2018-19 Regional Common Wheat & Triticale, Durum Wheat, and Barley Performance Tests in California

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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 2018-19 season. It also includes multi-year summaries of trials conducted between the 2016-17 and 2018-19 growing seasons. The 2018-19 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) Report results of the research and analysis on our program website, at extension meetings, and in other agricultural forums.

General Seasonal Overview

The 2018-19 California small grain crop consisted of approximately 480 thousand planted acres of wheat, triticale and barley. Approximately 29% of the planted area of wheat was harvested for grain. Total wheat production was down 1% over the previous year and total small grain acres in California were at their lowest in a decade but similar to the past two years. 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.

After a relatively dry start to the rainfall season from October through early November, rainfall in California was above average after November. Growing degree days (GDD: 86F max; 45F min) for common wheat and other small grains were fewer than the 10-year average in the early season and greater than the 10-year average in the later season. Relative to previous season there was a high incidence of septoria and stripe rust. Statewide common wheat yields averaged 3000 lb/ac, durum wheat yields averaged 6120 lb/ac, and barley yields averaged 3168 lb/ac. Within UC small grain variety testing trials, average grain yields were 6688 lb/ac, which is approximately 114% 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 2016-17 and 2018-19 (Table 1). Tests were conducted at University of California research stations or in fields of cooperating growers.

Field methods

Field methods and results are reported for the 2018-19 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 2018-19 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 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. The durum wheat trial in the Imperial location was planted and harvested "blind" by Second Nature Research. Grain was harvested with a Wintersteiger Seedmaster Universal 150 plot combine.

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

Location	Season	Fall Barley	Fall Common	Fall Durum	Fall Triticale	Fall Winterwheat	Spring Barley	Spring Springwheat
Colusa	2016-17	-	45	-	9	-	-	-
Colusa	2017-18	-	41	-	9	-	-	-
Colusa	2018-19	-	38	-	10	-	-	-
Davis	2016-17	12	45	27	9	-	-	-
Davis	2017-18	17	41	30	9	-	-	-
Davis	2018-19	20	38	30	10	-	-	-
Delta	2016-17	-	43	-	9	-	-	-
Delta	2017-18	-	39	-	7	-	-	-
Delta	2018-19	-	38	-	10	-	-	-
Fresno	2016-17	12	45	28	9	-	-	-
Fresno	2017-18	17	41	30	9	-	-	-
Fresno1	2018-19	20	38	-	10	-	-	-
Fresno2	2018-19	-	-	30	-	-	-	-
Imperial	2016-17	-	45	28	9	-	-	-
Imperial	2017-18	-	41	30	9	-	-	-
Imperial	2018-19	-	-	30	-	-	-	-
Kern	2016-17	-	45	28	9	-	-	-
Kern	2017-18	-	41	30	9	-	-	-
Kern	2018-19	-	38	30	10	-	-	-
Kings	2016-17	-	45	28	9	-	-	-
Kings	2017-18	-	41	28	9	-	-	-
Merced	2018-19	20	38	-	10	-	-	-
Montague	2018-19	-	-	-	-	44	-	-
Siskiyou	2016-17	-	-	-	-	42	-	-
Siskiyou	2017-18	-	-	-	-	40	-	-
Solano	2016-17	12	45	-	9	-	-	-
Solano	2017-18	11	41	-	9	-	-	-
Tehama	2017-18	17	41	-	9	-	-	-
Tulare	2016-17	12	45	-	9	-	-	-
Tulare	2017-18	17	-	-	-	-	-	-
Tulelake	2015-16	-	-	-	-	-	41	51
Tulelake	2016-17	-	-	-	-	-	41	64
Tulelake	2017-18	-	-	-	-	40	6	59
Tulelake	2018-19	-	-	-	-	70	13	29
Tulelake2	2016-17	-	-	-	-	41	-	-
Yolo2	2018-19	20	37	-	10	-	-	-
Yolo3	2018-19	19	-	-	-	-	-	-

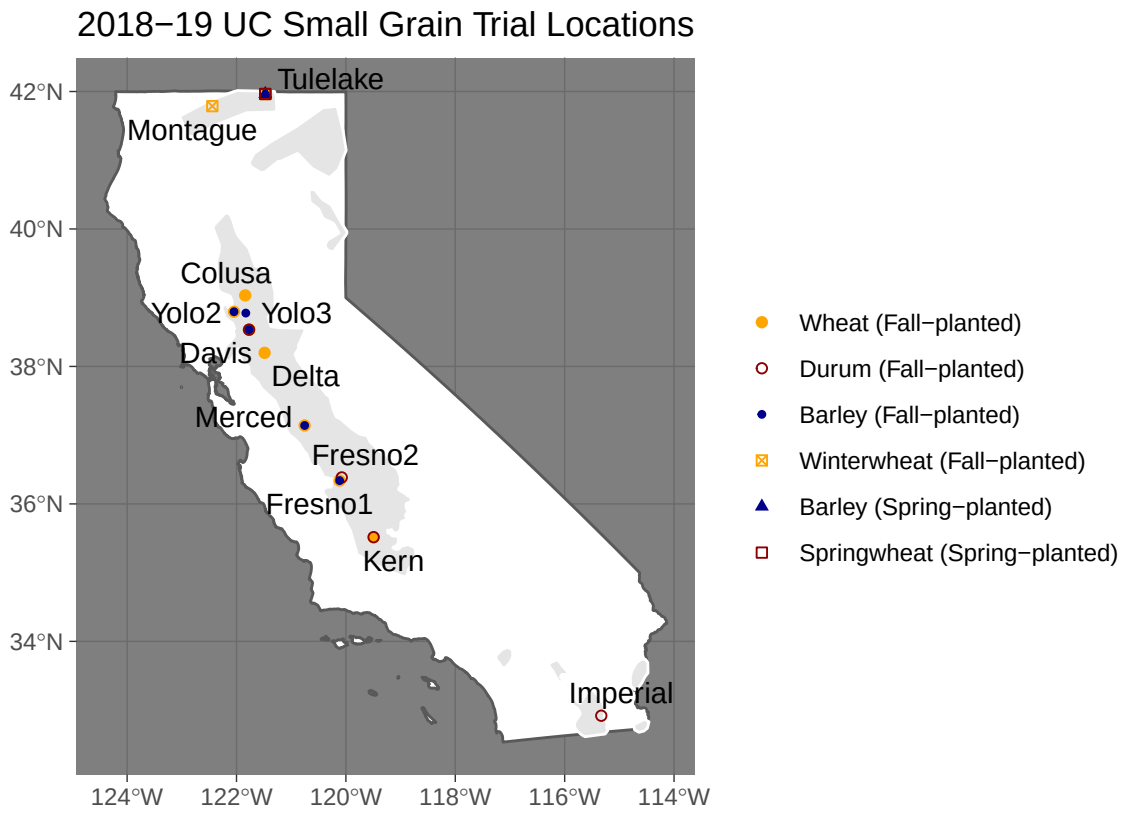

Figure 1: Map depicting the California small grain regional trial test locations used in the 2018-19 season.

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	2018-19
IR	BARLEY	41	41	6	13
	SPRINGWHEAT	51	64	59	29
	WINTERWHEAT	46	42	40	69
NonIR	BARLEY	34	12	17	20
	COMMON	41	45	41	38
	DURUM	28	28	30	30
	TRITICALE	8	9	9	10

Pre-plant soil sampling

Pre-plant soil samples were taken at depths of 0-1, 1-2, and 2-3 ft 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 100 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. 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 2018-19 season included stripe rust, septoria, barley yellow dwarf virus, and leaf rust. 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 2018-19 season.

Rating	Area of 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 location 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 senescence 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 one 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

Table 4: Test locations used by the statewide regional trials between the 2016-17 and 2018-19 seasons.

Location	Season	Trials	Latitude	Longitide	Soil Type	Previous Crop	Planting Date
Colusa	2016_17	COMMON, TRITICALE	39.04120	-121.8486	Grandbend loam, 0 to 2 percent slopes	safflower	2016-11-10
	2017_18	COMMON, TRITICALE	38.93759	-121.8375		cucumber	2017-11-22
	2018_19	COMMON, TRITICALE	39.03386	-121.8412		sunflower	2018-11-26
Davis	2016_17	BARLEY, COMMON, DURUM, TRITICALE	38.52738	-121.7719	Yolo loam, 0 to 4 percent slopes, MLRA 17	corn	2016-11-15
		COMMON, TRITICALE					2016-11-17
	2017_18	COMMON, TRITICALE	38.53722	-121.7810	Yolo silt loam, 0 to 2 percent slopes, MLRA 17	safflower	2017-11-20
		BARLEY, COMMON, DURUM, TRITICALE					2017-11-21
		COMMON, TRITICALE					2017-11-29
	2018_19	BARLEY, COMMON, DURUM, TRITICALE	38.53457	-121.7708	Reiff very fine sandy loam	fallow	2018-12-13
Delta	2016_17	COMMON, TRITICALE	38.14617	-121.5325	Ryde clay loam, partially drained, 0 to 2 percent slopes, MLRA 16	potato	2016-11-18
	2017_18	COMMON, TRITICALE	38.13365	-121.5307	Rindge mucky silt loam, partially drained, 0 to 2 percent slopes, MLRA 16	wheat	2017-11-15
	2018_19	COMMON, TRITICALE	38.19774	-121.4857	Valdez silt loam, organic substratum, partially drained, 0 to 2 percent slopes, MLRA 16	tomato	2018-11-14
Fresno	2016_17	BARLEY, COMMON, TRITICALE	36.34108	-120.1152	Panoche clay loam, 0 to 2 percent slopes	barley	2016-11-30
		COMMON, DURUM, TRITICALE					2016-12-01
		COMMON, TRITICALE				sudan grass	2016-11-30
	2017_18	BARLEY, COMMON, TRITICALE	36.33729	-120.1141			2017-11-29
		DURUM					2017-11-30
	2018_19	BARLEY, COMMON, TRITICALE	36.33940	-120.1152		cotton	2018-12-12
Fresno2		DURUM	36.38520	-120.0755	Ciervo, wet-Ciervo complex, saline-sodic, 0 to 1 percent slopes		2018-12-11
Imperial	2016_17	COMMON, DURUM, TRITICALE	32.81322	-115.4473	Imperial silty clay, wet	sudan grass	2016-12-09
	2017_18	COMMON, DURUM, TRITICALE	32.81164	-115.4441	Imperial-Glenbar silty clay loams, wet, 0 to 2 percent slopes	-	2017-12-13
	2018_19	DURUM	32.91821	-115.3308		alfalfa	2018-12-31
Kern	2016_17	COMMON, TRITICALE	35.37736	-119.3336	Westhaven fine sandy loam	cotton	2016-11-21
		DURUM					2019-11-21
	2017_18	COMMON, DURUM, TRITICALE	35.37382	-119.3316			2017-11-28
	2018_19	COMMON, DURUM, TRITICALE	35.51618	-119.4931	Lerdo complex, drained	corn	2018-11-20
Kings	2016_17	COMMON, DURUM, TRITICALE	36.00052	-119.5657	Gepford clay, sandy substratum, partially drained	-	2016-11-29
	2017_18	COMMON, DURUM, TRITICALE	35.99178	-119.5906	Gepford clay, partially drained	cotton	2017-12-05
Merced	2018_19	BARLEY, COMMON, TRITICALE	37.14110	-120.7542	Escano clay loam, partially drained	alfalfa	2018-11-19
Montague		WINTERWHEAT	41.78683	-122.4424	Montague clay, 0 to 2 percent slopes	fallow	2018-10-24
Siskiyou	2016_17	WINTERWHEAT	41.77241	-122.4497	Jenny clay, 0 to 2 percent slopes	-	2016-11-14
	2017_18	WINTERWHEAT	41.78683	-122.4424	Montague clay, 0 to 2 percent slopes		2017-10-26
Solano	2016_17	BARLEY, COMMON, TRITICALE	38.14006	-121.7373	Diablo-Ayar clays, 9 to 30 percent slopes, eroded	fallow	2016-11-16
	2017_18	BARLEY, COMMON, TRITICALE	38.14819	-121.8158	Altamont-San Ysidro-San Benito complex, 9 to 30 percent slopes	pasture	2017-11-21
Tehama		BARLEY, COMMON, TRITICALE	39.88389	-122.3611	Arbuckle gravelly loam, clayey substratum, channeled		2017-12-15
Tulare	2016_17	BARLEY, COMMON, TRITICALE	35.81451	-119.0546	Centerville clay, 2 to 5 percent slopes	fallow	2016-11-29
	2017_18	BARLEY	35.82180	-119.0437			2017-11-28
Tulelake	2016_17	BARLEY, SPRINGWHEAT	41.95871	-121.4730	Tulebasin mucky silty clay loam	sudan grass	2017-05-05
	2017_18	WINTERWHEAT	41.96606	-121.4725	Tulana silt loam, 0 to 1 percent slopes		2017-10-30
		BARLEY, SPRINGWHEAT					2018-04-26
	2018_19	WINTERWHEAT	41.96460	-121.4735			2018-10-23
		BARLEY, SPRINGWHEAT					2019-05-02
Tulelake2	2016_17	WINTERWHEAT	41.96599	-121.4725			2016-10-21
Yolo2	2018_19	BARLEY, COMMON, TRITICALE	38.79600	-122.0457	Rincon silty clay loam	fallow	2018-11-27
Yolo3		BARLEY	38.77649	-121.8301	Yolo silt loam, 0 to 2 percent slopes, MLRA 17	-	2019-01-04

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. Temperature thresholds of 87°F (30°C) and 44°F (7°C) were used.

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 Davis locations, were analyzed for grain and flour quality by the California Wheat Commission. Grain 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

Table 5: Nitrogen fertilizer management details for the regional trial test locations in the 2018-19 season.

Location	Trial	Date	Amount (lb N/ac)	Description
Colusa	Wheat	2018-10-23	60	as aqua ammonia - pre-plant
		2019-01-31	50	as urea flown
Fresno1	Barley	2019-02-25	50	
	Wheat	2019-02-25	100	
		2019-04-15	50	
Fresno2	Durum	2018-12-21	99	pre-plant
		2019-04-07	53	
Imperial		-	315	Approximately 45 lb of N per irrigation (7 total)
Merced	Barley, Wheat	-	100	pre-plant
Tulelake	Barley	-	90	
	Springwheat hard	-	25	UAN 32
		-	175	
	Springwheat hard, Springwheat soft	2019-06-05	50	UAN 32
		2019-06-13	40	UAN 32
		2019-06-27	60	UAN 32
	Springwheat soft	-	150	
	Winterwheat hard	2018-10-19	175	urea - pre-plant
		2019-04-25	50	UAN 32
		2019-05-03	50	UAN 32
		2019-06-28	25	UAN 32
	Winterwheat soft	2018-10-19	150	urea - pre-plant
Davis	Barley	2019-02-22	60	urea
	Barley, Durum, Wheat, Wheat low water	2018-11-20	30	urea - pre-plant
	Durum, Wheat, Wheat low water	2019-02-22	100	urea
	Wheat	2019-04-19	50	urea
Yolo2	Barley, Wheat	2018-11-19	24	ammonium phosphate (16-20-0) - pre-plant
		2019-02-09	60	calcium ammounium nitrate
		2019-04-25	11	12-0-0

Table 6: Irrigation management details for the regional trial test locations in the 2018-19 season.

