCenSJV	DURUM	DURUM	2016-2018	UC 1871	1871	6825	562	40	-341	429	0.62	6912	470	24	11.16	1.53	41	-0.45	0.68	0.7	13.73	0.84	8	
NCenSJV	DURUM	DURUM	2016-2018	UC 1872	1872	6814	526	41	-352	384	0.57	6925	422	23	10.75	1.49	50	-0.86	0.59	0.46	12.93	0.82	26	
NCenSJV	DURUM	DURUM	2016-2018	UC 16051 12	1849	6771	405	42	-395	196	0.19	-	-	-	11.43	1.4	32	-0.18	0.31	0.73	-	-	-	
NCenSJV	DURUM	DURUM	2016-2018	APB WESTMORE HP	1484	6747	385	43	-419	154	0.04	6646	422	27	12.47	1.38	4	0.86	0.24	0.01	14.73	0.82	2	Released
NCenSJV	DURUM	DURUM	2016-2018	DPG CANDURA	1867	6732	502	44	-434	351	0.38	6778	386	26	10.86	1.46	47	-0.75	0.53	0.48	12.82	0.81	27	Released
NCenSJV	DURUM	DURUM	2016-2018	AS COLOMBO	1800	6596	390	45	-570	165	0.01	7558	336	9	10.7	1.39	51	-0.91	0.26	0.01	12.61	0.8	29	Released
NCenSJV	DURUM	DURUM	2016-2018	APB 410077	1823	6578	470	46	-588	306	0.19	-	-	-	12.01	1.45	10	0.4	0.49	0.7	-	-	-	
NCenSJV	DURUM	DURUM	2016-2018	ASC 102	1856	6551	405	47	-615	196	0.01	-	-	-	11.83	1.4	18	0.23	0.31	0.7	-	-	-	
NCenSJV	DURUM	DURUM	2016-2018	APB KRONOS	951	6509	395	48	-656	176	0	7197	470	18	11.5	1.39	28	-0.1	0.27	0.81	13.45	0.84	15	Released
NCenSJV	DURUM	DURUM	2016-2018	WB MOHAVE	1654	6456	383	49	-710	147	0	7161	358	19	11.99	1.38	11	0.39	0.23	0.41	14.15	0.8	6	Released
NCenSJV	DURUM	DURUM	2016-2018	POWELL	1868	6412	470	50	-754	306	0.07	6523	336	28	12.79	1.45	1	1.18	0.49	0.13	14.6	0.8	3	Released
NCenSJV	DURUM	DURUM	2016-2018	UC 16051 1	1848	6362	405	51	-804	196	0	-	-	-	12.56	1.4	3	0.95	0.31	0.03	-	-	-	

Table 20. Sacramento Valley region, durum wheat yield and protein from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2018 Protein (%)	2018 St.Err.Protein (%)	2018 Protein Rank	Status
SacV	DURUM	DURUM	2016-2018	UC 15210 12	1825	8963	725	1	1632	364	0	-	-	-	11.78	0.5	36	-0.51	0.35	0.25	-	-	-	
SacV	DURUM	DURUM	2016-2018	UC 1870	1870	8367	725	2	1035	363	0.02	9041	361	1	12.16	0.5	30	-0.13	0.35	0.79	12.25	0.35	19	
SacV	DURUM	DURUM	2016-2018	APB 471400	1853	8360	675	3	1029	257	0	8938	361	2	11.67	0.43	41	-0.61	0.25	0.05	11.83	0.35	24	
SacV	DURUM	DURUM	2016-2018	AS SARAGOLLA	1583	8307	661	4	975	218	0	8572	405	7	11.24	0.4	49	-1.04	0.2	0	11.16	0.35	30	Released
SacV	DURUM	DURUM	2016-2018	UC DESERT KING	1375	8251	658	5	919	209	0	8879	361	3	11.62	0.4	42	-0.67	0.2	0.01	11.88	0.35	22	Released
SacV	DURUM	DURUM	2016-2018	LCS 13SD0056	1833	8142	754	6	810	418	0.12	-	-	-	11.48	0.56	45.5	-0.8	0.43	0.13	-	-	-	
SacV	DURUM	DURUM	2016-2018	UC 16051 12	1849	8081	724	7	749	364	0.11	-	-	-	11.41	0.5	47	-0.88	0.35	0.05	-	-	-	
SacV	DURUM	DURUM	2016-2018	UC 15210 24	1826	8072	725	8	740	364	0.11	-	-	-	11.48	0.5	45.5	-0.8	0.35	0.07	-	-	-	
SacV	DURUM	DURUM	2016-2018	UC 15210 11	1824	8027	725	9	695	364	0.13	-	-	-	12.07	0.5	32	-0.21	0.35	0.68	-	-	-	
SacV	DURUM	DURUM	2016-2018	DPG PLATINUM	1210	8021	725	10	689	363	0.13	8695	361	4	12.05	0.5	33	-0.24	0.35	0.64	12.15	0.35	20	Released
SacV	DURUM	DURUM	2016-2018	UC DESERT GOLD	1850	7997	675	11	665	257	0.05	8158	361	13	11.5	0.43	44	-0.79	0.25	0.01	11.55	0.35	28	Released
SacV	DURUM	DURUM	2016-2018	ASC 101	1855	7989	724	12	657	364	0.14	-	-	-	12.36	0.5	26	0.08	0.35	0.86	-	-	-	
SacV	DURUM	DURUM	2016-2018	LCS 12E4006	1832	7973	725	13	641	364	0.14	-	-	-	11.15	0.5	50	-1.13	0.35	0.01	-	-	-	
SacV	DURUM	DURUM	2016-2018	DPG DURAKING	878	7931	725	14	599	363	0.16	8606	361	6	11.76	0.5	38	-0.53	0.35	0.25	11.86	0.35	23	Released
SacV	DURUM	DURUM	2016-2018	APB 540505	1822	7706	725	15	374	364	0.45	-	-	-	12.13	0.5	31	-0.16	0.35	0.74	-	-	-	
SacV	DURUM	DURUM	2016-2018	SHASTA	1869	7704	725	16	372	363	0.45	8378	361	10	12.26	0.5	27	-0.02	0.35	0.95	12.36	0.35	14	Released
SacV	DURUM	DURUM	2016-2018	UC 14215/9	1796	7691	725	17	360	364	0.45	-	-	-	13.05	0.5	6	0.77	0.35	0.08	-	-	-	
SacV	DURUM	DURUM	2016-2018	UC MIWOK	1690	7654	643	18	322	157	0.11	8481	243	8	12.37	0.38	24	0.09	0.15	0.68	12.31	0.24	16	Released
SacV	DURUM	DURUM	2016-2018	ASC 102	1856	7647	724	19	315	364	0.5	-	-	-	12.22	0.5	28	-0.07	0.35	0.87	-	-	-	
SacV	DURUM	DURUM	2016-2018	ASC 103	1857	7640	724	20	308	364	0.5	-	-	-	11.56	0.5	43	-0.72	0.35	0.1	-	-	-	
SacV	DURUM	DURUM	2016-2018	APB WESTMORE HP	1484	7535	658	21	203	209	0.45	7777	361	18	12.85	0.4	12	0.57	0.2	0.02	13.13	0.35	6	Released
SacV	DURUM	DURUM	2016-2018	UC 1873	1873	7511	725	22	180	363	0.69	8186	361	11	12.52	0.56	21	0.24	0.43	0.68	12.54	0.41	13	
SacV	DURUM	DURUM	2016-2018	UC DESERT KING HP	1627	7499	658	23	167	209	0.52	8104	361	14	13.11	0.4	4	0.82	0.2	0	13.18	0.35	5	Released
SacV	DURUM	DURUM	2016-2018	DPG TOPPER	1211	7385	725	24	53	363	0.92	8059	361	15	11.76	0.56	37	-0.52	0.43	0.31	11.78	0.41	25	Released
SacV	DURUM	DURUM	2016-2018	AS MAESTRALE	1582	7371	658	25	39	209	0.91	7482	361	24	11.4	0.4	48	-0.89	0.2	0	11.77	0.35	26	Released
SacV	DURUM	DURUM	2016-2018	UC 1871	1871	7362	725	26	30	363	0.95	8036	361	16	12.2	0.5	29	-0.09	0.35	0.86	12.29	0.35	17	
SacV	DURUM	DURUM	2016-2018	ASC 100	1854	7323	724	27	-9	364	0.98	-	-	-	11.72	0.5	39	-0.57	0.35	0.21	-	-	-	
SacV	DURUM	DURUM	2016-2018	APB KRONOS	951	7189	661	28	-142	218	0.6	6973	405	29	12.84	0.4	13	0.55	0.2	0.03	13.49	0.35	1	Released
SacV	DURUM	DURUM	2016-2018	UC 1872	1872	7182	725	29	-150	363	0.74	7856	361	17	11.71	0.56	40	-0.58	0.43	0.27	11.72	0.41	27	
SacV	DURUM	DURUM	2016-2018	WB MEAD	1607	7173	658	30	-158	209	0.53	8479	361	9	12.56	0.4	20	0.27	0.2	0.27	12.36	0.35	15	Released
SacV	DURUM	DURUM	2016-2018	WB ORITA	1215	7141	658	31	-191	209	0.48	8158	361	12	13.05	0.4	7	0.77	0.2	0	12.65	0.35	11	Released
SacV	DURUM	DURUM	2016-2018	APB 571353	1812	7141	725	32	-191	364	0.68	-	-	-	11.99	0.5	35	-0.3	0.35	0.53	-	-	-	
SacV	DURUM	DURUM	2016-2018	DPG CANDURA	1867	6975	725	33	-357	363	0.45	7649	361	21	12.03	0.5	34	-0.26	0.35	0.61	12.12	0.35	21	Released
SacV	DURUM	DURUM	2016-2018	APB 540165	1827	6953	675	34	-379	257	0.22	-	-	-	12.64	0.43	17	0.35	0.25	0.25	-	-	-	
SacV	DURUM	DURUM	2016-2018	APB TIBURON	1640	6943	658	35	-389	209	0.13	7752	361	19	12.95	0.4	9	0.67	0.2	0.01	12.78	0.35	9	Released
SacV	DURUM	DURUM	2016-2018	WB HAVASU	1479	6916	675	36	-416	257	0.17	-	-	-	12.64	0.43	16	0.36	0.25	0.25	-	-	-	Released
SacV	DURUM	DURUM	2016-2018	APB 450311	1851	6888	675	37	-444	257	0.14	7562	361	22	12.62	0.43	18	0.34	0.25	0.27	12.95	0.35	8	
SacV	DURUM	DURUM	2016-2018	LCS KIKO	1697	6877	675	38	-455	257	0.14	-	-	-	12.37	0.43	25	0.08	0.25	0.8	-	-	-	Released
SacV	DURUM	DURUM	2016-2018	WB MOHAVE	1654	6860	658	39	-472	209	0.08	7692	361	20	12.76	0.4	14	0.48	0.2	0.06	13.37	0.35	2	Released
SacV	DURUM	DURUM	2016-2018	AS COLOMBO	1800	6858	675	40	-474	257	0.13	7378	361	25	10.86	0.43	51	-1.42	0.25	0	11.27	0.35	29	Released
SacV	DURUM	DURUM	2016-2018	SY FORTISSIMO	1429	6824	658	41	-508	209	0.07	8624	361	5	12.58	0.4	19	0.29	0.2	0.25	12.27	0.35	18	Released
SacV	DURUM	DURUM	2016-2018	SY VOLANTE	1431	6794	675	42	-538	256	0.11	7557	361	23	12.52	0.44	22	0.23	0.27	0.53	12.58	0.41	12	Released
SacV	DURUM	DURUM	2016-2018	POWELL	1868	6618	725	43	-714	363	0.12	7293	361	26	13.24	0.5	3	0.96	0.35	0.03	13.34	0.35	3	Released
SacV	DURUM	DURUM	2016-2018	APB ALBERTO	1813	6613	658	44	-719	209	0	7026	361	28	12.69	0.4	15	0.4	0.2	0.11	12.77	0.35	10	Released
SacV	DURUM	DURUM	2016-2018	APB 450275	1865	6589	725	45	-743	363	0.11	7263	361	27	13.09	0.5	5	0.81	0.35	0.06	13.19	0.35	4	
SacV	DURUM	DURUM	2016-2018	APB 571217	1810	6470	725	46	-862	364	0.07	-	-	-	13.5	0.5	2	1.22	0.35	0.01	-	-	-	
SacV	DURUM	DURUM	2016-2018	APB HELIOS	1440	6468	725	47	-864	364	0.07	-	-	-	12.87	0.5	11	0.59	0.35	0.19	-	-	-	Released
SacV	DURUM	DURUM	2016-2018	APB 470442	1852	6132	724	48	-1200	364	0.01	-	-	-	13.78	0.5	1	1.5	0.35	0	-	-	-	
SacV	DURUM	DURUM	2016-2018	APB 410077	1823	6116	725	49	-1215	364	0.01	-	-	-	12.47	0.5	23	0.18	0.35	0.7	-	-	-	
SacV	DURUM	DURUM	2016-2018	APB 450333	1866	6078	725	50	-1254	363	0	6753	361	30	12.89	0.5	10	0.61	0.35	0.18	12.99	0.35	7	
SacV	DURUM	DURUM	2016-2018	UC 16051 1	1848	5618	724	51	-1714	364	0	-	-	-	13.02	0.5	8	0.73	0.35	0.1	-	-	-	

Table 21. South San Joaquin Valley region, durum wheat yield and protein from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2018 Protein (%)	2018 St.Err.Protein (%)	2018 Protein Rank	Status
SoSJV	DURUM	DURUM	2016-2018	APB TIBURON	1640	8140	943	1	1605	248	0	7979	332	1	14.63	0.66	38	-0.35	0.17	0.1	15.04	0.35	14	Released
SoSJV	DURUM	DURUM	2016-2018	UC 14215/9	1796	8090	1009	2	1555	431	0.01	-	-	-	14.65	0.71	37	-0.33	0.31	0.38	-	-	-	
SoSJV	DURUM	DURUM	2016-2018	APB 540505	1822	7925	1009	3	1390	431	0.02	-	-	-	13.98	0.71	51	-1	0.31	0.01	-	-	-	
SoSJV	DURUM	DURUM	2016-2018	APB 540165	1827	7847	967	4	1313	325	0	-	-	-	14.46	0.67	39	-0.52	0.22	0.06	-	-	-	
SoSJV	DURUM	DURUM	2016-2018	APB 571217	1810	7676	1009	5	1141	431	0.04	-	-	-	14.68	0.71	35	-0.29	0.31	0.44	-	-	-	
SoSJV	DURUM	DURUM	2016-2018	UC 1870	1870	7675	1009	6	1141	430	0.04	7610	332	2	14.27	0.71	46	-0.71	0.31	0.07	14.24	0.35	27	
SoSJV	DURUM	DURUM	2016-2018	APB HELIOS	1440	7495	1009	7	961	431	0.09	-	-	-	13.99	0.71	49	-0.98	0.31	0.01	-	-	-	Released
SoSJV	DURUM	DURUM	2016-2018	APB 410077	1823	7426	1009	8	891	431	0.11	-	-	-	14.36	0.71	43	-0.61	0.31	0.11	-	-	-	
SoSJV	DURUM	DURUM	2016-2018	DPG TOPPER	1211	7053	1009	9	518	430	0.42	6988	332	4	13.99	0.71	50	-0.99	0.31	0.01	13.96	0.35	29	Released
SoSJV	DURUM	DURUM	2016-2018	SY VOLANTE	1431	7029	943	10	494	248	0.13	6697	332	9	14.69	0.66	34	-0.29	0.17	0.17	14.81	0.35	19	Released
SoSJV	DURUM	DURUM	2016-2018	APB 450311	1851	7018	960	11	483	304	0.22	6303	332	22	15.6	0.68	7	0.62	0.24	0.04	16.37	0.45	1	
SoSJV	DURUM	DURUM	2016-2018	UC MIWOK	1690	7002	927	12	467	183	0.04	6940	228	6	14.79	0.65	28	-0.19	0.13	0.25	14.74	0.3	23	Released
SoSJV	DURUM	DURUM	2016-2018	APB 571353	1812	6979	1009	13	444	431	0.48	-	-	-	14.37	0.71	42	-0.61	0.31	0.11	-	-	-	
SoSJV	DURUM	DURUM	2016-2018	UC 15210 24	1826	6931	1009	14	396	431	0.54	-	-	-	14.02	0.71	48	-0.96	0.31	0.01	-	-	-	
SoSJV	DURUM	DURUM	2016-2018	DPG DURAKING	878	6867	1009	15	332	430	0.62	6802	332	7	14.28	0.74	45	-0.7	0.38	0.14	14.34	0.38	26	Released
SoSJV	DURUM	DURUM	2016-2018	APB 471400	1853	6864	960	16	330	304	0.47	6468	332	15	14.12	0.67	47	-0.85	0.2	0	14.38	0.35	25	
SoSJV	DURUM	DURUM	2016-2018	WB MOHAVE	1654	6849	943	17	315	248	0.39	7066	332	3	14.92	0.66	27	-0.06	0.17	0.78	15.6	0.35	4	Released
SoSJV	DURUM	DURUM	2016-2018	UC 1872	1872	6843	1009	18	308	430	0.65	6778	332	8	15.02	0.71	25	0.04	0.31	0.91	14.99	0.35	17	
SoSJV	DURUM	DURUM	2016-2018	UC DESERT KING	1375	6792	943	19	257	248	0.48	6528	332	13	15.26	0.66	19	0.28	0.18	0.22	15.07	0.38	13	Released
SoSJV	DURUM	DURUM	2016-2018	LCS KIKO	1697	6689	960	20	154	305	0.78	-	-	-	14.72	0.67	32	-0.26	0.2	0.29	-	-	-	Released
SoSJV	DURUM	DURUM	2016-2018	SY FORTISSIMO	1429	6659	943	21	125	248	0.78	6529	332	12	14.96	0.66	26	-0.02	0.18	0.93	15.1	0.38	12	Released
SoSJV	DURUM	DURUM	2016-2018	APB ALBERTO	1813	6627	946	22	92	258	0.82	5913	370	27	15.28	0.66	18	0.3	0.17	0.15	15.65	0.35	3	Released
SoSJV	DURUM	DURUM	2016-2018	SHASTA	1869	6587	1009	23	53	430	0.92	6522	332	14	15.04	0.71	24	0.06	0.31	0.89	15.01	0.35	16	Released
SoSJV	DURUM	DURUM	2016-2018	DPG PLATINUM	1210	6522	1009	24	-13	430	0.98	6457	332	16	15.31	0.74	16	0.33	0.38	0.47	15.02	0.38	15	Released
SoSJV	DURUM	DURUM	2016-2018	WB HAVASU	1479	6490	960	25	-45	305	0.92	-	-	-	14.71	0.67	33	-0.27	0.2	0.28	-	-	-	Released
SoSJV	DURUM	DURUM	2016-2018	POWELL	1868	6443	1009	26	-92	430	0.88	6378	332	18	14.75	0.74	30	-0.23	0.38	0.62	14.81	0.38	20	Released
SoSJV	DURUM	DURUM	2016-2018	DPG CANDURA	1867	6423	1009	27	-112	430	0.86	6358	332	19	14.45	0.74	40	-0.53	0.38	0.26	14.5	0.38	24	Released
SoSJV	DURUM	DURUM	2016-2018	AS MAESTRALE	1582	6422	946	28	-113	258	0.81	6670	370	10	14.31	0.66	44	-0.67	0.18	0	13.98	0.38	28	Released
SoSJV	DURUM	DURUM	2016-2018	UC 15210 12	1825	6408	1009	29	-127	431	0.85	-	-	-	15.75	0.71	5	0.77	0.31	0.05	-	-	-	
SoSJV	DURUM	DURUM	2016-2018	APB 450333	1866	6381	1009	30	-154	430	0.82	6316	332	20	15.17	0.71	20	0.19	0.31	0.61	15.14	0.35	11	
SoSJV	DURUM	DURUM	2016-2018	UC 16051 12	1849	6364	1008	31	-171	431	0.82	-	-	-	15.53	0.69	10	0.55	0.27	0.1	-	-	-	
SoSJV	DURUM	DURUM	2016-2018	UC 15210 11	1824	6351	1009	32	-184	431	0.81	-	-	-	15.15	0.71	21	0.18	0.31	0.63	-	-	-	
SoSJV	DURUM	DURUM	2016-2018	WB ORITA	1215	6324	943	33	-211	248	0.58	6951	332	5	15.65	0.66	6	0.68	0.17	0	15.4	0.35	6	Released
SoSJV	DURUM	DURUM	2016-2018	UC 1871	1871	6192	1039	34	-343	493	0.65	6157	370	23	14.78	0.71	29	-0.2	0.31	0.61	14.75	0.35	22	
SoSJV	DURUM	DURUM	2016-2018	APB KRONOS	951	6132	943	35	-403	248	0.22	5213	332	30	14.72	0.66	31	-0.25	0.18	0.25	15.29	0.38	10	Released
SoSJV	DURUM	DURUM	2016-2018	UC 1873	1873	6127	1009	36	-408	430	0.53	6061	332	24	15.4	0.71	13	0.42	0.31	0.27	15.37	0.35	7	
SoSJV	DURUM	DURUM	2016-2018	AS SARAGOLLA	1583	6062	943	37	-473	248	0.14	6448	332	17	14.38	0.66	41	-0.59	0.16	0	13.62	0.35	30	Released
SoSJV	DURUM	DURUM	2016-2018	APB 450275	1865	6058	1009	38	-477	430	0.47	5993	332	26	15.37	0.71	15	0.4	0.31	0.29	15.35	0.35	8	
SoSJV	DURUM	DURUM	2016-2018	UC DESERT KING HP	1627	6055	943	39	-480	248	0.14	5559	332	29	16.07	0.66	2	1.09	0.17	0	15.73	0.35	2	Released
SoSJV	DURUM	DURUM	2016-2018	UC DESERT GOLD	1850	6047	960	40	-488	304	0.22	6051	332	25	15.14	0.67	22	0.17	0.2	0.5	14.79	0.35	21	Released
SoSJV	DURUM	DURUM	2016-2018	ASC 101	1855	5845	1008	41	-690	431	0.22	-	-	-	14.66	0.69	36	-0.31	0.27	0.34	-	-	-	
SoSJV	DURUM	DURUM	2016-2018	APB WESTMORE HP	1484	5812	943	42	-723	248	0.02	5795	332	28	15.45	0.66	11	0.47	0.17	0.02	15.51	0.35	5	Released
SoSJV	DURUM	DURUM	2016-2018	WB MEAD	1607	5760	943	43	-775	248	0.02	6316	332	21	15.8	0.66	4	0.82	0.18	0	15.31	0.38	9	Released
SoSJV	DURUM	DURUM	2016-2018	UC 16051 1	1848	5659	1038	44	-875	494	0.18	-	-	-	17.15	0.71	1	2.17	0.31	0	-	-	-	
SoSJV	DURUM	DURUM	2016-2018	AS COLOMBO	1800	5623	960	45	-912	304	0.02	6565	332	11	15.44	0.67	12	0.47	0.22	0.09	14.92	0.38	18	Released
SoSJV	DURUM	DURUM	2016-2018	APB 470442	1852	5621	1008	46	-914	431	0.1	-	-	-	15.38	0.69	14	0.4	0.27	0.25	-	-	-	
SoSJV	DURUM	DURUM	2016-2018	ASC 100	1854	5618	1008	47	-917	431	0.1	-	-	-	15.56	0.69	8	0.58	0.27	0.09	-	-	-	
SoSJV	DURUM	DURUM	2016-2018	LCS 12E4006	1832	5488	1009	48	-1047	431	0.06	-	-	-	15.54	0.71	9	0.56	0.31	0.14	-	-	-	
SoSJV	DURUM	DURUM	2016-2018	LCS 13SD0056	1833	5432	1009	49	-1103	431	0.04	-	-	-	15.29	0.71	17	0.31	0.31	0.42	-	-	-	
SoSJV	DURUM	DURUM	2016-2018	ASC 102	1856	5312	1008	50	-1223	431	0.03	-	-	-	15.06	0.69	23	0.09	0.27	0.8	-	-	-	
SoSJV	DURUM	DURUM	2016-2018	ASC 103	1857	5240	1008	51	-1295	431	0.02	-	-	-	15.83	0.69	3	0.85	0.27	0.01	-	-	-	

Table 22. Imperial Valley region, durum wheat yield and protein from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2018 Protein (%)	2018 St.Err.Protein (%)	2018 Protein Rank	Status
ImpV	DURUM	DURUM	2016-2018	UC 14215/9	1796	7820	410	1	972	289	0.01	-	-	-	12.88	0.63	24	0.13	0.16	0.47	-	-	-	
ImpV	DURUM	DURUM	2016-2018	LCS 12E4006	1832	7730	410	2	882	289	0.02	-	-	-	11.84	0.63	46	-0.91	0.16	0	-	-	-	
ImpV	DURUM	DURUM	2016-2018	SHASTA	1869	7707	410	3	859	288	0.02	8162	297	1	12.4	0.62	38	-0.35	0.14	0.02	13.44	0.13	23	Released
ImpV	DURUM	DURUM	2016-2018	APB 571217	1810	7483	410	4	635	289	0.11	-	-	-	12.67	0.63	31	-0.09	0.16	0.63	-	-	-	
ImpV	DURUM	DURUM	2016-2018	APB 470442	1852	7374	409	5	526	288	0.22	-	-	-	12.19	0.62	40	-0.56	0.14	0	-	-	-	
ImpV	DURUM	DURUM	2016-2018	APB 471400	1853	7334	353	6	486	204	0.08	8091	297	2	11.62	0.61	50	-1.13	0.1	0	12.37	0.13	30	
ImpV	DURUM	DURUM	2016-2018	ASC 101	1855	7330	409	7	482	288	0.27	-	-	-	11.73	0.62	48	-1.02	0.14	0	-	-	-	
ImpV	DURUM	DURUM	2016-2018	UC 1871	1871	7321	410	8	473	288	0.27	7776	297	3	12.94	0.62	22	0.19	0.14	0.24	13.97	0.13	14	
ImpV	DURUM	DURUM	2016-2018	DPG DURAKING	878	7297	410	9	449	288	0.28	7752	297	4	11.95	0.62	43	-0.8	0.14	0	12.99	0.13	28	Released
ImpV	DURUM	DURUM	2016-2018	POWELL	1868	7256	410	10	408	288	0.33	7711	297	6	13.21	0.62	12	0.46	0.14	0	14.25	0.13	9	Released
ImpV	DURUM	DURUM	2016-2018	LCS KIKO	1697	7213	353	11	365	204	0.22	-	-	-	11.7	0.61	49	-1.05	0.1	0	-	-	-	Released
ImpV	DURUM	DURUM	2016-2018	APB TIBURON	1640	7190	332	12	342	166	0.14	7631	297	7	12.73	0.61	28	-0.02	0.08	0.8	13.46	0.13	22	Released
ImpV	DURUM	DURUM	2016-2018	APB 540165	1827	7172	353	13	324	204	0.28	-	-	-	12.61	0.61	34	-0.14	0.1	0.24	-	-	-	
ImpV	DURUM	DURUM	2016-2018	UC MIWOK	1690	7115	312	14	267	122	0.11	7476	228	8	13.02	0.61	17	0.27	0.06	0	14.18	0.09	12	Released
ImpV	DURUM	DURUM	2016-2018	LCS 13SD0056	1833	7105	410	15	258	289	0.57	-	-	-	11.75	0.63	47	-1	0.16	0	-	-	-	
ImpV	DURUM	DURUM	2016-2018	UC 15210 24	1826	7103	410	16	255	289	0.57	-	-	-	12.64	0.63	33	-0.11	0.16	0.55	-	-	-	
ImpV	DURUM	DURUM	2016-2018	UC DESERT KING	1375	7041	332	17	193	166	0.48	7436	297	9	12.7	0.61	29	-0.05	0.08	0.58	13.83	0.13	16	Released
ImpV	DURUM	DURUM	2016-2018	WB ORITA	1215	7021	332	18	173	166	0.54	6998	297	24	13.29	0.61	9	0.54	0.08	0	14.89	0.13	2	Released
ImpV	DURUM	DURUM	2016-2018	APB 450311	1851	7018	353	19	170	204	0.59	7387	297	12	13.14	0.61	14	0.39	0.1	0	14.29	0.13	7	
ImpV	DURUM	DURUM	2016-2018	ASC 103	1857	7003	409	20	155	288	0.8	-	-	-	11.34	0.62	51	-1.41	0.14	0	-	-	-	
ImpV	DURUM	DURUM	2016-2018	APB ALBERTO	1813	7002	332	21	154	166	0.57	7241	297	19	13.05	0.61	16	0.3	0.08	0	14.21	0.13	11	Released
ImpV	DURUM	DURUM	2016-2018	WB MOHAVE	1654	6953	332	22	105	166	0.75	7294	297	17	13.43	0.61	6	0.68	0.08	0	14.53	0.13	4	Released
ImpV	DURUM	DURUM	2016-2018	APB 540505	1822	6950	410	23	102	289	0.9	-	-	-	12.86	0.63	25	0.11	0.16	0.55	-	-	-	
ImpV	DURUM	DURUM	2016-2018	UC 1873	1873	6932	410	24	84	288	0.91	7387	297	12	12.31	0.62	39	-0.44	0.14	0	13.35	0.13	24	
ImpV	DURUM	DURUM	2016-2018	APB KRONOS	951	6919	332	25	71	166	0.85	7725	297	5	12.91	0.61	23	0.16	0.08	0.08	13.76	0.13	17	Released
ImpV	DURUM	DURUM	2016-2018	ASC 102	1856	6883	409	26	35	288	0.96	-	-	-	12.73	0.62	26	-0.02	0.14	0.91	-	-	-	
ImpV	DURUM	DURUM	2016-2018	APB HELIOS	1440	6868	410	27	20	289	0.96	-	-	-	12.98	0.63	19	0.23	0.16	0.21	-	-	-	Released
ImpV	DURUM	DURUM	2016-2018	APB 450275	1865	6861	410	28	13	288	0.96	7316	297	16	13.2	0.62	13	0.45	0.14	0	14.23	0.13	10	
ImpV	DURUM	DURUM	2016-2018	SY VOLANTE	1431	6857	332	29	9	166	0.96	7156	297	21	11.9	0.61	44	-0.85	0.08	0	13.05	0.13	26	Released
ImpV	DURUM	DURUM	2016-2018	AS SARAGOLLA	1583	6816	332	30	-32	166	0.96	7423	297	10	11.86	0.61	45	-0.89	0.08	0	12.61	0.13	29	Released
ImpV	DURUM	DURUM	2016-2018	APB 571353	1812	6815	410	31	-33	289	0.96	-	-	-	12.45	0.63	36	-0.3	0.16	0.09	-	-	-	
ImpV	DURUM	DURUM	2016-2018	UC 15210 11	1824	6810	410	32	-37	289	0.96	-	-	-	12.96	0.63	21	0.2	0.16	0.26	-	-	-	
ImpV	DURUM	DURUM	2016-2018	APB 450333	1866	6788	410	33	-60	288	0.96	7243	297	18	13.39	0.62	7	0.64	0.14	0	14.42	0.13	6	
ImpV	DURUM	DURUM	2016-2018	APB WESTMORE HP	1484	6762	332	34	-86	166	0.8	7340	297	15	13.66	0.61	3	0.91	0.08	0	14.57	0.13	3	Released
ImpV	DURUM	DURUM	2016-2018	UC 15210 12	1825	6758	410	35	-90	289	0.91	-	-	-	13.12	0.63	15	0.37	0.16	0.03	-	-	-	
ImpV	DURUM	DURUM	2016-2018	UC 1870	1870	6702	410	36	-146	288	0.8	7157	297	20	12.01	0.62	42	-0.74	0.14	0	13.05	0.13	27	
ImpV	DURUM	DURUM	2016-2018	SY FORTISSIMO	1429	6696	332	37	-152	166	0.57	7350	297	14	12.73	0.61	27	-0.02	0.08	0.8	13.83	0.13	15	Released
ImpV	DURUM	DURUM	2016-2018	UC DESERT GOLD	1850	6644	353	38	-204	204	0.55	7400	297	11	12.67	0.61	30	-0.08	0.1	0.47	13.56	0.13	19	Released
ImpV	DURUM	DURUM	2016-2018	WB MEAD	1607	6610	332	39	-238	166	0.33	7123	297	22	13.34	0.61	8	0.59	0.08	0	14.48	0.13	5	Released
ImpV	DURUM	DURUM	2016-2018	UC 1872	1872	6562	410	40	-286	288	0.55	7017	297	23	12.98	0.62	20	0.23	0.14	0.15	14.01	0.13	13	
ImpV	DURUM	DURUM	2016-2018	APB 410077	1823	6545	410	41	-303	289	0.54	-	-	-	12.98	0.63	18	0.23	0.16	0.21	-	-	-	
ImpV	DURUM	DURUM	2016-2018	DPG TOPPER	1211	6469	410	42	-379	288	0.39	6924	297	25	12.02	0.62	41	-0.73	0.14	0	13.05	0.13	25	Released
ImpV	DURUM	DURUM	2016-2018	DPG PLATINUM	1210	6395	410	43	-453	288	0.28	6850	297	26	12.58	0.62	35	-0.17	0.14	0.27	13.61	0.13	18	Released
ImpV	DURUM	DURUM	2016-2018	UC DESERT KING HP	1627	6264	332	44	-584	166	0.01	6743	297	27	13.98	0.61	2	1.23	0.08	0	15.08	0.13	1	Released
ImpV	DURUM	DURUM	2016-2018	WB HAVASU	1479	6246	353	45	-602	204	0.02	-	-	-	13.25	0.61	10	0.5	0.1	0	-	-	-	Released
ImpV	DURUM	DURUM	2016-2018	DPG CANDURA	1867	6183	410	46	-665	288	0.09	6638	297	28	12.43	0.62	37	-0.32	0.14	0.04	13.47	0.13	21	Released
ImpV	DURUM	DURUM	2016-2018	AS MAESTRALE	1582	6176	346	47	-671	191	0.01	6590	297	29	12.66	0.61	32	-0.09	0.09	0.42	13.54	0.13	20	Released
ImpV	DURUM	DURUM	2016-2018	UC 16051 12	1849	6054	409	48	-794	288	0.03	-	-	-	13.53	0.62	5	0.78	0.14	0	-	-	-	
ImpV	DURUM	DURUM	2016-2018	ASC 100	1854	5916	409	49	-932	288	0.01	-	-	-	13.24	0.62	11	0.49	0.14	0	-	-	-	
ImpV	DURUM	DURUM	2016-2018	UC 16051 1	1848	5836	409	50	-1012	288	0.01	-	-	-	15.18	0.62	1	2.43	0.14	0	-	-	-	
ImpV	DURUM	DURUM	2016-2018	AS COLOMBO	1800	5338	372	51	-1510	234	0	5871	372	30	13.55	0.61	4	0.8	0.1	0	14.27	0.13	8	Released