Location	Trial	Total Irrigation (in)	Description
Fresno1	Wheat	15	2018-12-13: 1 in , 2018-12-21: 0.75 in , 2019-01-08: 0.75 in , 2019-02-28: 0.5 in , 2019-03-25: 6.8 in , 2019-04-16: 4.8 in
Fresno2	Durum	21	2018-12-21: 4.9 in , 2019-01-09: 2.5 in , 2019-03-07: 4.3 in , 2019-04-07: 3.4 in , 2019-04-18: 2.2 in , 2019-04-22: 2.1 in , 2019-04-29: 2 in
Imperial	Durum	28	28 in (7 irrigations spaced as needed)
Kern	Durum	18	6 in (October pre-irrigation), 2019-03-25: 6 in , 2019-04-15: 6 in
	Wheat	18	6 in (October pre-irrigation), 2019-03-25: 6 in , 2019-04-15: 6 in
Merced	Barley	7	3.5 in (mid-December), 3.5 in (late-December)
	Wheat	7	3.5 in (mid-December), 3.5 in (late-December)
Tulelake	Barley	14	2019-05-04: 1.26 in , 2019-05-11: 1.47 in , 2019-05-17: 1.05 in , 2019-06-05: 1.05 in , 2019-06-13: 1.68 in , 2019-06-19: 2.1 in , 2019-06-26: 2.1 in , 2019-07-05: 1.68 in , 2019-07-13: 2.1 in
	Springwheat hard	18	2019-05-04: 1.26 in , 2019-05-11: 1.47 in , 2019-05-17: 1.05 in , 2019-06-05: 1.05 in , 2019-06-13: 1.68 in , 2019-06-19: 2.1 in , 2019-06-26: 2.1 in , 2019-07-05: 1.68 in , 2019-07-13: 2.1 in , 2019-07-18: 1.47 in , 2019-07-26: 2.1 in
	Springwheat soft	18	2019-05-04: 1.26 in , 2019-05-11: 1.47 in , 2019-05-17: 1.05 in , 2019-06-05: 1.05 in , 2019-06-13: 1.68 in , 2019-06-19: 2.1 in , 2019-06-26: 2.1 in , 2019-07-05: 1.68 in , 2019-07-13: 2.1 in , 2019-07-18: 1.47 in , 2019-07-26: 2.1 in
	Winterwheat hard	15	2018-10-26: 1.89 in , 2019-04-25: 1.04 in , 2019-05-03: 1.68 in , 2019-05-10: 2.52 in , 2019-05-17: 1.68 in , 2019-06-06: 2.1 in , 2019-06-15: 2.52 in , 2019-07-04: 1.68 in
	Winterwheat soft	15	2018-10-26: 1.89 in , 2019-04-25: 1.04 in , 2019-05-03: 1.68 in , 2019-05-10: 2.52 in , 2019-05-17: 1.68 in , 2019-06-06: 2.1 in , 2019-06-15: 2.52 in , 2019-07-04: 1.68 in
Davis	Durum	2	2019-04-22: 2.5 in
	Wheat	2	2019-04-22: 2.5 in
	Wheat low nitrogen	2	2019-04-22: 2.5 in

Table 7: The locations where agronomic traits were recorded in the current season

Location	Trial Group	Yield	Protein	Height	Lodging	Test Weight	Thousand Kernel
Colusa	WHEAT	X	X	X	X	X	X
Delta	WHEAT	X	X	X	X	X	X
Fresno1	BARLEY	X	X	X	X	X	X
Fresno1	WHEAT	X	X	X	X	X	X
Fresno2	DURUM	X	X	X	X	X	X
Imperial	DURUM	X	-	-	-	X	-
Kern	DURUM	X	X	X	X	X	X
Kern	WHEAT	X	X	X	X	X	X
Merced	BARLEY	X	X	X	X	X	X
Merced	WHEAT	X	X	X	X	X	X
Montague	COMMON	X	-	X	X	-	-
Tulelake	COMMON	X	X	X	X	X	-
Tulelake	BARLEY	X	X	X	X	X	-
Tulelake	COMMON	X	X	X	X	X	-
Davis	BARLEY	X	X	X	X	X	X
Davis	DURUM	X	X	X	X	X	X
Davis	WHEAT	X	X	X	X	X	X
Yolo2	BARLEY	X	X	X	X	X	X
Yolo2	WHEAT	X	X	X	X	X	X
Yolo3	BARLEY	X	X	X	X	X	X

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/waterworks-nitrate-nitrite/) 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).

2.2 Collaborative quality trials

In the 2018-19 season, stands of advanced experimental varieties of both common wheat and durum wheat were established to produce bulk quantities of grain to supply to domestic millers and bakers for independent baking tests. Nine varieties of common wheat were grown at the Davis and Fresno2 locations. Five varieties of durum wheat were grown at the Fresno2 and Kern locations. Only Fresno2 samples were submitted to the collaborating mills. The plots of individual varieties were approximately 10 ft wide by 80 ft long. The commercial common wheat varieties SY Blanca Grande 515 (hard white) and SY Cal Rojo (hard red), and the commercial durum wheat variety SY Fortissimo, 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 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

Table 9: Common wheat and durum varieties included in the collaborative quality trials conducted in the 2018-19 season.

Trial Group	Variety Name	UC Entry Number	Breeder
WHEAT	APB 410089	1903	Arizona Plant Breeders
WHEAT	AP OCTANE	1878	Syngenta
WHEAT	SY BLANCA GRANDE 515	1657	Syngenta
WHEAT	SY CAL ROJO	1478	Syngenta
WHEAT	UC 1839	1839	University of California
WHEAT	UC 1882	1882	University of California
WHEAT	UC 1909	1909	University of California
WHEAT	WB 9490	1887	WestBred
WHEAT	WB 9699	1888	WestBred
DURUM	ALBERTO	1813	Arizona Plant Breeders
DURUM	SY FORTISSIMO	1429	Syngenta
DURUM	TIBURON	1640	Arizona Plant Breeders
DURUM	UC 1870	1870	University of California
DURUM	UC 1910	1910	University of California

2.3 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. 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 12 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 2018-19 season are available on the Small Grains website (http://smallgrains.ucanr.edu/Annual_Variety_Results/2019/), 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 (Colusa, Davis, Delta, Solano, and Yolo locations); the North Central San Joaquin Valley San Joaquin Valley (Fresno and Merced locations); the South San Joaquin Valley (Kern location); the Imperial Valley (Imperial location); and the Intermountain region (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.

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 2018-19 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.

2.4 Extension of results

Results of the analyses were published on the UC Small Grains website (http://smallgrains.ucanr.edu/Variety_Selection/) 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 2018-19 season.

3. RESULTS

Statewide variety trials

Site conditions

The 2018-19 season started out drier than usual, with infrequent rainfall events from November through mid-January. Precipitation from January until the end of the season was greater than average, including a significant rainfall even in May. There was a cooler start to the season but a warmer end to the season.

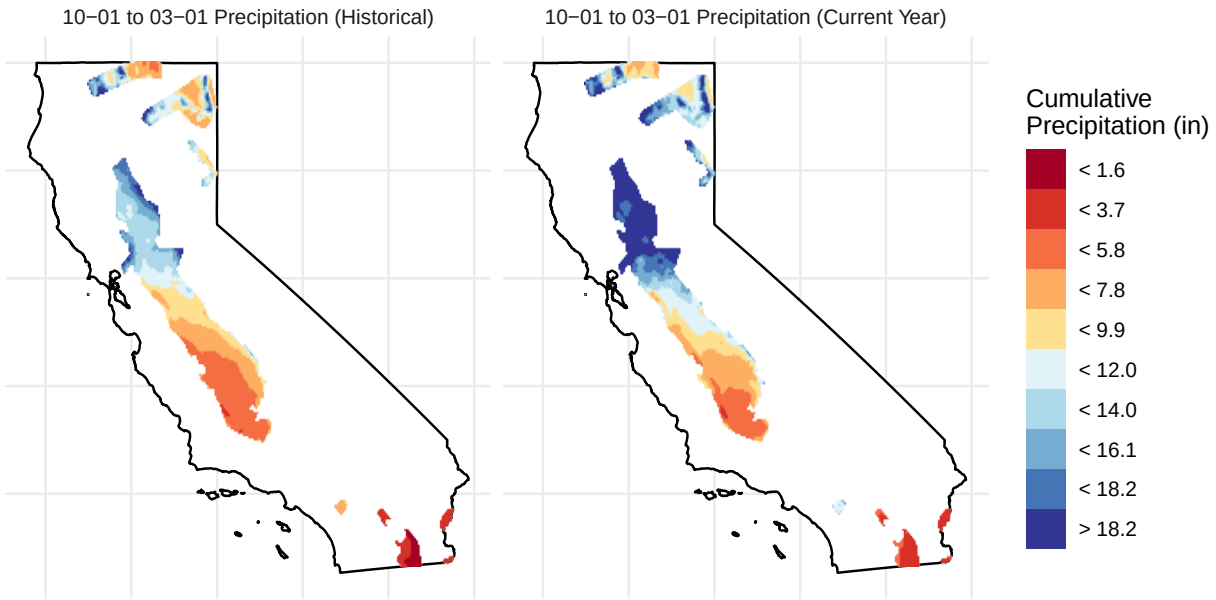

Figure 2: Historical precipitation (10-year average, left) compared to precipitation totals during the 2018-19 season (right) between 10/1/2018 and 3/1/2019.

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.

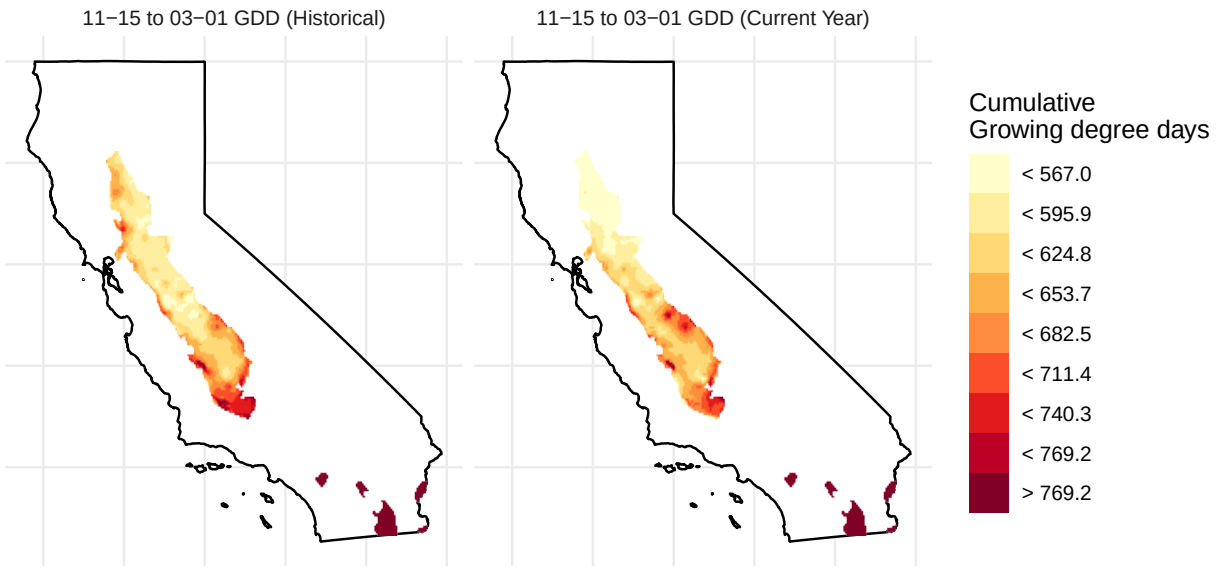

Figure 3: Historical growing degree day accumulation (GDD: 86F max, 45F min; 10-year average, left) compared to GDD totals during the 2018-19 season (right) between 11/15/2018 and 3/1/2019.

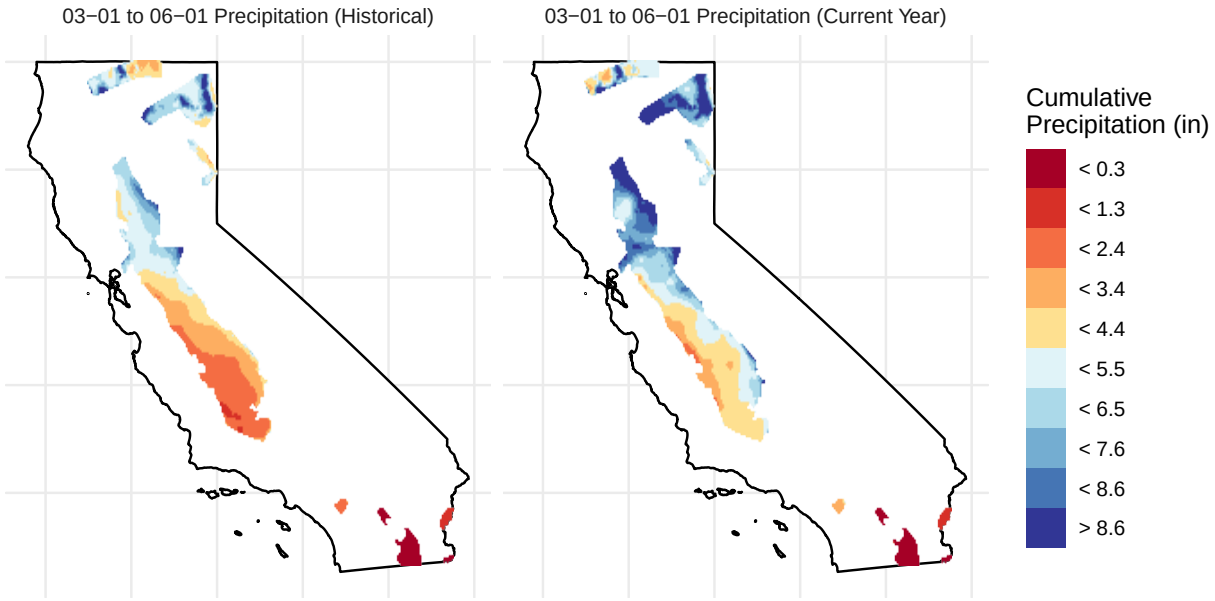

Figure 4: Historical precipitation (10-year average, left) compared to precipitation totals during the 2018-19 season (right) between 3/1/2018 and 6/1/2019.

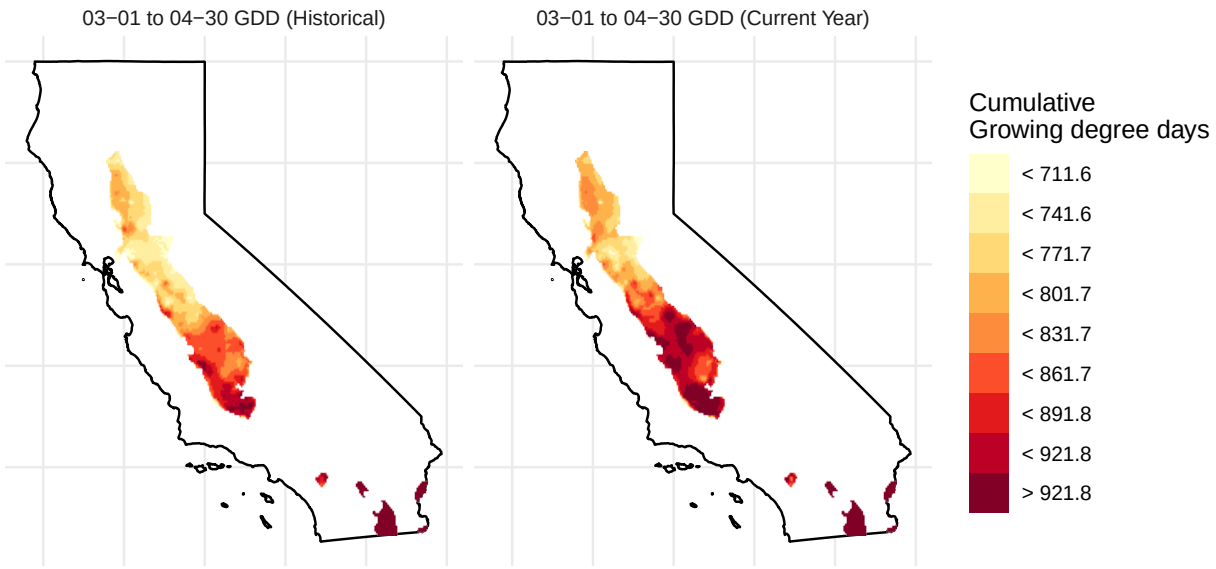

Figure 5: Historical growing degree day accumulation (GDD: 86F max, 45F min; 10-year average, left) compared to GDD totals during the2018-19 season (right) between 3/1/2018 and 4/30/2019.

Table 10: Approximate soil moisture by depth at planting and harvest for 2018-19 test locations.