Triticale performance tables

Table 23. Sacramento Valley region, triticale yield from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	Status
SacV	TRITICALE	TRITICALE	2016-2018	NS GOLD RUSH 91	3178	7298	568	1	1186	169	0	-	-	-	
SacV	TRITICALE	TRITICALE	2016-2018	UC 3184	3184	7286	588	2	1175	221	0	7282	1088	1	
SacV	TRITICALE	TRITICALE	2016-2018	UC 3185	3185	6995	579	3	883	199	0	6992	1083	2	
SacV	TRITICALE	TRITICALE	2016-2018	NS TRICAL 158EP	3169	6561	555	4	449	126	0	6614	1086	3	
SacV	TRITICALE	TRITICALE	2016-2018	WB PACHECO	3164	6543	555	5	432	122	0	6463	1083	4	Released
SacV	TRITICALE	TRITICALE	2016-2018	AGS 133	3182	6323	591	6	212	226	0.4	-	-	-	
SacV	TRITICALE	TRITICALE	2016-2018	NS TRICAL 115T	3170	6266	556	7	154	127	0.28	6428	1086	5	
SacV	TRITICALE	TRITICALE	2016-2018	NS CAMELOT	3168	6184	555	8	72	125	0.56	5900	1085	7	Released
SacV	TRITICALE	TRITICALE	2016-2018	UC 3183	3183	5941	584	9	-171	211	0.45	5961	1086	6	
SacV	TRITICALE	TRITICALE	2016-2018	XB T401	3186	5804	580	10	-307	203	0.18	5805	1083	9	
SacV	TRITICALE	TRITICALE	2016-2018	NS TRICAL 105	3097	5754	555	11	-358	124	0.01	5844	1084	8	Released
SacV	TRITICALE	TRITICALE	2016-2018	NS 12T01486	3180	5660	596	12	-452	238	0.09	-	-	-	
SacV	TRITICALE	TRITICALE	2016-2018	AGS 230	3181	5372	591	13	-740	226	0	-	-	-	
SacV	TRITICALE	TRITICALE	2016-2018	PRL 011TS 429	3177	5185	586	14	-926	218	0	-	-	-	
SacV	TRITICALE	TRITICALE	2016-2018	NS 10T70126	3179	4503	584	15	-1609	210	0	-	-	-	

Table 24. North Central San Joaquin Valley region, triticale yield from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	Status
NCenSJV	TRITICALE	TRITICALE	2016-2018	UC 3184	3184	7765	764	1	1256	224	0	7921	867	1	
NCenSJV	TRITICALE	TRITICALE	2016-2018	NS GOLD RUSH 91	3178	7383	744	2	875	154	0	-	-	-	
NCenSJV	TRITICALE	TRITICALE	2016-2018	UC 3185	3185	7304	755	3	796	195	0	7480	855	2	
NCenSJV	TRITICALE	TRITICALE	2016-2018	NS TRICAL 115T	3170	6773	737	4	264	120	0.08	6891	855	3	
NCenSJV	TRITICALE	TRITICALE	2016-2018	NS 12T01486	3180	6735	753	5	227	189	0.4	-	-	-	
NCenSJV	TRITICALE	TRITICALE	2016-2018	AGS 133	3182	6731	753	6	223	189	0.4	-	-	-	
NCenSJV	TRITICALE	TRITICALE	2016-2018	NS TRICAL 158EP	3169	6636	737	7	128	122	0.41	6878	858	4	
NCenSJV	TRITICALE	TRITICALE	2016-2018	WB PACHECO	3164	6554	737	8	46	120	0.76	6844	855	5	Released
NCenSJV	TRITICALE	TRITICALE	2016-2018	NS TRICAL 105	3097	6482	737	9	-27	122	0.83	6237	858	9	Released
NCenSJV	TRITICALE	TRITICALE	2016-2018	AGS 230	3181	6432	753	10	-76	189	0.76	-	-	-	
NCenSJV	TRITICALE	TRITICALE	2016-2018	UC 3183	3183	6354	761	11	-154	216	0.59	6548	863	7	
NCenSJV	TRITICALE	TRITICALE	2016-2018	NS CAMELOT	3168	6349	737	12	-160	121	0.4	6762	858	6	Released
NCenSJV	TRITICALE	TRITICALE	2016-2018	PRL 011TS 429	3177	6233	778	13	-276	264	0.41	-	-	-	
NCenSJV	TRITICALE	TRITICALE	2016-2018	XB T401	3186	6089	755	14	-420	195	0.08	6264	855	8	
NCenSJV	TRITICALE	TRITICALE	2016-2018	NS 10T70126	3179	3807	806	15	-2701	328	0	-	-	-	

Table 25. South San Joaquin Valley region, triticale yield from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	Status
SoSJV	TRITICALE	TRITICALE	2016-2018	UC 3184	3184	6776	1506	1	1450	410	0	8653	449	1	
SoSJV	TRITICALE	TRITICALE	2016-2018	NS GOLD RUSH 91	3178	6379	1453	2	1053	195	0	-	-	-	
SoSJV	TRITICALE	TRITICALE	2016-2018	WB PACHECO	3164	6355	1451	3	1029	177	0	8481	449	2	Released
SoSJV	TRITICALE	TRITICALE	2016-2018	NS 12T01486	3180	6321	1466	4	995	265	0	-	-	-	
SoSJV	TRITICALE	TRITICALE	2016-2018	UC 3185	3185	5660	1492	5	334	363	0.48	7537	414	4	
SoSJV	TRITICALE	TRITICALE	2016-2018	NS TRICAL 115T	3170	5650	1451	6	324	172	0.13	7681	414	3	
SoSJV	TRITICALE	TRITICALE	2016-2018	AGS 230	3181	5588	1466	7	261	265	0.48	-	-	-	
SoSJV	TRITICALE	TRITICALE	2016-2018	NS TRICAL 158EP	3169	5477	1451	8	150	172	0.48	7355	414	6	
SoSJV	TRITICALE	TRITICALE	2016-2018	NS CAMELOT	3168	5424	1451	9	98	172	0.66	7494	414	5	Released
SoSJV	TRITICALE	TRITICALE	2016-2018	NS TRICAL 105	3097	5338	1451	10	12	172	0.95	6703	414	7	Released
SoSJV	TRITICALE	TRITICALE	2016-2018	AGS 133	3182	5261	1466	11	-66	265	0.86	-	-	-	
SoSJV	TRITICALE	TRITICALE	2016-2018	PRL 011TS 429	3177	4888	1466	12	-439	268	0.17	-	-	-	
SoSJV	TRITICALE	TRITICALE	2016-2018	XB T401	3186	4730	1492	13	-596	363	0.17	6607	414	8	
SoSJV	TRITICALE	TRITICALE	2016-2018	UC 3183	3183	4361	1534	14	-965	491	0.13	6238	512	9	
SoSJV	TRITICALE	TRITICALE	2016-2018	NS 10T70126	3179	1689	1613	15	-3638	681	0	-	-	-	

Table 26. Imperial Valley region, triticale yield from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	Status
ImpV	TRITICALE	TRITICALE	2016-2018	UC 3184	3184	7196	375	1	613	290	0.18	7162	511	2	
ImpV	TRITICALE	TRITICALE	2016-2018	WB PACHECO	3164	6988	274	2	405	169	0.18	6465	511	4	Released
ImpV	TRITICALE	TRITICALE	2016-2018	NS GOLD RUSH 91	3178	6895	303	3	312	210	0.33	-	-	-	
ImpV	TRITICALE	TRITICALE	2016-2018	UC 3185	3185	6866	375	4	283	290	0.52	6831	511	3	
ImpV	TRITICALE	TRITICALE	2016-2018	NS TRICAL 158EP	3169	6670	274	5	87	169	0.79	7350	511	1	
ImpV	TRITICALE	TRITICALE	2016-2018	NS TRICAL 105	3097	6668	274	6	84	169	0.79	6251	511	8	Released
ImpV	TRITICALE	TRITICALE	2016-2018	AGS 230	3181	6664	374	7	81	290	0.84	-	-	-	
ImpV	TRITICALE	TRITICALE	2016-2018	NS 12T01486	3180	6637	374	8	54	290	0.85	-	-	-	
ImpV	TRITICALE	TRITICALE	2016-2018	UC 3183	3183	6462	375	9	-122	290	0.79	6427	511	5	
ImpV	TRITICALE	TRITICALE	2016-2018	XB T401	3186	6300	375	10	-283	290	0.52	6266	511	7	
ImpV	TRITICALE	TRITICALE	2016-2018	PRL 011TS 429	3177	6288	374	11	-296	296	0.52	-	-	-	
ImpV	TRITICALE	TRITICALE	2016-2018	NS TRICAL 115T	3170	6281	274	12	-303	169	0.21	6241	511	9	
ImpV	TRITICALE	TRITICALE	2016-2018	NS CAMELOT	3168	6229	274	13	-354	169	0.18	6337	511	6	Released
ImpV	TRITICALE	TRITICALE	2016-2018	AGS 133	3182	6021	374	14	-562	290	0.2	-	-	-	

Table 27. Rainfed trials, triticale yield from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	Status
Rainfed	TRITICALE	TRITICALE	2016-2018	NS GOLD RUSH 91	3178	6305	853	1	977	224	0	-	-	-	
Rainfed	TRITICALE	TRITICALE	2016-2018	UC 3184	3184	6289	866	2	961	266	0	7003	1464	1	
Rainfed	TRITICALE	TRITICALE	2016-2018	UC 3185	3185	6106	857	3	778	242	0.01	6827	1458	2	
Rainfed	TRITICALE	TRITICALE	2016-2018	WB PACHECO	3164	5638	835	4	309	154	0.08	6553	1458	3	Released
Rainfed	TRITICALE	TRITICALE	2016-2018	NS TRICAL 158EP	3169	5546	836	5	217	161	0.27	6345	1465	4	
Rainfed	TRITICALE	TRITICALE	2016-2018	NS CAMELOT	3168	5430	836	6	102	159	0.56	5626	1463	7	Released
Rainfed	TRITICALE	TRITICALE	2016-2018	NS TRICAL 115T	3170	5417	836	7	89	161	0.58	6275	1466	5	
Rainfed	TRITICALE	TRITICALE	2016-2018	NS 12T01486	3180	5159	862	8	-170	253	0.56	-	-	-	
Rainfed	TRITICALE	TRITICALE	2016-2018	AGS 133	3182	5142	862	9	-186	253	0.56	-	-	-	
Rainfed	TRITICALE	TRITICALE	2016-2018	NS TRICAL 105	3097	4971	836	10	-357	157	0.07	5691	1461	6	Released
Rainfed	TRITICALE	TRITICALE	2016-2018	NS 10T70126	3179	4968	893	11	-361	331	0.38	-	-	-	
Rainfed	TRITICALE	TRITICALE	2016-2018	XB T401	3186	4883	859	12	-445	249	0.12	5608	1459	8	
Rainfed	TRITICALE	TRITICALE	2016-2018	UC 3183	3183	4794	866	13	-534	265	0.08	5553	1464	9	
Rainfed	TRITICALE	TRITICALE	2016-2018	AGS 230	3181	4692	862	14	-637	253	0.05	-	-	-	
Rainfed	TRITICALE	TRITICALE	2016-2018	PRL 011TS 429	3177	4586	894	15	-742	336	0.07	-	-	-	

Barley performance tables

Table 28. Sacramento Valley region, barley yield from the 2015-16 to 2017-18 trials.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	Status
SacV	BARLEY	6RSF	2016-2018	UC UYP 210A	1351	5204	688	1	943	251	0	-	-	-	
SacV	BARLEY		2016-2018	UC UOP 102	1405	5102	688	2	841	251	0	-	-	-	
SacV	BARLEY		2016-2018	UC UOP 96	1400	5060	693	3	799	262	0.01	-	-	-	
SacV	BARLEY		2016-2018	UC UYP 210B	1383	5028	688	4	767	251	0.01	-	-	-	
SacV	BARLEY		2016-2018	UC 08YP 111 1231 LATE	1385	4898	688	5	637	251	0.03	-	-	-	
SacV	BARLEY	6RSF	2016-2018	ISHI	1047	4865	651	6	604	135	0	4603	1306	1	Released
SacV	BARLEY		2016-2018	UC UOP 98	1402	4836	688	7	575	251	0.05	-	-	-	
SacV	BARLEY	6RSF	2016-2018	UC B398	1256	4832	688	8	571	251	0.05	-	-	-	
SacV	BARLEY		2016-2018	UC UOP 97	1401	4810	693	9	549	262	0.07	-	-	-	
SacV	BARLEY		2016-2018	UC UYP 3B	1379	4766	688	10	505	251	0.08	-	-	-	
SacV	BARLEY	2RSM	2016-2018	UC UOP 95	1399	4736	688	11	475	251	0.1	-	-	-	
SacV	BARLEY	6RSN	2016-2018	UC 1266	1266	4633	693	12	372	262	0.24	-	-	-	
SacV	BARLEY	6RSF	2016-2018	UC 1280	1280	4604	688	13	343	251	0.26	-	-	-	
SacV	BARLEY		2016-2018	UC UOP 99	1403	4550	698	14	289	275	0.41	-	-	-	
SacV	BARLEY	6RSF	2016-2018	UC 933	933	4521	650	15	259	130	0.08	4386	1305	2	Released
SacV	BARLEY	6RSF	2016-2018	UC A237	1261	4494	693	16	233	262	0.51	-	-	-	
SacV	BARLEY	6RSF	2016-2018	UC B369	1255	4461	688	17	200	251	0.53	-	-	-	
SacV	BARLEY		2016-2018	UC UOP 100	1404	4413	688	18	152	251	0.64	-	-	-	
SacV	BARLEY	6RSF	2016-2018	UC 969	969	4360	647	19	99	118	0.51	4253	1303	4	Released
SacV	BARLEY	6RSN	2016-2018	UC 937	937	4352	661	20	91	177	0.69	4330	1306	3	
SacV	BARLEY	6RSN	2016-2018	UC 1263	1263	4313	693	21	52	262	0.91	-	-	-	
SacV	BARLEY	2RSM	2016-2018	UC UOP 111	1408	4295	693	22	34	262	0.94	-	-	-	
SacV	BARLEY	6RSN	2016-2018	UC 1317	1317	4279	698	23	18	275	0.95	-	-	-	
SacV	BARLEY	2RSM	2016-2018	LCS ODYSSEY	1415	4274	656	24	13	160	0.95	3903	1306	6	
SacV	BARLEY		2016-2018	UC UOP 105	1406	4146	688	25	-115	251	0.71	-	-	-	
SacV	BARLEY	2RSM	2016-2018	ACC SYNERGY	1859	4096	665	26	-165	191	0.51	3839	1307	7	Released
SacV	BARLEY	6RSF	2016-2018	UC71 183 1	162	4068	693	27	-193	262	0.55	-	-	-	
SacV	BARLEY	2RSM	2016-2018	UC MP179	1410	4048	669	28	-213	202	0.41	-	-	-	
SacV	BARLEY	6RSN	2016-2018	TAMALPAIS	1134	3925	649	29	-336	128	0.03	3698	1304	10	Released
SacV	BARLEY	6RSF	2016-2018	UC 603	603	3921	652	30	-341	139	0.04	3940	1307	5	Released
SacV	BARLEY	6RSN	2016-2018	UC 960	960	3889	661	31	-373	177	0.07	3757	1306	8	
SacV	BARLEY	6RSN	2016-2018	UC 1318	1318	3807	688	32	-454	251	0.12	-	-	-	
SacV	BARLEY	2RSM	2016-2018	B9K94	1861	3806	658	33	-455	168	0.02	3474	1305	15	
SacV	BARLEY	6RSF-H	2016-2018	SCHALLER	1413	3799	688	34	-462	251	0.11	-	-	-	Released
SacV	BARLEY	2RSM	2016-2018	LCS GENIE	1414	3798	646	35	-464	117	0	3615	1301	14	
SacV	BARLEY	2RSM	2016-2018	UC 1390	1390	3733	651	36	-528	137	0	3686	1306	11	
SacV	BARLEY	2RSM	2016-2018	UC TAHOE	1409	3706	652	37	-556	140	0	3726	1307	9	Released
SacV	BARLEY	2RSM	2016-2018	UC BUTTA 12 96	1360	3598	649	38	-663	129	0	3623	1305	13	
SacV	BARLEY	2RSM	2016-2018	OSU FULL PINT	1411	3589	658	39	-672	163	0	3642	1309	12	Released
SacV	BARLEY	2RSM	2016-2018	CDC COPELAND	1858	3331	655	40	-930	155	0	3205	1303	16	Released
SacV	BARLEY	6RSF	2016-2018	MAX	816	3325	671	41	-936	208	0	-	-	-	
SacV	BARLEY	2RSM	2016-2018	KLAGES	1860	2698	665	42	-1564	189	0	2687	1307	17	Released

Table 29. North Central San Joaquin Valley region, barley yield from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	Status
NCenSJV	BARLEY	6RSF	2016-2018	UC B369	1255	7396	549	1	2013	401	0	-	-	-	
NCenSJV	BARLEY		2016-2018	UC 08YP 111 1231 LATE	1385	7328	549	2	1945	401	0	-	-	-	
NCenSJV	BARLEY		2016-2018	UC UOP 102	1405	6787	549	3	1404	401	0	-	-	-	
NCenSJV	BARLEY	6RSF	2016-2018	UC A237	1261	6710	549	4	1327	401	0	-	-	-	
NCenSJV	BARLEY	6RSF	2016-2018	UC B398	1256	6514	549	5	1131	401	0.01	-	-	-	
NCenSJV	BARLEY	6RSF	2016-2018	UC UYP 210A	1351	6388	549	6	1006	401	0.03	-	-	-	
NCenSJV	BARLEY		2016-2018	UC UOP 98	1402	6308	549	7	925	401	0.05	-	-	-	
NCenSJV	BARLEY	6RSN	2016-2018	UC 1263	1263	6046	549	8	663	401	0.19	-	-	-	
NCenSJV	BARLEY	6RSF	2016-2018	UC 969	969	5952	388	9	569	158	0	6273	227	1	Released
NCenSJV	BARLEY		2016-2018	UC UYP 210B	1383	5941	549	10	559	401	0.3	-	-	-	
NCenSJV	BARLEY	6RSN	2016-2018	TAMALPAIS	1134	5815	398	11	432	180	0.04	6170	251	2	Released
NCenSJV	BARLEY		2016-2018	UC UOP 100	1404	5814	549	12	431	401	0.49	-	-	-	
NCenSJV	BARLEY		2016-2018	UC UOP 105	1406	5797	549	13	414	401	0.49	-	-	-	
NCenSJV	BARLEY	6RSF	2016-2018	UC 603	603	5725	404	14	342	192	0.15	6084	269	3	Released
NCenSJV	BARLEY		2016-2018	UC UOP 97	1401	5681	549	15	298	401	0.65	-	-	-	
NCenSJV	BARLEY	6RSF	2016-2018	UC 1280	1280	5518	549	16	135	401	0.88	-	-	-	
NCenSJV	BARLEY	6RSN	2016-2018	UC 1318	1318	5492	549	17	110	401	0.89	-	-	-	
NCenSJV	BARLEY	6RSF	2016-2018	ISHI	1047	5485	398	18	103	180	0.77	5169	251	7	Released
NCenSJV	BARLEY	2RSM	2016-2018	OSU FULL PINT	1411	5484	406	19	102	194	0.79	5704	251	5	Released
NCenSJV	BARLEY		2016-2018	UC UOP 96	1400	5456	549	20	73	401	0.92	-	-	-	
NCenSJV	BARLEY	2RSM	2016-2018	UC MP179	1410	5456	461	21	73	289	0.89	-	-	-	
NCenSJV	BARLEY	6RSN	2016-2018	UC 1317	1317	5443	549	22	61	401	0.92	-	-	-	
NCenSJV	BARLEY	2RSM	2016-2018	UC 1390	1390	5408	402	23	25	190	0.92	6041	251	4	
NCenSJV	BARLEY	2RSM	2016-2018	UC UOP 111	1408	5386	549	24	3	401	0.99	-	-	-	
NCenSJV	BARLEY		2016-2018	UC UOP 99	1403	5282	549	25	-101	401	0.89	-	-	-	
NCenSJV	BARLEY	6RSF	2016-2018	MAX	816	5247	461	26	-136	289	0.79	-	-	-	
NCenSJV	BARLEY	2RSM	2016-2018	LCS ODYSSEY	1415	5192	420	27	-190	227	0.6	5121	269	8	
NCenSJV	BARLEY		2016-2018	UC UYP 3B	1379	5191	549	28	-191	401	0.79	-	-	-	
NCenSJV	BARLEY	6RSF	2016-2018	UC 933	933	5183	404	29	-200	192	0.49	5191	269	6	Released
NCenSJV	BARLEY	6RSN	2016-2018	UC 1266	1266	5090	549	30	-292	401	0.65	-	-	-	
NCenSJV	BARLEY	2RSM	2016-2018	UC UOP 95	1399	4994	549	31	-388	401	0.52	-	-	-	
NCenSJV	BARLEY	2RSM	2016-2018	UC TAHOE	1409	4703	404	32	-680	192	0	4742	269	10	Released
NCenSJV	BARLEY	2RSM	2016-2018	B9K94	1861	4686	436	33	-697	251	0.01	4904	269	9	
NCenSJV	BARLEY	2RSM	2016-2018	UC BUTTA 12 96	1360	4581	413	34	-802	210	0	4484	302	13	
NCenSJV	BARLEY	2RSM	2016-2018	LCS GENIE	1414	4553	386	35	-830	157	0	4668	217	11	
NCenSJV	BARLEY	6RSF	2016-2018	UC71 183 1	162	4411	549	36	-972	401	0.04	-	-	-	
NCenSJV	BARLEY	6RSN	2016-2018	UC 937	937	4381	420	37	-1002	223	0	4558	251	12	
NCenSJV	BARLEY	2RSM	2016-2018	ACC SYNERGY	1859	4236	420	38	-1146	223	0	4413	251	14	Released
NCenSJV	BARLEY	6RSF-H	2016-2018	SCHALLER	1413	4008	549	39	-1375	401	0	-	-	-	Released
NCenSJV	BARLEY	6RSN	2016-2018	UC 960	960	3984	420	40	-1399	223	0	4161	251	15	
NCenSJV	BARLEY	2RSM	2016-2018	CDC COPELAND	1858	3653	436	41	-1730	251	0	3714	269	16	Released
NCenSJV	BARLEY	2RSM	2016-2018	KLAGES	1860	3369	420	42	-2014	223	0	3546	251	17	Released

Table 30. South San Joaquin Valley region, barley yield from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	Status
SoSJV	BARLEY		2016-2017	UC UOP 98	1402	3864	542	1	1175	425	0.11	-	-	-	
SoSJV	BARLEY	2RSM	2016-2017	LCS GENIE	1414	3531	704	2	842	624	0.64	3560	308	2	
SoSJV	BARLEY		2016-2017	UC UOP 100	1404	3495	542	3	806	425	0.51	-	-	-	
SoSJV	BARLEY	6RSF	2016-2017	UC B398	1256	3423	542	4	734	425	0.51	-	-	-	
SoSJV	BARLEY	6RSF	2016-2017	UC 1280	1280	3299	542	5	611	425	0.64	-	-	-	
SoSJV	BARLEY		2016-2017	UC UOP 105	1406	3262	542	6	574	425	0.64	-	-	-	
SoSJV	BARLEY	2RSM	2016-2017	UC 1390	1390	3189	476	7	500	351	0.64	3739	308	1	
SoSJV	BARLEY	2RSM	2016-2017	LCS ODYSSEY	1415	3027	704	8	339	624	0.9	3057	308	3	
SoSJV	BARLEY	6RSF	2016-2017	UC A237	1261	2986	542	9	297	425	0.87	-	-	-	
SoSJV	BARLEY	6RSN	2016-2017	UC 1318	1318	2975	542	10	286	425	0.87	-	-	-	
SoSJV	BARLEY		2016-2017	UC UYP 210B	1383	2968	542	11	279	425	0.87	-	-	-	
SoSJV	BARLEY		2016-2017	UC UYP 3B	1379	2956	542	12	268	425	0.87	-	-	-	
SoSJV	BARLEY	2RSM	2016-2017	UC MP179	1410	2847	488	13	159	366	0.95	3055	308	4	
SoSJV	BARLEY		2016-2017	UC 08YP 111 1231 LATE	1385	2825	542	14	136	425	0.95	-	-	-	
SoSJV	BARLEY	2RSM	2016-2017	UC UOP 111	1408	2740	542	15	52	425	0.95	-	-	-	
SoSJV	BARLEY	6RSF	2016-2017	UC 603	603	2722	476	16	33	351	0.95	2413	308	9	Released
SoSJV	BARLEY	2RSM	2016-2017	UC UOP 95	1399	2671	542	17	-18	425	0.97	-	-	-	
SoSJV	BARLEY	6RSF	2016-2017	UC 969	969	2641	488	18	-48	366	0.95	1910	308	12	Released
SoSJV	BARLEY		2016-2017	UC UOP 99	1403	2625	542	19	-63	425	0.95	-	-	-	
SoSJV	BARLEY	2RSM	2016-2017	UC BUTTA 12 96	1360	2615	476	20	-74	351	0.95	3015	308	5	
SoSJV	BARLEY	6RSN	2016-2017	UC 1263	1263	2586	542	21	-102	425	0.95	-	-	-	
SoSJV	BARLEY	6RSF	2016-2017	UC 933	933	2578	488	22	-111	366	0.95	2562	308	8	Released
SoSJV	BARLEY	6RSN	2016-2017	UC 1266	1266	2542	542	23	-147	425	0.95	-	-	-	
SoSJV	BARLEY		2016-2017	UC UOP 96	1400	2540	542	24	-148	425	0.95	-	-	-	
SoSJV	BARLEY	2RSM	2016-2017	UC TAHOE	1409	2469	476	25	-219	351	0.87	2995	308	6	Released
SoSJV	BARLEY	6RSF	2016-2017	UC B369	1255	2465	542	26	-224	425	0.9	-	-	-	
SoSJV	BARLEY	6RSN	2016-2017	TAMALPAIS	1134	2458	476	27	-231	351	0.87	1998	308	11	Released
SoSJV	BARLEY	6RSF	2016-2017	ISHI	1047	2445	488	28	-244	366	0.87	2600	308	7	Released
SoSJV	BARLEY	2RSM	2016-2017	OSU FULL PINT	1411	2382	542	29	-307	425	0.87	-	-	-	Released
SoSJV	BARLEY		2016-2017	UC UOP 102	1405	2365	542	30	-324	425	0.87	-	-	-	
SoSJV	BARLEY	6RSN	2016-2017	UC 1317	1317	2239	542	31	-450	425	0.81	-	-	-	
SoSJV	BARLEY		2016-2017	UC UOP 97	1401	2229	542	32	-459	425	0.81	-	-	-	
SoSJV	BARLEY	6RSF-H	2016-2017	SCHALLER	1413	2220	542	33	-469	425	0.81	-	-	-	Released
SoSJV	BARLEY	6RSF	2016-2017	MAX	816	2028	488	34	-661	366	0.51	2039	308	10	
SoSJV	BARLEY	6RSF	2016-2017	UC UYP 210A	1351	1847	542	35	-841	425	0.51	-	-	-	
SoSJV	BARLEY	6RSF	2016-2017	UC71 183 1	162	737	696	36	-1951	600	0.05	-	-	-	

Table 31. Rainfed trials, barley yield from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	Status
Rainfed	BARLEY		2016-2018	UC UOP 98	1402	4246	690	1	858	212	0	-	-	-	
Rainfed	BARLEY	6RSF	2016-2018	ISHI	1047	4109	665	2	721	126	0	3659	399	1	Released
Rainfed	BARLEY	6RSF	2016-2018	UC 1280	1280	3959	690	3	570	212	0.02	-	-	-	
Rainfed	BARLEY		2016-2018	UC UOP 100	1404	3949	690	4	560	212	0.02	-	-	-	
Rainfed	BARLEY		2016-2018	UC UYP 210B	1383	3934	690	5	546	212	0.03	-	-	-	
Rainfed	BARLEY	6RSF	2016-2018	UC 933	933	3905	664	6	517	117	0	3467	397	2	Released
Rainfed	BARLEY	2RSM	2016-2018	B9K94	1861	3895	670	7	507	148	0	2982	396	3	
Rainfed	BARLEY	6RSF	2016-2018	UC B398	1256	3849	690	8	461	212	0.07	-	-	-	
Rainfed	BARLEY		2016-2018	UC UYP 3B	1379	3714	690	9	326	212	0.27	-	-	-	
Rainfed	BARLEY		2016-2018	UC UOP 105	1406	3709	690	10	321	212	0.27	-	-	-	
Rainfed	BARLEY		2016-2018	UC 08YP 111 1231 LATE	1385	3634	690	11	246	212	0.43	-	-	-	
Rainfed	BARLEY	6RSN	2016-2018	UC 1266	1266	3625	692	12	237	219	0.47	-	-	-	
Rainfed	BARLEY	6RSF	2016-2018	UC A237	1261	3609	692	13	220	219	0.51	-	-	-	
Rainfed	BARLEY	2RSM	2016-2018	UC UOP 95	1399	3594	690	14	206	212	0.52	-	-	-	
Rainfed	BARLEY		2016-2018	UC UOP 96	1400	3572	692	15	184	219	0.55	-	-	-	
Rainfed	BARLEY		2016-2018	UC UOP 99	1403	3571	692	16	183	219	0.55	-	-	-	
Rainfed	BARLEY		2016-2018	UC UOP 102	1405	3547	690	17	159	212	0.6	-	-	-	
Rainfed	BARLEY	2RSM	2016-2018	LCS ODYSSEY	1415	3519	668	18	130	141	0.53	2510	397	7	
Rainfed	BARLEY	2RSM	2016-2018	ACC SYNERGY	1859	3447	670	19	59	147	0.81	2707	396	4	Released
Rainfed	BARLEY	6RSF	2016-2018	UC 969	969	3437	663	20	49	113	0.8	2674	396	6	Released
Rainfed	BARLEY	2RSM	2016-2018	UC MP179	1410	3384	675	21	-4	169	0.98	-	-	-	
Rainfed	BARLEY	2RSM	2016-2018	UC UOP 111	1408	3372	692	22	-17	219	0.96	-	-	-	
Rainfed	BARLEY	6RSN	2016-2018	UC 1263	1263	3361	692	23	-28	219	0.94	-	-	-	
Rainfed	BARLEY		2016-2018	UC UOP 97	1401	3356	690	24	-32	212	0.94	-	-	-	
Rainfed	BARLEY	2RSM	2016-2018	LCS GENIE	1414	3348	663	25	-41	120	0.83	2352	394	11	
Rainfed	BARLEY	6RSF	2016-2018	UC B369	1255	3341	690	26	-47	212	0.91	-	-	-	
Rainfed	BARLEY	2RSM	2016-2018	UC 1390	1390	3283	664	27	-105	119	0.54	2364	397	9	
Rainfed	BARLEY	6RSN	2016-2018	UC 960	960	3270	679	28	-118	183	0.64	2463	399	8	
Rainfed	BARLEY	2RSM	2016-2018	UC BUTTA 12 96	1360	3255	662	29	-133	110	0.41	2706	396	5	
Rainfed	BARLEY	6RSN	2016-2018	UC 1318	1318	3239	690	30	-149	212	0.61	-	-	-	
Rainfed	BARLEY	6RSF	2016-2018	UC UYP 210A	1351	3121	690	31	-268	212	0.4	-	-	-	
Rainfed	BARLEY	6RSN	2016-2018	UC 1317	1317	3097	692	32	-291	219	0.37	-	-	-	
Rainfed	BARLEY	2RSM	2016-2018	CDC COPELAND	1858	3017	666	33	-372	131	0.02	2239	394	14	Released
Rainfed	BARLEY	6RSF	2016-2018	UC 603	603	2954	667	34	-434	132	0	2243	402	13	Released
Rainfed	BARLEY	6RSF-H	2016-2018	SCHALLER	1413	2919	690	35	-469	212	0.07	-	-	-	Released
Rainfed	BARLEY	6RSN	2016-2018	UC 937	937	2887	679	36	-501	183	0.02	2360	399	10	
Rainfed	BARLEY	2RSM	2016-2018	UC TAHOE	1409	2877	667	37	-511	134	0	1478	404	17	Released
Rainfed	BARLEY	2RSM	2016-2018	OSU FULL PINT	1411	2777	679	38	-611	180	0	2326	413	12	Released
Rainfed	BARLEY	6RSN	2016-2018	TAMALPAIS	1134	2697	663	39	-692	111	0	1590	396	16	Released
Rainfed	BARLEY	6RSF	2016-2018	UC71 183 1	162	2672	701	40	-716	245	0.01	-	-	-	
Rainfed	BARLEY	6RSF	2016-2018	MAX	816	2646	676	41	-742	172	0	-	-	-	
Rainfed	BARLEY	2RSM	2016-2018	KLAGES	1860	2611	679	42	-777	183	0	2084	399	15	Released

Intermountain region performance tables

Table 32. Intermountain Region, winter wheat yield and protein from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2018 Protein (%)	2018 St.Err.Protein (%)	2018 Protein Rank	Status
InterMnt	WINTERWHEAT		2016-2018	LWW15 71945	29199	10167	730	1	2037	383	0	9647	2274	1	10.71	0.38	28	0.03	0.3	0.94	11.15	0.34	10	
InterMnt	WINTERWHEAT	SWW	2016-2018	ORI2101841	29083	9374	762	2	1244	440	0.03	-	-	-	10.02	0.42	80	-0.66	0.35	0.21	-	-	-	
InterMnt	WINTERWHEAT		2016-2018	IDO 1005	29197	9135	730	3	1005	383	0.04	8615	2274	5	10.22	0.38	69	-0.46	0.3	0.35	10.66	0.34	33.5	
InterMnt	WINTERWHEAT		2016-2018	WA 8293	29210	8969	730	4	839	383	0.11	8449	2274	8	10.56	0.38	40	-0.12	0.3	0.82	11	0.34	18	
InterMnt	WINTERWHEAT		2016-2018	LCS HULK	29058	8943	661	5	813	229	0	8910	2274	2	10.44	0.29	55	-0.24	0.18	0.44	11.19	0.34	9	
InterMnt	WINTERWHEAT		2016-2018	SY 04PN062 18	29095	8929	684	6	799	288	0.03	-	-	-	10.12	0.32	75	-0.56	0.23	0.07	-	-	-	
InterMnt	WINTERWHEAT	SWW	2016-2018	ROSALYN	29090	8924	661	7	794	229	0	8608	2274	6	10.1	0.29	77	-0.58	0.18	0.01	10.63	0.34	35	Released
InterMnt	WINTERWHEAT	SWW	2016-2018	BOBTAIL	29011	8910	661	8	780	229	0.01	8668	2274	3	10.46	0.29	51	-0.22	0.18	0.48	10.85	0.34	25	Released
InterMnt	WINTERWHEAT		2016-2018	SY BANKS	29205	8892	730	9	762	383	0.14	8372	2274	9	10.57	0.38	37	-0.11	0.3	0.83	11.01	0.34	16	
InterMnt	WINTERWHEAT	SWW	2016-2018	LEGION	29043	8866	729	10	736	381	0.14	-	-	-	9.81	0.38	86	-0.87	0.3	0.02	-	-	-	Released
InterMnt	WINTERWHEAT	SWW	2016-2018	OR2110526	29074	8853	762	11	723	440	0.22	-	-	-	10.18	0.42	70	-0.5	0.35	0.38	-	-	-	
InterMnt	WINTERWHEAT		2016-2018	NORTHWEST DUET	29201	8841	730	12	711	383	0.16	8321	2274	11	10.61	0.38	34	-0.07	0.3	0.88	11.05	0.34	14	
InterMnt	WINTERWHEAT	SWW	2016-2018	MARY	29059	8831	661	13	701	229	0.02	8327	2274	10	10.58	0.29	36	-0.1	0.18	0.77	10.99	0.34	19	Released
InterMnt	WINTERWHEAT		2016-2018	ARS06134 57C	29009	8813	762	14	683	440	0.25	-	-	-	10.37	0.42	63	-0.31	0.35	0.64	-	-	-	
InterMnt	WINTERWHEAT	SWW	2016-2018	IDN 06 18102A	29034	8785	762	15	655	440	0.27	-	-	-	10.53	0.42	43	-0.15	0.35	0.82	-	-	-	
InterMnt	WINTERWHEAT		2016-2018	SY 04PN066 7	29096	8766	684	16	636	288	0.11	-	-	-	10.48	0.32	48	-0.2	0.23	0.64	-	-	-	
InterMnt	WINTERWHEAT	SWW	2016-2018	IDN 02 29001A	29030	8745	684	17	615	288	0.11	-	-	-	10.66	0.32	30	-0.02	0.23	0.94	-	-	-	
InterMnt	WINTERWHEAT	SWW	2016-2018	NORTHWEST DUET	29044	8718	729	18	588	381	0.25	-	-	-	9.95	0.38	84	-0.73	0.3	0.07	-	-	-	Released
InterMnt	WINTERWHEAT	SWW	2016-2018	TUBBS 06	29105	8677	661	19	547	229	0.08	7904	2274	21	9.99	0.29	81	-0.69	0.18	0	10.48	0.34	39	Released
InterMnt	WINTERWHEAT		2016-2018	OR2121086	29075	8673	661	20	543	229	0.08	8193	2274	15	9.95	0.29	83	-0.73	0.18	0	10.78	0.34	31	
InterMnt	WINTERWHEAT	SWW	2016-2018	SY OVATION	29102	8668	676	21	538	270	0.14	8149	2274	16	10.54	0.31	42	-0.14	0.21	0.73	11.36	0.34	3	Released
InterMnt	WINTERWHEAT	SWW	2016-2018	WB 1783	29146	8659	666	22	529	243	0.11	8663	2274	4	10.9	0.3	17	0.22	0.19	0.5	11.25	0.34	6	Released
InterMnt	WINTERWHEAT	SWW	2016-2018	LWW14 74143	29138	8658	668	23	528	249	0.11	8213	2274	14	10.02	0.3	79	-0.66	0.19	0	10.66	0.34	33.5	
InterMnt	WINTERWHEAT		2016-2018	IDN 07 28017B	29035	8654	661	24	524	229	0.09	7891	2274	22	10.46	0.29	52	-0.22	0.18	0.46	10.81	0.34	28	
InterMnt	WINTERWHEAT	SWW	2016-2018	LCS BIANCOR	29042	8638	684	25	508	288	0.19	-	-	-	10.29	0.32	66	-0.39	0.23	0.26	-	-	-	Released
InterMnt	WINTERWHEAT		2016-2018	WA 8232	29113	8616	684	26	486	288	0.21	-	-	-	10.17	0.32	72	-0.51	0.23	0.11	-	-	-	Released
InterMnt	WINTERWHEAT		2016-2018	ORLD113092	29087	8611	762	27	481	440	0.47	-	-	-	10.36	0.42	64	-0.32	0.35	0.64	-	-	-	
InterMnt	WINTERWHEAT		2016-2018	SY DAYTON	29207	8609	730	28	479	383	0.38	8088	2274	17	10.41	0.38	59	-0.27	0.3	0.64	10.85	0.34	26	
InterMnt	WINTERWHEAT	SWW	2016-2018	LWW14 73161	29137	8602	666	29	472	243	0.14	8244	2274	12	10.41	0.3	58	-0.27	0.19	0.39	10.98	0.34	21	
InterMnt	WINTERWHEAT		2016-2018	WB 1532	29211	8578	730	30	448	383	0.43	8057	2274	19	10.88	0.38	19	0.2	0.3	0.73	11.33	0.34	4	
InterMnt	WINTERWHEAT		2016-2018	HUFFMAN	29027	8577	762	31	447	440	0.51	-	-	-	10.33	0.42	65	-0.35	0.35	0.61	-	-	-	Released
InterMnt	WINTERWHEAT		2016-2018	SY 04PN096 2	29098	8575	762	32	445	440	0.51	-	-	-	10.86	0.42	20	0.18	0.35	0.79	-	-	-	
InterMnt	WINTERWHEAT		2016-2018	JASPER	29037	8522	684	33	392	288	0.33	-	-	-	10.39	0.32	62	-0.29	0.23	0.44	-	-	-	Released
InterMnt	WINTERWHEAT	SWW	2016-2018	KELDIN	29039	8517	762	34	387	440	0.57	-	-	-	10.91	0.42	16	0.24	0.35	0.73	-	-	-	Released
InterMnt	WINTERWHEAT		2016-2018	EXPBZ6W09 489	29023	8497	762	35	367	440	0.6	-	-	-	10.49	0.42	46	-0.19	0.35	0.77	-	-	-	
InterMnt	WINTERWHEAT	SWW	2016-2018	TUBBS	29104	8439	684	36	308	288	0.48	-	-	-	10.09	0.32	78	-0.59	0.23	0.05	-	-	-	Released
InterMnt	WINTERWHEAT		2016-2018	WA 8292	29209	8434	730	37	304	383	0.62	7913	2274	20	10.43	0.38	56	-0.25	0.3	0.65	10.88	0.34	24	
InterMnt	WINTERWHEAT	SWW	2016-2018	ORI2101840 2 GENE	29082	8362	762	38	232	440	0.78	-	-	-	10.59	0.42	35	-0.09	0.35	0.86	-	-	-	
InterMnt	WINTERWHEAT	SWW	2016-2018	STEPHENS	29093	8345	661	39	215	229	0.54	8060	2274	18	10.61	0.29	33	-0.07	0.18	0.83	10.98	0.34	20	Released
InterMnt	WINTERWHEAT		2016-2018	M PRESS	29200	8342	730	40	212	383	0.77	7822	2274	23	10.17	0.38	73	-0.51	0.3	0.27	10.61	0.34	36	
InterMnt	WINTERWHEAT		2016-2018	YS 201	29213	8291	730	41	161	383	0.8	7771	2274	24	10.13	0.38	74	-0.55	0.3	0.23	10.58	0.34	37	
InterMnt	WINTERWHEAT		2016-2018	WA 8206	29112	8288	684	42	158	288	0.77	-	-	-	10.57	0.32	39	-0.11	0.23	0.79	-	-	-	Released
InterMnt	WINTERWHEAT		2016-2018	IDO 1708	29198	8281	730	43	151	383	0.8	7760	2274	25	10.76	0.38	25	0.08	0.3	0.86	11.2	0.34	8	
InterMnt	WINTERWHEAT	SWW	2016-2018	SY 09PN008 72	29142	8277	666	44	147	243	0.74	8473	2274	7	10.39	0.3	61	-0.29	0.19	0.35	10.8	0.34	29	
InterMnt	WINTERWHEAT		2016-2018	SY 04PN005 25	29094	8258	684	45	128	288	0.8	-	-	-	9.98	0.32	82	-0.7	0.23	0.01	-	-	-	
InterMnt	WINTERWHEAT	SWW	2016-2018	WA 8234	29145	8251	696	46	121	314	0.8	-	-	-	10.79	0.34	23	0.11	0.25	0.82	-	-	-	Released
InterMnt	WINTERWHEAT	SWW	2016-2018	SY 09PN046 16	29143	8243	696	47	113	314	0.8	-	-	-	11.38	0.34	9	0.7	0.25	0.03	-	-	-	
InterMnt	WINTERWHEAT	SWW	2016-2018	SY 107	29099	8243	684	48	113	288	0.8	-	-	-	10.18	0.32	71	-0.5	0.23	0.12	-	-	-	
InterMnt	WINTERWHEAT		2016-2018	LCS SHARK	29057	8221	661	49	91	229	0.8	7058	2274	32	10.64	0.29	31	-0.04	0.18	0.88	11.1	0.34	12	
InterMnt	WINTERWHEAT	SWW	2016-2018	UI SPARROW	29036	8220	684	50	90	288	0.83	-	-	-	10.25	0.32	67	-0.43	0.23	0.21	-	-	-	Released
InterMnt	WINTERWHEAT	SWW	2016-2018	KASEBERG	29038	8215	661	51	85	229	0.8	8217	2274	13	9.94	0.29	85	-0.74	0.18	0	10.41	0.34	40	Released
InterMnt	WINTERWHEAT		2016-2018	OR2121285	29203	8205	730	52	75	383	0.89	7684	2274	26	10.51	0.38	45	-0.17	0.3	0.77	10.95	0.34	22	
InterMnt	WINTERWHEAT		2016-2018	SY COMMAND	29206	8193	730	53	63	383	0.9	7672	2274	27	10.12	0.38	76	-0.56	0.3	0.22	10.56	0.34	38	
InterMnt	WINTERWHEAT	SWW	2016-2018	LCS ARTDECO	29041	8180	661	54	50	229	0.89	7421	2274	30	10.45	0.29	53	-0.23	0.18	0.45	11.2	0.34	7	Released
InterMnt	WINTERWHEAT		2016-2018	SY RAPTOR	29208	8154	730	55	24	383	0.97	7633	2274	28	10.62	0.38	32	-0.06	0.3	0.89	11.06	0.34	13	
InterMnt	WINTERWHEAT	SWW	2016-2018	NORTHWEST TANDEM	29045	8151	729	56	21	381	0.97	-	-	-	10.43	0.38	57	-0.25	0.3	0.65	-	-	-	Released
InterMnt	WINTERWHEAT	SWW	2016-2018	OR 2121285	29139	8141	696	57	11	314	0.97	-	-	-	10.74	0.34	26	0.07	0.25	0.86	-	-	-	
InterMnt	WINTERWHEAT	SWW	2016-2018	OR 2130485	29140	8070	696	58	-60	314	0.89	-	-	-	10.47	0.34	50	-0.21	0.25	0.64	-	-	-	
InterMnt	WINTERWHEAT	SWW	2016-2018	LCS DRIVE	29052	8040	729	59	-90	381	0.89	-	-	-	10.48	0.38	47	-0.2	0.3	0.73	-	-	-	Released
InterMnt	WINTERWHEAT	SWW	2016-2018	LWW14 72916	29136	8005	666	60	-125	243	0.78	7066	2274	31	10.78	0.3	24	0.1	0.19	0.77	10.79	0.34	30	
InterMnt	WINTERWHEAT		2016-2018	EXPBZ6W09 471	29022	7973	762	61	-157	440	0.8	-	-	-	10.89	0.42	18	0.21	0.35	0.75	-	-	-	
InterMnt	WINTERWHEAT		2016-2018	OR2130081	29204	7965	730	62	-165	383	0.8	7445	2274	29	10.4	0.38	60	-0.28	0.3	0.64	10.84	0.34	27	
InterMnt	WINTERWHEAT		2016-2018	OR2121252	29076	7924	684	63	-206	288	0.68	-	-	-	10.48	0.32	49	-0.2	0.23	0.64	-	-	-	
InterMnt	WINTERWHEAT	SWW	2016-2018	WB 1529	29115	7906	661	64	-224	229	0.51	6902	2274	34	10.83	0.29	21	0.15	0.18	0.64	11.3	0.34	5	Released
InterMnt	WINTERWHEAT		2016-2018	LWW14 71032	29056	7842	762	65	-288	440	0.71	-	-	-	10.82	0.42	22	0.14	0.35	0.82	-	-	-	
InterMnt	WINTERWHEAT	SWW	2016-2018	LWW10 1018	29054	7820	762	66	-310	440	0.68	-	-	-	10.54	0.42	41	-0.14	0.35	0.82	-	-	-	
InterMnt	WINTERWHEAT	SWW	2016-2018	WB 1604	29116	7770	684	67	-360	288	0.38	6652	2274	37	10.52	0.32	44	-0.16	0.23	0.73	10.94	0.34	23	Released
InterMnt	WINTERWHEAT		2016-2018	ORLD112334	29086	7699	762	68	-431	440	0.51	-	-	-	10.57	0.42	38	-0.11	0.35	0.86	-	-	-	
InterMnt	WINTERWHEAT	NA	2016-2018	NA	29055	7661	684	69	-469	288	0.22	6675	2274	36	10.45	0.32	54	-0.23	0.23	0.6	11	0.34	17	
InterMnt	WINTERWHEAT	SWW	2016-2018	SY 05PN100 63	29141	7608	696	70	-522	314	0.22	-	-	-	11.88	0.34	7	1.2	0.25	0	-	-	-	
InterMnt	WINTERWHEAT	SWW	2016-2018	IDN 09 08357A	29135	7578	696	71	-552	314	0.19	-	-	-	11.36	0.34	10	0.68	0.25	0.03	-	-	-	
InterMnt	WINTERWHEAT	HRW	2016-2018	WINCAL 09196	29126	7540	762	72	-590	440	0.34	-	-	-	11.32	0.42	11	0.64	0.35	0.22	-	-	-	
InterMnt	WINTERWHEAT		2016-2018	NORTHWEST TANDEM	29202	7494	730	73	-636	383	0.22	6974	2274	33	10.71	0.38	27	0.03	0.3	0.94	11.15	0.34	11	
InterMnt	WINTERWHEAT		2016-2018	ARS DH08X117 83C	29196	7377	730	74	-753	383	0.14	6856	2274	35	11.2	0.38	13	0.52	0.3	0.26	11.64	0.34	1	
InterMnt	COMMON	NA	2016-2018	NA	1802	7359	731	75	-771	384	0.14	-	-	-	12.28	0.38	5	1.6	0.3	0	-	-	-	Released
InterMnt	WINTERWHEAT	SWW	2016-2018	OR2101043	29073	7216	762	76	-914	440	0.12	-	-	-	10.67	0.42	29	-0.01	0.35	0.99	-	-	-	
InterMnt	WINTERWHEAT		2016-2018	XB 1104 (EXP)	29212	7125	730	77	-1005	383	0.04	6604	2274	38	10.25	0.38	68	-0.43	0.3	0.38	10.69	0.34	32	
InterMnt	WINTERWHEAT	SWW	2016-2018	SY ASSURE	29144	7045	666	78	-1085	243	0	6536	2274	39	11.51	0.3	8	0.83	0.19	0	11.03	0.34	15	Released
InterMnt	WINTERWHEAT		2016-2018	ARS DH08X028 9C	29195	6794	730	79	-1336	383	0	6274	2274	40	11.11	0.38	14	0.43	0.3	0.38	11.55	0.34	2	
InterMnt	COMMON	NA	2016-2018	NA	1821	6573	823	80	-1557	537	0.02	-	-	-	12.13	0.48	6	1.45	0.42	0	-	-	-	
InterMnt	COMMON	NA	2016-2018	NA	1743	6536	823	81	-1594	537	0.02	-	-	-	13.18	0.48	1	2.5	0.42	0	-	-	-	Released
InterMnt	WINTERWHEAT	SWW	2016-2018	YAMHILL	29128	5993	708	82	-2137	340	0	-	-	-	11.24	0.35	12	0.56	0.27	0.14	-	-	-	Released
InterMnt	COMMON	NA	2016-2018	NA	1779	5964	823	83	-2166	537	0	-	-	-	12.33	0.48	4	1.65	0.42	0	-	-	-	Released
InterMnt	WINTERWHEAT		2016-2018	20060126 35C	29003	5927	762	84	-2203	440	0	-	-	-	10.99	0.42	15	0.31	0.35	0.64	-	-	-	
InterMnt	WINTERWHEAT		2016-2018	WINCORA	29127	5556	762	85	-2574	440	0	-	-	-	12.85	0.42	2	2.17	0.35	0	-	-	-	Released
InterMnt	WINTERWHEAT		2016-2018	VERDANT	29107	5292	787	86	-2838	481	0	-	-	-	12.65	0.45	3	1.97	0.38	0	-	-	-	Released