Location	Trial	Date	0-30 cm	30-60 cm	60-90 cm
Colusa	WHEAT	2018-11-26	0.07	0.07	0.08
Davis	BARLEY	2018-12-14	0.13	0.11	0.10
		2019-02-21	0.14	-	-
	DURUM	2018-12-14	0.13	0.12	0.12
	WHEAT		0.13	0.12	0.12
		2019-02-21	0.15	-	-
	WHEAT LOW N	2018-12-14	0.13	0.11	0.10
		2019-02-21	0.14	-	-
Delta	WHEAT	2018-11-15	0.11	0.13	0.14
Fresno1	BARLEY	2018-12-11	0.13	-	0.08
	WHEAT		0.13	-	0.08
Fresno2	DURUM		0.14	0.10	0.10
		2019-03-13	0.17	-	-
Kern	WHEAT	2018-11-20	0.09	0.11	0.10
			0.09	0.11	0.10
Merced	BARLEY	2018-11-19	0.01	-	-
		2019-03-14	0.26	-	-
	WHEAT	2018-11-19	0.01	-	-
		2019-03-14	0.26	-	-
Yolo2	BARLEY	2018-11-27	0.09	-	-
	WHEAT		0.09	-	-
Yolo3	BARLEY	2019-01-04	0.10	0.09	0.09

Table 11: Soil nitrate concentration in the top 30 cm of soil.

Location	Trial	Date	Soil Nitrate (ppm)
Fresno2	DURUM	2018-12-11	29.1
Kern	DURUM	2018-11-20	31.3
Merced	BARLEY	2018-11-19	110.0
Merced	WHEAT	2018-11-19	110.0
Davis	BARLEY	2018-12-14	26.3
Kern	WHEAT	2018-11-20	31.3
Davis	WHEAT	2018-12-14	17.8
Davis	WHEAT	2018-12-14	17.8
Davis	WHEAT LOW N	2018-12-14	26.3
Colusa	WHEAT	2018-11-26	89.1
Delta	WHEAT	2018-11-15	19.5
Fresno1	BARLEY	2018-12-11	13.1
Fresno1	WHEAT	2018-12-11	13.1
Yolo2	BARLEY	2018-11-27	12.4
Yolo2	BARLEY	2018-11-27	12.4
Yolo3	BARLEY	2019-01-04	17.9

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 2018-19 were similar to or higher than previous seasons where such data is available.

Variety Performance

Table 17 reports top-performing varieties delineated by crop type and region. Top performing varieties met 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 18 – 42.

Table 12: The mean yield by location in the regional trials for barley over the past five season.

Crop Type	Location	2014-15	2015-16	2016-17	2017-18	2018-19
BARLEY	Chico	4113	-	-	-	-
	Clarksburg	6997	4779	-	-	-
	Davis	7057	5208	6624	7102	6385
	Fresno	5234	6860	5132	5621	6591
	Lassen	4764	-	-	-	-
	Merced	-	-	-	-	6231
	Siskiyou	3240	-	-	-	-
	Slo	-	3578	-	-	-
	Solano	-	-	5641	2212	-
	Tehama	1499	1844	-	3253	-
	Tulare	-	2399	3077	823	-
	Tulelake	4577	5258	7214	8138	8303
	Yolo2	-	-	-	-	3136
	Yolo3	-	-	-	-	4001

Table 13: The mean yield by location in the regional trials for common wheat over the past five season.

Crop Type	Location	2014-15	2015-16	2016-17	2017-18	2018-19
	Clarksburg	4578	6966	-	-	-
	Colusa	-	7082	8064	9522	6660
	Davis	6101	6529	8754	7825	8322
	Davis LN	-	-	4455	4747	7434
	Davis LW	5875	5602	-	6751	-
	Delta	7013	6534	3056	7591	5799
	Fresno	6377	7906	7528	9650	7161
	Fresno LN	-	-	1932	7252	-
	Fresno LW	-	-	6483	5391	-
	Fresno2	-	7749	-	-	-
	Imperial	6672	7568	6715	7534	-
COMMON	Kern	6773	6642	10327	7378	8026
	Kings	5429	-	7212	7462	-
	Merced	-	-	-	-	8649
	Solano	-	-	5142	3177	-
	Tehama	-	-	-	3777	-
	Tulare	-	2393	3836	-	-
	Yolo2	-	-	-	-	5949

Table 14: The mean yield by location in the regional trials for triticale over the past five season.

Crop Type	Location	2014-15	2015-16	2016-17	2017-18	2018-19
	Clarksburg	5422	5921	-	-	-
	Colusa	-	7495	10139	11026	8385
	Davis	6132	7374	9810	9612	11192
	Davis LN	-	-	4576	5718	9455
	Davis LW	6022	6260	-	7053	-
	Delta	8445	7722	3275	9878	6061
	Fresno	6514	8399	7414	9574	7651
	Fresno LN	-	-	2164	8049	-
	Fresno LW	-	-	6576	5136	-
	Fresno2	-	9342	-	-	-
	Imperial	6632	7823	6948	7389	-
TRITICALE	Kern	5897	6259	11026	8313	9046
	Kings	5677	-	8636	8081	-
	Merced	-	-	-	-	9065
	Solano	-	-	5661	3172	-
	Tehama	-	-	-	3455	-
	Tulare	-	2042	3564	-	-
	Yolo2	-	-	-	-	7352

Table 15: The mean yield by location in the regional trials for durum wheat over the past five season.

Crop Type	Location	2014-15	2015-16	2016-17	2017-18	2018-19
	Davis	7568	6835	8802	8951	6417
	Fresno	7472	8322	7049	8189	-
	Fresno2	-	8972	-	-	11443
DURUM	Imperial	7450	7796	6962	8163	8437
	Kern	6401	5832	8932	7260	9479
	Kings	6330	-	7295	8029	-

Table 16: The mean yield by location in the regional trials for springwheat and winterwheat over the past five season.

Crop Type	Location	2014-15	2015-16	2016-17	2017-18	2018-19
SPRINGWHEAT	Lassen	4681	-	-	-	-
	Siskiyou	4082	-	-	-	-
	Tulelake	5869	8134	-	-	-
	Tulelake (Hard)	-	-	7577	10257	9991
	Tulelake (Soft)	-	-	7782	11106	10934
WINTERWHEAT	Montague	-	-	-	-	12159
	Siskiyou	-	9403	9244	6250	-
	Siskiyou2	5786	-	-	-	-
	Tulelake	4367	10184	9747	11280	-
	Tulelake (Hard)	-	-	-	-	11432
	Tulelake (Soft)	-	-	-	-	11602

Table 17: Top performing commercial varieties by region in the 2016-17 through 2018-19 seasons.

Crop Type	Region/Group	Top-performing varieties
BARLEY	CA	ISHI
	InterMnt	OSU FULL PINT, LCS GENIE, LCS OPERA, LCS VESPA, LYON
	NCenSJV	ISHI
	Rainfed	ISHI
	SacV	ISHI
COMMON	CA	UC PATWIN 515, WB 9699
	SacV	UC PATWIN 515, WB 9699
	SoSJV	SY SUMMIT 515, SY SIENNA
DURUM	CA	TIBURON
	ImpV	POWELL
	NCenSJV	TIBURON
	SoSJV	SY FORTISSIMO, TIBURON
SPRINGWHEAT	InterMnt	AP RENEGADE, WB 9904, WB 7566, WB 9717
TRITICALE	CA	NS GOLD RUSH 91
	ImpV	WB PACHECO
	SacV	NS GOLD RUSH 91
	SoSJV	WB PACHECO, NS GOLD RUSH 91

Variety performance tables (Tables 18 – 42)

All tables herein are also available in .pdf and .xls formats at: http://smallgrains.ucanr.edu/Variety_Results/2019/ In addition to the multi-year summary tables included here and at the above website single site data for the 2018-19 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_2019_Variety_Results_Single_Site/

Fall planted Durum Wheat: http://smallgrains.ucanr.edu/Variety_Results/Durum_2019_Variety_Results_Single_Site/

Fall planted Triticale: http://smallgrains.ucanr.edu/Variety_Results/Tritcale_2019_Variety_Results_Single_Site/

Fall planted Barley: http://smallgrains.ucanr.edu/Variety_Results/Barley_2019_Variety_Results_Single_Site/

Winter Wheat: http://smallgrains.ucanr.edu/Variety_Results/Winter_Wheat_2019_Variety_Results_Single_Site/

Spring planted spring wheat: http://smallgrains.ucanr.edu/Variety_Results/2019/

Spring planted spring barley: http://smallgrains.ucanr.edu/Variety_Results/2019/

Common performance tables

Table 18: Sacramento Valley region, common wheat yield and protein from the 2016-17 to 2018-19 seasons.

Crop Classification	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Protein diff. from overall mean	Protein st.err.diff. from overall mean	Protein p-Value	2019 Protein (%)	2019 St.Err.Protein (%)	2019 Protein Rank	Status
HWS	2017-2019	LCS ATOMO	1723	6324	522	1	858	178	0.00	7142	481	1	10.81	0.51	58	-0.53	0.27	0.27	9.59	1.08	34	Released
HRS	2017-2019	LCS 12SB0197	1830	6131	542	2	666	228	0.03	-	-	-	10.58	0.54	62	-0.76	0.32	0.11	-	-	-	-
HRS	2017-2019	WB 9350	1842	6086	522	3	620	178	0.01	6757	481	2	10.95	0.51	51	-0.39	0.27	0.47	9.89	1.08	32	Released
HRS	2017-2019	XA 9501	1845	6045	589	4	579	322	0.25	-	-	-	10.89	0.64	53	-0.45	0.46	0.60	-	-	-	-
HRS	2017-2019	XA 9502	1846	6040	595	5	574	331	0.27	-	-	-	10.50	0.65	64	-0.83	0.48	0.37	-	-	-	-
HRS	2017-2019	AP OCTANE	1878	6013	543	6	547	232	0.10	6648	486	5	10.87	0.55	55	-0.47	0.35	0.47	9.41	1.08	36	Released
HRS	2017-2019	WB 9433	1847	5967	524	7	501	183	0.05	6422	486	8	10.98	0.51	50	-0.36	0.27	0.47	10.03	1.08	29	Released
HRS	2017-2019	WB 9699	1888	5960	537	8	494	217	0.12	6508	486	6	11.01	0.54	45	-0.33	0.32	0.58	10.27	1.08	24	Released
HRS	2017-2019	SY ULTRA	1590	5916	589	9	450	322	0.40	-	-	-	11.15	0.64	42	-0.18	0.46	0.86	-	-	-	Released
SRS	2017-2019	SY VACA	1766	5892	543	10	427	231	0.25	6303	492	12	9.43	0.55	67	-1.91	0.34	0.00	8.44	1.08	38	Released
HWS	2017-2019	UC PATWIN 515	1680	5891	523	11	426	181	0.10	6746	483	3	11.23	0.51	37	-0.11	0.27	0.86	10.38	1.08	18	Released
HWS	2017-2019	LCS 12SB0224	1831	5881	539	12	415	222	0.25	-	-	-	10.94	0.54	52	-0.40	0.32	0.48	-	-	-	-
HRS	2017-2019	SY 64-1-9	1876	5848	538	13	383	220	0.27	6661	486	4	11.65	0.54	20	0.32	0.33	0.60	10.40	1.08	16	-
HWS	2017-2019	UC 1815	1815	5830	540	14	365	225	0.30	-	-	-	10.99	0.54	48	-0.35	0.32	0.55	-	-	-	-
HRS	2017-2019	XA 9302	1844	5826	595	15	361	331	0.64	-	-	-	10.51	0.66	63	-0.83	0.50	0.38	-	-	-	-
HRS	2017-2019	XB 9512	1886	5779	584	16	314	314	0.67	-	-	-	10.82	0.60	56	-0.52	0.42	0.48	-	-	-	-
HRS	2017-2019	APB 510453	1841	5736	600	17	270	341	0.78	-	-	-	11.70	0.65	16	0.36	0.48	0.69	-	-	-	-
HRS	2017-2019	SY SUMMIT 515	1658	5729	523	18	264	181	0.37	6472	486	7	11.45	0.51	24	0.11	0.27	0.86	10.44	1.08	15	Released
HWS	2017-2019	WB 7566	1802	5712	551	19	247	249	0.67	-	-	-	11.00	0.55	47	-0.34	0.33	0.58	-	-	-	Released
HRS	2017-2019	SY 13W00850	1834	5696	589	20	231	322	0.78	-	-	-	11.34	0.64	30	0.00	0.46	0.99	-	-	-	-
HRS	2017-2019	WB 9490	1887	5693	539	21	228	223	0.67	6372	483	9	10.40	0.55	65	-0.94	0.33	0.05	9.69	1.08	33	Released
HRS	2017-2019	UC CENTRAL RED	1817	5614	522	22	148	178	0.75	6023	483	24	11.71	0.51	14	0.37	0.27	0.47	10.72	1.08	10	Released
HRS	2017-2019	UC LASSIK	1495	5610	526	23	145	188	0.78	6096	489	21	11.13	0.51	43	-0.21	0.28	0.69	10.25	1.08	25	Released
HRS	2017-2019	XA 9301	1843	5608	607	24	142	352	0.88	-	-	-	11.00	0.68	46	-0.34	0.52	0.77	-	-	-	-
HRS	2017-2019	SY REDWING	1521	5602	528	25	136	193	0.78	6331	489	11	11.09	0.51	44	-0.25	0.28	0.64	10.25	1.08	26	Released
HRS	2017-2019	UC 1884	1884	5595	584	26	129	314	0.88	-	-	-	11.29	0.64	33	-0.05	0.46	0.97	-	-	-	-
HRW	2017-2019	WINCAL 158-5	1906	5594	585	27	128	315	0.88	6225	486	15	11.31	0.66	31	-0.03	0.50	0.97	10.30	1.08	21	-
HRS	2017-2019	UC YUROK	1745	5579	523	28	113	180	0.79	6254	486	14	11.21	0.51	38	-0.13	0.27	0.86	10.39	1.08	17	Released
HRS	2017-2019	SY CAL ROJO	1478	5571	524	29	106	183	0.82	6261	486	13	10.81	0.51	57	-0.53	0.26	0.26	10.00	1.08	30	Released
HWS	2017-2019	UC 1883	1883	5567	569	30	101	286	0.89	-	-	-	11.80	0.60	11	0.46	0.42	0.55	-	-	-	-
HRS	2017-2019	UC 1880	1880	5560	538	31	95	220	0.88	5976	489	25	11.43	0.54	25	0.09	0.32	0.92	10.27	1.08	23	-
HRS	2017-2019	APB 410089	1903	5554	585	32	89	315	0.89	6178	486	18	12.67	0.66	3	1.33	0.50	0.06	11.66	1.08	1	-
HRS	2017-2019	XC 9407	1905	5538	577	33	72	300	0.89	6180	481	17	11.96	0.66	9	0.62	0.50	0.48	10.95	1.08	7	-
HRS	2017-2019	APB 500709	1819	5524	600	34	58	341	0.92	-	-	-	11.41	0.65	26	0.07	0.48	0.97	-	-	-	-
HWS	2017-2019	SY BLANCA ROYALE	1522	5520	543	35	54	231	0.89	-	-	-	11.20	0.55	39	-0.14	0.33	0.86	-	-	-	Released
HWS	2017-2019	LCS STAR	1688	5505	546	36	39	237	0.92	-	-	-	11.27	0.55	34	-0.07	0.33	0.96	-	-	-	Released
HRS	2017-2019	AP VENOM	1877	5496	540	37	31	225	0.93	6126	489	19	11.19	0.54	40	-0.15	0.33	0.86	10.14	1.08	28	Released
HRS	2017-2019	APB 510879	1904	5458	580	38	-7	307	0.98	6082	483	22	11.31	0.66	32	-0.03	0.50	0.97	10.30	1.08	22	-
HRS	2017-2019	UC 1882	1882	5458	537	39	-8	217	0.98	6031	486	23	11.71	0.54	15	0.37	0.32	0.54	10.68	1.08	12	-
HWS	2017-2019	SY BLANCA GRANDE 515	1657	5444	529	40	-22	197	0.94	6363	486	10	11.51	0.52	22	0.17	0.29	0.79	10.38	1.08	20	Released
HRS	2017-2019	WB 9904	1751	5412	523	41	-53	180	0.89	5741	483	30	11.19	0.51	41	-0.15	0.27	0.84	10.19	1.08	27	Released
HRS	2017-2019	SY SIENNA	1835	5410	523	42	-55	181	0.89	5674	483	31	11.67	0.51	19	0.33	0.27	0.48	10.59	1.08	13	Released
HRS	2017-2019	UC ANZA	20	5383	595	43	-83	331	0.89	-	-	-	10.63	0.65	61	-0.71	0.48	0.47	-	-	-	Released
HRS	2017-2019	UC 16010 20	1838	5377	589	44	-89	322	0.89	-	-	-	11.25	0.64	36	-0.09	0.46	0.96	-	-	-	-
HRS	2017-2019	APB 510477	1874	5370	584	45	-96	314	0.89	-	-	-	11.70	0.61	17	0.36	0.43	0.67	-	-	-	-
HWS	2017-2019	UC PATWIN 515 HP	1743	5367	522	46	-98	177	0.83	6108	483	20	12.18	0.50	6	0.84	0.26	0.02	11.19	1.08	4	Released
HRS	2017-2019	WB PATRON	1731	5351	524	47	-115	183	0.79	6214	486	16	11.38	0.51	28	0.04	0.26	0.97	10.38	1.08	19	Released
HRS	2017-2019	APB 501089	1828	5297	595	48	-168	331	0.85	-	-	-	10.74	0.64	59	-0.59	0.46	0.48	-	-	-	-
HRS	2017-2019	UC 1885	1885	5271	580	49	-195	306	0.79	-	-	-	11.36	0.62	29	0.02	0.45	0.97	-	-	-	-
HWS	2017-2019	UC 1907	1907	5262	585	50	-203	315	0.79	5894	486	26	12.67	0.66	4	1.33	0.50	0.06	11.66	1.08	2	-
HRS	2017-2019	APB 410117	1840	5213	600	51	-252	341	0.78	-	-	-	11.38	0.66	27	0.04	0.50	0.97	-	-	-	-
HRS	2017-2019	APB 511829	1875	5196	580	52	-269	306	0.73	-	-	-	11.68	0.60	18	0.34	0.41	0.67	-	-	-	-
HRS	2017-2019	UC 1908	1908	5194	580	53	-272	307	0.73	5813	483	28	12.14	0.66	7	0.80	0.50	0.41	11.13	1.08	5	-
HRS	2017-2019	WB 9112	1748	5180	538	54	-285	219	0.46	-	-	-	11.25	0.53	35	-0.08	0.31	0.92	-	-	-	Released
HRS	2017-2019	SY 314	1660	5154	607	55	-312	352	0.73	-	-	-	10.64	0.66	60	-0.70	0.50	0.47	-	-	-	Released
HRS	2017-2019	WB 9229	1730	5136	524	56	-329	183	0.25	5788	486	29	11.92	0.51	10	0.58	0.27	0.21	10.87	1.08	9	Released
HWS	2017-2019	UC 1839	1839	5109	546	57	-357	238	0.36	5611	489	32	12.02	0.56	8	0.68	0.36	0.28	11.00	1.08	6	-
HRS	2017-2019	DPG FV 2808	1608	5097	546	58	-369	238	0.34	5865	500	27	10.27	0.55	66	-1.07	0.34	0.02	8.92	1.08	37	Released
HRW	2017-2019	ASSL TAM 204	1778	5054	525	59	-411	186	0.13	5228	483	36	10.87	0.51	54	-0.47	0.28	0.38	9.50	1.08	35	Released
HRS	2017-2019	UC 14657 170	1836	4911	600	60	-554	341	0.30	-	-	-	11.59	0.66	21	0.25	0.50	0.86	-	-	-	-
HWS	2017-2019	UC 1909	1909	4905	580	61	-561	307	0.25	5552	483	33	11.51	0.66	23	0.17	0.50	0.90	10.50	1.08	14	-
HRS	2017-2019	WB JOAQUIN ORO	1728	4702	526	62	-763	190	0.00	5464	483	34	12.46	0.52	5	1.12	0.29	0.00	11.51	1.08	3	Released
HRS	2017-2019	YECORA ROJO	112	4650	531	63	-815	201	0.00	5384	489	35	11.74	0.53	12	0.40	0.30	0.47	10.91	1.08	8	Released
HWS	2017-2019	UC 15080 49	1837	4610	600	64	-856	341	0.08	-	-	-	12.79	0.66	2	1.45	0.50	0.04	-	-	-	-
SWS	2017-2019	BAG NEW DIRKWIN	1667	4485	524	65	-981	184	0.00	5183	489	37	10.98	0.51	49	-0.36	0.27	0.47	9.94	1.08	31	Released
HRS	2017-2019	WB TRIPLE IV	1550	4444	580	66	-1022	307	0.01	5063	483	38	11.72	0.66	13	0.38	0.50	0.69	10.71	1.08	11	Released
HRS	2017-2019	YECORA ROJO 515	1879	4253	576	67	-1212	299	0.00	-	-	-	13.82	0.62	1	2.48	0.45	0.00	-	-	-	-