Table 33. Intermountain Region, spring wheat yield and protein from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2018 Protein (%)	2018 St.Err.Protein (%)	2018 Protein Rank
InterMnt	SPRINGWHEAT	SWS	2016-2018	IDO01405S	29190	9487	897	1	1727	307	0	11152	289	2	11.23	0.81	95	-1.75	0.26	0	12.75	0.25	54
InterMnt	SPRINGWHEAT	HRS	2016-2018	XA 9301 EXP	29156	9434	897	2	1675	308	0	-	-	-	12.44	0.81	67	-0.54	0.26	0.06	-	-	-
InterMnt	SPRINGWHEAT	SWS	2016-2018	WB 6341	19091	9330	860	3	1570	177	0	11293	289	1	10.53	0.78	102	-2.45	0.15	0	11.84	0.25	59
InterMnt	SPRINGWHEAT	SWS	2016-2018	WB 6430	19092	9080	855	4	1321	154	0	10850	216	4	11.1	0.77	96	-1.88	0.13	0	12.59	0.19	56
InterMnt	SPRINGWHEAT	SWS	2016-2018	YS 602	19108	9030	897	5	1270	308	0	-	-	-	11.28	0.81	94	-1.7	0.26	0	-	-	-
InterMnt	SPRINGWHEAT	SWS	2016-2018	UI STONE	19078	8884	860	6	1124	177	0	10866	289	3	10.98	0.78	99	-2	0.15	0	12.46	0.25	57
InterMnt	SPRINGWHEAT	SWS	2016-2018	WA 8189	19082	8846	870	7	1086	222	0	-	-	-	13	0.78	53	0.02	0.19	0.92	-	-	-
InterMnt	SPRINGWHEAT	SWS	2016-2018	ALTURAS	19015	8844	914	8	1085	354	0.01	-	-	-	11.04	0.82	98	-1.95	0.3	0	-	-	-
InterMnt	SPRINGWHEAT	SWS	2016-2018	WA TEKOA	29150	8703	869	9	943	217	0	10660	289	5	11.32	0.78	93	-1.66	0.18	0	12.84	0.25	53
InterMnt	SPRINGWHEAT	HWS	2016-2018	LCS STAR	19046	8697	869	10	938	218	0	-	-	-	12.36	0.78	72	-0.62	0.18	0	-	-	-
InterMnt	SPRINGWHEAT	SWS	2016-2018	12SW052	19009	8642	897	11	883	308	0.02	-	-	-	11.73	0.81	89	-1.25	0.26	0	-	-	-
InterMnt	SPRINGWHEAT	HWS	2016-2018	WB HARTLINE	19100	8498	897	12	738	308	0.05	-	-	-	13.23	0.81	44	0.25	0.26	0.41	-	-	-
InterMnt	SPRINGWHEAT	HWS	2016-2018	IDO1203S A	19033	8451	860	13	692	177	0	10251	289	7	13.2	0.78	47	0.21	0.16	0.21	15.08	0.29	22
InterMnt	SPRINGWHEAT	SWS	2016-2018	RYAN WA 8214	29148	8395	897	14	636	308	0.1	-	-	-	11.74	0.81	88	-1.24	0.26	0	-	-	-
InterMnt	SPRINGWHEAT	HWS	2016-2018	IDO1202S	19032	8385	860	15	626	177	0	9856	289	14	13.54	0.78	34	0.55	0.15	0	15.23	0.25	19
InterMnt	SPRINGWHEAT	HRS	2016-2018	12SB0224	19008	8365	862	16	605	185	0.01	10487	289	6	12.44	0.78	68	-0.55	0.16	0	14.02	0.29	41
InterMnt	SPRINGWHEAT	HRS	2016-2018	SY BASALT 04W40240R	19062	8315	869	17	556	218	0.04	-	-	-	12.69	0.78	61	-0.3	0.18	0.14	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	LCS IRON	19045	8311	869	18	551	217	0.04	9628	289	21	12.92	0.79	55	-0.07	0.2	0.78	14.22	0.29	39
InterMnt	SPRINGWHEAT	HRS	2016-2018	XB 9610	29175	8277	897	19	517	307	0.19	9942	289	9	13.56	0.82	32	0.58	0.3	0.08	15.08	0.29	24
InterMnt	SPRINGWHEAT	SWS	2016-2018	IDO01403S	29189	8265	897	20	505	307	0.2	9930	289	10	11.44	0.81	91	-1.54	0.26	0	12.96	0.25	51
InterMnt	SPRINGWHEAT	SWS	2016-2018	WA RYAN	29192	8258	897	21	498	307	0.21	9923	289	11	11.34	0.81	92	-1.64	0.26	0	12.86	0.25	52
InterMnt	SPRINGWHEAT	SWS	2016-2018	WB 6121	19090	8242	864	22	483	194	0.04	9954	289	8	12.1	0.78	79	-0.88	0.16	0	13.67	0.25	47
InterMnt	SPRINGWHEAT	HRS	2016-2018	JEFFERSON	19041	8220	897	23	461	308	0.26	-	-	-	13.62	0.81	29	0.63	0.26	0.03	-	-	-
InterMnt	SPRINGWHEAT	HWS	2016-2018	LCS ATOMO	19044	8220	869	24	460	218	0.09	-	-	-	12.85	0.78	59	-0.13	0.18	0.52	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	UC 16010 20	29181	8215	897	25	456	307	0.26	9880	289	12	13.26	0.82	43	0.28	0.3	0.41	14.78	0.29	28
InterMnt	SPRINGWHEAT	SWS	2016-2018	12SW068	19010	8189	897	26	429	308	0.3	-	-	-	11.48	0.81	90	-1.5	0.26	0	-	-	-
InterMnt	SPRINGWHEAT	SWS	2016-2018	WB 1035 CL	29151	8175	897	27	415	308	0.31	-	-	-	11.92	0.81	84	-1.07	0.26	0	-	-	-
InterMnt	SPRINGWHEAT	SWS	2016-2018	IDO01702S	29191	8147	897	28	388	307	0.35	9813	289	15	11.09	0.81	97	-1.89	0.26	0	12.61	0.25	55
InterMnt	SPRINGWHEAT	HRS	2016-2018	WB 9200	19094	8132	869	29	373	218	0.18	-	-	-	13.91	0.78	20	0.93	0.18	0	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	WB 9717	29172	8115	897	30	356	307	0.37	9781	289	16	13.02	0.82	52	0.04	0.3	0.91	14.54	0.29	35
InterMnt	SPRINGWHEAT	SWS	2016-2018	WA MELBA	19050	8105	860	31	346	177	0.12	9649	289	20	10.63	0.78	101	-2.35	0.15	0	12.16	0.25	58
InterMnt	SPRINGWHEAT	HRS	2016-2018	SY 04PN3051 9	19057	8090	897	32	331	308	0.41	-	-	-	14.33	0.81	14	1.35	0.26	0	-	-	-
InterMnt	SPRINGWHEAT	SWS	2016-2018	YS 604	29162	8049	897	33	290	308	0.49	-	-	-	10.87	0.81	100	-2.12	0.26	0	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	WB 9229	19095	8047	873	34	287	232	0.35	-	-	-	13.7	0.79	27	0.71	0.2	0	-	-	-
InterMnt	SPRINGWHEAT	HWS	2016-2018	WB 7417	19093	8034	869	35	274	218	0.35	-	-	-	14.2	0.78	16	1.22	0.18	0	-	-	-
InterMnt	SPRINGWHEAT	SWS	2016-2018	YS 603	29161	8028	869	36	268	217	0.35	9751	289	17	11.92	0.78	83	-1.06	0.18	0	13.52	0.25	49
InterMnt	SPRINGWHEAT	HRS	2016-2018	SY3017 9	29179	8024	897	37	264	307	0.52	9689	289	19	14.42	0.82	10	1.44	0.3	0	15.94	0.29	10
InterMnt	SPRINGWHEAT	HRS	2016-2018	SY SELWAY	19065	8005	860	38	245	177	0.3	9286	289	33	13.64	0.78	28	0.66	0.16	0	15.17	0.29	21
InterMnt	SPRINGWHEAT	HRS	2016-2018	12SB0199	19007	8000	869	39	241	218	0.4	-	-	-	12.56	0.78	66	-0.42	0.18	0.04	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	HRS 3504	19030	8000	914	40	240	354	0.62	-	-	-	13.5	0.82	36	0.52	0.3	0.11	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	SY 06PN3015 08	19059	7999	897	41	240	308	0.57	-	-	-	12.88	0.81	56	-0.1	0.26	0.74	-	-	-
InterMnt	SPRINGWHEAT	HWS	2016-2018	UI PLATINUM	19077	7991	860	42	232	177	0.33	9278	289	34	12.59	0.78	63	-0.39	0.16	0.02	14.45	0.29	36
InterMnt	SPRINGWHEAT	HRS	2016-2018	UC CENTRAL RED	29180	7956	897	43	196	307	0.64	9621	289	22	13.41	0.82	39	0.43	0.3	0.19	14.93	0.29	27
InterMnt	SPRINGWHEAT	SWS	2016-2018	WHIT	19105	7952	897	44	192	308	0.65	-	-	-	11.88	0.81	85	-1.1	0.26	0	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	XA 9860 EXP	29158	7921	897	45	162	308	0.72	-	-	-	13.22	0.81	46	0.23	0.26	0.42	-	-	-
InterMnt	SPRINGWHEAT	SWS	2016-2018	14 FAC 2043	29187	7918	897	46	158	307	0.72	9583	289	23	12.58	0.81	64	-0.4	0.26	0.16	14.1	0.25	40
InterMnt	SPRINGWHEAT	HRS	2016-2018	WB 9518	19096	7915	860	47	155	177	0.52	9466	289	26	14.59	0.78	9	1.61	0.16	0	15.83	0.35	11
InterMnt	SPRINGWHEAT	HRS	2016-2018	XB 9591	29174	7905	897	48	146	307	0.74	9571	289	24	12.16	0.82	77	-0.83	0.3	0.01	13.68	0.29	46
InterMnt	SPRINGWHEAT	HRS	2016-2018	XA 9861 EXP	29159	7872	897	49	113	308	0.8	-	-	-	12.69	0.81	60	-0.29	0.26	0.32	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	WB 9668	19097	7865	869	50	105	217	0.74	9723	289	18	14.69	0.79	8	1.7	0.2	0	16.1	0.29	8
InterMnt	SPRINGWHEAT	HRS	2016-2018	WB PATRON	29147	7863	897	51	103	308	0.8	-	-	-	13.74	0.81	25	0.76	0.26	0.01	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	12SB0197	19006	7840	862	52	80	185	0.75	9089	289	40	12.33	0.78	73	-0.66	0.16	0	13.68	0.29	45
InterMnt	SPRINGWHEAT	SWS	2016-2018	WB 1035 CLP	19089	7816	869	53	56	217	0.83	9876	289	13	12.58	0.78	65	-0.4	0.18	0.04	14.31	0.25	38
InterMnt	SPRINGWHEAT	HRS	2016-2018	SY COHO	19064	7805	860	54	45	177	0.83	9511	289	25	13.76	0.78	24	0.78	0.16	0	15.23	0.29	20
InterMnt	SPRINGWHEAT	SWS	2016-2018	SY 04PN3024 2	19056	7770	897	55	11	308	0.98	-	-	-	11.83	0.81	86	-1.15	0.26	0	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	WB 9411	29153	7764	897	56	5	308	0.99	-	-	-	13.54	0.81	33	0.56	0.26	0.05	-	-	-
InterMnt	SPRINGWHEAT	HWS	2016-2018	WB 7566	29167	7743	897	57	-16	307	0.98	9409	289	29	13.17	0.82	48	0.19	0.3	0.59	14.69	0.29	31
InterMnt	SPRINGWHEAT	HRS	2016-2018	BULLSEYE	19019	7704	897	58	-55	308	0.88	-	-	-	13.93	0.81	19	0.95	0.26	0	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	SY STEELHEAD	19066	7687	869	59	-72	218	0.8	-	-	-	14.37	0.78	11	1.39	0.18	0	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	XB 9290	29173	7674	897	60	-86	307	0.83	9339	289	30	13.22	0.82	45	0.24	0.3	0.49	14.74	0.29	30
InterMnt	SPRINGWHEAT	HWS	2016-2018	XA 7320 CL EXP	29155	7664	897	61	-95	308	0.81	-	-	-	12.87	0.81	58	-0.12	0.26	0.71	-	-	-
InterMnt	SPRINGWHEAT	SWS	2016-2018	ALPOWA	19014	7658	869	62	-101	218	0.74	-	-	-	11.75	0.78	87	-1.23	0.18	0	-	-	-
InterMnt	SPRINGWHEAT	HWS	2016-2018	WB 7202 CLP	29171	7657	897	63	-103	307	0.8	9322	289	31	12.43	0.82	70	-0.55	0.3	0.09	13.95	0.29	43
InterMnt	SPRINGWHEAT	HRS	2016-2018	WB 9350	29152	7554	869	64	-206	217	0.49	9423	289	28	13.33	0.79	42	0.35	0.2	0.11	14.57	0.29	34
InterMnt	SPRINGWHEAT	HRS	2016-2018	LCS TRIGGER	29193	7537	897	65	-223	307	0.59	9202	289	35	12.43	0.82	69	-0.55	0.3	0.09	13.95	0.29	42
InterMnt	SPRINGWHEAT	HRS	2016-2018	UC LASSIK	19043	7531	897	66	-229	307	0.58	9196	289	36	13.09	0.85	50	0.11	0.37	0.8	14.61	0.35	33
InterMnt	SPRINGWHEAT	HRS	2016-2018	XA 9660 EXP	29157	7524	897	67	-236	308	0.57	-	-	-	13.57	0.81	30	0.58	0.26	0.04	-	-	-
InterMnt	SPRINGWHEAT	SWS	2016-2018	SY SALTESE	29149	7521	869	68	-239	217	0.4	9439	289	27	12.11	0.78	78	-0.88	0.18	0	13.66	0.25	48
InterMnt	SPRINGWHEAT	HRS	2016-2018	WB 9662	29154	7507	869	69	-253	217	0.37	9091	289	39	14.35	0.79	12	1.37	0.2	0	15.99	0.29	9
InterMnt	SPRINGWHEAT	HRS	2016-2018	SY GUNSIGHT	29178	7497	897	70	-263	307	0.52	9162	289	37	13.46	0.82	37	0.48	0.3	0.15	14.98	0.29	26
InterMnt	SPRINGWHEAT	HRS	2016-2018	WA 8282 HRS	29186	7485	897	71	-275	307	0.51	9150	289	38	13.74	0.82	26	0.75	0.3	0.02	15.26	0.29	18
InterMnt	SPRINGWHEAT	SWS	2016-2018	14SWW1030	19012	7398	897	72	-362	308	0.37	-	-	-	12.23	0.81	75	-0.75	0.26	0.01	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	MSU LANNING	29176	7396	897	73	-364	307	0.37	9061	289	41	15.32	0.82	4	2.33	0.3	0	16.84	0.29	4
InterMnt	SPRINGWHEAT	HRS	2016-2018	YS 802 1	19111	7378	897	74	-382	308	0.35	-	-	-	14.28	0.81	15	1.3	0.26	0	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	WB 9879 CLP	19099	7355	869	75	-405	217	0.14	8706	289	51	13.84	0.79	22	0.86	0.2	0	15.62	0.29	13
InterMnt	SPRINGWHEAT	HRS	2016-2018	ALUM	19016	7344	860	76	-415	177	0.06	8999	289	43	13.79	0.78	23	0.81	0.16	0	15.4	0.29	16
InterMnt	SPRINGWHEAT	HRS	2016-2018	YS 802	19110	7341	897	77	-419	307	0.31	9006	289	42	14.71	0.82	6	1.72	0.3	0	16.23	0.29	7
InterMnt	SPRINGWHEAT	HRS	2016-2018	YECORA ROJO	19106	7298	860	78	-462	177	0.03	8742	289	50	14.33	0.78	13	1.35	0.16	0	15.48	0.29	15
InterMnt	SPRINGWHEAT	HRS	2016-2018	GLEE	19025	7267	869	79	-492	217	0.07	9286	289	32	13.43	0.79	38	0.44	0.2	0.04	14.76	0.29	29
InterMnt	SPRINGWHEAT	SWS	2016-2018	WA SEAHAWK	19054	7216	855	80	-544	154	0	8922	289	44	12.05	0.77	82	-0.93	0.13	0	13.2	0.25	50
InterMnt	SPRINGWHEAT	SWS	2016-2018	14 SSW 1059	29188	7197	897	81	-563	307	0.15	8862	289	45	13.14	0.81	49	0.16	0.26	0.6	14.66	0.25	32
InterMnt	SPRINGWHEAT	HRS	2016-2018	LCS Buck Pronto	19018	7152	897	82	-608	307	0.11	8817	289	46	14.94	0.82	5	1.96	0.3	0	16.46	0.29	5
InterMnt	SPRINGWHEAT	SWS	2016-2018	WA 8214	19083	7151	914	83	-609	354	0.18	-	-	-	12.3	0.82	74	-0.68	0.3	0.04	-	-	-
InterMnt	SPRINGWHEAT	HWS	2016-2018	IDO1602S	29182	7135	897	84	-625	307	0.1	8800	289	47	13.56	0.82	31	0.58	0.3	0.08	15.08	0.29	23
InterMnt	SPRINGWHEAT	HRS	2016-2018	16 HRS 5172	29170	7118	897	85	-642	307	0.09	8783	289	48	13.51	0.85	35	0.53	0.37	0.19	15.03	0.35	25
InterMnt	SPRINGWHEAT	HRS	2016-2018	10SB0087 B	19002	7095	897	86	-665	308	0.08	-	-	-	13.03	0.81	51	0.05	0.26	0.89	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	IDO1603S	29183	7093	897	87	-666	307	0.08	8758	289	49	14.16	0.82	17	1.18	0.3	0	15.68	0.29	12
InterMnt	SPRINGWHEAT	HRS	2016-2018	HRS 3419	19029	7052	897	88	-708	308	0.06	-	-	-	12.98	0.81	54	0	0.26	0.99	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	LCS LUNA	29169	6949	897	89	-811	307	0.03	8614	289	52	12.87	0.82	57	-0.11	0.3	0.76	14.39	0.29	37
InterMnt	SPRINGWHEAT	HRS	2016-2018	HRS 3100	19027	6936	897	90	-824	308	0.03	-	-	-	13.35	0.81	40	0.37	0.26	0.19	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	IDO1701S	29184	6934	897	91	-825	307	0.03	8600	289	53	13.87	0.85	21	0.89	0.37	0.03	15.39	0.35	17
InterMnt	SPRINGWHEAT	HRS	2016-2018	WA 8280 CLP	29185	6903	897	92	-857	307	0.02	8568	289	54	13.97	0.82	18	0.99	0.3	0	15.49	0.29	14
InterMnt	SPRINGWHEAT	SWS	2016-2018	14SWW1059	19013	6850	897	93	-909	308	0.01	-	-	-	12.08	0.81	81	-0.9	0.26	0	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	KELSE	19042	6808	869	94	-952	217	0	8197	289	55	14.7	0.79	7	1.71	0.2	0	16.39	0.29	6
InterMnt	SPRINGWHEAT	HRS	2016-2018	HRS 3361	19028	6799	914	95	-961	354	0.03	-	-	-	13.34	0.82	41	0.35	0.3	0.29	-	-	-
InterMnt	SPRINGWHEAT	SWS	2016-2018	YS 605	29163	6726	897	96	-1033	308	0	-	-	-	12.09	0.81	80	-0.89	0.26	0	-	-	-
InterMnt	SPRINGWHEAT	SWS	2016-2018	WA LOUISE	19048	6597	860	97	-1162	177	0	7918	289	57	12.39	0.78	71	-0.6	0.15	0	13.89	0.25	44
InterMnt	SPRINGWHEAT	HRS	2016-2018	LCS REBEL	29194	6528	897	98	-1231	307	0	8194	289	56	15.32	0.82	3	2.34	0.3	0	16.84	0.29	3
InterMnt	SPRINGWHEAT	HRS	2016-2018	ANZA	19052	6518	914	99	-1242	354	0	-	-	-	12.2	0.82	76	-0.78	0.3	0.02	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	YECORA ROJO 515	29160	6110	869	100	-1650	217	0	7761	289	58	15.82	0.79	1	2.84	0.2	0	17.77	0.29	1
InterMnt	SPRINGWHEAT	SWS	2016-2018	DIVA	19023	5767	869	101	-1992	218	0	-	-	-	12.69	0.78	62	-0.3	0.18	0.14	-	-	-
InterMnt	SPRINGWHEAT	HRS	2016-2018	MSU VIDA	29177	5443	897	102	-2317	307	0	7108	289	59	15.58	0.82	2	2.6	0.3	0	17.1	0.29	2

Table 34. Intermountain Region, spring barley yield from the 2015-16 to 2017-18 seasons.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank
InterMnt	BARLEY	6RSF	2016-2018	UC 1341	9082	9172	914	1	2965	306	0	-	-	-
InterMnt	BARLEY	6RSF	2016-2018	UC 1337	9081	9117	914	2	2910	306	0	-	-	-
InterMnt	BARLEY		2016-2018	UC 1278	9080	8044	914	3	1837	306	0	-	-	-
InterMnt	BARLEY	2RSM	2016-2018	FRANCIN	9148	7615	886	4	1408	234	0	9140	521	1
InterMnt	BARLEY	6RSF	2016-2018	UC 1365	9083	7542	914	5	1334	306	0	-	-	-
InterMnt	BARLEY		2016-2018	UTSB10902 91	9135	7050	888	6	843	216	0	-	-	-
InterMnt	BARLEY		2016-2018	EXPLORER	9147	6935	915	7	728	306	0.05	-	-	-
InterMnt	BARLEY		2016-2018	11WA 107 20	9020	6929	914	8	722	306	0.05	-	-	-
InterMnt	BARLEY	2RSM	2016-2018	OSU FULL PINT	9059	6917	888	9	709	216	0	-	-	-
InterMnt	BARLEY	2RSM	2016-2018	UC BUTTA 12 96	9049	6908	886	10	700	235	0.01	7738	521	3
InterMnt	BARLEY		2016-2018	UTSB10905 72	9136	6906	888	11	698	216	0.01	-	-	-
InterMnt	BARLEY	2RSM	2016-2018	2ND28065	9044	6900	914	12	693	306	0.06	-	-	-
InterMnt	BARLEY		2016-2018	08ARS028 20	9001	6695	888	13	488	216	0.06	-	-	-
InterMnt	BARLEY		2016-2018	BZ512 220	9143	6678	915	14	470	306	0.24	-	-	-
InterMnt	BARLEY	6RSF	2016-2018	STEPTOE	9077	6629	914	15	422	306	0.3	-	-	-
InterMnt	BARLEY		2016-2018	SYNERGY	9154	6512	915	16	304	306	0.45	-	-	-
InterMnt	BARLEY	2RSF	2016-2018	BARONESSE	9048	6496	914	17	289	306	0.47	-	-	-
InterMnt	BARLEY		2016-2018	10ARS191 3	9140	6464	915	18	256	306	0.53	-	-	-
InterMnt	BARLEY		2016-2018	BZ509 601	9053	6451	914	19	244	306	0.55	-	-	-
InterMnt	BARLEY	2RSM	2016-2018	2B10 4378	9035	6449	888	20	242	216	0.4	-	-	-
InterMnt	BARLEY		2016-2018	08ARS116 91	9003	6435	888	21	227	216	0.43	-	-	-
InterMnt	BARLEY		2016-2018	MT124555	9070	6411	914	22	204	306	0.62	-	-	-
InterMnt	BARLEY		2016-2018	MT090182	9065	6367	914	23	160	306	0.69	-	-	-
InterMnt	BARLEY	2RSF	2016-2018	MT100120	9067	6358	914	24	151	306	0.69	-	-	-
InterMnt	BARLEY	2RSM	2016-2018	UC 1410	9086	6312	879	25	105	178	0.65	-	-	-
InterMnt	BARLEY		2016-2018	08ARS112 75	9002	6300	888	26	93	216	0.73	-	-	-
InterMnt	BARLEY		2016-2018	BZ512 282	9144	6290	915	27	83	306	0.84	-	-	-
InterMnt	BARLEY	2RSM	2016-2018	LCS GENIE	9149	6283	915	28	75	306	0.85	-	-	-
InterMnt	BARLEY		2016-2018	CDC BOW	9145	6270	915	29	63	306	0.86	-	-	-
InterMnt	BARLEY	2RSF	2016-2018	MT100126	9068	6222	914	30	14	306	0.97	-	-	-
InterMnt	BARLEY		2016-2018	MT090190	9066	6198	888	31	-9	216	0.97	-	-	-
InterMnt	BARLEY		2016-2018	11WA 107 58	9022	6069	888	32	-138	216	0.62	-	-	-
InterMnt	BARLEY	2RSM	2016-2018	2B11 4949	9038	6066	888	33	-142	216	0.62	-	-	-
InterMnt	BARLEY	6RSF	2016-2018	UC 1393	9084	6054	914	34	-153	306	0.69	-	-	-
InterMnt	BARLEY		2016-2018	11WA 107 43	9021	6007	888	36	-201	216	0.47	-	-	-
InterMnt	BARLEY	2RSM	2016-2018	AC METCALFE	9047	5886	888	37	-321	216	0.25	-	-	-
InterMnt	BARLEY	2RSM	2016-2018	HARRINGTON	9060	5884	914	38	-323	306	0.43	-	-	-
InterMnt	BARLEY		2016-2018	2ND32529	9141	5848	915	39	-360	306	0.38	-	-	-
InterMnt	BARLEY	2RSM	2016-2018	UC TAHOE	9085	5843	921	40	-365	359	0.44	7082	521	4
InterMnt	BARLEY		2016-2018	2ND33760	9142	5836	915	42	-372	306	0.37	-	-	-
InterMnt	BARLEY	2RSM	2016-2018	UC 1390	9018	5810	886	44	-397	235	0.18	6437	521	5
InterMnt	BARLEY	2RSM	2016-2018	CDC COPELAND	9054	5752	876	45	-455	186	0.04	7781	521	2
InterMnt	BARLEY	2RSM	2016-2018	2B10 4162	9034	5739	888	46	-468	216	0.07	-	-	-
InterMnt	BARLEY		2016-2018	MT124677	9153	5692	915	48	-515	306	0.18	-	-	-
InterMnt	BARLEY		2016-2018	CDC FRASER	9146	5690	915	49	-517	306	0.18	-	-	-
InterMnt	BARLEY		2016-2018	MT124112	9150	5671	915	50	-537	306	0.17	-	-	-
InterMnt	BARLEY	2RSF-H	2016-2018	2AB09 X06F084-51	9032	5610	914	51	-597	306	0.12	-	-	-
InterMnt	BARLEY		2016-2018	MT124134	9152	5517	915	52	-690	306	0.06	-	-	-
InterMnt	BARLEY		2016-2018	2B12 5582	9041	5410	888	53	-797	216	0	-	-	-
InterMnt	BARLEY		2016-2018	12WA 120 14	9023	5409	891	54	-798	230	0	-	-	-
InterMnt	BARLEY		2016-2018	MT124128	9151	5403	915	55	-805	306	0.03	-	-	-
InterMnt	BARLEY	2RSF	2016-2018	10WA 117 24	9017	5385	914	56	-822	306	0.03	-	-	-
InterMnt	BARLEY	2RSM	2016-2018	2B11 5166	9039	5382	888	57	-826	216	0	-	-	-
InterMnt	BARLEY	2RSF	2016-2018	10WA 106 18	9013	5332	888	58	-875	216	0	-	-	-
InterMnt	BARLEY	2RSF	2016-2018	10WA 117 17	9016	5290	888	60	-917	216	0	-	-	-
InterMnt	BARLEY		2016-2018	2ND30837	9046	5050	914	61	-1157	306	0	-	-	-
InterMnt	BARLEY	2RSF H	2016-2018	2AB09 X06F058HL-31	9031	4711	888	62	-1497	216	0	-	-	-
InterMnt	BARLEY	2RSM	2016-2018	UC B9K94	9155	4144	921	63	-2063	359	0	5384	521	6

Disease & agronomic summaries

The occurrence of diseases in the UC trial locations during the 2017-18 season is presented in Table 35. Yecora Rojo (UC 112) was included as known stripe rust-susceptible check, and it displayed a maximum stripe rust score of 5 at the Fresno location, which was the highest of all varieties. Overall disease incidence was low during the 2017-18 season, resulting in a 90th percentile value of 2 for the entire population of stripe rust observations recorded during the season. Variety specific disease observations compiled during 2017-18 are presented in Tables 36 – 37. The 90th percentile disease incidence ratings for individual locations in the 2017-18 season and for the previous five seasons are presented in Tables 38 and 39.

Table 35. Locations where disease and disease-like symptoms were observed and recorded in the 2017-18 season.

Site Name	Trial	Early Stripe Rust	Late Stripe Rust	Stripe Rust	BYDV	Leaf Rust	Septoria	False Black Chaff
Colusa	WHEAT				X		X	
Davis	BARLEY							
Davis	DURUM		X	X	X			
Davis	WHEAT				X			X
Delta	WHEAT		X	X	X			
Fresno	BARLEY							
Fresno	DURUM		X	X				
Fresno	WHEAT		X	X	X			X
Imperial	DURUM							
Imperial	WHEAT							
Kern	DURUM		X	X				
Kern	WHEAT				X			
Kings	DURUM		X	X	X			
Kings	WHEAT				X			
Siskiyou	COMMON							
Solano	BARLEY							
Solano	WHEAT							
Tehama	BARLEY							
Tehama	WHEAT							
Tulare	BARLEY							
Tulare	WHEAT							
Tulelake	BARLEY							
Tulelake	COMMON							

A multi-year summary of disease and agronomic observations for common wheat, durum, triticale and barley are presented in Table 40, Table 41, Table 42, and Table 43, respectively. The varieties Anza, Yecora Rojo, WB Triple IV, ASSL TAM 204, XB 9510, SY REDWING, SY ULTRA, DPG FV 2808, LCS ATOMO, APB 5011189, APB 501129, and APB 510477 recorded incidences of stripe rust of over 3 at the 90th percentile value. These varieties are considered susceptible or moderately susceptible to stripe rust based on multi-year analyses. The varieties DPG FV 2808, WB 9229 and WB TRIPLE IV are susceptible (a 90th percentile value > 4) to barley yellow dwarf virus.

As in the 2016-17 season, during the 2017-18 season, a disease-like symptom characterized by darkening of the glumes was observed at a number of test locations. The symptoms may be a condition referred to as pseudo-black chaff/false black chaff/melanism. This is a physiological condition associated with the presence of the stem rust resistance gene Sr2 that results in the deposition of melanoid pigments that discolor the glumes in the wheat head and, in severe cases, in the stem below the head. Entries with ratings of 3 or greater were SY Cal Rojo, APB 511829, WB 7566, UC 1880, and SY Summit 515. There does not appear to be a quantitative relationship between the glume discoloration symptoms and wheat yield. More information and images of symptoms are available on the UC Small Grains Blog.

A leaf-spotting symptom, termed "physiological leaf spot" was also observed in multiple locations, with some varieties also showing greater incidence than others APB 410117 and SY Blanca Grande 515 had ratings of 4 or greater. No clear correlation with reduced performance was observed for this trait and no consistent pathogens were recovered from plants

Table 36. 2018 Common wheat disease observations.

Year	Crop Group	Species	Type	UC Number	Name	Stripe rust, late, 90th percen	Septoria, 90th percentile	Barley Yellow Dwarf, 90th perc	Black Chafe, 90th percentil	Physiological Leaf Spot, 90th pe
2018	WHEAT	COMMON	HRS	112	YECORA ROJO	4.2	1.0	2.6	2.0	1.0
2018	WHEAT	COMMON	HRS	1478	SY CAL ROJO	1.8	1.0	3.8	4.0	1.0
2018	WHEAT	COMMON	HRS	1495	UC LASSIK	1.0	1.0	1.8	1.5	1.0
2018	WHEAT	COMMON	HRS	1521	SY REDWING	1.0	1.0	3.2	1.5	1.0
2018	WHEAT	COMMON	HWS	1522	SY BLANCA ROYALE	1.8	1.0	2.2	1.5	1.8
2018	WHEAT	COMMON	HWS	1657	SY BLANCA GRANDE 515	1.0	1.0	2.4	2.5	1.0
2018	WHEAT	COMMON	HRS	1658	SY SUMMIT 515	1.0	1.0	2.8	3.0	1.8
2018	WHEAT	COMMON	SWS	1667	BAG NEW DIRKWIN	1.0	1.0	2.2	1.0	1.0
2018	WHEAT	COMMON	HWS	1680	UC PATWIN 515	1.0	1.0	2.2	1.5	1.0
2018	WHEAT	COMMON	HWS	1688	LCS STAR	1.0	1.0	1.0	1.0	1.0
2018	WHEAT	COMMON	HWS	1723	LCS ATOMO	3.6	1.0	3.2	1.0	1.8
2018	WHEAT	COMMON	HRS	1728	WB JOAQUIN ORO	1.0	1.0	4.4	2.5	4.2
2018	WHEAT	COMMON	HRS	1730	WB 9229	1.0	1.0	3.6	1.5	1.8
2018	WHEAT	COMMON	HRS	1731	WB PATRON	1.0	1.0	3.8	2.5	1.8
2018	WHEAT	COMMON	HWS	1743	UC PATWIN 515HP	1.0	1.0	3.2	1.5	1.0
2018	WHEAT	COMMON	HRS	1745	UC YUROK	1.0	1.0	1.8	1.0	1.8
2018	WHEAT	COMMON	HRS	1748	WB 9112	1.0	1.0	2.6	2.5	1.0
2018	WHEAT	COMMON	HRS	1751	WB 9904	1.0	1.0	3.2	1.0	1.8
2018	WHEAT	COMMON	SRS	1778	ASSL TAM 204	2.6	1.0	2.8	1.0	2.0
2018	WHEAT	COMMON	HWS	1802	WB 7566	1.0	1.0	1.8	3.5	1.0
2018	WHEAT	COMMON	HWS	1815	UC 15010 27	1.0	1.0	2.2	1.5	1.0
2018	WHEAT	COMMON	HRS	1817	UC CENTRAL RED	1.0	1.0	2.2	1.0	1.0
2018	WHEAT	COMMON	HRS	1830	LCS 12SB0197	1.0	1.0	2.2	1.0	1.0
2018	WHEAT	COMMON	HWS	1831	LCS 12SB0224	1.8	1.0	2.8	1.0	2.0
2018	WHEAT	COMMON	HRS	1835	SY 13W00886	1.0	1.0	2.4	1.5	1.0
2018	WHEAT	COMMON	HRS	1842	WB 9350	1.8	2.0	2.8	1.5	1.0
2018	WHEAT	COMMON	HRS	1847	WB 9433	2.6	1.0	3.0	2.5	1.0
2018	WHEAT	COMMON	HRS	1874	APB 510477	4.4	1.0	2.2	2.5	1.0
2018	WHEAT	COMMON	HRS	1875	APB 511829	1.0	1.0	3.2	3.5	1.0
2018	WHEAT	COMMON	HRS	1876	SY 11200064-1-9	1.8	1.0	2.4	1.0	1.0
2018	WHEAT	COMMON	HRS	1877	SY 11200083-1-3	1.0	1.0	2.4	2.0	1.0
2018	WHEAT	COMMON	HRS	1878	SY 11200024-1-4	1.0	1.0	1.4	1.0	1.8
2018	WHEAT	COMMON	HRS	1879	YECORA ROJO 515	1.0	1.0	2.6	2.5	1.0
2018	WHEAT	COMMON	HRS	1880	UC 1880	1.0	1.0	2.8	3.0	1.0
2018	WHEAT	COMMON	HRS	1882	UC 1882	1.0	1.0	2.2	1.0	1.8
2018	WHEAT	COMMON	HWS	1883	UC 1883	1.0	1.0	2.8	1.0	1.8
2018	WHEAT	COMMON	HRS	1884	UC 1884	1.0	1.0	2.8	2.0	1.0
2018	WHEAT	COMMON	HRS	1885	UC 1885	1.0	1.0	3.2	1.0	1.0
2018	WHEAT	COMMON	HRS	1886	XB 9512	1.8	1.0	1.8	1.0	1.0
2018	WHEAT	COMMON	HRS	1887	XB 9510	2.6	1.0	2.2	2.0	1.0
2018	WHEAT	COMMON	HRS	1888	XB 9511	1.8	1.0	1.8	1.0	1.0

Rating scale, area of penultimate leaf affected (BYDV percentage of plants showing symptoms):

1 = 0-3%
2 = 4-14%
3 = 15-29%
4 = 30-49%
5 = 50-69%
6 = 70-84%
7 = 85-95%
8 = 96-100%

demonstrating this symptomology. More information and images of this symptom are available on the UC Small Grain Blog.

Variety-specific ratings of agronomic traits such as lodging and multi-year averages of traits such as test weight, plant height, and relative maturity can be found for the different crop types in Tables 38 – 42.

Table 37. 2018 durum wheat disease observations.