Table 19: North Cental San Joaquin Valley region, common wheat yield and protein from the 2016-17 to 2018-19 seasons.

Crop Classification	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Protein diff. from overall mean	Protein st.err.diff. from overall mean	Protein p-Value	2019 Protein (%)	2019 St.Err.Protein (%)	2019 Protein Rank	Status
HRS	2017-2019	XA 9501	1845	7163	614	1	731	430	0.53	-	-	-	11.11	0.97	58	-0.61	0.53	0.71	-	-	-	-
HRS	2017-2019	WB 9699	1888	7118	568	2	687	367	0.51	7657	707	4	11.47	0.95	41	-0.26	0.49	0.83	12.30	0.51	21	Released
HRS	2017-2019	WB 9490	1887	7082	574	3	650	375	0.53	8193	712	1	10.83	0.95	64	-0.90	0.49	0.52	12.02	0.51	27	Released
HRS	2017-2019	WB 9433	1847	7014	513	4	583	275	0.38	7812	707	2	11.41	0.89	46	-0.31	0.36	0.81	12.06	0.51	26	Released
HRS	2017-2019	SY ULTRA	1590	6973	614	5	542	430	0.81	-	-	-	11.30	0.97	49	-0.42	0.53	0.83	-	-	-	Released
HRS	2017-2019	LCS 12SB0197	1830	6962	536	6	530	314	0.53	-	-	-	11.25	0.89	51	-0.47	0.38	0.71	-	-	-	-
HWS	2017-2019	UC 1815	1815	6887	533	7	455	309	0.67	-	-	-	11.36	0.89	48	-0.36	0.38	0.77	-	-	-	-
HWS	2017-2019	LCS ATOMO	1723	6886	515	8	455	279	0.53	7594	707	6	11.16	0.89	56	-0.56	0.36	0.62	11.82	0.51	30	Released
HRS	2017-2019	APB 510879	1904	6850	750	9	419	608	0.89	7504	707	8	12.19	1.53	14	0.47	1.29	0.83	12.93	0.51	14	-
HRS	2017-2019	SY 13W00850	1834	6844	614	10	413	430	0.89	-	-	-	11.82	0.97	29	0.10	0.53	0.92	-	-	-	-
HRS	2017-2019	XA 9301	1843	6813	614	11	381	430	0.89	-	-	-	11.03	0.97	62	-0.70	0.53	0.67	-	-	-	-
HRS	2017-2019	SY REDWING	1521	6797	515	12	365	279	0.81	7308	707	17	11.75	0.89	31	0.03	0.36	0.95	11.66	0.51	33	Released
HRS	2017-2019	WB 9350	1842	6786	513	13	355	275	0.81	7595	707	5	11.17	0.89	55	-0.55	0.36	0.62	11.73	0.51	32	Released
HRS	2017-2019	SY 64-1-9	1876	6774	580	14	342	385	0.89	7476	707	9	12.07	0.97	18	0.35	0.53	0.83	13.45	0.51	9	-
HRS	2017-2019	SY 314	1660	6756	614	15	324	430	0.89	-	-	-	11.18	0.97	53	-0.55	0.53	0.75	-	-	-	Released
HWS	2017-2019	LCS 12SB0224	1831	6755	533	16	323	309	0.89	-	-	-	11.12	0.89	57	-0.60	0.38	0.62	-	-	-	-
HRS	2017-2019	AP VENOM	1877	6731	574	17	299	375	0.89	7725	707	3	11.88	0.96	27	0.16	0.51	0.85	13.54	0.51	7	Released
HWS	2017-2019	WB 7566	1802	6718	533	18	287	309	0.89	-	-	-	11.18	0.89	54	-0.55	0.38	0.62	-	-	-	Released
HRS	2017-2019	AP OCTANE	1878	6711	568	19	279	367	0.89	7167	707	23	10.80	0.96	65	-0.92	0.51	0.52	12.21	0.51	23	Released
HWS	2017-2019	UC PATWIN 515	1680	6706	513	20	274	275	0.89	7061	707	26	11.65	0.89	34	-0.07	0.36	0.92	12.28	0.51	22	Released
HRS	2017-2019	APB 510453	1841	6698	614	21	266	430	0.89	-	-	-	11.51	0.97	38	-0.21	0.53	0.83	-	-	-	-
HRS	2017-2019	XC 9407	1905	6686	750	22	255	608	0.89	7340	707	13	12.29	1.53	11	0.56	1.29	0.83	13.03	0.51	12	-
HRS	2017-2019	UC 1880	1880	6686	568	23	254	367	0.89	7381	707	12	11.96	0.97	22	0.23	0.53	0.83	12.79	0.51	16	-
HRW	2017-2019	WINCAL 158-5	1906	6679	785	24	247	649	0.89	7328	712	15	11.90	1.53	25	0.17	1.29	0.93	12.64	0.51	17	-
HRS	2017-2019	APB 501089	1828	6677	614	25	245	430	0.89	-	-	-	11.42	0.97	45	-0.30	0.53	0.83	-	-	-	-
HRS	2017-2019	XB 9512	1886	6676	635	26	244	460	0.89	-	-	-	11.08	0.97	61	-0.64	0.53	0.71	-	-	-	-
HWS	2017-2019	UC 1907	1907	6665	750	27	233	608	0.89	7319	707	16	13.16	1.53	2	1.44	1.29	0.71	13.90	0.51	3	-
HRS	2017-2019	UC 1908	1908	6635	785	28	203	649	0.91	7337	712	14	12.53	1.53	8	0.81	1.29	0.83	13.27	0.51	11	-
HRS	2017-2019	APB 500709	1819	6623	614	29	191	430	0.89	-	-	-	11.09	0.98	60	-0.63	0.55	0.71	-	-	-	-
HRS	2017-2019	XA 9502	1846	6601	614	30	169	430	0.89	-	-	-	11.20	0.97	52	-0.52	0.53	0.77	-	-	-	-
HRS	2017-2019	SY SIENNA	1835	6582	515	31	150	279	0.89	6631	707	32	11.86	0.89	28	0.14	0.36	0.83	13.65	0.51	5	Released
HRS	2017-2019	UC YUROK	1745	6577	513	32	145	275	0.89	7223	707	21	11.89	0.89	26	0.16	0.36	0.83	12.48	0.51	20	Released
HRS	2017-2019	APB 410089	1903	6575	750	33	143	608	0.91	7229	707	20	12.85	1.53	4	1.13	1.29	0.81	13.60	0.51	6	-
HRS	2017-2019	UC 1884	1884	6561	624	34	130	445	0.91	-	-	-	12.50	0.97	9	0.78	0.53	0.62	-	-	-	-
HRS	2017-2019	XA 9302	1844	6532	614	35	101	430	0.91	-	-	-	11.10	0.97	59	-0.62	0.53	0.71	-	-	-	-
HWS	2017-2019	LCS STAR	1688	6524	551	36	93	337	0.91	-	-	-	11.68	0.90	33	-0.05	0.39	0.93	-	-	-	Released
HRS	2017-2019	UC 1882	1882	6521	568	37	89	367	0.91	7281	712	18	11.95	0.95	23	0.22	0.49	0.83	12.62	0.51	18	-
HWS	2017-2019	SY BLANCA GRANDE 515	1657	6520	515	38	88	279	0.91	7544	707	7	11.97	0.89	21	0.25	0.36	0.83	12.60	0.51	19	Released
HWS	2017-2019	UC 1883	1883	6471	624	39	39	445	0.97	-	-	-	11.74	0.97	32	0.02	0.53	0.97	-	-	-	-
HRS	2017-2019	APB 511829	1875	6468	624	40	36	445	0.97	-	-	-	11.41	0.97	47	-0.31	0.53	0.83	-	-	-	-
HRS	2017-2019	SY CAL ROJO	1478	6467	515	41	35	279	0.97	7196	707	22	11.54	0.89	37	-0.19	0.37	0.83	11.21	0.51	36	Released
HRS	2017-2019	APB 510477	1874	6453	635	42	21	460	0.97	-	-	-	11.79	0.97	30	0.07	0.53	0.93	-	-	-	-
HRS	2017-2019	SY SUMMIT 515	1658	6448	513	43	16	275	0.97	7472	707	10	11.57	0.89	35	-0.15	0.36	0.83	11.58	0.51	34	Released
HWS	2017-2019	SY BLANCA ROYALE	1522	6421	536	44	-10	314	0.97	-	-	-	11.91	0.90	24	0.19	0.38	0.83	-	-	-	Released
HRS	2017-2019	UC LASSIK	1495	6400	513	45	-32	275	0.97	7278	707	19	11.44	0.89	44	-0.28	0.37	0.83	11.81	0.51	31	Released
HWS	2017-2019	UC PATWIN 515 HP	1743	6310	513	46	-122	275	0.89	6757	707	28	12.85	0.89	5	1.12	0.36	0.04	13.93	0.51	2	Released
HRS	2017-2019	UC 1885	1885	6261	624	47	-170	445	0.89	-	-	-	12.07	0.97	19	0.35	0.53	0.83	-	-	-	-
HWS	2017-2019	UC 1839	1839	6261	558	48	-171	350	0.89	7071	707	25	12.62	0.95	7	0.89	0.49	0.52	13.71	0.51	4	-
HRS	2017-2019	UC ANZA	20	6231	614	49	-200	430	0.89	-	-	-	10.95	0.97	63	-0.77	0.53	0.62	-	-	-	Released
HRS	2017-2019	WB PATRON	1731	6226	515	50	-205	279	0.89	7448	707	11	11.54	0.89	36	-0.18	0.37	0.83	12.21	0.51	24.5	Released
HRS	2017-2019	WB 9112	1748	6222	533	51	-209	309	0.89	-	-	-	12.24	0.89	13	0.52	0.38	0.65	-	-	-	Released
HRS	2017-2019	WB 9904	1751	6214	513	52	-218	275	0.89	6881	707	27	11.50	0.88	40	-0.22	0.35	0.83	11.97	0.51	29	Released
HRW	2017-2019	ASSL TAM 204	1778	6199	513	53	-232	275	0.89	6193	707	35	11.45	0.89	43	-0.28	0.36	0.83	12.21	0.51	24.5	Released
HRS	2017-2019	APB 410117	1840	6188	614	54	-244	430	0.89	-	-	-	11.51	0.97	39	-0.22	0.53	0.83	-	-	-	-
HRS	2017-2019	UC 16010 20	1838	6161	614	55	-270	430	0.89	-	-	-	12.44	0.97	10	0.72	0.53	0.65	-	-	-	-
HRS	2017-2019	UC CENTRAL RED	1817	6150	513	56	-282	275	0.89	7131	707	24	12.11	0.89	17	0.39	0.36	0.73	13.52	0.51	8	Released
HRS	2017-2019	WB 9229	1730	6119	513	57	-313	275	0.89	6693	707	30	12.26	0.89	12	0.54	0.37	0.62	12.97	0.51	13	Released
HRS	2017-2019	DPG FV 2808	1608	6104	558	58	-327	350	0.89	6369	707	34	10.50	0.95	66	-1.22	0.49	0.17	10.34	0.51	38	Released
HRS	2017-2019	YECORA ROJO	112	6088	515	59	-343	279	0.81	6637	707	31	12.05	0.89	20	0.32	0.37	0.81	13.35	0.51	10	Released
HWS	2017-2019	UC 1909	1909	5832	750	60	-600	608	0.89	6486	707	33	12.18	1.53	15	0.46	1.29	0.83	12.92	0.51	15	-
HRS	2017-2019	UC 14657 170	1836	5722	614	61	-710	430	0.53	-	-	-	12.15	0.98	16	0.43	0.55	0.83	-	-	-	-
HRS	2017-2019	YECORA ROJO 515	1879	5517	635	62	-915	460	0.45	-	-	-	13.43	0.97	1	1.71	0.53	0.04	-	-	-	-
HRS	2017-2019	WB JOAQUIN ORO	1728	5482	513	63	-950	275	0.01	6731	707	29	12.89	0.89	3	1.17	0.36	0.04	13.98	0.51	1	Released
HWS	2017-2019	UC 15080 49	1837	5328	614	64	-1104	430	0.17	-	-	-	12.68	0.97	6	0.96	0.53	0.52	-	-	-	-
SWS	2017-2019	BAG NEW DIRKWIN	1667	5167	519	65	-1265	286	0.00	5561	712	37	11.46	0.89	42	-0.26	0.37	0.83	11.58	0.51	35	Released
HRS	2017-2019	WB TRIPLE IV	1550	5082	750	66	-1349	608	0.36	5736	707	36	11.28	1.53	50	-0.45	1.29	0.83	12.02	0.51	28	Released
SRS	2017-2019	SY VACA	1766	4583	568	67	-1848	366	0.00	4740	707	38	10.20	0.96	67	-1.53	0.51	0.04	11.05	0.51	37	Released

Table 20: South San Joaquin Valley region, common wheat yield and protein from the 2016-17 to 2018-19 seasons.

Crop Classification	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Protein diff. from overall mean	Protein st.err.diff. from overall mean	Protein p-Value	2019 Protein (%)	2019 St.Err.Protein (%)	2019 Protein Rank	Status
HRS	2017-2019	XB 9512	1886	7792	1291	1	1209	451	0.03	-	-	-	13.00	0.93	56	-0.67	0.80	0.69	-	-	-	-
HWS	2017-2019	LCS ATOMO	1723	7631	1229	2	1048	225	0.00	8051	457	5	13.03	0.59	54	-0.65	0.38	0.33	11.75	0	32	Released
HRS	2017-2019	XA 9301	1843	7620	1250	3	1037	319	0.01	-	-	-	13.31	0.65	46	-0.37	0.47	0.70	-	-	-	-
HRS	2017-2019	XA 9302	1844	7471	1250	4	888	319	0.02	-	-	-	12.95	0.65	57	-0.73	0.47	0.36	-	-	-	-
HWS	2017-2019	LCS 12SB0224	1831	7450	1236	5	868	260	0.01	-	-	-	13.61	0.59	37	-0.06	0.38	0.94	-	-	-	-
HWS	2017-2019	UC 1815	1815	7389	1236	6	806	260	0.01	-	-	-	13.43	0.59	41	-0.24	0.38	0.80	-	-	-	-
HRS	2017-2019	UC 1884	1884	7377	1291	7	794	451	0.20	-	-	-	14.27	0.80	15	0.59	0.66	0.68	-	-	-	-
HRS	2017-2019	XA 9501	1845	7363	1250	8	780	319	0.05	-	-	-	12.72	0.65	64	-0.96	0.47	0.29	-	-	-	-
HRS	2017-2019	WB 9433	1847	7311	1229	9	728	225	0.01	8378	457	2	13.70	0.58	33	0.03	0.36	0.96	11.95	0	31	Released
HRS	2017-2019	XA 9502	1846	7294	1250	10	712	319	0.08	-	-	-	12.82	0.65	60	-0.86	0.47	0.30	-	-	-	-
HRS	2017-2019	APB 500709	1819	7289	1250	11	707	319	0.08	-	-	-	13.16	0.65	51	-0.51	0.47	0.64	-	-	-	-
HRS	2017-2019	SY SUMMIT 515	1658	7182	1230	12	600	232	0.04	7260	457	20	13.34	0.58	44	-0.34	0.36	0.68	12.53	0	24	Released
HRS	2017-2019	SY SIENNA	1835	7177	1229	13	594	225	0.03	7371	457	17	14.02	0.58	18	0.35	0.36	0.67	13.30	0	14	Released
HRS	2017-2019	WB 9350	1842	7177	1230	14	594	232	0.04	8382	457	1	13.30	0.58	47	-0.38	0.36	0.64	11.53	0	34	Released
HRS	2017-2019	APB 501089	1828	7171	1250	15	588	319	0.18	-	-	-	13.09	0.65	52	-0.59	0.47	0.54	-	-	-	-
HRS	2017-2019	APB 511829	1875	7129	1317	16	546	518	0.46	-	-	-	13.51	0.93	39	-0.17	0.80	0.94	-	-	-	-
HRS	2017-2019	APB 410117	1840	7113	1250	17	530	319	0.22	-	-	-	13.80	0.65	28	0.12	0.47	0.94	-	-	-	-
HWS	2017-2019	UC 1839	1839	7028	1236	18	446	260	0.22	6864	457	25	13.83	0.62	25	0.15	0.43	0.92	13.99	0	4	-
HRS	2017-2019	SY 314	1660	6999	1256	19	417	340	0.37	-	-	-	13.21	0.65	49	-0.47	0.47	0.64	-	-	-	Released
HRS	2017-2019	WB 9699	1888	6990	1250	20	408	319	0.36	7976	457	6	14.60	0.73	7	0.93	0.57	0.33	12.91	0	19	Released
HRW	2017-2019	WINCAL 158-5	1906	6950	1291	21	368	451	0.61	7661	457	11	13.87	1.23	24	0.19	1.13	0.94	12.96	0	18	-
HRS	2017-2019	SY CAL ROJO	1478	6948	1229	22	365	225	0.23	7525	457	14	13.08	0.58	53	-0.60	0.36	0.33	11.52	0	35	Released
HWS	2017-2019	WB 7566	1802	6903	1236	23	320	260	0.37	-	-	-	12.94	0.59	58	-0.74	0.38	0.30	-	-	-	Released
HRS	2017-2019	UC CENTRAL RED	1817	6901	1232	24	318	240	0.35	7298	505	19	12.50	0.58	66	-1.18	0.36	0.03	13.37	0	13	Released
HRS	2017-2019	SY REDWING	1521	6893	1230	25	310	232	0.35	7534	457	13	13.63	0.59	35	-0.05	0.38	0.94	12.27	0	26	Released
HWS	2017-2019	SY BLANCA GRANDE 515	1657	6865	1229	26	282	225	0.37	6387	457	34	13.53	0.58	38	-0.15	0.36	0.92	13.53	0	9.5	Released
HRS	2017-2019	XC 9407	1905	6849	1291	27	267	451	0.70	7560	457	12	13.92	1.23	23	0.25	1.13	0.94	13.01	0	17	-
HRS	2017-2019	SY 13W00850	1834	6839	1250	28	256	319	0.61	-	-	-	13.28	0.65	48	-0.40	0.47	0.69	-	-	-	-
HRS	2017-2019	SY 64-1-9	1876	6834	1250	29	251	319	0.61	7390	457	16	14.42	0.73	11	0.74	0.57	0.53	13.43	0	12	-
HRS	2017-2019	APB 510453	1841	6830	1250	30	247	319	0.61	-	-	-	13.93	0.65	22	0.25	0.47	0.86	-	-	-	-
HRS	2017-2019	WB 9490	1887	6804	1250	31	222	319	0.64	8084	457	4	12.73	0.73	62	-0.94	0.57	0.33	11.71	0	33	Released
HRS	2017-2019	UC 1880	1880	6779	1263	32	196	366	0.74	7959	505	7	13.79	0.80	29	0.11	0.65	0.94	12.77	0	20	-
HWS	2017-2019	UC PATWIN 515 HP	1743	6717	1229	33	134	225	0.70	6792	457	27	14.53	0.58	9	0.86	0.36	0.24	13.66	0	8	Released
HRS	2017-2019	AP OCTANE	1878	6717	1250	34	134	319	0.81	7923	457	8	13.41	0.73	42	-0.27	0.57	0.89	12.19	0	28.5	Released
HRS	2017-2019	AP VENOM	1877	6701	1250	35	118	319	0.81	7807	457	9	14.31	0.73	13	0.63	0.57	0.64	13.09	0	16	Released
HRS	2017-2019	LCS 12SB0197	1830	6679	1236	36	96	260	0.81	-	-	-	13.19	0.59	50	-0.49	0.38	0.53	-	-	-	-
HRS	2017-2019	SY ULTRA	1590	6587	1250	37	4	319	0.99	-	-	-	12.63	0.65	65	-1.05	0.47	0.24	-	-	-	Released
HRS	2017-2019	UC 16010 20	1838	6562	1250	38	-20	319	0.96	-	-	-	13.80	0.65	26	0.13	0.47	0.94	-	-	-	-
HRW	2017-2019	ASSL TAM 204	1778	6535	1230	39	-48	232	0.86	8102	457	3	13.80	0.58	27	0.13	0.36	0.92	12.22	0	27	Released
HWS	2017-2019	SY BLANCA ROYALE	1522	6519	1241	40	-64	285	0.86	-	-	-	13.96	0.61	21	0.28	0.40	0.78	-	-	-	Released
HRS	2017-2019	UC LASSIK	1495	6513	1230	41	-70	232	0.82	6387	457	33	12.93	0.59	59	-0.75	0.38	0.30	12.62	0	23	Released
HRS	2017-2019	WB 9112	1748	6495	1245	42	-88	300	0.82	-	-	-	13.41	0.61	43	-0.27	0.40	0.79	-	-	-	Released
HRS	2017-2019	WB 9904	1751	6493	1230	43	-90	232	0.81	7214	457	21	13.01	0.58	55	-0.67	0.36	0.30	12.16	0	30	Released
HRS	2017-2019	UC YUROK	1745	6470	1229	44	-112	225	0.75	7040	457	24	12.82	0.58	61	-0.86	0.36	0.24	13.44	0	11	Released
HRS	2017-2019	UC 1882	1882	6458	1263	45	-125	367	0.82	7320	457	18	14.05	0.80	17	0.37	0.65	0.85	12.43	0	25	-
HRS	2017-2019	APB 510879	1904	6453	1291	46	-129	451	0.82	7164	457	22	13.66	1.23	34	-0.02	1.13	0.99	12.75	0	21	-
HWS	2017-2019	UC PATWIN 515	1680	6329	1230	47	-254	232	0.44	7459	457	15	14.45	0.58	10	0.77	0.36	0.29	12.66	0	22	Released
HRS	2017-2019	APB 510477	1874	6263	1291	48	-320	451	0.64	-	-	-	13.73	0.80	32	0.05	0.66	0.96	-	-	-	-
HWS	2017-2019	LCS STAR	1688	6226	1236	49	-356	260	0.34	-	-	-	14.39	0.59	12	0.71	0.38	0.30	-	-	-	Released
HRS	2017-2019	APB 410089	1903	6220	1317	50	-363	518	0.64	7115	505	23	14.89	1.23	3	1.21	1.13	0.64	13.98	0	5	-
HWS	2017-2019	UC 1907	1907	6145	1291	51	-438	451	0.51	6856	457	26	15.40	1.23	2	1.73	1.13	0.38	14.49	0	2	-
HWS	2017-2019	UC 15080 49	1837	6135	1250	52	-448	319	0.33	-	-	-	14.73	0.65	6	1.06	0.47	0.24	-	-	-	-
HRS	2017-2019	WB PATRON	1731	6066	1229	53	-517	225	0.07	5822	457	37	13.77	0.58	30	0.09	0.36	0.94	12.19	0	28.5	Released
HRS	2017-2019	UC 1908	1908	6065	1291	54	-517	451	0.41	6776	457	28	14.59	1.23	8	0.92	1.13	0.70	13.68	0	7	-
HWS	2017-2019	UC 1909	1909	5917	1291	55	-666	451	0.29	6627	457	31	14.83	1.23	4	1.16	1.13	0.64	13.92	0	6	-
HRS	2017-2019	WB JOAQUIN ORO	1728	5882	1230	56	-701	232	0.01	5898	457	36	14.27	0.58	14	0.60	0.36	0.33	14.55	0	1	Released
HWS	2017-2019	UC 1883	1883	5829	1291	57	-753	451	0.22	-	-	-	14.78	0.80	5	1.10	0.66	0.33	-	-	-	-
HRS	2017-2019	YECORA ROJO	112	5820	1238	58	-763	271	0.02	6070	588	35	13.73	0.60	31	0.05	0.40	0.94	13.53	0	9.5	Released
HRS	2017-2019	DPG FV 2808	1608	5793	1236	59	-790	260	0.01	6772	457	29	11.81	0.62	67	-1.86	0.43	0.00	10.74	0	37	Released
HRS	2017-2019	WB 9229	1730	5792	1230	60	-790	232	0.01	6537	457	32	13.99	0.58	19	0.32	0.36	0.69	14.28	0	3	Released
HRS	2017-2019	UC 1885	1885	5707	1317	61	-876	518	0.22	-	-	-	13.99	0.80	20	0.31	0.66	0.89	-	-	-	-
HRS	2017-2019	UC 14657 170	1836	5633	1250	62	-950	319	0.02	-	-	-	13.50	0.65	40	-0.17	0.47	0.92	-	-	-	-
HRS	2017-2019	YECORA ROJO 515	1879	5476	1291	63	-1107	451	0.05	-	-	-	15.93	0.80	1	2.25	0.66	0.02	-	-	-	-
HRS	2017-2019	UC ANZA	20	5456	1250	64	-1126	319	0.01	-	-	-	12.73	0.65	63	-0.95	0.47	0.29	-	-	-	Released
SRS	2017-2019	SY VACA	1766	5346	1236	65	-1237	260	0.00	7730	457	10	13.62	0.62	36	-0.05	0.43	0.94	10.44	0	38	Released
SWS	2017-2019	BAG NEW DIRKWIN	1667	4415	1229	66	-2168	225	0.00	6724	457	30	13.31	0.58	45	-0.37	0.36	0.64	11.43	0	36	Released
HRS	2017-2019	WB TRIPLE IV	1550	4283	1367	67	-2300	632	0.00	5329	588	38	14.09	1.23	16	0.41	1.13	0.92	13.18	0	15	Released

Table 21: Imperial Valley region, common wheat yield and protein from the 2016-17 to 2018-19 seasons.