Year	Crop Group	Species	Type	UC Number	Name	Stripe rust, late, 90th percentile (1-8)	Barley Yellow Dwarf, 90th percentile (1-8)	Physiological Leaf Spot, 90th percentile (1-8)
2018	DURUM	DURUM	DURUM	878	DPG DURAKING	1.0	3.0	2.8
2018	DURUM	DURUM	DURUM	951	APB KRONOS	1.0	3.9	2.8
2018	DURUM	DURUM	DURUM	1210	DPG PLATINUM	1.0	2.9	1.0
2018	DURUM	DURUM	DURUM	1211	DPG TOPPER	1.0	2.0	1.0
2018	DURUM	DURUM	DURUM	1215	WB ORITA	3.8	2.9	1.9
2018	DURUM	DURUM	DURUM	1375	UC DESERT KING	1.0	1.9	1.0
2018	DURUM	DURUM	DURUM	1429	SY FORTISSIMO	1.7	2.0	1.0
2018	DURUM	DURUM	DURUM	1431	SY VOLANTE	1.0	2.0	2.9
2018	DURUM	DURUM	DURUM	1484	APB WESTMORE HP	1.0	2.9	1.0
2018	DURUM	DURUM	DURUM	1582	AS MAESTRALE	1.0	2.8	1.0
2018	DURUM	DURUM	DURUM	1583	AS SARAGOLLA	1.7	2.9	1.9
2018	DURUM	DURUM	DURUM	1607	WB MEAD	1.7	3.9	1.0
2018	DURUM	DURUM	DURUM	1627	UC DESERT KING HP	1.0	2.9	1.9
2018	DURUM	DURUM	DURUM	1640	APB TIBURON	1.0	2.0	1.9
2018	DURUM	DURUM	DURUM	1654	WB MOHAVE	4.4	3.0	1.0
2018	DURUM	DURUM	DURUM	1690	UC MIWOK	3.8	3.0	1.0
2018	DURUM	DURUM	DURUM	1800	AS COLOMBO	1.7	1.9	1.0
2018	DURUM	DURUM	DURUM	1813	APB ALBERTO	1.0	2.8	1.0
2018	DURUM	DURUM	DURUM	1850	UC DESERT GOLD	1.0	2.8	1.0
2018	DURUM	DURUM	DURUM	1863	APB 450311	1.0	1.9	1.9
2018	DURUM	DURUM	DURUM	1864	APB 471400	1.0	1.9	1.0
2018	DURUM	DURUM	DURUM	1865	APB 450275	1.0	2.8	1.9
2018	DURUM	DURUM	DURUM	1866	APB 450333	1.0	2.0	2.8
2018	DURUM	DURUM	DURUM	1867	DPG CANDURA	1.0	2.0	1.0
2018	DURUM	DURUM	DURUM	1868	POWELL	1.0	3.9	2.9
2018	DURUM	DURUM	DURUM	1869	SHASTA	1.0	2.9	1.0
2018	DURUM	DURUM	DURUM	1870	UC 1870	1.0	2.8	2.8
2018	DURUM	DURUM	DURUM	1871	UC 1871	1.0	3.7	1.0
2018	DURUM	DURUM	DURUM	1872	UC 1872	1.0	2.9	2.8
2018	DURUM	DURUM	DURUM	1873	UC 1873	1.0	2.0	1.0

Rating scale, area of penultimate leaf affected (BYDV percentage of plants showing symptoms):

1 = 0-3%
2 = 4-14%
3 = 15-29%
4 = 30-49%
5 = 50-69%
6 = 70-84%
7 = 85-95%
8 = 96-100%

Table 38. The 90th percentile for disease incidence at individual test locations in the 2017-18 season.

Crop Type	Site Name	Stripe Rust	Leaf Rust	Septoria	BYDV	False Black Chaff
BARLEY	Davis					
	Fresno					
	Solano					
	Tehama					
	Tulare					
	Tulelake					
COMMON	Colusa			1	1	
	Davis				1	1
	Davis (Nitrogen Stress)				1	1
	Davis (Water Stress)					1
	Delta	1			1	
	Fresno	2			2	2
	Fresno (Nitrogen Stress)	1				
	Fresno (Water Stress)					
	Imperial					
	Kern				1	
	Kings				4	
	Solano (Rainfed)					
	Tehama (Rainfed)					
	Tulare (Rainfed)					
DURUM	Davis	1			2	
	Fresno	1				
	Imperial					
	Kern	1				
	Kings	1			3	
TRITICALE	Colusa			1	1	
	Davis				1	1
	Davis (Nitrogen Stress)				1	1
	Davis (Water Stress)					1
	Delta	1			1	
	Fresno	1			1.2	2
	Fresno (Nitrogen Stress)	1				
	Fresno (Water Stress)					
	Imperial					
	Kern				1	
	Kings				4	
	Solano (Rainfed)					
	Tehama (Rainfed)					
	Tulare (Rainfed)					
SPRINGWHEAT	Tulelake					
WINTERWHEAT	Siskiyou					
	Tulelake					

Table 39. The 90th percentile for disease incidence across all test locations within individual season between the 2013-14 season and the 2017-18 season.

Crop Type	Season	Stripe Rust	Leaf Rust	Septoria	BYDV
BARLEY	2013-14				1.3
	2014-15		1.8		2.5
	2015-16	2	2		3
	2016-17		2		2
	2017-18				
COMMON	2013-14	1	1		4
	2014-15	5	1		4
	2015-16	3	1		4
	2016-17	1	1	1	2
	2017-18	2		1	1
DURUM	2013-14	1	1		2.4
	2014-15	4	1		3
	2015-16	3	1		2
	2016-17	4	1	1.3	1
	2017-18	1			3
TRITICALE	2013-14	1	1		2
	2014-15	4			4
	2015-16	1	1		2
	2016-17	1	1	1	1
	2017-18	1		1	1
SPRING WHEAT	2013-14				
	2014-15				
	2015-16				
	2016-17				
	2017-18				
WINTER WHEAT	2013-14				2.65
	2014-15				3.53
	2015-16				2
	2016-17				
	2017-18				

Table 40. A summary of common wheat disease and agronomic observations taken from the 2013-14 to 2017-18 seasons.

Crop Group	Crop Type	Name	UC Number	2014-2018 S. Rust rating	2014-2018 L. Rust rating	2014-2018 BYDV rating	2014-2018 Septoria rating	Test Wt (lb/bu)	1000 Kernel Wt (g)	Days to heading (from Jan. 1, Davis)	Days to maturity (from Jan. 1, Davis)	Plant Ht (in)	Lodging risk	Shatter risk	2014-2018 plots observed (n)	Status
COMMON	HRS	UC ANZA	20	S	R	MR	R	61.8	35.5	97	139	34	Med. Low	Low	123	Released
COMMON	HRS	YECORA ROJO	112	S	R	R	MR	61.8	42.6	86	148	27	High	-	100	Released
COMMON	HRS	SY CAL ROJO	1478	R	R	MR	R	60.2	39.4	91	137	30	Low	Low	206	Released
COMMON	HRS	UC LASSIK	1495	R	R	MR	MR	61.4	34.7	94	141	33	Med. High	Low	205	Released
COMMON	HRS	SY REDWING	1521	MS	R	MR	R	59.9	39.1	92	138	31	Low	Low	205	Released
COMMON	HWS	SY BLANCA ROYALE	1522	R	R	MR	R	61.4	38	91	137	32	Med. Low	Low	206	Released
COMMON	HRS	WB TRIPLE IV	1550	S	-	S	-	60.6	40.5	82	127	38	Med. High	Low	106	Released
COMMON	HRS	SY ULTRA	1590	MS	R	MR	MR	62.2	39.1	91	138	32	Med. Low	Low	153	Released
COMMON	HRS	DPG FV 2808	1608	MS	R	S	R	61.2	36.6	96	138	38	Med. High	Low	154	Released
COMMON	HRS	WB ROCKLAND	1650	R	-	MS	-	62.1	38.9	89	132	32	Low	Low	104	Released
COMMON	HWS	SY BLANCA GRANDE 515	1657	R	R	R	MR	63.5	40.8	87	136	34	Med. High	Low	204	Released
COMMON	HRS	SY SUMMIT 515	1658	R	R	MR	R	61.8	39.1	92	139	32	Low	Low	205	Released
COMMON	HRS	SY 314	1660	R	R	MR	R	60.3	39.5	92	136	32	Low	Low	154	Released
COMMON	SWS	BAG NEW DIRKWIN	1667	R	R	MS	R	57	35.5	110	149	37	Med. High	Low	203	Released
COMMON	HWS	UC PATWIN 515	1680	R	R	R	R	60.5	35.7	94	140	30	Low	Low	207	Released
COMMON	HWS	LCS STAR	1688	R	R	MR	R	61.2	35.9	91	139	35	High	Low	202	Released
COMMON	HWS	LCS ATOMO	1723	MS	R	MS	R	62	38.4	89	137	32	Med. Low	Low	206	Released
COMMON	HRS	WB JOAQUIN ORO	1728	R	R	MS	MR	62.5	42	84	132	34	Low	Low	206	Released
COMMON	HRS	WB 9229	1730	R	R	S	R	62.6	37.9	92	139	33	Med. Low	Low	206	Released
COMMON	HRS	WB PATRON	1731	R	R	MS	R	60.7	41.3	91	138	35	Med. High	Low	207	Released
COMMON	HWS	UC PATWIN 515HP	1743	R	R	R	R	60.6	34.6	89	138	30	Low	Low	144	Released
COMMON	HRS	UC YUROK	1745	R	R	MS	R	62.5	37.2	96	141	35	Med. High	Low	205	Released
COMMON	HRS	WB 9112	1748	R	R	MS	R	62.1	36.2	88	136	34	Med. Low	Low	205	Released
COMMON	HWS	WB 7618	1749	R	-	MS	-	61.9	37.7	89	135	34	Low	Low	107	Released
COMMON	HRS	WB 9904	1751	R	R	MS	R	61	45	95	142	36	Med. Low	Low	205	Released
COMMON	SRS	SY VACA	1766	R	R	MR	R	56	33.5	111	151	38	Med. Low	Low	153	Released
COMMON	SRS	ASSL TAM 204	1778	MR	R	MR	R	58.3	30.6	105	147	36	Med. Low	Low	206	Released
COMMON	HWS	WB 7566	1802	R	R	R	R	62.2	41.8	94	142	32	Med. High	Low	179	Released
COMMON	HRS	UC CENTRAL RED	1817	R	R	R	R	62.2	39.1	91	142	30	Med. Low	Low	140	Released
COMMON	HRS	SY SIENNA	1835	R	R	R	R	62.3	43.7	94	149	30	Low	-	100	Released
COMMON	HRS	WB 9350	1842	R	R	R	R	61.4	39.1	94	148	27	Low	-	100	Released
COMMON	HRS	WB 9433	1847	R	MR	R	R	62	38.5	97	149	27	Med. Low	-	100	Released
COMMON	HWS	WB 7390	1750	R	-	MS	-	63.4	43.5	90	134	37	Med. Low	Low	107	
COMMON	HRS	APB 501189	1807	S	R	MR	-	61.8	39.3	82	128	36	Med. High	Low	71	
COMMON	HRS	UC 15010 5	1814	R	R	R	-	60.4	38.5	90	130	33	Med. Low	Low	40	
COMMON	HWS	UC 15010 27	1815	R	R	R	R	60.9	40.5	88	138	30	Low	Low	140	
COMMON	HWS	UC 15013 15	1816	R	R	R	-	64.1	39.8	84	133	32	Med. Low	Low	40	
COMMON	HRS	UC 15014 35	1818	R	R	R	-	63.6	34.9	85	127	37	Med. Low	Medium	39	
COMMON	HRS	APB 500709	1819	R	R	R	R	61.8	38.5	85	136	29	Med. Low	Low	88	
COMMON		APB 501129	1820	MR	R	MR	-	60.4	38.5	84	132	31	Med. Low	Low	40	
COMMON		APB 8238	1821	R	R	MR	-	62	38.8	84	129	34	Med. Low	Low	43	
COMMON	HRS	APB 501089	1828	R	R	R	R	61	39.6	85	132	28	Low	Low	88	
COMMON		APB 8155	1829	R	R	MR	-	62.2	39	84	130	36	Med. Low	Low	40	
COMMON	HRS	LCS 12SB0197	1830	R	R	R	R	59.9	38.1	96	144	34	Med. Low	Low	139	
COMMON	HWS	LCS 12SB0224	1831	R	R	MR	R	60.6	38	94	143	33	Med. Low	Low	140	
COMMON	HRS	SY 13W00850	1834	R	R	R	R	62.2	46.2	92	152	30	Med. Low	-	48	
COMMON	HRS	UC 14657 170	1836	R	R	R	R	58.5	40.4	92	152	28	Med. Low	-	48	
COMMON	HWS	UC 15080 49	1837	R	R	R	R	57.5	37.9	88	149	27	High	-	48	
COMMON	HRS	UC 16010 20	1838	R	R	R	R	62.9	43.1	92	149	32	Med. Low	-	48	
COMMON	HWS	UC 16010 32	1839	R	R	R	R	61.3	42.4	92	145	31	Med. Low	-	48	
COMMON	HRS	APB 410117	1840	R	R	R	R	61.4	46.7	92	149	30	Med. Low	-	48	
COMMON	HRS	APB 510453	1841	R	R	R	R	62.1	45.7	92	152	29	Med. Low	-	48	
COMMON	HRS	XA 9301	1843	R	R	R	R	62.3	47.3	88	152	30	Med. Low	-	48	
COMMON	HRS	XA 9302	1844	R	R	R	MR	63.6	43.3	88	142	28	Med. Low	-	48	
COMMON	HRS	XA 9501	1845	R	MR	R	R	62	46	92	145	27	Med. Low	-	48	
COMMON	HRS	XA 9502	1846	R	R	R	R	62.8	44.5	92	149	27	Med. Low	-	48	
COMMON	HRS	APB 510477	1874	S	-	R	R	60.7	36.5	98	149	34	Med. Low	-	52	
COMMON	HRS	APB 511829	1875	R	-	R	R	60.8	35.1	94	149	33	Med. Low	-	52	
COMMON	HRS	SY 11200064-1-9	1876	R	-	R	R	59.9	34.5	94	149	31	Med. Low	-	52	
COMMON	HRS	SY 11200083-1-3	1877	R	-	R	R	59.8	35	98	149	36	Med. High	-	52	
COMMON	HRS	SY 11200024-1-4	1878	R	-	R	R	60.4	39.4	94	149	32	Med. High	-	52	
COMMON	HRS	YECORA ROJO 515	1879	R	-	R	R	60	36.1	86	149	28	Low	-	52	
COMMON	HRS	UC 1880	1880	R	-	R	R	60.2	38.1	94	149	34	Med. Low	-	52	
COMMON	HRS	UC 1882	1882	R	-	R	R	60.5	37.8	94	149	32	Low	-	52	
COMMON	HWS	UC 1883	1883	R	-	R	R	60.7	36.8	94	149	32	Low	-	52	
COMMON	HRS	UC 1884	1884	R	-	R	R	62.1	38.2	91	149	33	Med. High	-	52	
COMMON	HRS	UC 1885	1885	R	-	R	R	59.7	33.5	98	149	30	Low	-	52	
COMMON	HRS	XB 9512	1886	R	-	R	R	62.5	35.3	94	149	32	Med. High	-	52	
COMMON	HRS	WB 9490	1887	MR	-	R	R	60.7	38.4	94	149	32	Med. High	-	52	
COMMON	HRS	WB 9699	1888	R	-	R	R	62.9	40.8	94	149	32	Low	-	52	

Table 41. A summary of durum wheat disease and agronomic observations taken from the 2013-14 to 2017-18 seasons.

Crop Group	Crop Type	Name	UC Number	2014-2018 S. Rust rating	2014-2018 L. Rust rating	2014-2018 BYDV rating	2014-2018 Septoria rating	Test Wt (lb/bu)	1000 Kernel Wt (g)	Days to heading (from Jan. 1, Davis)	Days to maturity (from Jan. 1, Davis)	Plant Ht (in)	Lodging risk	Shatter risk	2014-2018 plots observed (n)	Status
DURUM	DURUM	DPG DURAKING	878	R	-	MR	-	62.2	45.1	100	142	34	Med. Low	Low	58	Released
DURUM	DURUM	APB KRONOS	951	MS	R	MR	R	61.7	55	88	139	33	High	Low	102	Released
DURUM	DURUM	DPG PLATINUM	1210	R	-	MR	-	62.3	44.7	97	141	31	Med. Low	Low	58	Released
DURUM	DURUM	DPG TOPPER	1211	MR	-	MR	-	62.5	42.2	103	140	37	Med. Low	Low	58	Released
DURUM	DURUM	WB ORITA	1215	S	R	R	R	60.9	52.2	100	142	34	Med. Low	Low	102	Released
DURUM	DURUM	UC DESERT KING	1375	R	R	R	R	61.9	50.4	101	144	34	Med. Low	Low	102	Released
DURUM	DURUM	SY FORTISSIMO	1429	R	R	R	R	61.5	46.6	97	141	33	Med. Low	Low	102	Released
DURUM	DURUM	SY VOLANTE	1431	R	R	R	R	62.6	54.4	99	140	32	Med. Low	Low	97	Released
DURUM	DURUM	APB HELIOS	1440	MS	R	R	-	62.3	50	81	133	35	Med. Low	Low	39	Released
DURUM	DURUM	WB HAVASU	1479	S	R	R	MR	62.9	51.9	89	135	35	High	Low	82	Released
DURUM	DURUM	APB WESTMORE HP	1484	R	R	R	R	61.6	43.3	90	138	33	High	Low	101	Released
DURUM	DURUM	AS MAESTRALE	1582	R	R	MR	R	62.9	48	96	140	37	High	Low	96	Released
DURUM	DURUM	AS SARAGOLLA	1583	R	R	R	R	63	49.1	97	141	34	Med. High	Low	102	Released
DURUM	DURUM	WB MEAD	1607	R	R	MR	R	61.1	45.7	104	145	35	Med. Low	Low	102	Released
DURUM	DURUM	UC DESERT KING HP	1627	R	R	R	R	59.9	44.5	102	142	33	Med. Low	Low	102	Released
DURUM	DURUM	APB TIBURON	1640	R	R	R	MR	61.9	58.4	91	140	33	Med. High	Low	102	Released
DURUM	DURUM	WB MOHAVE	1654	S	R	R	R	62.1	48.8	92	140	34	Med. Low	Low	102	Released
DURUM	DURUM	UC MIWOK	1690	MR	R	MR	R	62.6	55.8	99	145	34	Med. High	Low	162	Released
DURUM	DURUM	LCS KIKO	1697	R	R	R	R	61.9	55.1	94	137	35	Med. High	Low	82	Released
DURUM	DURUM	AS COLOMBO	1800	MR	R	R	R	60.9	48.9	114	155	34	Low	Low	63	Released
DURUM	DURUM	APB ALBERTO	1813	R	R	R	R	61.3	51.6	91	143	28	Med. Low	Low	83	Released
DURUM	DURUM	UC DESERT GOLD	1850	R	R	R	R	60.4	48.6	107	150	35	Med. Low	-	44	Released
DURUM	DURUM	DPG CANDURA	1867	R	-	R	-	61.4	43.1	101	149	35	Med. Low	-	20	Released
DURUM	DURUM	POWELL	1868	R	-	MS	-	63.1	51.4	91	149	32	Low	-	20	Released
DURUM	DURUM	SHASTA	1869	R	-	MR	-	63.4	56.4	91	149	34	Med. Low	-	20	Released
DURUM	DURUM	UC 14215/9	1796	R	R	MR	-	63.4	56.3	89	136	33	Med. Low	Low	39	
DURUM	DURUM	APB 571217	1810	MR	R	R	-	63.8	53.1	90	139	32	Med. Low	Medium	39	
DURUM	DURUM	APB 571353	1812	MS	R	R	-	62.8	47.4	90	136	31	Med. Low	Low	32	
DURUM	DURUM	APB 540505	1822	MR	R	R	-	64.1	51.3	87	134	33	Med. Low	Low	20	
DURUM	DURUM	APB 410077	1823	R	R	R	-	62.8	58.3	83	137	34	Med. Low	Low	20	
DURUM	DURUM	UC 15210 11	1824	R	R	R	-	60.3	49.3	100	138	34	Med. High	Low	20	
DURUM	DURUM	UC 15210 12	1825	R	R	R	-	63	53.8	89	134	34	High	Low	20	
DURUM	DURUM	UC 15210 24	1826	MR	R	R	-	63.5	57.6	92	136	36	Med. High	Low	20	
DURUM	DURUM	APB 540165	1827	R	R	R	MS	61.4	57.4	84	140	31	Med. Low	Low	44	
DURUM	DURUM	LCS 12E4006	1832	R	R	R	-	63.8	53.2	99	138	33	Med. High	Low	20	
DURUM	DURUM	LCS 13SD0056	1833	R	R	R	-	63.3	49.4	93	135	33	High	Low	19	
DURUM	DURUM	UC 16051 1	1848	R	R	R	R	57.9	43.8	106	156	32	Med. High	-	24	
DURUM	DURUM	UC 16051 12	1849	R	R	R	R	60.6	48.7	106	159	35	Med. Low	-	24	
DURUM	DURUM	APB 450311	1851	MR	R	R	R	60.7	50.2	94	150	27	Med. Low	-	44	
DURUM	DURUM	APB 470442	1852	R	R	R	R	62.2	52.1	99	152	31	Med. Low	-	24	
DURUM	DURUM	APB 471400	1853	R	R	R	MR	63.3	51.7	94	149	29	Med. High	-	44	
DURUM	DURUM	ASC 100	1854	MS	R	R	R	61.5	49.4	109	159	34	Low	-	24	
DURUM	DURUM	ASC 101	1855	S	R	R	R	62	49.5	99	156	30	High	-	24	
DURUM	DURUM	ASC 102	1856	S	R	R	R	62.6	56.4	92	152	29	High	-	24	
DURUM	DURUM	ASC 103	1857	S	R	R	R	61.9	51.2	99	156	30	Med. Low	-	24	
DURUM	DURUM	APB 450275	1865	R	-	MR	-	60	47.6	98	149	27	Low	-	20	
DURUM	DURUM	APB 450333	1866	R	-	R	-	60.7	49	94	149	28	Low	-	20	
DURUM	DURUM	UC 1870	1870	R	-	MR	-	62.3	46.8	101	149	33	Med. Low	-	20	
DURUM	DURUM	UC 1871	1871	R	-	MR	-	63.5	47.5	91	149	34	Med. Low	-	20	
DURUM	DURUM	UC 1872	1872	R	-	MR	-	61	46.2	101	-	34	Med. High	-	20	
DURUM	DURUM	UC 1873	1873	R	-	R	-	62.4	46.4	107	149	34	Med. Low	-	20	

Table 42. A summary of triticale disease and agronomic observations taken from the 2013-14 to 2017-18 seasons.

Crop Group	Crop Type	Name	UC Number	2014-2018 S. Rust rating	2014-2018 L. Rust rating	2014-2018 BYDV rating	2014-2018 Septoria rating	Test Wt (lb/bu)	1000 Kernel Wt (g)	Days to heading (from Jan. 1, Davis)	Days to maturity (from Jan. 1, Davis)	Plant Ht (in)	Lodging risk	Shatter risk	2014-2018 plots observed (n)	Status
TRITICALE	TRITICALE	NS TRICAL 105	3097	R	R	MR	R	58.7	44.7	90	142	39	Med. Low	Low	206	Released
TRITICALE	TRITICALE	WB PACHECO	3164	R	R	R	R	59.5	44.5	89	139	38	Med. Low	Low	207	Released
TRITICALE	TRITICALE	NS CAMELOT	3168	R	R	R	R	57	40	88	139	37	Med. Low	Low	207	Released
TRITICALE	TRITICALE	NS TRICAL 158EP	3169	R	R	R	R	58.2	36.2	93	143	35	Low	Low	205	
TRITICALE	TRITICALE	NS TRICAL 115T	3170	R	R	MR	MR	58.2	37.4	92	143	35	Low	Low	206	
TRITICALE	TRITICALE	PRL 011TS 429	3177	R	R	R	-	57.2	37.8	83	134	44	High	Low	40	
TRITICALE	TRITICALE	NS GOLD RUSH 91	3178	R	-	R	-	56.4	39.7	85	139	32	Med. Low	Low	82	
TRITICALE	TRITICALE	NS 10T70126	3179	R	R	R	-	52.3	31.4	112	161	47	Med. High	Low	27	
TRITICALE	TRITICALE	NS 12T01486	3180	R	R	R	R	57.2	-	85	152	34	Med. Low	-	48	
TRITICALE	TRITICALE	AGS 230	3181	MR	MR	R	MR	59.9	-	88	156	34	Low	-	48	
TRITICALE	TRITICALE	AGS 133	3182	R	R	R	R	58.9	-	92	159	31	Low	-	48	
TRITICALE	TRITICALE	UC 3183	3183	R	-	R	R	59.7	40.4	86	-	37	High	-	52	
TRITICALE	TRITICALE	UC 3184	3184	R	-	R	R	57.8	44.4	86	149	39	Med. High	-	52	
TRITICALE	TRITICALE	UC 3185	3185	R	-	R	R	58.1	46	91	149	36	Low	-	52	
TRITICALE	TRITICALE	XB T401	3186	R	-	R	R	56.9	37.8	94	-	35	Low	-	52	

Table 43. A summary of barley disease and agronomic observations taken from the 2013-14 to 2017-18 seasons

Crop Group	Crop Type	Name	UC Number	2014-2018 S. Rust rating	2014-2018 L. Rust rating	2014-2018 BYDV rating	2014-2018 Septoria rating	Test Wt (lb/bu)	1000 Kernel Wt (g)	Days to heading (from Jan. 1, Davis)	Days to maturity (from Jan. 1, Davis)	Plant Ht (in)	Lodging risk	Shatter risk	2014-2018 plots observed (n)	Status
BARLEY	6RSF	UC 603	603	S	S	MR	-	50.4	40.4	-	-	32	Med. Low	Medium	72	Released
BARLEY	6RSF	UC 933	933	S	MS	MR	-	49.7	43.8	-	-	31	Med. High	Medium	73	Released
BARLEY	6RSF	UC 969	969	S	MR	MR	-	52.3	43.1	-	-	34	Med. High	Medium	96	Released
BARLEY	6RSF	ISHI	1047	R	R	MS	-	49.8	45.1	-	-	31	High	Low	70	Released
BARLEY	6RSN	TAMALPAIS	1134	MR	R	R	-	55	41.7	-	-	30	Med. Low	Medium	72	Released
BARLEY	2RSM	UC TAHOE	1409	R	R	R	-	54.2	44.1	-	-	31	Med. High	Low	73	Released
BARLEY	2RSM	OSU FULL PINT	1411	R	R	S	-	52.2	42.1	-	-	30	Med. High	Low	51	Released
BARLEY	6RSF-H	SCHALLER	1413	R	MR	R	-	48	39.9	-	-	38	High	Low	24	Released
BARLEY	2RSM	CDC COPELAND	1858	-	-	-	-	-	-	-	-	34	Med. High	-	30	Released
BARLEY	2RSM	ACC SYNERGY	1859	-	-	-	-	-	-	-	-	32	Med. High	-	26	Released
BARLEY	2RSM	KLAGES	1860	-	-	-	-	-	-	-	-	33	Med. High	-	24	Released
BARLEY	6RSF	UC71 183 1	162	R	R	MR	-	44	36.7	-	-	40	Med. Low	Low	24	
BARLEY	6RSF	MAX	816	MS	MR	R	-	51	41	-	-	29	Med. High	Low	46	
BARLEY	6RSN	UC 937	937	-	-	-	-	-	-	-	-	30	Med. High	-	24	
BARLEY	6RSN	UC 960	960	-	-	-	-	-	-	-	-	28	Med. High	-	24	
BARLEY	6RSF	UC B369	1255	R	R	R	-	49	45.4	-	-	34	High	Low	33	
BARLEY	6RSF	UC B398	1256	R	R	MR	-	49.4	44.7	-	-	34	High	Low	33	
BARLEY	6RSF	UC A237	1261	R	R	MR	-	49.5	44.9	-	-	34	High	Low	32	
BARLEY	6RSN	UC 1263	1263	R	R	R	-	55.4	43.4	-	-	34	Med. High	Low	28	
BARLEY	6RSN	UC 1266	1266	R	R	MR	-	55.5	41.8	-	-	34	Med. High	Low	28	
BARLEY	6RSF	UC 1280	1280	R	R	R	-	51.4	44.3	-	-	36	High	Low	33	
BARLEY	6RSN	UC 1317	1317	R	R	MS	-	54.5	41	-	-	33	Med. High	Low	31	
BARLEY	6RSN	UC 1318	1318	R	R	MR	-	53.7	44.3	-	-	34	High	Low	33	
BARLEY	6RSF	UC UYP 210A	1351	R	R	R	-	48.8	42.6	-	-	34	Med. High	Low	33	
BARLEY	2RSM	UC BUTTA 12 96	1360	R	R	MS	-	53.1	49.4	-	-	33	High	Low	75	
BARLEY		UC UYP 3B	1379	R	R	MR	-	50.3	45.3	-	-	32	High	Low	33	
BARLEY		UC UYP 210B	1383	R	R	R	-	49.2	43.2	-	-	34	High	Low	33	
BARLEY		UC 08YP 111 1231 LATE	1385	R	R	MR	-	49.5	49.2	-	-	35	Med. High	Low	33	
BARLEY	2RSM	UC 1390	1390	R	R	R	-	53.9	54.4	-	-	36	Med. High	Low	68	
BARLEY	2RSM	UC UOP 95	1399	R	R	MR	-	50.1	47.8	-	-	33	High	Low	29	
BARLEY		UC UOP 96	1400	R	R	MR	-	50.9	49.3	-	-	34	High	Low	28	
BARLEY		UC UOP 97	1401	R	R	R	-	50.5	46.4	-	-	35	Med. High	Low	28	
BARLEY		UC UOP 98	1402	R	MR	MR	-	49.9	42.3	-	-	34	High	Low	29	
BARLEY		UC UOP 99	1403	R	R	R	-	49.9	44.7	-	-	34	High	Low	27	
BARLEY		UC UOP 100	1404	R	R	MR	-	49.1	42.3	-	-	33	High	Low	29	
BARLEY		UC UOP 102	1405	R	R	R	-	49.4	45.8	-	-	34	Med. High	Low	29	
BARLEY		UC UOP 105	1406	R	MR	MR	-	50.7	47.3	-	-	34	High	Low	29	
BARLEY	2RSM	UC UOP 111	1408	R	R	MS	-	58.5	44.1	-	-	33	Med. High	Low	28	
BARLEY	2RSM	UC MP179	1410	R	R	R	-	52.2	42.5	-	-	29	High	Low	47	
BARLEY	2RSM	LCS GENIE	1414	-	R	R	-	52	48.5	-	-	30	Med. Low	-	93	
BARLEY	2RSM	LCS ODYSSEY	1415	-	R	R	-	52.9	50.2	-	-	28	Med. High	-	40	
BARLEY	2RSM	B9K94	1861	-	-	-	-	-	-	-	-	32	Med. High	-	28	

Genotype-by-environment analyses

Summaries of the GGE analyses of yield data from the 2017-18 season are provided in Figures 7 to 14. For all species there are large changes in variety ranking between test locations in some cases, indicating potentially important genotype-by-environment effects. Individual locations within sub-regions show over-lap with other sub-region axes in many cases, indicating different sub-regions in the 2017-18 season are not distinct from each other in some instances. For the common and durum wheat, the GGE biplots show high-performing varieties tend to cluster near the origin, which indicates that their mean yields are similar, whereas low-performing varieties are spread away from the origin, suggesting that they display a greater range of values.