Crop Classification	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Protein diff. from overall mean	Protein st.err.diff. from overall mean	Protein p-Value	Status
HRS	2016-2018	XA 9301	1843	8119	465	1	1618	361	0.00	11.87	0.41	64	-0.82	0.38	0.10	-
HRS	2016-2018	XA 9501	1845	7747	465	2	1246	361	0.00	12.38	0.41	43	-0.31	0.38	0.52	-
HRS	2016-2018	APB 500709	1819	7604	387	3	1103	255	0.00	13.01	0.32	23	0.32	0.29	0.38	-
HRS	2016-2018	APB 510453	1841	7271	465	4	770	361	0.12	13.06	0.41	22	0.37	0.38	0.45	-
HWS	2016-2018	UC 1815	1815	7266	357	5	765	208	0.00	12.64	0.28	31	-0.05	0.24	0.87	-
HRS	2016-2018	XA 9502	1846	7255	465	6	754	361	0.12	11.12	0.41	68	-1.57	0.38	0.00	-
HRS	2016-2018	WB 9433	1847	7165	387	7	664	255	0.04	12.37	0.32	44	-0.32	0.29	0.38	Released
HRS	2016-2018	APB 510477	1874	7122	466	8	621	362	0.26	12.11	0.47	57	-0.57	0.44	0.31	-
HRS	2016-2018	UC 1885	1885	7119	466	9	618	362	0.26	12.50	0.47	38	-0.19	0.44	0.76	-
HRS	2016-2018	AP OCTANE	1878	7100	466	10	599	362	0.26	13.82	0.47	7	1.13	0.44	0.04	Released
HRS	2016-2018	SY REDWING	1521	7094	357	11	593	208	0.02	12.23	0.28	50	-0.46	0.24	0.15	Released
HRS	2016-2018	SY ULTRA	1590	7057	387	12	556	255	0.11	11.84	0.32	65	-0.85	0.29	0.02	Released
HWS	2016-2018	WB 7390	1750	6988	466	13	487	362	0.42	11.98	0.47	61	-0.70	0.44	0.22	-
HRS	2016-2018	APB 511829	1875	6974	466	14	474	362	0.43	11.97	0.47	62	-0.71	0.44	0.22	-
HRS	2016-2018	YECORA ROJO	112	6960	387	15	460	255	0.23	12.63	0.32	32	-0.06	0.29	0.87	Released
HRS	2016-2018	SY 13W00850	1834	6916	465	16	415	361	0.48	12.16	0.41	53	-0.53	0.38	0.28	-
HWS	2016-2018	UC 15013 15	1816	6870	466	17	369	362	0.55	11.42	0.47	67	-1.27	0.44	0.02	-
HRS	2016-2018	UC LASSIK	1495	6850	357	18	349	208	0.26	12.12	0.28	56	-0.57	0.24	0.07	Released
HRS	2016-2018	AP VENOM	1877	6844	466	19	343	362	0.60	12.55	0.47	36	-0.13	0.44	0.83	Released
HRS	2016-2018	SY SUMMIT 515	1658	6840	357	20	339	208	0.27	12.93	0.28	25	0.24	0.24	0.44	Released
HRS	2016-2018	WB 9904	1751	6828	357	21	327	208	0.28	12.03	0.28	59	-0.66	0.24	0.03	Released
HRS	2016-2018	UC 15010 5	1814	6809	466	22	309	362	0.67	13.22	0.47	17	0.53	0.44	0.35	-
HRS	2016-2018	WB 9350	1842	6795	387	23	294	255	0.48	12.17	0.32	52	-0.51	0.29	0.17	Released
HRS	2016-2018	UC 14657 170	1836	6763	465	24	262	361	0.72	13.81	0.41	8	1.12	0.38	0.02	-
HWS	2016-2018	UC PATWIN 515	1680	6743	357	25	243	208	0.48	12.39	0.28	41	-0.29	0.24	0.35	Released
HWS	2016-2018	WB 7566	1802	6730	357	26	229	208	0.50	12.52	0.28	37	-0.17	0.24	0.61	Released
HWS	2016-2018	UC 15080 49	1837	6727	465	27	226	361	0.78	14.76	0.41	2	2.07	0.38	0.00	-
-	2016-2018	APB 501129	1820	6697	466	28	196	362	0.83	12.48	0.47	39	-0.20	0.44	0.75	-
HWS	2016-2018	WB 7618	1749	6676	466	29	175	362	0.83	13.45	0.47	12	0.76	0.44	0.19	Released
HRS	2016-2018	APB 8238	1821	6654	466	30	153	362	0.87	12.82	0.47	27	0.13	0.44	0.83	-
HWS	2016-2018	LCS 12SB0224	1831	6653	357	31	152	208	0.72	12.13	0.28	55	-0.56	0.24	0.07	-
HRS	2016-2018	UC YUROK	1745	6647	357	32	146	208	0.72	12.30	0.28	47	-0.39	0.24	0.22	Released
HRS	2016-2018	UC 1882	1882	6639	466	33	138	362	0.88	12.06	0.47	58	-0.62	0.44	0.27	-
HRS	2016-2018	WB 9112	1748	6607	357	34	106	208	0.83	13.13	0.28	20	0.44	0.24	0.16	Released
HWS	2016-2018	LCS ATOMO	1723	6606	357	35	105	208	0.83	12.30	0.28	46	-0.38	0.24	0.22	Released
HRS	2016-2018	WB 9229	1730	6605	357	36	104	208	0.83	13.47	0.28	11	0.78	0.24	0.01	Released
HRS	2016-2018	UC 1884	1884	6588	466	37	87	362	0.90	12.39	0.47	42	-0.29	0.44	0.61	-
HRS	2016-2018	APB 501089	1828	6560	387	38	59	255	0.90	12.25	0.32	49	-0.44	0.29	0.24	-
HWS	2016-2018	SY BLANCA GRANDE 515	1657	6560	357	39	59	208	0.90	13.16	0.28	19	0.48	0.24	0.13	Released
HRS	2016-2018	SY SIENNA	1835	6558	387	40	57	255	0.90	12.92	0.32	26	0.24	0.29	0.52	Released
HRS	2016-2018	WB 9490	1887	6538	466	41	37	362	0.95	12.62	0.47	33	-0.06	0.44	0.90	Released
HRS	2016-2018	UC CENTRAL RED	1817	6522	357	42	22	208	0.95	13.27	0.28	16	0.59	0.24	0.06	Released
HWS	2016-2018	UC PATWIN 515 HP	1743	6484	357	43	-17	208	0.95	12.99	0.28	24	0.31	0.24	0.33	Released
HWS	2016-2018	UC 1883	1883	6478	466	44	-23	362	0.95	13.63	0.47	9	0.95	0.44	0.10	-
HRS	2016-2018	UC ANZA	20	6466	387	45	-35	255	0.95	10.68	0.32	69	-2.01	0.29	0.00	Released
HRS	2016-2018	XA 9302	1844	6459	465	46	-42	361	0.95	11.89	0.41	63	-0.80	0.38	0.11	-
HRS	2016-2018	SY 314	1660	6427	387	47	-74	255	0.90	12.45	0.32	40	-0.24	0.29	0.52	Released
HRS	2016-2018	APB 501189	1807	6414	466	48	-87	362	0.90	13.35	0.47	14	0.66	0.44	0.24	-
HRS	2016-2018	YECORA ROJO 515	1879	6383	466	49	-118	362	0.90	12.28	0.47	48	-0.41	0.44	0.47	-
HRS	2016-2018	UC 1880	1880	6376	466	50	-125	362	0.90	12.19	0.47	51	-0.50	0.44	0.38	-
HRS	2016-2018	WB ROCKLAND	1650	6365	466	51	-136	362	0.88	14.08	0.47	6	1.40	0.44	0.01	Released
HRS	2016-2018	SY CAL ROJO	1478	6330	362	52	-171	217	0.70	12.13	0.28	54	-0.56	0.24	0.07	Released
HRS	2016-2018	WB 9699	1888	6246	466	53	-255	362	0.72	13.59	0.47	10	0.91	0.44	0.11	Released
HWS	2016-2018	SY BLANCA ROYALE	1522	6237	357	54	-264	208	0.44	12.02	0.28	60	-0.66	0.24	0.03	Released
HRS	2016-2018	WB PATRON	1731	6231	357	55	-270	208	0.43	12.71	0.28	29	0.03	0.24	0.92	Released
HRS	2016-2018	XB 9512	1886	6205	466	56	-296	362	0.69	13.11	0.47	21	0.43	0.44	0.45	-
HRS	2016-2018	LCS 12SB0197	1830	6168	357	57	-333	208	0.28	12.32	0.28	45	-0.37	0.24	0.24	-
HWS	2016-2018	UC 1839	1839	6087	465	58	-414	361	0.48	13.21	0.41	18	0.52	0.38	0.29	-
HRS	2016-2018	WB JOAQUIN ORO	1728	5816	357	59	-685	208	0.01	14.16	0.28	3	1.47	0.24	0.00	Released
HRW	2016-2018	ASSL TAM 204	1778	5790	357	60	-711	208	0.00	12.64	0.28	30	-0.04	0.24	0.88	Released
HRS	2016-2018	DPG FV 2808	1608	5731	387	61	-770	255	0.01	10.58	0.32	70	-2.11	0.29	0.00	Released
HRS	2016-2018	APB 410117	1840	5675	465	62	-826	361	0.09	13.31	0.41	15	0.62	0.38	0.22	-
HRS	2016-2018	SY 64-1-9	1876	5674	466	63	-827	362	0.09	14.10	0.47	5	1.41	0.44	0.01	-
HWS	2016-2018	LCS STAR	1688	5640	377	64	-861	240	0.00	12.59	0.30	34	-0.10	0.27	0.80	Released
SWS	2016-2018	BAG NEW DIRKWIN	1667	5578	357	65	-923	208	0.00	11.81	0.28	66	-0.88	0.24	0.00	Released
-	2016-2018	APB 8155	1829	5530	466	66	-971	362	0.04	14.12	0.47	4	1.43	0.44	0.01	-
SRS	2016-2018	SY VACA	1766	5224	387	67	-1277	255	0.00	12.55	0.32	35	-0.13	0.29	0.75	Released
HRS	2016-2018	WB TRIPLE IV	1550	4883	466	68	-1618	362	0.00	12.82	0.47	28	0.13	0.44	0.83	Released
HRS	2016-2018	UC 16010 20	1838	4636	465	69	-1865	361	0.00	13.42	0.41	13	0.73	0.38	0.14	-
HRS	2016-2018	UC 15014 35	1818	3867	510	70	-2634	416	0.00	15.00	0.56	1	2.31	0.54	0.00	-

Table 22: Rainfed locations, common wheat yield and protein from the 2016-17 to 2018-19 seasons.

Crop Classification	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Protein diff. from overall mean	Protein st.err.diff. from overall mean	Protein p-Value	2019 Protein (%)	2019 St.Err.Protein (%)	2019 Protein Rank	Status
HWS	2017-2019	LCS ATOMO	1723	5978	543	1	770	201	0.00	6006	353	2	11.36	0.53	60	-0.70	0.27	0.08	9.54	0	35	Released
HRS	2017-2019	APB 500709	1819	5694	586	2	485	295	0.45	-	-	-	11.82	0.60	45	-0.24	0.38	0.85	-	-	-	-
HRS	2017-2019	APB 510453	1841	5675	591	3	467	303	0.46	-	-	-	12.13	0.60	24	0.07	0.38	0.97	-	-	-	-
HRS	2017-2019	LCS 12SB0197	1830	5675	550	4	466	218	0.31	-	-	-	11.87	0.53	42	-0.19	0.27	0.85	-	-	-	-
HRS	2017-2019	WB 9699	1888	5671	574	5	462	273	0.45	5667	353	11	11.78	0.59	48	-0.27	0.36	0.85	11.20	0	9	Released
HRS	2017-2019	WB 9350	1842	5663	543	6	455	201	0.26	5937	353	4	11.74	0.53	53	-0.32	0.26	0.57	10.96	0	10	Released
HRW	2017-2019	WINCAL 158-5	1906	5662	810	7	454	623	0.80	5822	353	6	12.12	1.48	28	0.06	1.39	0.97	10.63	0	19	-
HRS	2017-2019	XA 9501	1845	5649	586	8	440	295	0.46	-	-	-	11.28	0.60	63	-0.78	0.38	0.22	-	-	-	-
HRS	2017-2019	XA 9502	1846	5636	586	9	427	295	0.47	-	-	-	11.21	0.60	64	-0.85	0.38	0.16	-	-	-	-
HWS	2017-2019	UC 1815	1815	5591	549	10	382	215	0.45	-	-	-	11.69	0.53	54	-0.37	0.27	0.51	-	-	-	-
HRS	2017-2019	SY ULTRA	1590	5578	586	11	369	295	0.57	-	-	-	11.81	0.60	46	-0.25	0.38	0.85	-	-	-	Released
HRS	2017-2019	XA 9302	1844	5576	586	12	368	295	0.57	-	-	-	11.56	0.60	58	-0.50	0.38	0.51	-	-	-	-
HWS	2017-2019	UC PATWIN 515	1680	5515	545	13	307	206	0.46	5804	353	7	12.12	0.54	26	0.06	0.28	0.97	11.77	0	4	Released
HRS	2017-2019	APB 510879	1904	5505	810	14	297	623	0.87	5665	353	12	12.42	1.48	15	0.36	1.39	0.97	10.93	0	11.5	-
HRS	2017-2019	XA 9301	1843	5496	586	15	287	295	0.74	-	-	-	11.99	0.60	36	-0.06	0.38	0.97	-	-	-	-
HRS	2017-2019	XC 9407	1905	5494	810	16	285	623	0.87	5653	353	13	11.99	1.48	37	-0.07	1.39	0.97	10.50	0	23	-
HRS	2017-2019	SY REDWING	1521	5482	545	17	273	206	0.56	5967	353	3	12.18	0.53	21	0.13	0.27	0.95	11.46	0	6	Released
HRS	2017-2019	XB 9512	1886	5479	600	18	270	323	0.75	-	-	-	11.57	0.59	57	-0.49	0.38	0.52	-	-	-	-
HWS	2017-2019	LCS 12SB0224	1831	5473	549	19	265	215	0.57	-	-	-	11.75	0.53	51	-0.31	0.27	0.62	-	-	-	-
HRS	2017-2019	UC 1884	1884	5471	595	20	262	313	0.75	-	-	-	11.97	0.61	38	-0.09	0.41	0.97	-	-	-	-
HRS	2017-2019	SY SUMMIT 515	1658	5448	543	21	239	201	0.58	5736	353	10	12.10	0.53	32	0.04	0.26	0.97	10.57	0	20	Released
HRS	2017-2019	AP OCTANE	1878	5429	585	22	221	294	0.80	5635	353	14	11.80	0.60	47	-0.25	0.39	0.85	8.93	0	37	Released
HRS	2017-2019	APB 410089	1903	5425	810	23	216	623	0.90	5584	353	15	12.14	1.48	23	0.09	1.39	0.97	10.65	0	18	-
HRS	2017-2019	WB 9433	1847	5408	544	24	200	203	0.74	5231	353	23	11.92	0.53	40	-0.13	0.27	0.95	10.18	0	29	Released
HWS	2017-2019	WB 7566	1802	5407	554	25	199	229	0.75	-	-	-	11.74	0.54	52	-0.32	0.29	0.62	-	-	-	Released
HRS	2017-2019	UC 16010 20	1838	5387	586	26	178	295	0.85	-	-	-	12.71	0.60	8	0.65	0.38	0.33	-	-	-	-
HRS	2017-2019	UC 1880	1880	5373	574	27	164	273	0.85	5428	353	16	12.38	0.59	16	0.32	0.36	0.76	11.30	0	7	-
HRS	2017-2019	SY 13W00850	1834	5360	586	28	151	295	0.87	-	-	-	11.92	0.60	41	-0.14	0.38	0.97	-	-	-	-
HWS	2017-2019	SY BLANCA GRANDE 515	1657	5356	546	29	147	208	0.81	5384	353	18	12.11	0.53	30	0.05	0.27	0.97	9.87	0	31	Released
HRS	2017-2019	APB 410117	1840	5354	586	30	146	295	0.87	-	-	-	12.01	0.60	34	-0.05	0.38	0.97	-	-	-	-
HRS	2017-2019	UC CENTRAL RED	1817	5312	542	31	103	198	0.87	5280	353	21	12.38	0.53	17	0.32	0.27	0.60	10.35	0	25	Released
HWS	2017-2019	SY BLANCA ROYALE	1522	5308	549	32	99	215	0.87	-	-	-	12.44	0.54	13	0.38	0.28	0.51	-	-	-	Released
HRS	2017-2019	WB 9490	1887	5303	581	33	94	287	0.90	5824	353	5	11.09	0.59	65	-0.97	0.38	0.08	9.55	0	34	Released
HWS	2017-2019	UC 1883	1883	5289	582	34	80	288	0.90	-	-	-	12.42	0.59	14	0.36	0.38	0.71	-	-	-	-
HRS	2017-2019	APB 501089	1828	5283	586	35	74	295	0.90	-	-	-	11.66	0.60	55	-0.40	0.38	0.63	-	-	-	-
HWS	2017-2019	LCS STAR	1688	5259	553	36	51	225	0.90	-	-	-	12.49	0.54	12	0.43	0.28	0.41	-	-	-	Released
HRS	2017-2019	WB 9904	1751	5259	544	37	50	203	0.90	5156	353	24	12.04	0.53	33	-0.02	0.27	0.97	9.63	0	33	Released
HRS	2017-2019	UC YUROK	1745	5257	542	38	48	198	0.90	6090	353	1	11.64	0.53	56	-0.42	0.26	0.41	10.74	0	15	Released
HRS	2017-2019	SY SIENNA	1835	5243	543	39	35	201	0.93	4069	353	37	12.10	0.53	31	0.04	0.26	0.97	10.46	0	24	Released
HRS	2017-2019	SY CAL ROJO	1478	5225	545	40	16	206	0.97	5077	353	26	11.50	0.53	59	-0.56	0.26	0.22	10.51	0	22	Released
HRS	2017-2019	APB 511829	1875	5206	594	41	-2	313	0.99	-	-	-	12.11	0.59	29	0.06	0.37	0.97	-	-	-	-
HRS	2017-2019	APB 510477	1874	5196	590	42	-12	304	0.98	-	-	-	12.72	0.59	7	0.66	0.38	0.33	-	-	-	-
HRS	2017-2019	UC LASSIK	1495	5195	545	43	-14	206	0.97	5321	353	19	11.77	0.54	49	-0.29	0.28	0.63	10.78	0	13.5	Released
HRS	2017-2019	SY 64-1-9	1876	5182	578	44	-26	280	0.97	5244	353	22	13.16	0.59	4	1.10	0.38	0.05	11.86	0	2	-
HRS	2017-2019	SY 314	1660	5138	586	45	-70	295	0.90	-	-	-	11.31	0.60	62	-0.75	0.38	0.24	-	-	-	Released
HRS	2017-2019	WB 9112	1748	5135	545	46	-74	207	0.90	-	-	-	11.87	0.53	43	-0.19	0.27	0.85	-	-	-	Released
HRS	2017-2019	AP VENOM	1877	5102	578	47	-107	280	0.90	5792	353	8	12.29	0.59	19	0.23	0.38	0.87	10.32	0	27	Released
HWS	2017-2019	UC 1839	1839	5096	572	48	-113	266	0.88	4337	353	36	12.57	0.59	10	0.51	0.36	0.51	10.93	0	11.5	-
HRS	2017-2019	WB PATRON	1731	5088	543	49	-121	201	0.85	5747	353	9	11.97	0.53	39	-0.09	0.26	0.97	10.71	0	16	Released
HWS	2017-2019	UC PATWIN 515 HP	1743	5038	542	50	-170	198	0.75	5386	353	17	13.18	0.53	3	1.12	0.26	0.00	11.94	0	1	Released
HRS	2017-2019	DPG FV 2808	1608	4948	586	51	-261	295	0.75	-	-	-	11.07	0.59	66	-0.98	0.36	0.08	9.68	0	32	Released
HRS	2017-2019	UC 1885	1885	4933	595	52	-275	313	0.75	-	-	-	12.32	0.61	18	0.26	0.41	0.85	-	-	-	-
HRS	2017-2019	UC 1882	1882	4912	574	53	-297	273	0.66	4526	353	34	12.63	0.59	9	0.57	0.36	0.41	11.22	0	8	-
HWS	2017-2019	UC 1907	1907	4901	810	54	-308	623	0.87	5060	353	27	12.96	1.48	5	0.90	1.39	0.85	11.47	0	5	-
HRS	2017-2019	WB 9229	1730	4837	545	55	-371	206	0.45	4796	353	32	12.56	0.54	11	0.50	0.28	0.32	10.00	0	30	Released
SRS	2017-2019	SY VACA	1766	4779	572	56	-429	266	0.45	5281	353	20	10.79	0.59	67	-1.27	0.36	0.01	8.31	0	38	Released
HRS	2017-2019	YECORA ROJO	112	4771	549	57	-437	214	0.35	5105	353	25	12.12	0.55	27	0.06	0.29	0.97	10.67	0	17	Released
HRS	2017-2019	UC ANZA	20	4730	586	58	-479	295	0.45	-	-	-	11.32	0.60	61	-0.73	0.38	0.25	-	-	-	Released
HWS	2017-2019	UC 15080 49	1837	4726	586	59	-483	295	0.45	-	-	-	13.23	0.60	2	1.18	0.38	0.03	-	-	-	-
HRS	2017-2019	WB TRIPLE IV	1550	4716	810	60	-493	623	0.78	4875	353	31	12.01	1.48	35	-0.05	1.39	0.97	10.51	0	21	Released
HRW	2017-2019	ASSL TAM 204	1778	4681	549	61	-527	214	0.19	4908	353	29	12.13	0.54	25	0.07	0.28	0.97	9.36	0	36	Released
HRS	2017-2019	UC 14657 170	1836	4668	586	62	-541	295	0.45	-	-	-	12.24	0.60	20	0.18	0.38	0.95	-	-	-	-
HRS	2017-2019	WB JOAQUIN ORO	1728	4596	544	63	-613	203	0.04	5035	353	28	12.77	0.54	6	0.71	0.28	0.08	11.86	0	3	Released
HRS	2017-2019	UC 1908	1908	4448	810	64	-760	623	0.57	4608	353	33	11.75	1.48	50	-0.31	1.39	0.97	10.26	0	28	-
HWS	2017-2019	UC 1909	1909	4254	810	65	-954	623	0.46	4414	353	35	11.83	1.48	44	-0.23	1.39	0.97	10.34	0	26	-
HRS	2017-2019	YECORA ROJO 515	1879	4241	590	66	-968	304	0.03	-	-	-	14.15	0.61	1	2.09	0.41	0.00	-	-	-	-
SWS	2017-2019	BAG NEW DIRKWIN	1667	3815	545	67	-1394	206	0.00	4892	353	30	12.17	0.53	22	0.12	0.27	0.97	10.78	0	13.5	Released