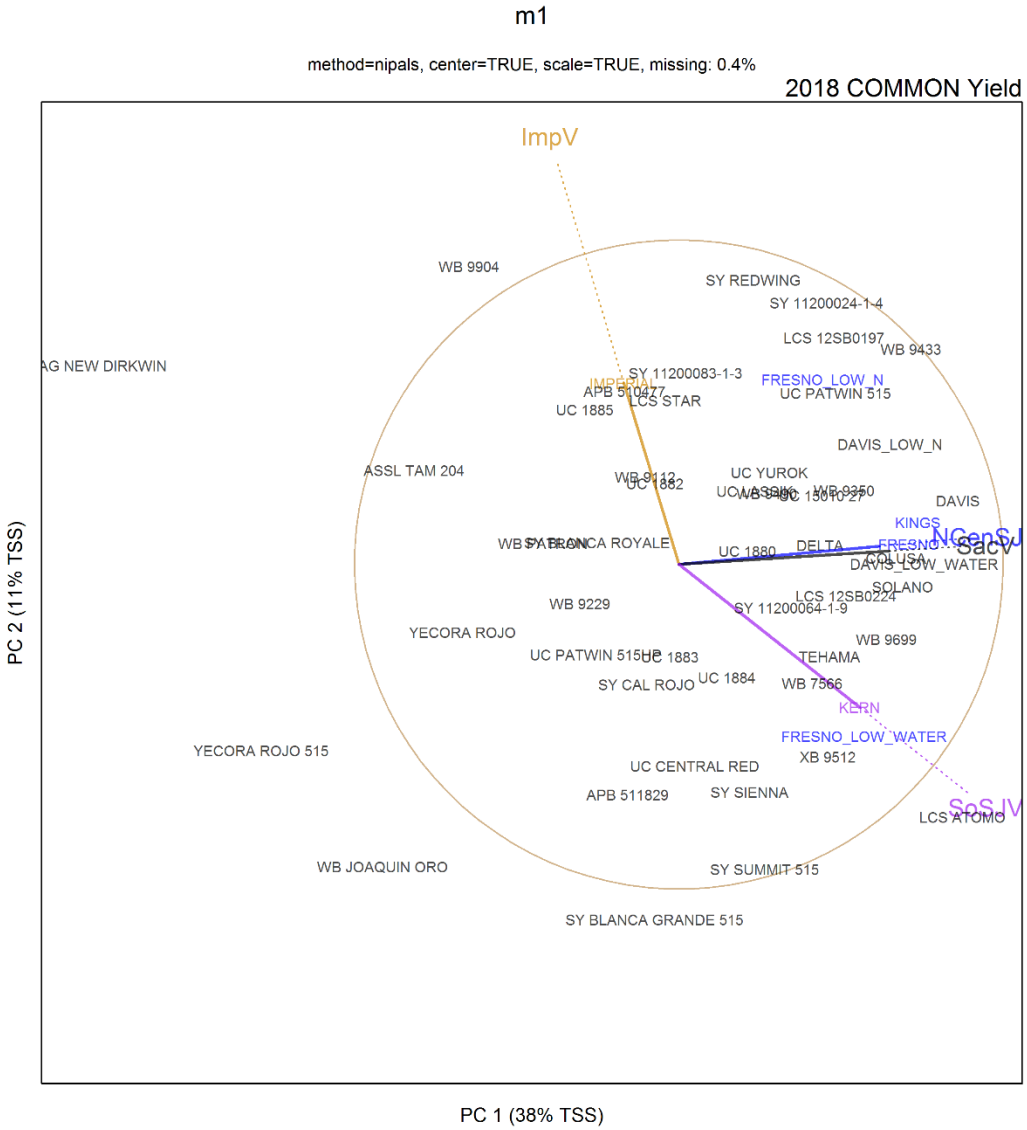


Figure 7. GGE biplot of common wheat yield data from the 2017-18 regional variety trials.

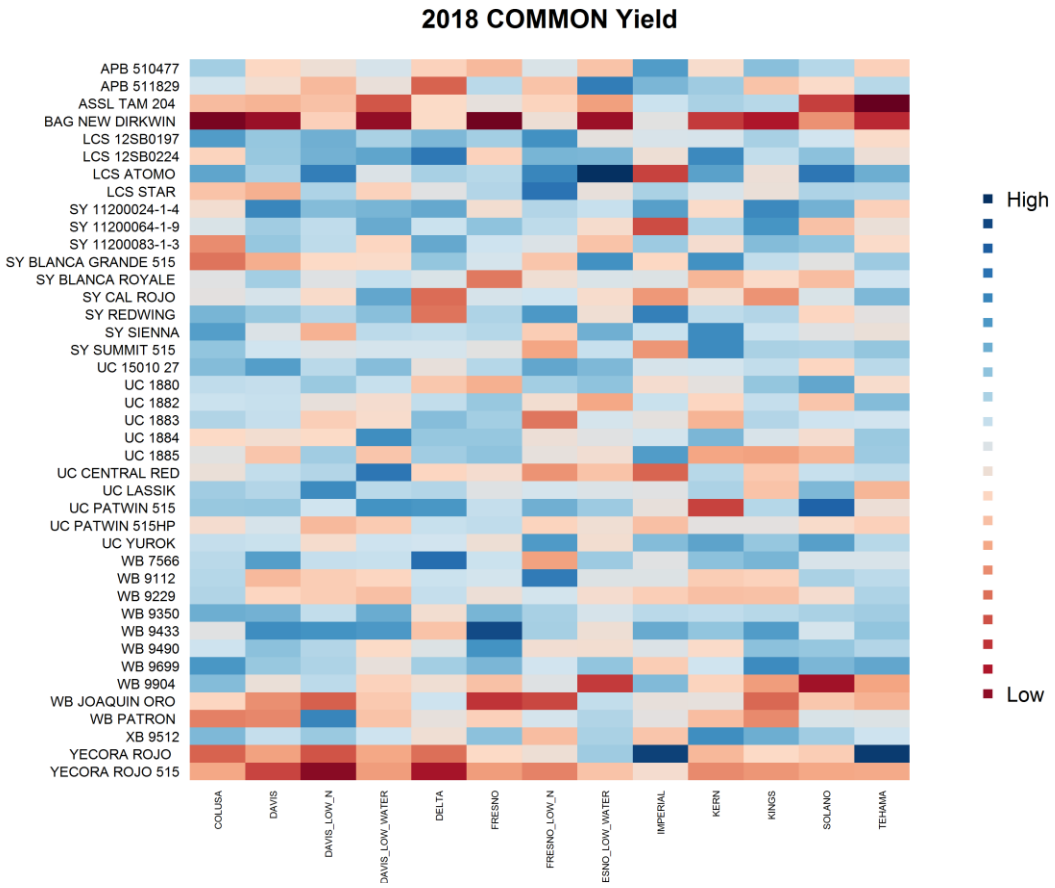


Figure 8. GGE heatmap of common wheat yield data from the 2017-18 regional variety trials.

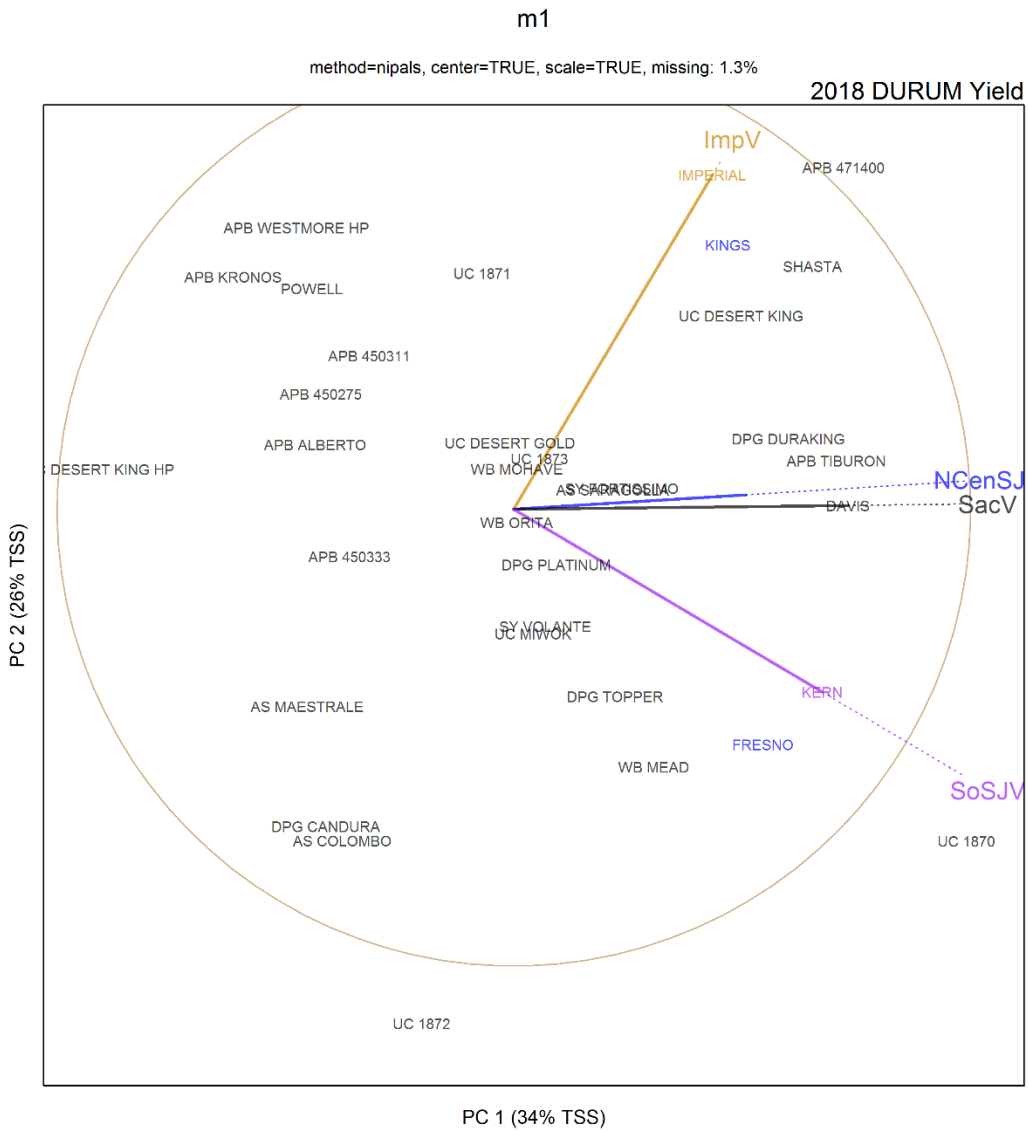


Figure 9. GGE biplot of durum wheat yield data from the 2017-18 regional variety trials.

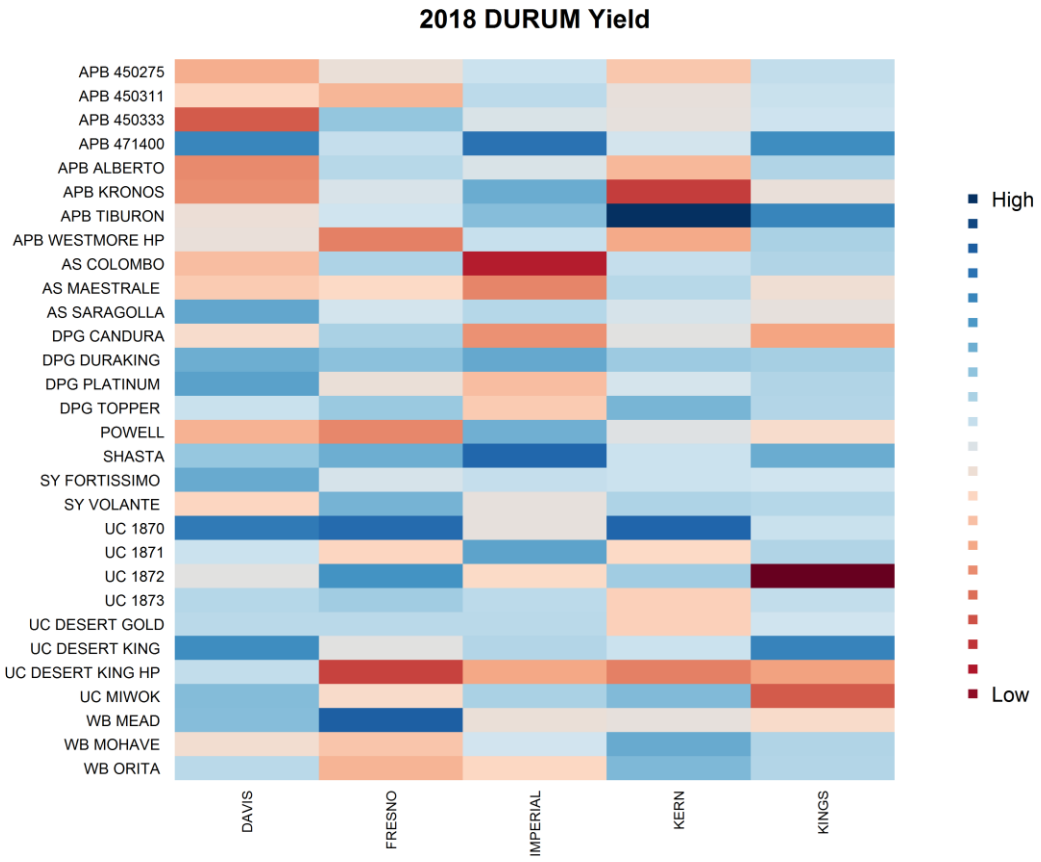


Figure 10. GGE heatmap of durum wheat yield data from the 2017-18 regional variety trial data.

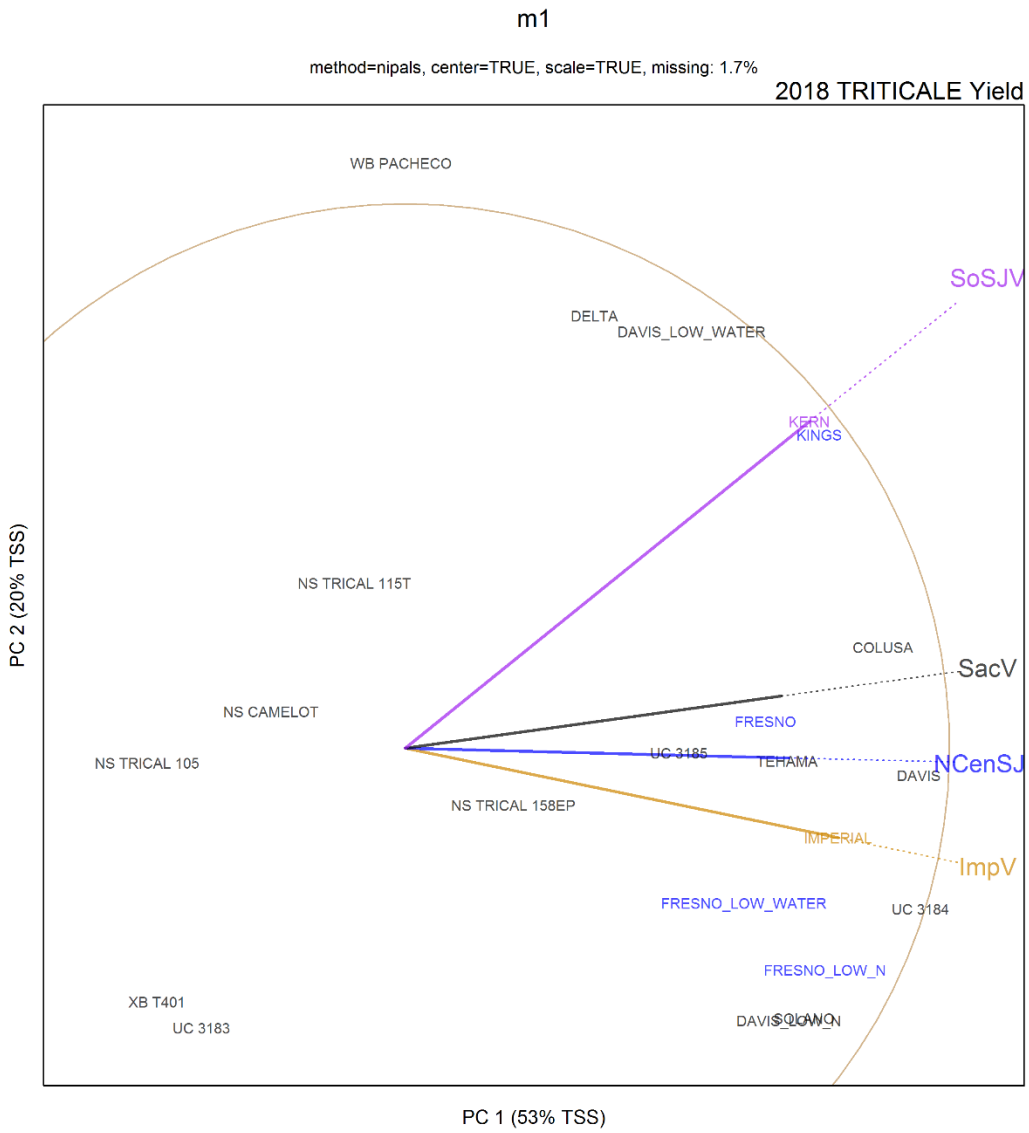


Figure 11. GGE biplot of triticale yield data from the 2017-18 regional variety trials.

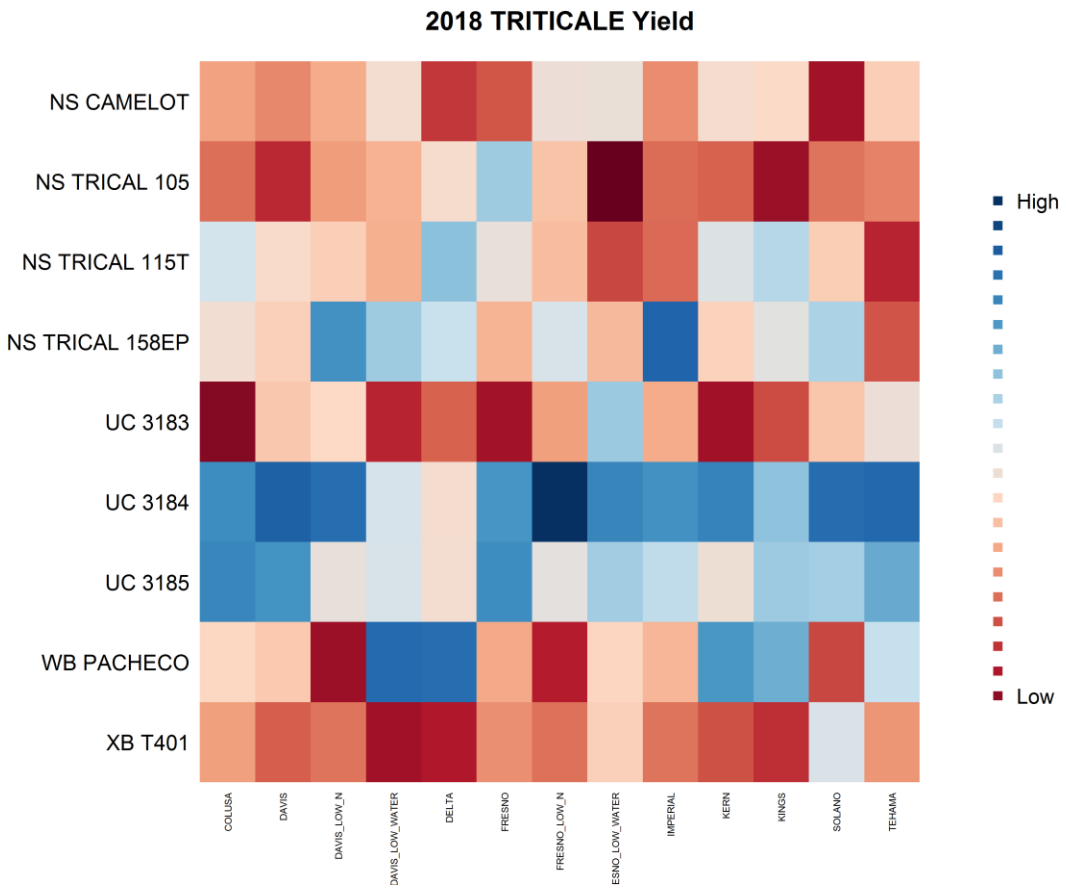


Figure 12. GGE heatmap of triticale yield data from the 2017-18 regional variety trials.

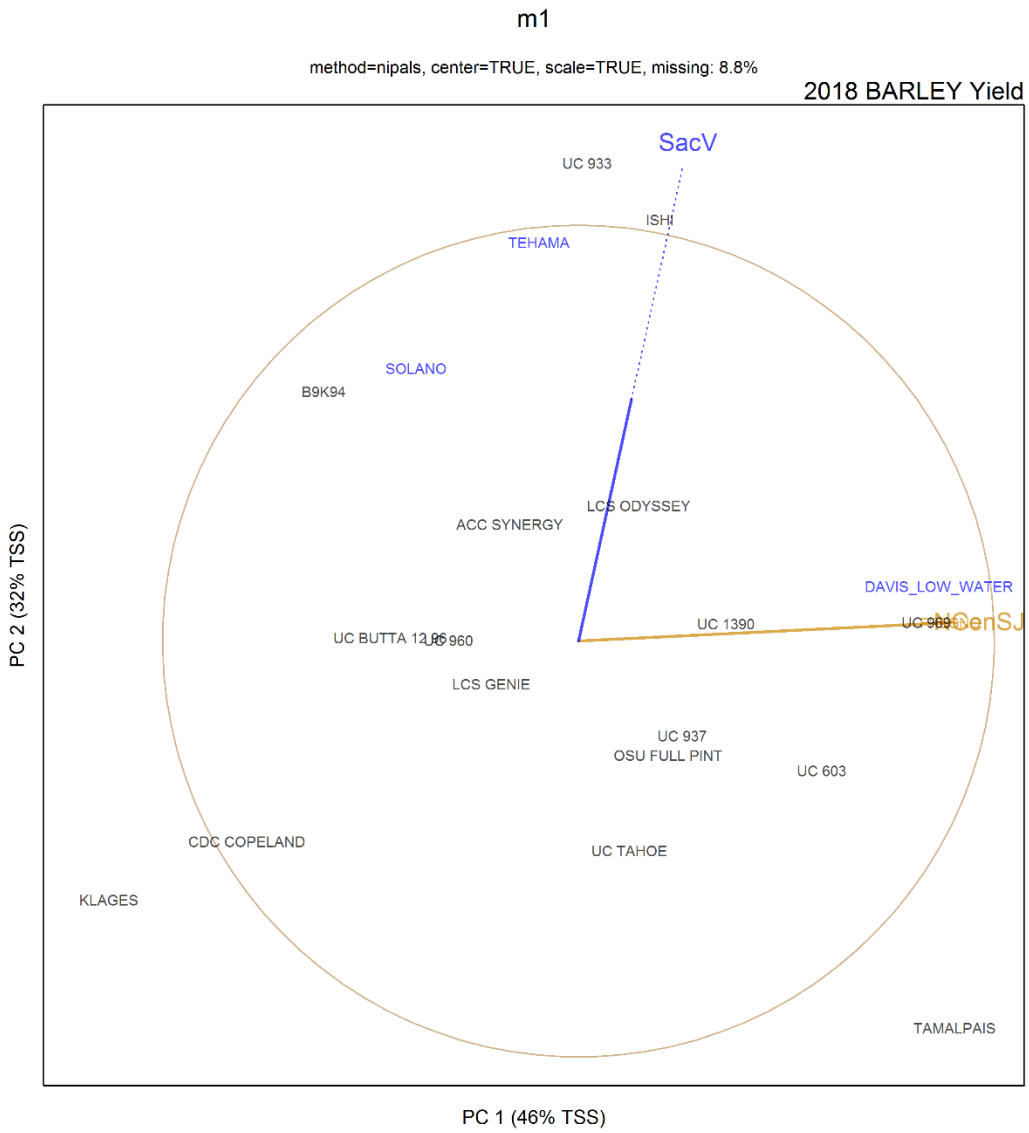


Figure 13. GGE biplot of barley yield data from the 2017-18 regional variety trials.

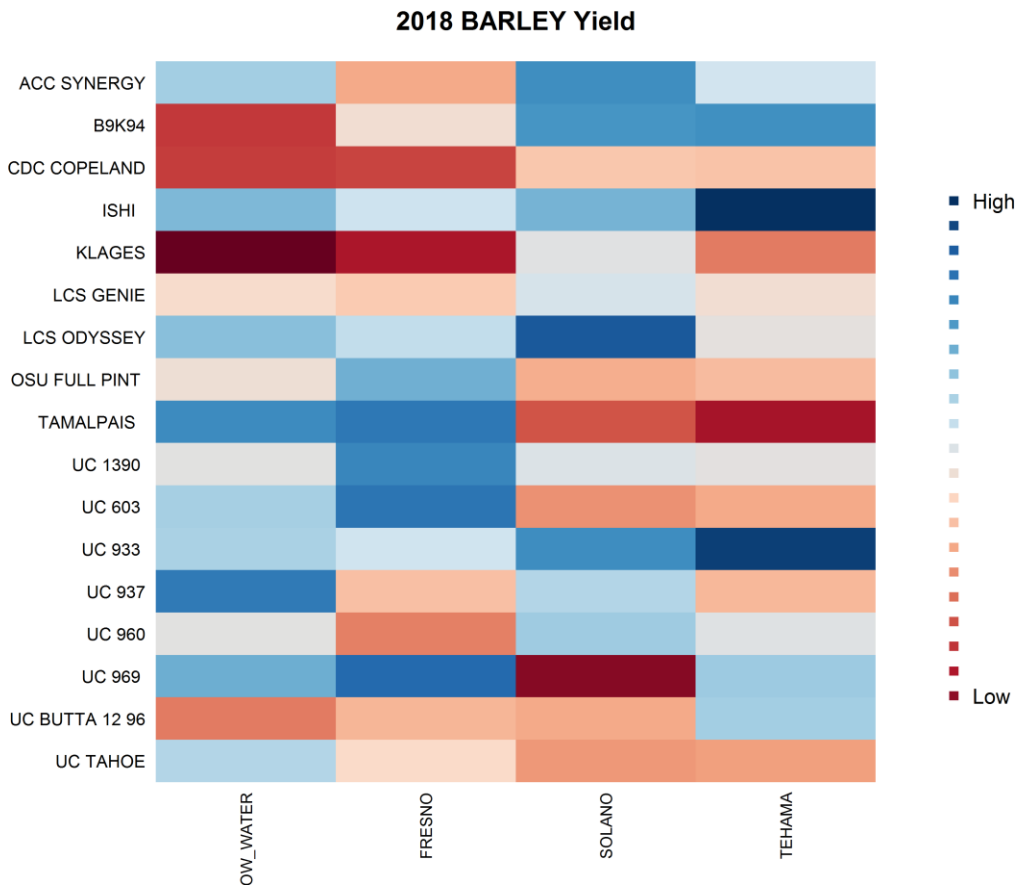


Figure 14. GGE heatmap of barley yield data from the 2017-18 regional variety trials.

Crop productivity in the 2017-18 Collaborative Quality Trials

The absolute yield, range of yields between varieties, and trial error for the common wheat and durum wheat varieties grown in the collaborative trials at Davis and Fresno were slightly higher than the same varieties in the region trials between 2015-16 and 2017-18 (Figure 15) The absolute yield, range of yields between varieties, and trial error for the durum wheat varieties grown in the collaborative trial at Fresno were slightly higher than the same varieties in the regional trails between 2015-16 and 2017-18, whereas the yields at the collaborative trial in the Imperial Valley were marginally lower than yields in the regional trials (Figure 16).

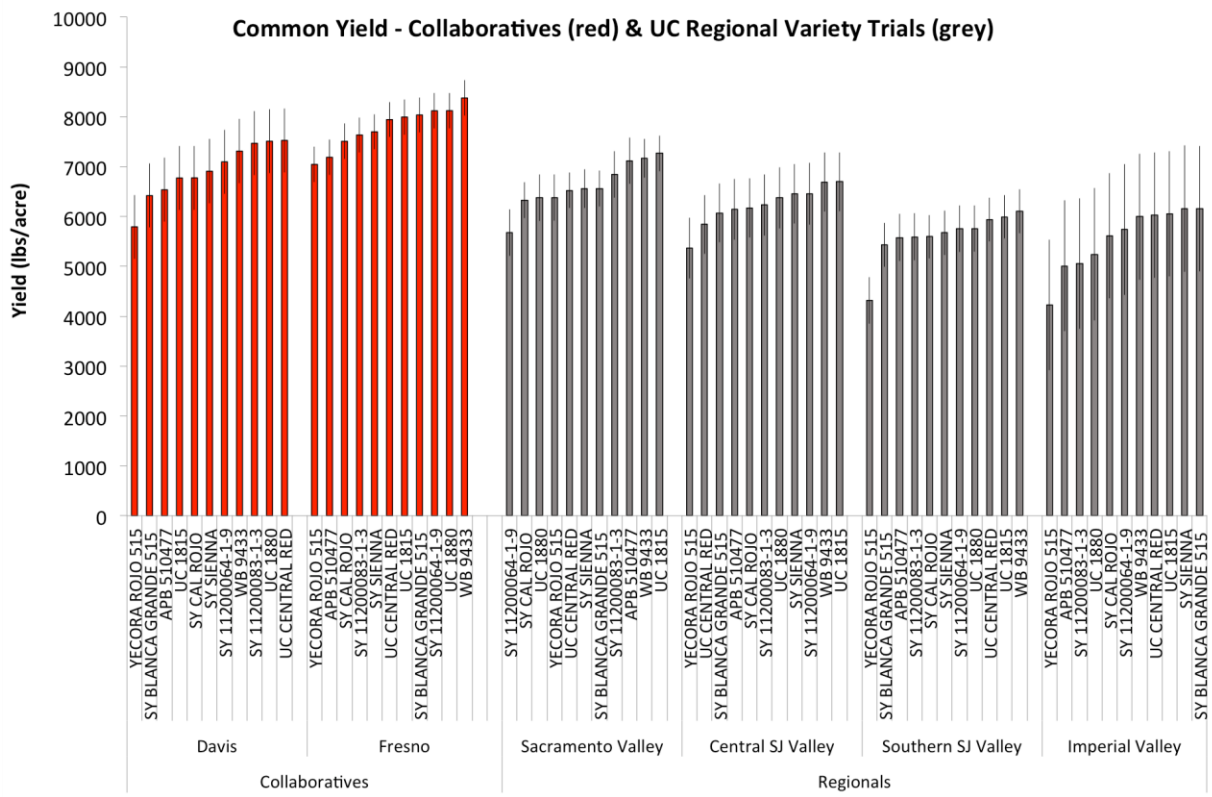


Figure 15. The yield performance of varieties in the common wheat collaborative trials relative to the same varieties in the region trials between the 2013-14 and 2017-18 seasons.

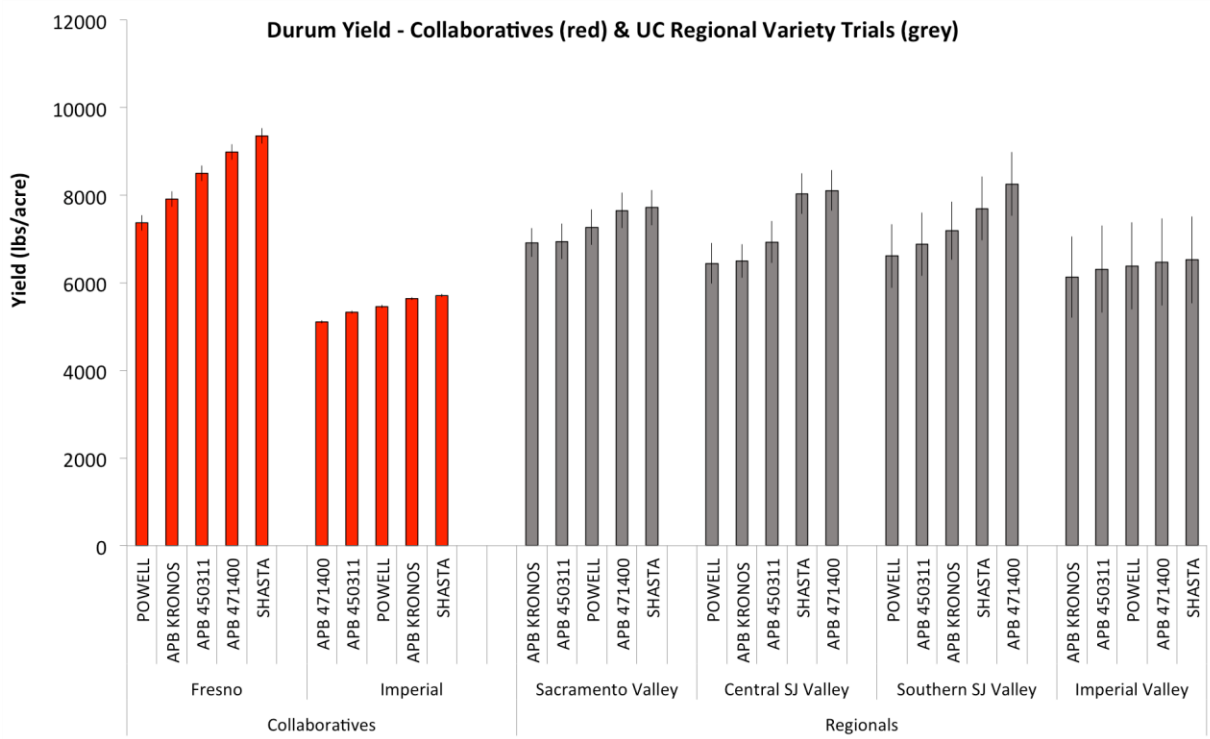


Figure 16. The yield performance of varieties in the durum wheat collaborative trials relative to the same varieties in the region trials between the 2013-14 and 2017-18 seasons.

Crop Quality

Analyses of grain quality performed by the California Wheat Commission quality lab on common wheat samples grown at the Davis and Fresno locations and on durum wheat samples grown at the Fresno and Kern locations are presented in Tables 43 – 46. Further analyses are being conducted on samples from other trial locations and will be made available on the UC Small Grains Agronomy Research and Information Center website when they are completed. In addition, a system of quality classification was developed during the 2017-18 season in cooperation with the California Wheat Commission. Quality results will be incorporated into this quantitative quality metric and reported in the 2019-20 season.

Table 43. 2017-18 Common wheat grain quality from samples growth at the Davis location

Entry	Name		Protein %		Moist	Test Weight	Weight	Diam	Hardness	Fall no.
			(as is)	(12% MB)	%	(lbs/bu)	(mg)	(mm)		(sec)
112	YECORA ROJO		11.54	11.13	8.74	64.59	43.60	3.04	69.83	407
1478	SY CAL ROJO		12.32	11.93	9.18	61.44	40.75	2.83	57.96	442
1495	UC LASSIK		11.35	10.91	8.46	63.69	36.10	2.86	66.79	399
1521	SY REDWING		12.02	11.53	8.24	62.23	42.49	3.10	71.27	435
1522	SY BLANCA ROYALE		12.79	12.27	8.25	63.37	42.52	3.03	62.23	505
1657	SY BLANCA GRANDE 515		13.36	12.80	8.12	64.72	41.31	3.01	59.78	342
1658	SY SUMMIT 515		12.69	12.15	8.12	63.57	41.67	3.09	66.49	388
1667	BAG NEW DIRKWIN		11.10	10.72	8.91	57.72	33.26	2.68	28.05	333
1680	UC PATWIN 515		11.14	10.73	8.65	62.06	34.97	2.83	80.84	371
1688	LCS STAR		13.06	12.60	8.82	62.12	34.90	2.83	71.85	485
1723	LCS ATOMO		12.14	11.71	8.83	64.18	41.94	3.10	81.14	537
1728	WB JOAQUIN ORO		14.66	14.24	9.40	63.68	39.39	2.94	69.99	485
1730	WB 9229		13.98	13.44	8.45	64.08	39.49	2.98	69.68	495
1731	WB PATRON		12.87	12.41	8.77	62.33	38.45	2.86	60.78	487
1743	UC PATWIN 515HP		12.86	12.37	8.51	61.81	37.57	2.84	76.53	496
1745	UC YUROK		12.95	12.40	8.16	63.44	38.02	2.89	66.37	424
1748	WB 9112		13.08	12.54	8.21	63.63	37.34	2.87	72.64	485
1751	WB 9904		12.03	11.63	8.98	62.69	45.09	3.00	59.81	431
1778	ASSL TAM 204		11.65	11.23	8.69	62.10	31.35	2.70	66.05	439
1802	WB 7566		13.04	12.51	8.28	64.34	43.54	3.09	71.10	416
1817	UC CENTRAL RED		12.18	11.73	8.69	63.89	40.29	3.00	78.01	486
1830	LCS 12SB0197		11.77	11.35	8.74	61.13	41.88	3.01	65.48	409
1831	LCS 12SB0224		11.55	11.13	8.69	61.76	40.61	3.02	71.45	380
1835	SY SIENNA		14.18	13.62	8.41	63.04	45.10	3.10	49.21	396
1842	WB 9350		12.64	12.13	8.34	63.06	40.41	2.98	71.05	448
1847	WB 9433		12.72	12.21	8.30	64.07	42.74	3.06	69.59	530
1874	APB 510477		13.29	12.79	8.57	64.64	41.92	3.08	68.52	335
1875	APB 511829		13.49	13.01	8.73	64.11	43.88	3.02	65.32	258
1876	SY 11200064-1-9		11.60	11.16	8.49	64.27	41.50	3.04	62.22	401
1877	SY 11200083-1-3		12.04	11.59	8.63	62.13	39.48	2.96	67.40	347
1878	SY 11200024-1-4		12.85	12.37	8.56	63.21	42.19	3.06	63.10	406
1879	YECORA ROJO 515		13.56	13.04	8.51	61.72	41.62	2.97	67.65	495
1880	UC 1880		12.79	12.30	8.55	62.87	42.86	3.11	70.23	496
1881	UC 1881		13.08	12.57	8.44	62.05	43.32	3.10	75.57	407
1882	UC 1882		12.04	11.58	8.55	62.32	40.49	3.00	58.62	436
1883	UC 1883		13.37	12.84	8.38	62.54	39.16	2.95	69.68	440
1884	UC 1884		13.67	13.17	8.64	64.98	42.46	3.09	63.52	526
1885	UC 1885		10.98	10.58	8.73	61.84	37.96	2.95	68.31	493
1886	XB 9512		12.98	12.47	8.37	64.64	37.98	2.95	68.55	493
1887	XB 9510		11.93	11.47	8.51	64.63	39.16	2.98	71.06	501
1888	XB 9511		12.01	11.55	8.51	64.31	41.63	3.08	70.49	469

Table 44. 2017-18 Common wheat flour quality from samples growth at the Davis location.

		Flour							Mixograph				Regular Bread Test							
Entry	Name	Flour Yield	Flour Protein		Moist	Ash		MillingSscore	ABS	Mixing Peak Time	Mixing Peak Height	Score	Baking	Mix Time	Vol	Dough Handling	Crumb Color	Grumb Grain	Crumb Texture	Bread Symmetry
		%	(as is)	(14% MB)	%	(as is)	(14% MB)		%	(mins)	(M.U)		(abs %)	(min sec)	(cc)	(1-10)	(1-10)	(1-10)	(1-10)	(1-10)
112	YECORA ROJO	70.33	9.86	9.88	14.21	0.48	0.48	80.93	59.1	4.9	45.6	5M	62.5	0:24	905	8	8	7	7	7
1478	SY CAL ROJO	72.22	10.76	10.78	14.16	0.50	0.50	81.61	58.3	3.1	50.4	3M	58.5	7:12	990	9	8	8	8	9
1495	UC LASSIK	72.29	9.83	9.91	14.70	0.51	0.52	80.79	63.5	3.0	46.7	2M	63.0	15:12	925	7	7	6	4	8
1521	SY REDWING	69.69	10.41	10.52	14.92	0.48	0.49	79.83	62.8	3.6	49.7	3M	66.0	12:48	950	8	8	8	8	9
1522	SY BLANCA ROYALE	69.72	10.89	11.04	15.13	0.40	0.40	84.28	58.5	3.5	51.3	3M	60.5	7:12	970	9	8	8	7	9
1657	SY BLANCA GRANDE 515	69.77	11.67	11.79	14.95	0.50	0.50	78.96	64.3	3.4	58.3	3H	64.5	1:12	960	8	8	7	7	9
1658	SY SUMMIT 515	70.29	10.83	10.95	14.94	0.41	0.42	83.97	63.3	2.8	51.4	2M	64.5	10:48	100	8	8	8	8	8
1667	BAG NEW DIRKWIN	67.05	9.54	9.54	14.01	0.43	0.43	79.89	54.6	2.0	44.5	2M	55.0	21:36	925	3	6	6	7	5
1680	UC PATWIN 515	68.56	9.50	9.58	14.73	0.51	0.51	77.20	62.8	3.0	54.4	3M	63.0	22:00	970	8	8	7	7	8
1688	LCS STAR	72.90	11.30	11.35	14.33	0.53	0.54	80.48	60.4	4.0	49.4	4H	62.0	16:00	960	9	8	7	8	9
1723	LCS ATOMO	69.89	10.84	10.84	14.00	0.49	0.49	79.69	64.7	3.0	51.0	3M	67.0	3:36	935	8	8	7	7	8
1728	WB JOAQUIN ORO	70.06	12.97	13.06	14.61	0.44	0.44	82.46	65.7	3.2	67.5	3H	66.5	2:24	1070	10	8	9	8	10
1730	WB 9229	68.15	12.39	12.57	15.23	0.46	0.47	78.98	65.8	3.7	63.6	4H	66.5	18:24	1040	10	8	8	7	9
1731	WB PATRON	69.19	11.29	11.38	14.75	0.39	0.39	84.15	59.9	1.4	59.7	1H	60.5	18:24	890	4	8	6	7	7
1743	UC PATWIN 515HP	69.43	11.05	11.11	14.51	0.45	0.45	81.35	64.8	3.1	53.7	3M	64.0	12:00	945	7	8	8	8	8
1745	UC YUROK	71.82	11.29	11.37	14.67	0.40	0.40	86.31	63.9	2.1	55.4	1M	62.5	8:00	995	8	8	7	7	8
1748	WB 9112	71.57	11.47	11.46	13.96	0.51	0.51	80.48	63.7	3.6	54.4	4M	64.5	13:12	1070	8	7	6	7	9
1751	WB 9904	73.61	10.48	10.54	14.54	0.47	0.48	84.36	58.2	2.3	51.4	2M	60.5	12:48	920	5	9	8	7	8
1778	ASSL TAM 204	70.37	10.11	10.11	14.02	0.43	0.43	83.17	57.9	2.0	46.3	2M	58.5	7:36	870	4	8	5	5	5
1802	WB 7566	71.11	11.48	11.46	13.84	0.46	0.46	82.56	63.5	3.5	51.4	4M	65.0	12:24	920	7	8	7	8	8
1817	UC CENTRAL RED	68.10	10.69	10.82	15.06	0.45	0.46	79.54	64.5	4.1	47.6	3M	63.5	9:36	925	8	9	8	8	8
1830	LCS 12SB0197	71.76	10.34	10.36	14.18	0.48	0.48	82.17	59.8	3.3	51.5	3M	63.0	3:36	1010	9	8	8	9	9
1831	LCS 12SB0224	70.56	10.21	10.23	14.25	0.54	0.54	77.82	59.0	3.9	52.7	4M	63.5	15:12	975	9	8	9	9	9
1835	SY SIENNA	70.97	12.62	12.74	14.87	0.47	0.47	81.90	60.3	3.6	52.0	4M	61.5	14:48	1060	9	8	9	8	10
1842	WB 9350	72.12	10.86	10.90	14.31	0.45	0.45	83.95	60.7	6.1	49.1	6M	65.0	14:48	950	7	8	9	8	8
1847	WB 9433	72.67	11.13	11.16	14.23	0.47	0.47	83.62	62.0	5.8	49.6	6M	66.5	0:00	945	8	9	9	9	9
1874	APB 510477	72.69	11.84	11.86	14.11	0.40	0.40	87.41	63.0	2.7	54.5	2M	63.5	19:12	1055	9	8	7	7	9
1875	APB 511829	73.75	12.02	12.04	14.17	0.48	0.48	84.29	62.5	2.6	54.2	3H	63.5	21:12	1035	9	8	8	8	9
1876	SY 11200064-1-9	70.48	9.75	9.83	14.70	0.48	0.49	80.61	57.4	2.7	45.8	3M	61.5	10:24	910	7	8	6	7	8
1877	SY 11200083-1-3	69.69	10.65	10.74	14.66	0.48	0.48	80.03	60.9	7.5	42.9	7M	63.0	9:12	925	7	8	7	8	8
1878	SY 11200024-1-4	70.79	11.05	11.16	14.82	0.49	0.49	80.48	61.4	4.7	45.0	4M	61.5	2:48	900	7	8	7	7	8
1879	YECORA ROJO 515	67.04	12.10	12.22	14.83	0.48	0.48	77.09	64.4	6.0	44.8	6M	62.5	16:24	960	9	8	8	6	8
1880	UC 1880	70.09	11.11	11.17	14.45	0.47	0.47	80.85	65.7	2.5	53.3	2H	65.5	22:24	995	9	8	7	6	9
1881	UC 1881	69.45	11.25	11.35	14.79	0.42	0.42	82.87	63.0	4.2	56.1	5M	65.5	13:36	1010	9	8	8	9	8
1882	UC 1882	67.80	10.67	10.77	14.77	0.45	0.45	79.63	58.4	3.8	44.2	3M	60.0	22:24	970	7	8	7	7	8
1883	UC 1883	68.41	11.79	11.93	14.96	0.43	0.44	81.01	60.1	3.1	55.5	3M	60.5	9:36	985	9	9	8	8	8
1884	UC 1884	70.46	11.55	11.71	15.14	0.37	0.37	86.62	62.6	6.4	49.1	6M	64.5	16:48	1060	8	8	7	8	7
1885	UC 1885	66.17	9.38	9.46	14.76	0.47	0.48	76.52	56.6	4.5	51.0	5M	59.0	21:36	950	8	8	7	8	7
1886	XB 9512	72.51	11.37	11.42	14.33	0.48	0.48	82.79	58.8	4.5	58.2	4M	59.5	5:36	925	8	8	9	8	9
1887	XB 9510	73.96	10.35	10.35	14.07	0.49	0.50	83.77	61.2	2.1	56.9	2M	63.5	8:48	970	4	8	7	7	8
1888	XB 9511	69.81	10.31	10.32	14.06	0.43	0.43	82.67	60.6	4.6	46.2	5M	63.0	10:48	1005	8	8	8	8	8

Table 45. 2017-18 Common wheat grain quality from samples growth at the Fresno location

			Wheat							
Entry	Name		Protein %		Moist	Test Weight	Weight	Diam	Hardness	Fall no.
			(as is)	(12% MB)	%	(lbs/bu)	(mg)	(mm)		(sec)
112	YECORA ROJO		13.75	13.23	8.57	65.01	46.69	3.13	67.71	423
1478	SY CAL ROJO		12.22	11.78	8.71	63.88	44.64	2.99	60.56	388
1495	UC LASSIK		12.19	11.61	7.66	64.81	37.53	2.91	68.17	404
1521	SY REDWING		12.48	11.98	8.33	63.52	40.32	3.04	77.59	430
1522	SY BLANCA ROYALE		13.57	13.03	8.32	63.82	38.97	2.92	71.26	522
1657	SY BLANCA GRANDE 515		13.70	13.12	8.06	66.20	42.28	3.07	60.23	333
1658	SY SUMMIT 515		13.54	12.98	8.21	64.92	41.34	3.04	66.72	337
1667	BAG NEW DIRKWIN		10.93	10.54	8.72	59.52	38.54	2.86	27.81	337
1680	UC PATWIN 515		12.12	11.60	8.05	64.15	39.56	2.98	74.64	363
1688	LCS STAR		13.03	12.49	8.24	64.45	39.07	2.97	69.66	502
1723	LCS ATOMO		10.81	10.37	8.30	64.85	41.11	3.07	83.02	425
1728	WB JOAQUIN ORO		13.69	13.11	8.13	65.08	42.20	3.08	66.31	359
1730	WB 9229		13.87	13.31	8.31	64.81	40.71	3.05	72.37	456
1731	WB PATRON		13.73	13.22	8.63	63.76	44.46	3.04	62.54	483
1743	UC PATWIN 515HP		13.77	13.21	8.30	63.15	36.92	2.87	78.42	604
1745	UC YUROK		13.61	13.01	7.96	64.42	39.56	2.99	60.77	403
1748	WB 9112		13.41	12.87	8.32	64.37	39.17	2.95	73.26	440
1751	WB 9904		12.01	11.56	8.57	63.85	48.36	3.13	60.15	456
1778	ASSL TAM 204		12.91	12.41	8.47	61.15	32.68	2.81	70.99	425
1802	WB 7566		9.88	9.48	8.33	64.99	42.45	2.99	75.89	414
1817	UC CENTRAL RED		11.79	11.29	8.09	65.38	42.17	3.07	78.39	491
1830	LCS 12SB0197		12.25	11.77	8.47	63.46	39.33	2.92	70.58	425
1831	LCS 12SB0224		13.35	12.81	8.27	63.90	41.73	3.01	70.67	430
1835	SY SIENNA		12.71	12.22	8.47	64.95	46.03	3.12	55.91	463
1842	WB 9350		9.78	9.45	8.93	64.56	42.45	2.99	75.89	412
1847	WB 9433		10.57	10.16	8.42	66.06	44.36	3.10	71.84	421
1874	APB 510477		13.24	12.67	8.02	64.29	42.52	3.09	65.22	409
1875	APB 511829		13.67	13.13	8.36	65.21	43.06	2.99	68.79	414
1876	SY 11200064-1-9		12.08	11.55	7.98	65.43	44.62	3.17	61.28	394
1877	SY 11200083-1-3		13.58	13.03	8.31	63.63	42.93	3.04	67.24	405
1878	SY 11200024-1-4		11.67	11.21	8.38	64.51	43.15	3.08	61.65	348
1879	YECORA ROJO 515		13.78	13.22	8.33	63.42	42.79	3.03	68.74	436
1880	UC 1880		11.12	10.67	8.25	64.27	44.31	3.17	69.57	473
1881	UC 1881		9.87	9.45	8.11	63.04	40.51	3.00	74.92	380
1882	UC 1882		13.91	13.34	8.26	63.48	43.10	3.14	59.71	449
1883	UC 1883		14.58	13.96	8.13	64.30	42.63	3.11	60.07	459
1884	UC 1884		13.10	12.59	8.41	61.96	43.05	3.12	69.64	485
1885	UC 1885		12.87	12.35	8.30	64.72	37.59	2.94	66.69	363
1886	XB 9512		12.64	12.12	8.24	65.04	39.68	2.98	74.37	364
1887	XB 9510		11.69	11.25	8.57	64.93	39.68	2.99	71.04	378
1888	XB 9511		13.77	13.24	8.47	65.44	44.18	3.13	72.66	420

Table 46. 2017-18 Common wheat flour quality from samples growth at the Fresno location.

		Flour							Mixograph				Regular Bread Test							
Entry	Name	Flour Yield	Flour Protein		Moist	Ash		Milling Sscore	ABS	Mixing Peak Time	Mixing Peak Height	Score	Baking	Mix Time	Vol	Dough Handling	Crumb Color	Grumb Grain	Crumb Texture	Bread Symmetry
		%	(as is)	(14% MB)	%	(as is)	(14% MB)		%	(mins)	(M.U)		(abs %)	(min sec)	(cc)	(1-10)	(1-10)	(1-10)	(1-10)	(1-10)
112	YECORA ROJO	73.01	12.15	12.15	14.06	0.43	0.43	86.41	60.3	3.9	55.8	4M	61.0	18:00	1000	8	8	8	8	9
1478	SY CAL ROJO	74.71	10.60	10.58	13.81	0.53	0.53	82.92	58.6	3.0	46.6	3M	61.5	10:24	950	7	8	8	7	7
1495	UC LASSIK	73.81	10.69	10.79	14.76	0.46	0.46	85.35	62.6	2.2	58.1	2H	66.0	16:24	925	7	8	6	6	7
1521	SY REDWING	71.09	10.88	10.91	14.28	0.46	0.46	82.64	62.5	3.5	49.7	4M	65.5	17:36	1025	8	8	8	8	8
1522	SY BLANCA ROYALE	70.79	11.78	11.81	14.20	0.48	0.48	81.13	58.0	3.6	49.3	4M	60.5	18:24	900	7	8	7	8	7
1657	SY BLANCA GRANDE 515	73.30	12.21	12.23	14.17	0.41	0.41	87.64	64.0	3.4	51.6	3M	64.5	20:00	1025	7	8	7	8	8
1658	SY SUMMIT 515	73.33	11.84	11.80	13.70	0.46	0.46	84.89	62.4	2.5	50.1	2M	63.5	12:48	975	7	8	7	7	8
1667	BAG NEW DIRKWIN	71.12	9.05	9.07	14.19	0.42	0.42	84.75	54.0	2.2	42.1	2L	55.5	3:36	920	3	6	6	4	7
1680	UC PATWIN 515	70.50	10.62	10.63	14.16	0.51	0.51	79.50	62.5	2.8	50.0	3M	66.0	0:00	940	6	8	8	7	7
1688	LCS STAR	74.13	11.54	11.54	13.97	0.48	0.48	84.76	60.7	4.0	45.4	4M	62.5	6:00	965	7	8	8	8	8
1723	LCS ATOMO	67.78	9.27	9.33	14.55	0.45	0.45	79.64	64.4	3.4	43.2	3M	67.5	4:00	910	5	8	7	6	7
1728	WB JOAQUIN ORO	72.73	12.45	12.47	14.15	0.44	0.43	85.60	65.2	3.7	51.5	4M	65.5	20:24	1040	9	8	9	8	9
1730	WB 9229	72.16	12.29	12.29	13.99	0.46	0.46	83.75	65.2	3.8	49.9	4M	66.5	0:48	1040	9	8	9	9	9
1731	WB PATRON	73.21	11.92	11.87	13.64	0.43	0.43	86.51	61.6	1.4	49.3	1M	62.0	20:00	900	2	8	6	4	7
1743	UC PATWIN 515HP	71.80	12.24	12.24	14.03	0.49	0.49	81.57	63.7	2.8	54.1	3H	64.0	18:24	935	8	8	7	8	7
1745	UC YUROK	74.16	12.26	12.29	14.21	0.41	0.41	88.41	62.6	1.8	54.8	2H	63.5	18:48	990	7	8	6	7	9
1748	WB 9112	73.24	12.17	12.12	13.63	0.45	0.46	85.15	64.3	3.6	50.5	4M	65.0	0:00	990	8	8	8	8	9
1751	WB 9904	74.13	10.36	10.38	14.13	0.45	0.45	86.41	57.9	2.3	43.4	3M	60.5	21:36	885	4	8	6	6	7
1778	ASSL TAM 204	70.31	10.91	10.93	14.21	0.44	0.44	83.01	56.8	1.6	53.8	2M	58.5	22:24	935	5	8	6	5	7
1802	WB 7566	67.73	8.43	8.42	13.86	0.44	0.44	79.99	64.3	5.1	35.8	5L	67.0	20:00	840	4	6	6	5	5
1817	UC CENTRAL RED	70.19	10.31	10.34	14.25	0.47	0.47	81.03	62.9	3.6	41.3	4M	65.5	14:48	925	7	8	8	8	7
1830	LCS 12SB0197	73.68	11.12	11.08	13.69	0.50	0.50	83.39	60.6	3.2	49.9	3M	64.0	4:48	855	8	8	9	9	6
1831	LCS 12SB0224	71.69	11.66	11.69	14.25	0.50	0.50	81.23	60.4	4.0	50.9	4M	64.0	2:00	945	7	8	9	9	8
1835	SY SIENNA	74.31	11.38	11.37	13.92	0.48	0.48	85.06	59.0	4.0	44.7	4M	63.0	10:24	910	7	8	8	7	7
1842	WB 9350	70.80	8.33	8.33	13.97	0.47	0.47	81.82	61.8	0.9	32.6	7L	64.5	0:00	890	6	8	8	8	7
1847	WB 9433	72.18	9.21	9.19	13.80	0.49	0.49	82.12	61.7	8.5	36.7	8L	62.5	22:00	950	5	8	7	6	7
1874	APB 510477	70.60	11.79	11.82	14.24	0.45	0.45	82.55	62.7	2.5	49.9	2M	63.5	8:48	1035	7	8	7	8	9
1875	APB 511829	72.86	12.09	12.11	14.13	0.47	0.47	84.12	62.4	2.9	55.2	3M	65.0	18:24	970	7	8	8	8	8
1876	SY 11200064-1-9	73.44	10.76	10.81	14.37	0.46	0.45	85.23	57.9	3.1	46.7	3M	60.5	1:36	900	7	8	7	8	7
1877	SY 11200083-1-3	73.43	11.82	11.85	14.21	0.49	0.49	83.42	61.0	4.8	50.8	5M	63.5	0:24	1035	8	8	8	7	9
1878	SY 11200024-1-4	74.09	10.01	10.02	14.07	0.52	0.52	82.43	57.0	4.1	44.1	4M	62.5	16:00	890	4	8	6	4	7
1879	YECORA ROJO 515	70.15	12.36	12.32	13.78	0.48	0.48	80.41	62.7	6.5	44.4	6M	65.0	8:00	960	9	8	7	8	9
1880	UC 1880	68.72	9.77	9.76	13.94	0.50	0.50	77.99	64.5	2.4	45.6	3M	67.5	2:00	970	7	8	7	8	8
1881	UC 1881	69.09	8.66	8.66	13.98	0.50	0.50	78.30	62.9	4.8	36.8	5L	65.5	12:00	895	5	8	6	7	7
1882	UC 1882	73.73	12.32	12.30	13.89	0.49	0.49	83.73	60.3	2.8	52.7	3M	62.5	16:24	990	7	8	8	7	7
1883	UC 1883	72.45	12.60	12.64	14.28	0.43	0.43	85.41	60.2	2.5	57.9	2H	60.5	13:36	1040	8	8	8	8	8
1884	UC 1884	71.86	11.84	11.82	13.81	0.44	0.44	84.46	57.8	3.0	46.6	3M	61.5	19:12	1020	8	8	9	8	8
1885	UC 1885	72.70	11.76	11.77	14.10	0.43	0.43	85.75	64.8	3.2	51.9	3M	67.5	20:48	1020	8	8	7	7	8
1886	XB 9512	74.27	10.88	10.83	13.61	0.42	0.42	88.15	59.4	3.8	59.4	4H	62.0	16:00	1035	7	8	8	8	8
1887	XB 9510	74.30	10.50	10.47	13.81	0.42	0.42	88.29	59.6	2.4	57.8	2H	62.0	10:00	935	7	8	6	6	7
1888	XB 9511	71.11	11.86	11.86	14.03	0.39	0.39	86.50	62.4	3.9	55.5	4M	64.0	16:48	980	8	8	8	8	8

Table 47. 2017-18 Durum wheat grain quality from samples growth at the Fresno location.

Entry	Name		Protein %		Moisture %	Ash %		Test Weight	1000 KWt	Kernel Size Dist (100 g)		
			(as is)	(12% MB)		(as is)	(12% MB)	(lbs/bu)		L	M	S
878	DPG DURA KING		13.06	12.46	7.73	1.34	1.28	63.93	43.48	86	14	0
951	APB KRONOS		12.81	12.20	7.62	1.42	1.35	63.76	53.76	98	2	0
1210	DPG PLATINUM		12.69	12.06	7.44	1.32	1.25	64.20	49.02	93	7	0
1211	DPG TOPPER		11.90	11.34	7.65	1.23	1.17	65.72	45.45	87	13	0
1215	WB ORITA		14.85	14.16	7.71	1.37	1.31	62.71	52.08	96	4	0
1375	UC DESERT KING		13.75	13.16	8.03	1.38	1.32	64.14	49.50	95	5	0
1429	SY FORTISSIMO		12.01	11.44	7.65	1.37	1.30	63.61	45.45	90	10	0
1431	SY VOLANTE		11.76	11.19	7.49	1.26	1.20	65.21	54.05	97	3	0
1484	APB WESTMORE HP		15.20	14.48	7.63	1.41	1.34	61.23	40.00	86	14	0
1582	AS MAESTRALE		12.98	12.35	7.51	1.40	1.34	63.20	43.48	85	14	1
1583	AS SARAGOLLA		12.70	12.08	7.47	1.40	1.33	63.93	47.39	89	10	1
1607	WB MEAD		14.09	13.43	7.65	1.40	1.33	63.78	49.75	91	9	0
1627	UC DESERT KING HP		14.59	13.89	7.58	1.53	1.46	61.53	44.25	92	8	0
1640	APB TIBURON		13.40	12.78	7.73	1.46	1.39	62.77	57.80	98	2	0
1654	WB MOHAVE		13.79	13.15	7.71	1.36	1.30	63.38	47.17	93	7	0
1690	UC MIWOK		13.60	13.02	8.11	1.43	1.37	63.65	56.50	98	2	0
1800	AS COLOMBO		12.09	11.49	7.42	1.30	1.24	64.58	47.39	91	9	0
1813	APB ALBERTO		11.90	11.34	7.67	1.49	1.42	63.82	53.19	97	3	0
1850	UC DESERT GOLD		12.61	12.01	7.60	1.33	1.26	64.82	50.25	94	6	0
1863	APB 450311		12.98	12.39	7.78	1.27	1.21	63.25	51.55	97	3	0
1864	APB 471400		11.86	11.30	7.67	1.24	1.18	65.36	53.76	96	4	0
1865	APB 450275		12.87	12.26	7.64	1.36	1.29	63.21	49.50	96	4	0
1866	APB 450333		12.39	11.83	7.82	1.55	1.48	64.23	48.54	96	4	0
1867	DPG CANDURA		12.50	11.90	7.59	1.26	1.20	63.97	46.30	90	10	0
1868	POWELL		14.15	13.48	7.60	1.52	1.45	64.93	59.52	98	2	0
1869	SHASTA		13.03	12.43	7.77	1.41	1.35	65.02	61.73	97	3	0
1870	UC 1870		12.66	12.06	7.56	1.33	1.27	64.89	51.30	97	3	0
1871	UC 1871		13.51	12.86	7.56	1.41	1.34	64.14	48.54	96	4	0
1872	UC 1872		12.60	12.03	7.80	1.52	1.45	64.91	49.02	95	5	0
1873	UC 1873		13.46	12.81	7.56	1.49	1.42	63.51	43.67	92	8	0

Table 48. 2017-18 Durum wheat grain quality from samples growth at the Kern location.

Entry	Name		Protein %		Moisture %	Ash %		Test Weight	1000 KWt	Kernel Size Dist (100 g)		
			(as is)	(12% MB)		(as is)	(12% MB)	(lbs/bu)		L	M	S
878	DPG DURA KING		15.00	14.37	8.14	2.13	2.04	60.69	39.37	73	26	1
951	APB KRONOS		15.62	14.95	8.08	2.22	2.13	59.81	39.84	89	11	0
1210	DPG PLATINUM		15.30	14.64	8.04	2.29	2.20	60.55	35.84	65	34	1
1211	DPG TOPPER		14.27	13.67	8.10	2.05	1.97	63.21	40.98	84	16	0
1215	WB ORITA		15.53	14.86	8.06	2.05	1.96	61.04	47.62	92	8	0
1375	UC DESERT KING		14.52	13.86	7.83	2.16	2.06	60.56	41.10	79	20	1
1429	SY FORTISSIMO		14.68	14.00	7.70	2.18	2.08	61.06	37.59	68	32	0
1431	SY VOLANTE		14.84	14.15	7.68	2.04	1.94	60.71	43.10	86	14	0
1484	APB WESTMORE HP		15.62	14.93	7.96	2.00	1.91	60.42	33.00	67	32	1
1582	AS MAESTRALE		14.04	13.46	8.23	1.96	1.88	61.75	37.17	75	24	1
1583	AS SARAGOLLA		14.07	13.48	8.13	2.17	2.08	61.78	35.84	71	28	1
1607	WB MEAD		15.20	14.51	7.79	2.31	2.20	59.47	39.37	80	19	1
1627	UC DESERT KING HP		15.54	14.78	7.48	2.19	2.08	60.16	39.23	77	22	1
1640	APB TIBURON		15.72	15.03	7.94	2.13	2.03	60.58	46.73	91	9	0
1654	WB MOHAVE		15.42	14.72	7.85	2.02	1.93	61.45	40.32	80	20	0
1690	UC MIWOK		14.78	14.07	7.55	1.96	1.86	61.55	44.80	89	11	0
1800	AS COLOMBO		14.79	14.16	8.09	2.12	2.03	61.72	41.84	85	15	0
1813	APB ALBERTO		15.95	15.28	8.15	2.24	2.15	58.94	38.76	85	14	1
1850	UC DESERT GOLD		14.29	13.65	7.87	1.91	1.83	60.71	40.50	79	20	1
1863	APB 450311		15.72	15.05	8.07	2.25	2.15	58.37	38.61	85	15	0
1864	APB 471400		13.98	13.37	7.99	2.19	2.09	59.89	33.67	69	31	1
1865	APB 450275		15.74	15.05	7.98	2.16	2.07	58.59	38.91	82	18	0
1866	APB 450333		15.28	14.57	7.73	2.24	2.13	59.61	42.02	87	13	0
1867	DPG CANDURA		14.24	13.62	7.97	2.34	2.24	61.26	38.02	78	21	1
1868	POWELL		15.44	14.71	7.67	2.22	2.11	62.73	34.97	88	11	1
1869	SHASTA		15.27	14.57	7.76	2.14	2.04	62.02	42.92	84	15	1
1870	UC 1870		14.60	13.92	7.69	1.83	1.75	61.88	41.80	72	27	1
1871	UC 1871		14.52	13.85	7.73	2.01	1.91	61.82	40.10	76	24	0
1872	UC 1872		14.70	14.01	7.68	1.93	1.84	61.17	42.20	84	16	0
1873	UC 1873		15.71	14.98	7.72	2.21	2.11	61.42	39.50	73	26	1

Effect of reduced nitrogen & water availability on crop productivity

2017-18 was the second season that managed nitrogen (N) and water stress trials were included as part of the variety testing efforts. Relative to the conventionally managed trial, the low water common wheat trial at Fresno received approximately 3.5 inches less irrigation than the conventionally managed trial, and the low water trial in Davis received approximately 8.5 inches less irrigation during the 2017-18 season. In the N stress trials at these locations, no N fertilizer was applied compared to the 200 lb ac^{-1} N applied in the conventionally managed trials. As a result of the decreased water availability, yields in the low water trial decreased by 3,684 and 864 lb ac^{-1} in the Fresno and Davis trials, respectively. The difference in N availability resulted in a 2,173 and 2,662 lb ac^{-1} yield reduction in the Fresno and Davis trials, respectively (Figure 17). Changes in relative variety performance under conditions of terminal drought and N stress for grain yield, grain protein and grain protein yield are presented in Figures 18-20 and Table 49.

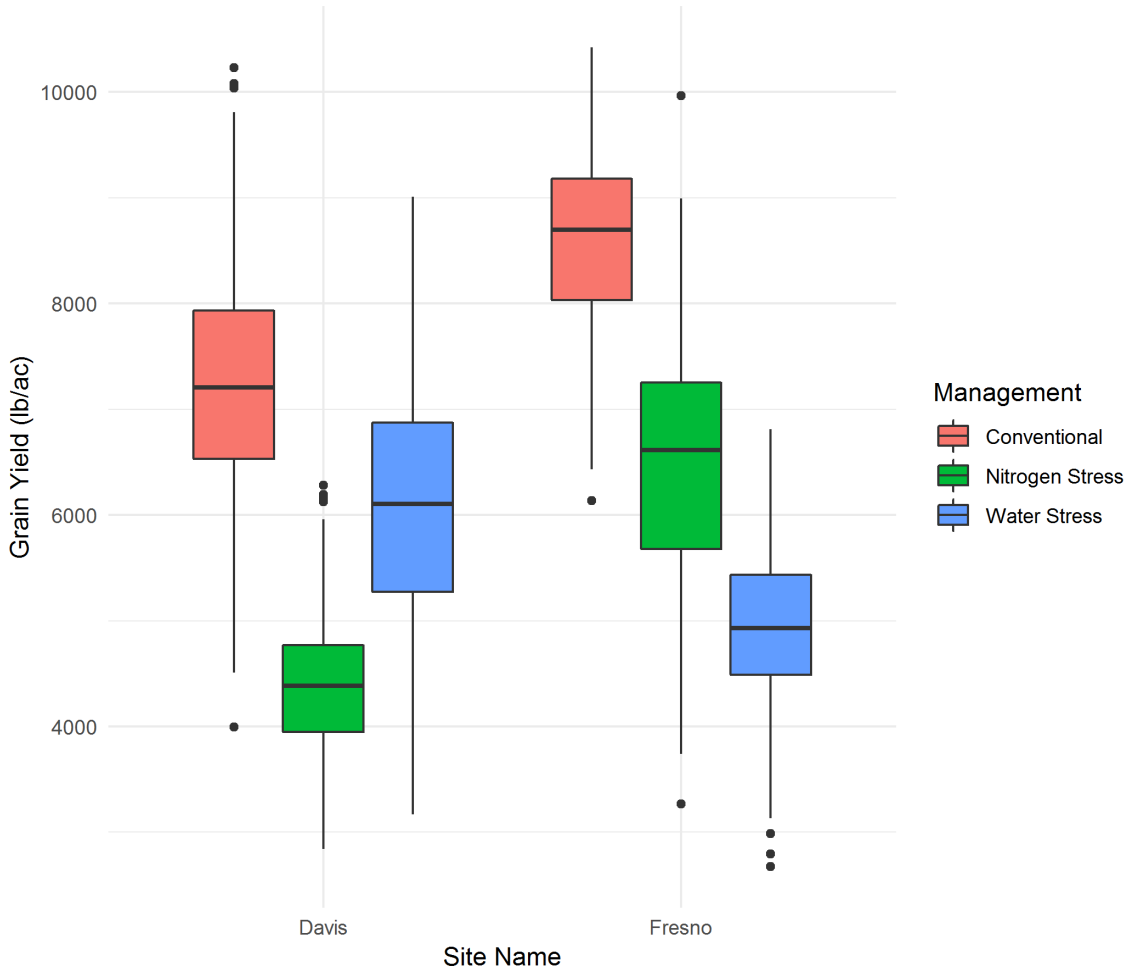


Figure 17. The grain yield of the common wheat and triticale varieties grown under either reduced nitrogen or reduced irrigation, compared to the same common wheat and triticale varieties grown under conventional management.

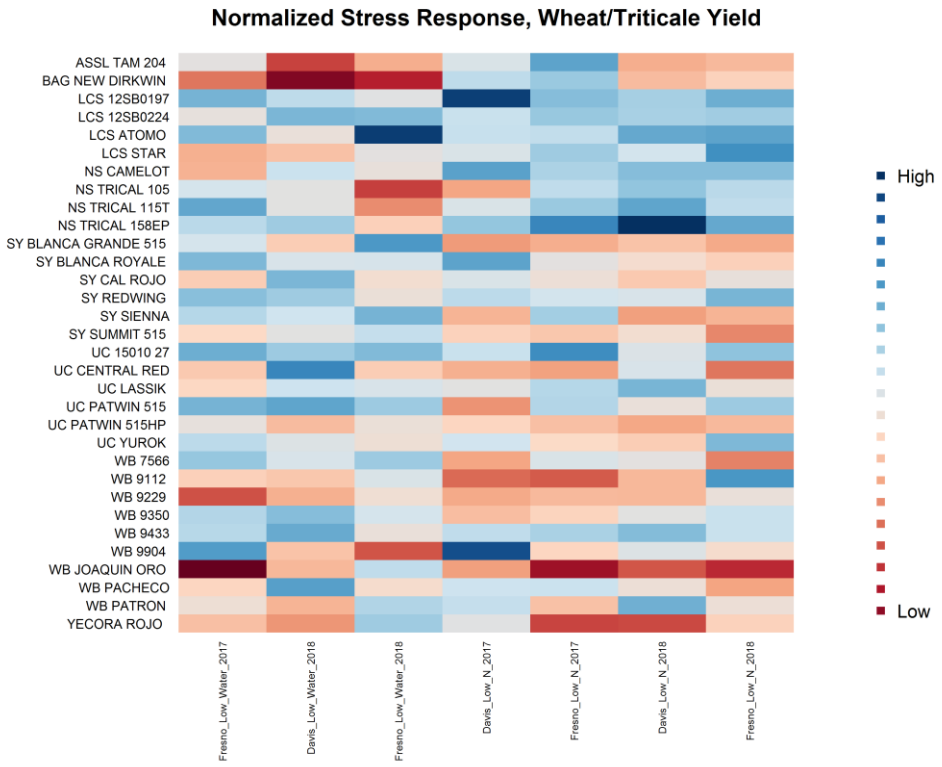


Figure 18. Average normalized yield response of wheat and triticale varieties to terminal drought and nitrogen (N) stress in trials conducted at the Davis and Fresno locations during the 2016-2017 and 2017-2018 seasons.

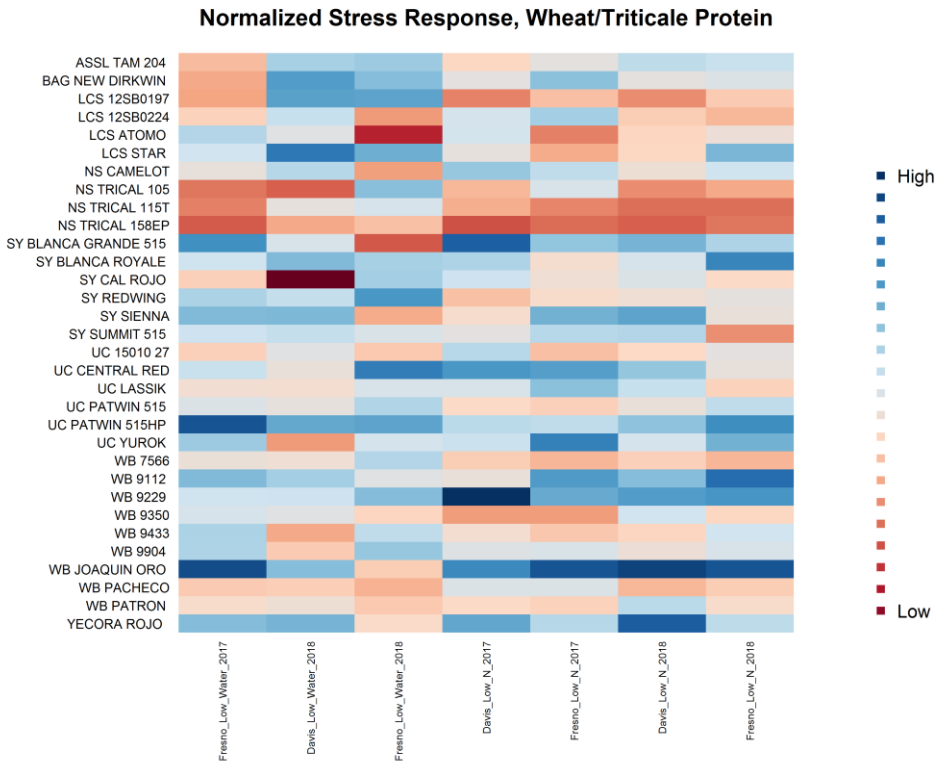


Figure 19. Average normalized protein response of wheat and triticale varieties to terminal drought and nitrogen (N) stress in trials conducted at the Davis and Fresno locations during the 2016-2017 and 2017-2018 seasons.

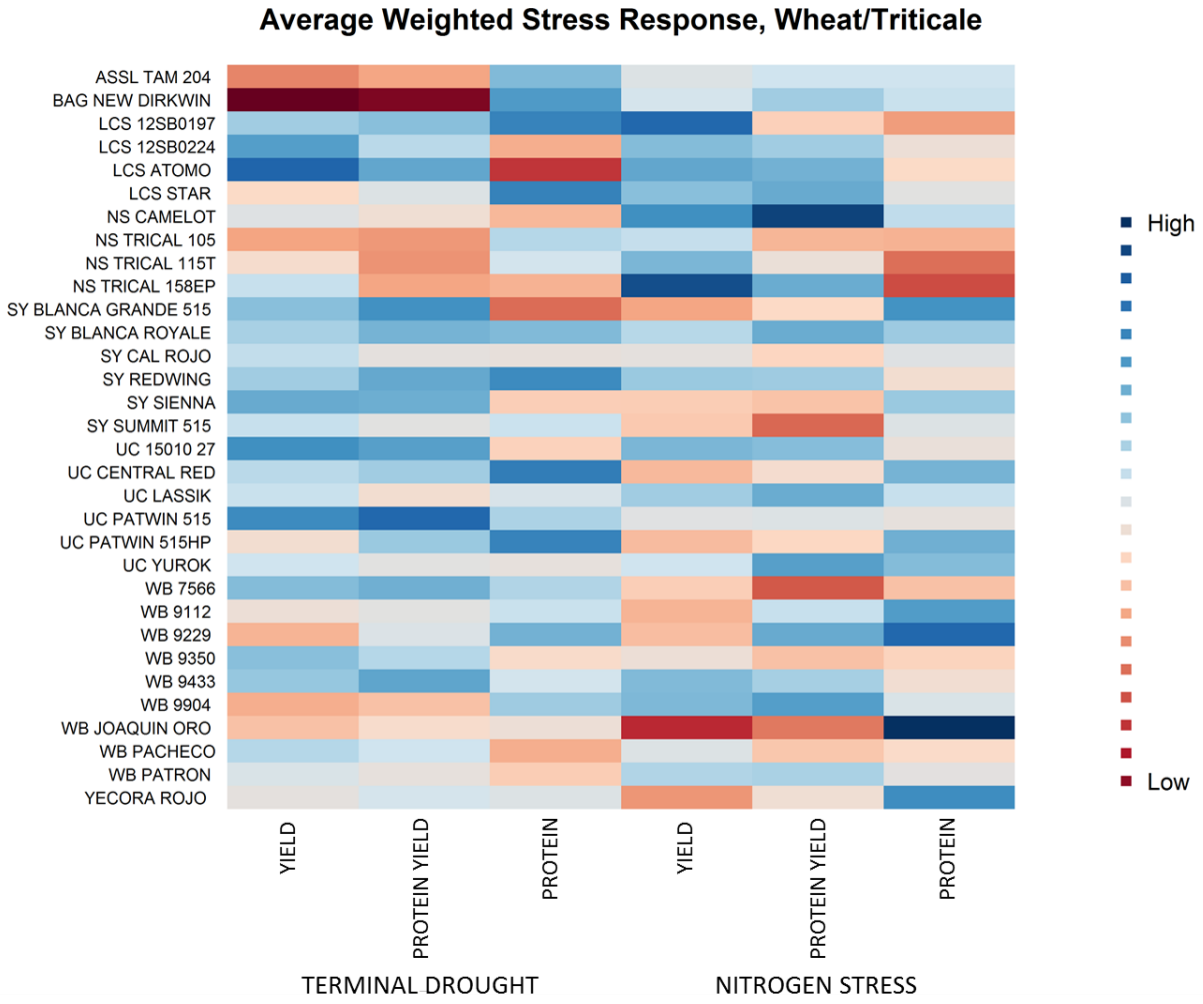


Figure 20. Average normalized response of wheat and triticale varieties to terminal drought and nitrogen (N) stress in trials conducted at the Davis and Fresno locations during the 2016-2017 and 2017-2018 seasons. Terminal drought and N stress responses are based on averages of 3 and 4 site-years of data, respectively. The normalized stress response is calculated as: [Ai / mean(A)] + [([mean(A) – mean(B)] / mean(A)) – ((Ai – Bi) / mean(A))], where A is a fully watered/fertilized control, B is a managed stress trial grown at the same location, and i is an individual variety. Stress trials are managed identically except for the exclusion of irrigation after the vegetative growth period (terminal drought) or the exclusion of N fertilizer additions throughout the season (N stress).

Table 49. Average normalized response of wheat and triticale varieties to terminal drought and nitrogen (N) stress in trials conducted at the Davis and Fresno locations during the 2016-2017 and 2017-2018 seasons. Terminal drought and N stress responses are based on averages of 3 and 4 site-years of data, respectively. The normalized stress response is calculated as: [Ai / mean(A)] + [([mean(A) – mean(B)] / mean(A)) – ((Ai – Bi) / mean(A))], where A is a fully watered/fertilized control, B is a managed stress trial grown at the same location, and i is an individual variety. Stress trials are managed identically except for the exclusion of irrigation after the vegetative growth period (terminal drought) or the exclusion of N fertilizer additions throughout the season (N stress).

	Terminal Drought Stress Response										Nitrogen Stress Response									
	Yield				Protein Yield			Protein			Yield				Protein Yield			Protein		
Variety Name	Rank	Response (%)	SE Response	p-value	Response (%)	SE Response	p-value	Response (%)	SE Response	p-value	Rank	Response (%)	SE Response	p-value	Response (%)	SE Response	p-value	Response (%)	SE Response	p-value
ASSL TAM 204	30	-10	4.4	0.027	-12	4.9	0.018	0.5	4.3	0.908	23	-2.4	2.5	0.342	-0.5	2.3	0.815	-0.2	1.7	0.917
BAG NEW DIRKWIN	32	-20	4.4	0.000	-22.4	4.9	0.000	2.4	4.3	0.582	19	-1.4	2.5	0.584	0.5	2.3	0.818	0.6	1.7	0.701
LCS 12SB0197	8	4.7	4.4	0.291	4.2	4.9	0.403	2.9	4.3	0.497	2	8.4	2.5	0.001	-1.6	2.3	0.471	-6.2	1.7	0.000
LCS 12SB0224	4	6.1	4.4	0.175	0	4.9	0.996	-4.6	4.3	0.282	7	3.7	2.5	0.146	0.9	2.3	0.697	-1.5	1.7	0.374
LCS ATOMO	3	7.7	4.4	0.086	5.6	4.9	0.261	-5.3	4.3	0.219	4	5.8	2.5	0.023	2.1	2.3	0.350	-3.2	1.7	0.056
LCS STAR	28	-5.6	4.4	0.212	-3	4.9	0.543	7.7	4.3	0.078	5	4.4	2.5	0.087	3.2	2.3	0.161	-1.3	1.7	0.437
NS CAMELOT	21	-1.7	4.4	0.705	-1.1	4.9	0.830	-2.8	4.3	0.515	3	6.3	2.5	0.014	5.2	2.3	0.023	1	1.7	0.541
NS TRICAL 105	25	-3.8	4.4	0.395	-7.2	4.9	0.153	-6.9	4.3	0.113	14	1.3	2.5	0.618	-2.5	2.3	0.267	-4.9	1.7	0.004
NS TRICAL 115T	18	0.7	4.4	0.867	-7.9	4.9	0.117	-4.8	4.3	0.268	6	3.9	2.5	0.128	-1	2.3	0.649	-8.2	1.7	0.000
NS TRICAL 158EP	14	3	4.4	0.498	-7	4.9	0.163	-10.3	4.3	0.019	1	10.3	2.5	0.000	2.1	2.3	0.358	-9.8	1.7	0.000
SY BLANCA GRANDE 515	16	1.1	4.4	0.803	9.1	4.9	0.069	-0.8	4.3	0.852	30	-5.9	2.5	0.021	-1.6	2.3	0.485	6	1.7	0.000
SY BLANCA ROYALE	12	3.6	4.4	0.418	6.6	4.9	0.186	4.1	4.3	0.338	16	0.2	2.5	0.935	2.2	2.3	0.335	2.4	1.7	0.156
SY CAL ROJO	15	2	4.4	0.659	-3.3	4.9	0.511	-8.1	4.3	0.063	20	-1.4	2.5	0.581	-1.6	2.3	0.484	-1	1.7	0.560
SY REDWING	7	5.2	4.4	0.246	9.8	4.9	0.051	5.7	4.3	0.186	10	3.3	2.5	0.193	1.4	2.3	0.551	-2.4	1.7	0.155
SY SIENNA	9	4.6	4.4	0.297	7.8	4.9	0.118	2.1	4.3	0.630	27	-4.8	2.5	0.059	-2.7	2.3	0.229	2.4	1.7	0.144
SY SUMMIT 515	20	-0.6	4.4	0.892	-1.5	4.9	0.758	1	4.3	0.807	26	-4.6	2.5	0.068	-4.6	2.3	0.044	-0.9	1.7	0.607
UC 15010 27	2	8.3	4.4	0.066	7	4.9	0.161	-4.1	4.3	0.343	8	3.6	2.5	0.151	1.7	2.3	0.462	-1.7	1.7	0.306
UC CENTRAL RED	11	3.7	4.4	0.402	5.1	4.9	0.302	4.6	4.3	0.283	29	-5.3	2.5	0.039	-1.5	2.3	0.499	4.4	1.7	0.010
UC LASSIK	19	0	4.4	0.994	-3.6	4.9	0.473	-1.9	4.3	0.664	12	1.9	2.5	0.443	1.7	2.3	0.459	0.6	1.7	0.705
UC PATWIN 515	1	9.8	4.4	0.031	13.5	4.9	0.008	0.7	4.3	0.875	17	-0.1	2.5	0.972	0	2.3	0.990	-1.5	1.7	0.357
UC PATWIN 515HP	24	-3.7	4.4	0.405	4.2	4.9	0.400	12.6	4.3	0.005	28	-4.9	2.5	0.053	-1.3	2.3	0.580	4.1	1.7	0.015
UC YUROK	17	1	4.4	0.826	0.9	4.9	0.861	-1.1	4.3	0.791	15	1.1	2.5	0.652	3	2.3	0.180	4	1.7	0.017
WB 7566	10	4.3	4.4	0.337	4.5	4.9	0.361	-0.4	4.3	0.930	25	-4.6	2.5	0.071	-4.8	2.3	0.035	-4.5	1.7	0.007
WB 9112	26	-3.9	4.4	0.380	-2.1	4.9	0.673	3.8	4.3	0.373	22	-2.2	2.5	0.387	1.8	2.3	0.432	5.5	1.7	0.001
WB 9229	29	-9.4	4.4	0.038	-1.9	4.9	0.698	3.1	4.3	0.470	24	-3.9	2.5	0.120	2.5	2.3	0.270	8.9	1.7	0.000
WB 9350	6	5.7	4.4	0.206	4	4.9	0.424	-1.7	4.3	0.698	18	-1	2.5	0.700	-1.7	2.3	0.450	-3.9	1.7	0.021
WB 9433	5	5.9	4.4	0.187	8.9	4.9	0.078	-0.6	4.3	0.896	9	3.5	2.5	0.168	1.1	2.3	0.632	-2.3	1.7	0.176
WB 9904	22	-2.7	4.4	0.537	-3	4.9	0.545	1.6	4.3	0.709	11	2.8	2.5	0.267	2.3	2.3	0.300	-0.5	1.7	0.752
WB JOAQUIN ORO	31	-11	4.4	0.016	-6.2	4.9	0.216	7.1	4.3	0.100	32	-11.6	2.5	0.000	-3.6	2.3	0.113	12.1	1.7	0.000
WB PACHECO	13	3.4	4.4	0.446	1.5	4.9	0.759	-6.4	4.3	0.138	21	-2	2.5	0.421	-2.5	2.3	0.262	-2.5	1.7	0.137
WB PATRON	23	-3	4.4	0.498	-5.7	4.9	0.254	-4	4.3	0.354	13	1.7	2.5	0.499	0.9	2.3	0.707	-1.5	1.7	0.357
YECORA ROJO	27	-5.4	4.4	0.224	-5.1	4.9	0.303	3.7	4.3	0.384	31	-6.1	2.5	0.018	-0.8	2.3	0.708	5.8	1.7	0.001

Canopy spectral reflectance

Varieties with yields that are relatively stable under conditions of N stress demonstrate a distinct reflectance fingerprint across the season as compared to varieties with unstable yields under N stress. Furthermore, the reflectance phenotype manifests differently in trials where stress is/is not present (Figure 21). Analyses to date have not found as much information present in the reflectance data related to terminal drought stress tolerance as to N stress tolerance. However, these conclusions are initial and further analysis of these data is required to explore these interactions more fully and uncover other insight that these reflectance measurements may offer.

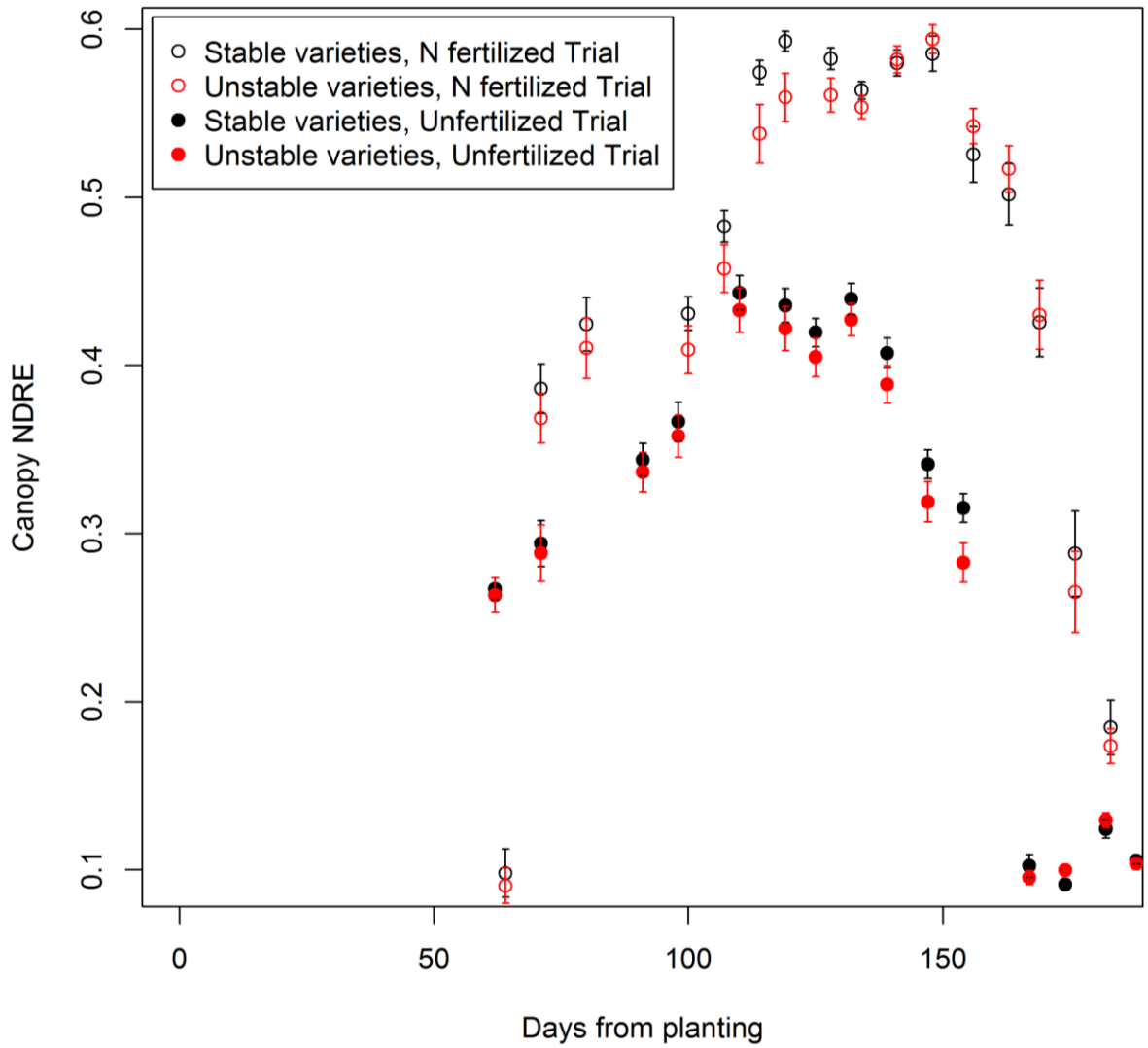


Figure 21. Average NDRE values measured across the 2017-18 season from varieties that showed yield stability under N stress (black) versus varieties with unstable yields under conditions of N stress (red). Values were measured both from fully fertilized trial (open circles) and unfertilized trial (filled circles) in Davis. Higher relative values measured from yield-stable varieties during the early grain filling period under unstressed conditions correlates to higher relative values during late grain fill and later senescence under N stressed conditions in these same varieties.