Table 23: Statewide common wheat yield and protein from the 2016-17 to 2018-19 seasons.

Crop Classification	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Protein diff. from overall mean	Protein st.err.diff. from overall mean	Protein p-Value	2019 Protein (%)	2019 St.Err.Protein (%)	2019 Protein Rank	Status
HRS	2017-2019	XA 9501	1845	6681	393	1	725	209	0.00	-	-	-	11.35	0.42	59	-0.56	0.27	0.12	-	-	-	-
HWS	2017-2019	LCS ATOMO	1723	6639	356	2	683	129	0.00	7373	378	1	11.40	0.36	57	-0.52	0.18	0.02	10.43	0.78	35	Released
HRS	2017-2019	WB 9433	1847	6518	356	3	562	130	0.00	7020	380	4	11.62	0.36	44	-0.29	0.18	0.21	10.83	0.78	29	Released
HRS	2017-2019	XA 9301	1843	6493	397	4	537	216	0.04	-	-	-	11.39	0.43	58	-0.52	0.28	0.16	-	-	-	-
HRS	2017-2019	WB 9350	1842	6458	356	5	502	129	0.00	7169	378	2	11.47	0.36	50	-0.44	0.18	0.05	10.64	0.78	32	Released
HRS	2017-2019	WB 9699	1888	6444	370	6	488	165	0.01	6980	380	5	11.79	0.39	39	-0.13	0.23	0.73	11.11	0.78	25	Released
HWS	2017-2019	UC 1815	1815	6429	365	7	473	151	0.01	-	-	-	11.62	0.37	46	-0.30	0.20	0.24	-	-	-	-
HRS	2017-2019	XA 9502	1846	6427	394	8	471	211	0.07	-	-	-	11.11	0.42	63	-0.80	0.28	0.02	-	-	-	-
HRS	2017-2019	LCS 12SB0197	1830	6421	365	9	465	153	0.01	-	-	-	11.32	0.37	61	-0.59	0.20	0.01	-	-	-	-
HRS	2017-2019	SY ULTRA	1590	6389	393	10	433	209	0.10	-	-	-	11.41	0.42	56	-0.50	0.27	0.16	-	-	-	Released
HWS	2017-2019	LCS 12SB0224	1831	6369	364	11	413	150	0.02	-	-	-	11.45	0.37	52	-0.46	0.20	0.07	-	-	-	-
HRS	2017-2019	AP OCTANE	1878	6359	373	12	403	171	0.06	6932	380	7	11.44	0.40	53	-0.47	0.24	0.14	10.36	0.78	36	Released
HRS	2017-2019	WB 9490	1887	6284	372	13	328	168	0.13	7022	380	3	11.04	0.39	64	-0.87	0.24	0.00	10.53	0.78	33	Released
HRS	2017-2019	XA 9302	1844	6283	394	14	327	211	0.26	-	-	-	11.19	0.42	62	-0.73	0.28	0.04	-	-	-	-
HRS	2017-2019	APB 500709	1819	6279	396	15	323	213	0.26	-	-	-	11.70	0.42	42	-0.22	0.28	0.63	-	-	-	-
HRS	2017-2019	SY 13W00850	1834	6270	393	16	314	209	0.26	-	-	-	11.83	0.42	38	-0.08	0.27	0.90	-	-	-	-
HRS	2017-2019	APB 510453	1841	6267	396	17	311	213	0.27	-	-	-	12.07	0.42	23	0.16	0.28	0.73	-	-	-	-
HRS	2017-2019	XB 9512	1886	6265	400	18	309	221	0.29	-	-	-	11.43	0.42	54	-0.49	0.28	0.19	-	-	-	-
HRS	2017-2019	SY 64-1-9	1876	6231	372	19	275	168	0.23	6952	380	6	12.35	0.39	11	0.44	0.24	0.16	11.40	0.78	15	-
HWS	2017-2019	UC PATWIN 515	1680	6229	356	20	273	130	0.10	6913	379	8	11.91	0.36	34	-0.01	0.18	0.98	11.18	0.78	21	Released
HRS	2017-2019	SY REDWING	1521	6228	358	21	272	134	0.11	6725	382	11	11.76	0.36	41	-0.15	0.18	0.59	10.97	0.78	27	Released
HWS	2017-2019	WB 7566	1802	6224	367	22	268	157	0.21	-	-	-	11.47	0.37	49	-0.44	0.20	0.09	-	-	-	Released
HRS	2017-2019	SY SUMMIT 515	1658	6161	356	23	205	130	0.25	6817	380	9	11.92	0.36	32	0.01	0.18	0.98	11.13	0.78	24	Released
HRS	2017-2019	UC 1884	1884	6136	398	24	180	219	0.64	-	-	-	12.21	0.43	16	0.30	0.29	0.45	-	-	-	-
HRW	2017-2019	WINCAL 158-5	1906	6124	422	25	168	259	0.67	6680	382	12	11.94	0.53	31	0.03	0.42	0.98	11.19	0.78	20	-
HRS	2017-2019	APB 501089	1828	6097	394	26	141	211	0.67	-	-	-	11.41	0.42	55	-0.50	0.27	0.16	-	-	-	-
HRS	2017-2019	UC 1880	1880	6083	372	27	127	168	0.64	6564	383	18	12.01	0.39	27	0.10	0.24	0.82	11.17	0.78	22	-
HRS	2017-2019	AP VENOM	1877	6082	373	28	126	170	0.64	6749	382	10	11.92	0.39	33	0.01	0.24	0.98	11.19	0.78	19	Released
HRS	2017-2019	XC 9407	1905	6076	415	29	120	247	0.74	6640	378	15	12.52	0.53	9	0.61	0.42	0.27	11.76	0.78	9	-
HRS	2017-2019	UC YUROK	1745	6056	356	30	100	129	0.64	6592	380	16	11.78	0.36	40	-0.13	0.18	0.63	11.27	0.78	17	Released
HRS	2017-2019	SY SIENNA	1835	6053	356	31	97	130	0.64	6125	379	29	12.19	0.36	19	0.27	0.18	0.24	11.58	0.78	11	Released
HRS	2017-2019	SY CAL ROJO	1478	6040	356	32	84	131	0.67	6651	380	14	11.47	0.36	51	-0.45	0.18	0.04	10.66	0.78	30	Released
HRS	2017-2019	SY 314	1660	6036	398	33	79	218	0.83	-	-	-	11.34	0.42	60	-0.57	0.28	0.12	-	-	-	Released
HRS	2017-2019	APB 510879	1904	6021	417	34	65	251	0.89	6572	379	17	11.97	0.53	29	0.05	0.42	0.98	11.21	0.78	18	-
HRS	2017-2019	UC LASSIK	1495	6020	357	35	64	132	0.74	6424	382	23	11.60	0.36	47	-0.31	0.18	0.19	11.01	0.78	26	Released
HWS	2017-2019	SY BLANCA GRANDE 515	1657	6002	358	36	46	135	0.83	6658	380	13	12.11	0.36	22	0.20	0.18	0.42	11.28	0.78	16	Released
HRS	2017-2019	APB 410089	1903	5992	422	37	35	259	0.96	6560	382	19	13.23	0.53	3	1.31	0.42	0.01	12.47	0.78	2	-
HWS	2017-2019	SY BLANCA ROYALE	1522	5973	366	38	17	155	0.97	-	-	-	11.89	0.37	37	-0.02	0.20	0.98	-	-	-	Released
HRS	2017-2019	UC 1882	1882	5963	372	39	7	167	0.97	6501	382	20	12.18	0.39	20	0.27	0.23	0.39	11.45	0.78	12	-
HRS	2017-2019	UC CENTRAL RED	1817	5950	356	40	-6	129	0.97	6455	380	22	12.14	0.36	21	0.22	0.18	0.36	11.67	0.78	10	Released
HWS	2017-2019	UC 1883	1883	5943	393	41	-13	209	0.97	-	-	-	12.32	0.42	12	0.40	0.28	0.27	-	-	-	-
HRS	2017-2019	APB 510477	1874	5940	400	42	-16	221	0.97	-	-	-	12.06	0.42	25	0.14	0.28	0.75	-	-	-	-
HRS	2017-2019	APB 511829	1875	5917	398	43	-39	219	0.94	-	-	-	11.91	0.42	35	-0.01	0.28	0.98	-	-	-	-
HWS	2017-2019	UC PATWIN 515 HP	1743	5882	355	44	-74	128	0.71	6355	379	25	12.79	0.36	6	0.88	0.18	0.00	12.11	0.78	4	Released
HWS	2017-2019	LCS STAR	1688	5874	368	45	-82	159	0.74	-	-	-	11.97	0.37	28	0.05	0.20	0.91	-	-	-	Released
HRS	2017-2019	WB 9904	1751	5864	356	46	-92	129	0.65	6210	379	27	11.66	0.36	43	-0.25	0.18	0.27	10.95	0.78	28	Released
HWS	2017-2019	UC 1907	1907	5815	420	47	-141	255	0.72	6372	380	24	13.30	0.53	2	1.39	0.42	0.01	12.54	0.78	1	-
HRS	2017-2019	APB 410117	1840	5798	396	48	-158	213	0.64	-	-	-	11.96	0.42	30	0.04	0.28	0.98	-	-	-	-
HRS	2017-2019	UC 1885	1885	5791	398	49	-165	219	0.64	-	-	-	12.06	0.43	24	0.15	0.29	0.75	-	-	-	-
HWS	2017-2019	UC 1839	1839	5782	371	50	-174	165	0.49	6141	382	28	12.58	0.39	8	0.67	0.24	0.02	11.96	0.78	6	-
HRS	2017-2019	WB 9112	1748	5748	365	51	-208	152	0.29	-	-	-	12.05	0.37	26	0.14	0.20	0.65	-	-	-	Released
HRS	2017-2019	UC 1908	1908	5740	420	52	-216	255	0.64	6299	380	26	12.74	0.53	7	0.83	0.42	0.14	11.99	0.78	5	-
HRS	2017-2019	WB PATRON	1731	5734	356	53	-222	130	0.21	6469	380	21	11.90	0.36	36	-0.02	0.18	0.98	11.14	0.78	23	Released
HRS	2017-2019	UC 16010 20	1838	5661	393	54	-295	209	0.29	-	-	-	12.23	0.42	14	0.32	0.27	0.39	-	-	-	-
HRS	2017-2019	UC ANZA	20	5647	394	55	-309	211	0.27	-	-	-	10.98	0.42	65	-0.93	0.28	0.01	-	-	-	Released
HRW	2017-2019	ASSL TAM 204	1778	5628	357	56	-328	131	0.04	5828	379	35	11.62	0.36	45	-0.29	0.18	0.21	10.44	0.78	34	Released
HRS	2017-2019	WB 9229	1730	5581	356	57	-375	130	0.02	6105	380	30	12.47	0.36	10	0.55	0.18	0.01	11.77	0.78	8	Released
HRS	2017-2019	DPG FV 2808	1608	5522	371	58	-434	166	0.03	6076	386	31	10.62	0.39	66	-1.29	0.23	0.00	9.63	0.78	37	Released
HRS	2017-2019	YECORA ROJO	112	5412	360	59	-544	139	0.00	5813	384	36	12.21	0.37	15	0.30	0.19	0.23	11.81	0.78	7	Released
HWS	2017-2019	UC 1909	1909	5352	417	60	-604	251	0.05	5919	379	33	12.21	0.53	17	0.29	0.42	0.65	11.45	0.78	13	-
HRS	2017-2019	UC 14657 170	1836	5349	396	61	-607	213	0.02	-	-	-	12.26	0.43	13	0.35	0.28	0.36	-	-	-	-
SRS	2017-2019	SY VACA	1766	5293	371	62	-663	165	0.00	6027	383	32	10.57	0.39	67	-1.35	0.23	0.00	9.32	0.78	38	Released
HWS	2017-2019	UC 15080 49	1837	5184	396	63	-772	213	0.00	-	-	-	13.21	0.42	4	1.29	0.28	0.00	-	-	-	-
HRS	2017-2019	WB JOAQUIN ORO	1728	5137	357	64	-819	133	0.00	5835	379	34	13.01	0.36	5	1.10	0.18	0.00	12.44	0.78	3	Released
HRS	2017-2019	YECORA ROJO 515	1879	4944	397	65	-1012	216	0.00	-	-	-	13.83	0.43	1	1.91	0.29	0.00	-	-	-	-
HRS	2017-2019	WB TRIPLE IV	1550	4736	422	66	-1220	259	0.00	5306	382	38	12.20	0.53	18	0.29	0.42	0.65	11.45	0.78	14	Released
SWS	2017-2019	BAG NEW DIRKWIN	1667	4725	357	67	-1231	132	0.00	5480	383	37	11.57	0.36	48	-0.35	0.18	0.14	10.66	0.78	31	Released

Durum performance tables

Table 24: Sacramento Valley region, durum wheat yield and protein from the 2016-17 to 2018-19 seasons.

Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Protein diff. from overall mean	Protein st.err.diff. from overall mean	Protein p-Value	2019 Protein (%)	2019 St.Err.Protein (%)	2019 Protein Rank	Status
2017-2019	AS SARAGOLLA	1583	8206	796	1	1074	237	0.00	6892	457	1	10.75	0.33	47	-1.31	0.25	0.00	9.89	0	28	Released
2017-2019	UC 1771	1771	8016	859	2	884	394	0.14	6500	457	3	11.15	0.70	43	-0.91	0.65	0.36	10.93	0	24	-
2017-2019	UC DESERT KING	1375	8006	793	3	874	227	0.00	6298	457	5	11.38	0.33	39	-0.67	0.25	0.04	10.79	0	25	Released
2017-2019	UC 16051 12	1849	7940	859	4	808	395	0.17	-	-	-	10.97	0.45	45	-1.09	0.38	0.03	-	-	-	-
2017-2019	UC 1870	1870	7905	810	5	773	279	0.04	6061	457	10	12.19	0.40	21	0.13	0.33	0.89	13.04	0	6	-
2017-2019	ASC 101	1855	7848	859	6	716	395	0.20	-	-	-	11.93	0.45	31	-0.13	0.38	0.89	-	-	-	-
2017-2019	UC DESERT GOLD	1850	7837	793	7	705	227	0.02	6278	457	6	11.23	0.33	42	-0.83	0.25	0.01	11.69	0	21	Released
2017-2019	DPG DURAKING	878	7797	858	8	664	393	0.23	-	-	-	11.43	0.44	38	-0.63	0.38	0.26	-	-	-	Released
2017-2019	UC MIWOK	1690	7675	778	9	543	170	0.02	6577	457	2	11.96	0.28	30	-0.09	0.18	0.82	10.68	0	26	Released
2017-2019	APB 471400	1853	7616	793	10	484	227	0.15	4886	457	29	11.46	0.33	36	-0.60	0.25	0.07	12.24	0	12	-
2017-2019	ASC 124	1914	7592	859	11	459	394	0.43	6076	457	9	11.92	0.70	32	-0.14	0.65	0.93	11.70	0	20	-
2017-2019	WB MEAD	1607	7572	793	12	440	227	0.18	6114	457	8	11.97	0.33	29	-0.09	0.25	0.89	12.08	0	13	Released
2017-2019	ASC 123	1913	7528	859	13	396	394	0.44	6012	457	12	12.10	0.70	23	0.05	0.65	0.96	11.88	0	18	-
2017-2019	UC 1910	1910	7522	859	14	390	394	0.44	6006	457	13	12.75	0.70	8	0.69	0.65	0.50	12.53	0	9	-
2017-2019	DPG PLATINUM	1210	7517	810	15	385	279	0.34	5632	457	18	12.02	0.40	27	-0.04	0.33	0.96	12.69	0	7	Released
2017-2019	ASC 102	1856	7505	859	16	373	395	0.46	-	-	-	11.79	0.45	34	-0.27	0.38	0.74	-	-	-	-
2017-2019	ASC 103	1857	7498	859	17	366	395	0.46	-	-	-	11.13	0.45	44	-0.93	0.38	0.07	-	-	-	-
2017-2019	UC 1871	1871	7380	810	18	247	279	0.47	6016	457	11	12.08	0.40	24	0.03	0.33	0.96	12.51	0	10	-
2017-2019	UC 1873	1873	7377	858	19	245	393	0.64	-	-	-	12.20	0.52	20	0.14	0.46	0.89	-	-	-	-
2017-2019	TIBURON	1640	7364	793	20	232	227	0.44	6362	457	4	12.25	0.33	18	0.19	0.25	0.72	11.08	0	23	Released
2017-2019	AS MAESTRALE	1582	7256	793	21	124	227	0.67	5939	457	14	10.88	0.33	46	-1.18	0.25	0.00	9.67	0	29	Released
2017-2019	DPG TOPPER	1211	7250	858	22	118	393	0.82	-	-	-	11.43	0.52	37	-0.62	0.46	0.36	-	-	-	Released
2017-2019	WB HAVASU	1479	7236	859	23	103	395	0.83	-	-	-	11.88	0.45	33	-0.18	0.38	0.86	-	-	-	Released
2017-2019	SHASTA	1869	7231	810	24	99	279	0.81	5377	457	22	12.48	0.40	15	0.42	0.33	0.38	13.88	0	1	Released
2017-2019	UC DESERT KING HP	1627	7208	793	25	76	227	0.81	5881	457	15	12.76	0.33	7	0.70	0.25	0.03	13.21	0	5	Released
2017-2019	ASC 100	1854	7182	859	26	50	395	0.90	-	-	-	11.28	0.45	41	-0.77	0.38	0.14	-	-	-	-
2017-2019	UC 1872	1872	7047	858	27	-85	393	0.85	-	-	-	11.38	0.52	40	-0.68	0.46	0.33	-	-	-	-
2017-2019	AS COLOMBO	1800	6906	793	28	-226	227	0.44	5764	457	16	10.32	0.33	48	-1.74	0.25	0.00	9.14	0	30	Released
2017-2019	APB 152356	1902	6895	859	29	-237	394	0.64	5379	457	21	13.59	0.70	2	1.53	0.65	0.08	13.37	0	4	-
2017-2019	KRONOS	951	6880	796	30	-252	237	0.44	5102	457	26	12.53	0.33	12	0.48	0.25	0.18	11.99	0	15	Released
2017-2019	WB ORITA	1215	6872	793	31	-260	227	0.43	5175	457	24	12.43	0.33	16	0.37	0.25	0.33	11.95	0	17	Released
2017-2019	WB MOHAVE	1654	6861	793	32	-271	227	0.43	5451	457	20	12.48	0.33	14	0.42	0.25	0.25	12.07	0	14	Released
2017-2019	DPG CANDURA	1867	6840	858	33	-292	393	0.56	-	-	-	11.70	0.44	35	-0.36	0.38	0.58	-	-	-	Released
2017-2019	POWELL	1868	6834	810	34	-298	279	0.44	5668	457	17	13.11	0.40	4	1.05	0.33	0.01	13.46	0	3	Released
2017-2019	ALBERTO	1813	6816	793	35	-316	227	0.34	5501	457	19	12.14	0.33	22	0.08	0.25	0.89	11.97	0	16	Released
2017-2019	SY FORTISSIMO	1429	6774	793	36	-358	227	0.28	6137	457	7	12.00	0.33	28	-0.05	0.25	0.93	10.33	0	27	Released
2017-2019	APB 450311	1851	6750	810	37	-382	278	0.34	-	-	-	12.24	0.35	19	0.18	0.27	0.74	-	-	-	-
2017-2019	ASC 122	1912	6712	859	38	-420	394	0.44	5196	457	23	12.49	0.70	13	0.43	0.65	0.74	12.27	0	11	-
2017-2019	WESTMORE HP	1484	6682	793	39	-450	227	0.18	4446	457	30	12.62	0.33	9	0.56	0.25	0.09	11.81	0	19	Released
2017-2019	APB 152308	1900	6650	859	40	-482	394	0.43	5134	457	25	13.95	0.70	1	1.89	0.65	0.03	13.73	0	2	-
2017-2019	SY VOLANTE	1431	6621	810	41	-511	279	0.20	4977	457	27	12.03	0.44	26	-0.03	0.38	0.96	11.39	0	22	Released
2017-2019	APB 540165	1827	6568	859	42	-564	395	0.34	-	-	-	12.04	0.45	25	-0.02	0.38	0.97	-	-	-	-
2017-2019	APB 450275	1865	6454	858	43	-678	393	0.23	-	-	-	12.76	0.44	6	0.71	0.38	0.19	-	-	-	-
2017-2019	APB 153541	1901	6410	859	44	-722	394	0.20	4894	457	28	12.81	0.70	5	0.75	0.65	0.45	12.59	0	8	-
2017-2019	LCS KIKO	1697	6296	859	45	-836	395	0.15	-	-	-	12.28	0.45	17	0.22	0.38	0.79	-	-	-	Released
2017-2019	APB 470442	1852	5991	859	46	-1142	395	0.03	-	-	-	13.35	0.45	3	1.29	0.38	0.01	-	-	-	-
2017-2019	APB 450333	1866	5944	858	47	-1188	393	0.02	-	-	-	12.56	0.44	11	0.51	0.38	0.36	-	-	-	-
2017-2019	UC 16051 1	1848	5477	859	48	-1655	395	0.00	-	-	-	12.58	0.45	10	0.53	0.38	0.36	-	-	-	-

Table 25: North Cental San Joaquin Valley region, durum wheat yield and protein from the 2016-17 to 2018-19 seasons.

Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Protein diff. from overall mean	Protein st.err.diff. from overall mean	Protein p-Value	2019 Protein (%)	2019 St.Err.Protein (%)	2019 Protein Rank	Status
2017-2019	APB 152308	1900	9675	1197	1	1719	473	0.01	11828	542	1	10.97	1.34	42	-0.71	0.64	0.44	11.17	0	25	-
2017-2019	SHASTA	1869	8807	1131	2	850	274	0.03	10932	542	4	11.35	1.20	35	-0.33	0.24	0.35	11.92	0	15	Released
2017-2019	UC DESERT KING	1375	8597	1118	3	641	212	0.03	10890	542	6	11.58	1.19	27	-0.10	0.18	0.72	11.73	0	18	Released
2017-2019	UC 1870	1870	8532	1134	4	576	285	0.23	10754	600	8	11.49	1.20	30	-0.18	0.24	0.58	11.97	0	14	-
2017-2019	TIBURON	1640	8532	1118	5	575	212	0.06	10860	542	7	12.00	1.19	13	0.32	0.18	0.21	12.85	0	4	Released
2017-2019	UC 1771	1771	8519	1228	6	563	543	0.68	10541	600	9	11.40	1.34	33	-0.28	0.64	0.75	11.60	0	20	-
2017-2019	UC DESERT GOLD	1850	8500	1121	7	544	229	0.11	10998	600	3	11.20	1.19	39	-0.47	0.20	0.06	10.88	0	26	Released
2017-2019	DPG DURAKING	878	8416	1149	8	460	336	0.48	-	-	-	11.51	1.21	29	-0.16	0.26	0.68	-	-	-	Released
2017-2019	ASC 103	1857	8369	1149	9	413	337	0.59	-	-	-	10.91	1.21	45	-0.76	0.26	0.02	-	-	-	-
2017-2019	DPG TOPPER	1211	8295	1149	10	339	336	0.68	-	-	-	10.94	1.21	43	-0.73	0.29	0.05	-	-	-	Released
2017-2019	APB 471400	1853	8278	1118	11	322	212	0.39	9974	542	17	10.93	1.19	44	-0.74	0.19	0.00	10.58	0	30	-
2017-2019	UC 1873	1873	8183	1149	12	227	336	0.81	-	-	-	11.77	1.21	23	0.09	0.26	0.82	-	-	-	-
2017-2019	APB 153541	1901	8169	1197	13	212	473	0.85	10321	542	10	12.48	1.34	5	0.80	0.64	0.36	12.68	0	5	-
2017-2019	APB 450333	1866	8133	1149	14	177	336	0.84	-	-	-	11.80	1.21	21	0.12	0.26	0.75	-	-	-	-
2017-2019	ASC 123	1913	8124	1228	15	168	543	0.91	10146	600	12	10.67	1.34	47	-1.00	0.64	0.26	10.87	0	27	-
2017-2019	SY VOLANTE	1431	8113	1119	16	157	217	0.81	9872	542	20	11.44	1.19	32	-0.24	0.18	0.35	12.02	0	13	Released
2017-2019	LCS KIKO	1697	8097	1149	17	141	337	0.85	-	-	-	11.66	1.21	24	-0.02	0.26	0.95	-	-	-	Released
2017-2019	ALBERTO	1813	8083	1120	18	127	223	0.83	10065	542	15	11.35	1.19	34	-0.32	0.19	0.22	11.43	0	23	Released
2017-2019	DPG PLATINUM	1210	8045	1134	19	89	285	0.91	9937	600	18	11.22	1.20	38	-0.45	0.24	0.19	11.68	0	19	Released
2017-2019	AS SARAGOLLA	1583	7994	1120	20	38	223	0.93	9910	600	19	11.26	1.19	37	-0.42	0.18	0.08	11.56	0	21	Released
2017-2019	WB ORITA	1215	7987	1120	21	31	223	0.93	10132	542	14	12.31	1.19	7	0.63	0.20	0.01	12.95	0	3	Released
2017-2019	ASC 124	1914	7982	1197	22	26	473	0.97	10134	542	13	10.42	1.34	48	-1.25	0.64	0.16	10.63	0	28	-
2017-2019	APB 450275	1865	7944	1156	23	-12	358	0.97	-	-	-	11.77	1.21	22	0.09	0.29	0.82	-	-	-	-
2017-2019	SY FORTISSIMO	1429	7926	1118	24	-30	212	0.93	9761	542	23	11.92	1.19	19	0.24	0.18	0.35	12.24	0	11	Released
2017-2019	WB MEAD	1607	7918	1118	25	-38	212	0.93	10242	542	11	11.99	1.19	14	0.32	0.18	0.21	11.46	0	22	Released
2017-2019	ASC 101	1855	7860	1149	26	-96	337	0.91	-	-	-	11.28	1.21	36	-0.40	0.26	0.29	-	-	-	-
2017-2019	UC 1910	1910	7835	1197	27	-122	473	0.91	9987	542	16	12.16	1.34	8	0.48	0.64	0.58	12.36	0	8.5	-
2017-2019	APB 470442	1852	7814	1149	28	-142	337	0.85	-	-	-	12.01	1.21	10	0.34	0.26	0.36	-	-	-	-
2017-2019	UC 16051 12	1849	7802	1149	29	-154	337	0.85	-	-	-	11.44	1.21	31	-0.24	0.26	0.51	-	-	-	-
2017-2019	ASC 100	1854	7735	1156	30	-221	358	0.81	-	-	-	11.95	1.21	17	0.28	0.29	0.49	-	-	-	-
2017-2019	POWELL	1868	7733	1131	31	-223	274	0.81	10893	542	5	12.73	1.20	2	1.05	0.24	0.00	12.40	0	7	Released
2017-2019	APB 540165	1827	7715	1156	32	-241	358	0.81	-	-	-	11.95	1.21	16	0.28	0.29	0.49	-	-	-	-
2017-2019	APB 450311	1851	7715	1125	33	-241	245	0.68	-	-	-	11.86	1.19	20	0.18	0.20	0.49	-	-	-	-
2017-2019	AS COLOMBO	1800	7712	1118	34	-244	212	0.64	9848	542	21	10.80	1.19	46	-0.87	0.18	0.00	10.62	0	29	Released
2017-2019	UC 1871	1871	7653	1164	35	-303	383	0.81	9457	702	24	12.00	1.22	12	0.32	0.32	0.49	12.41	0	6	-
2017-2019	APB 152356	1902	7643	1197	36	-313	473	0.81	9796	542	22	11.98	1.34	15	0.30	0.64	0.75	12.18	0	12	-
2017-2019	UC 1872	1872	7636	1178	37	-320	421	0.81	-	-	-	11.15	1.22	40	-0.53	0.32	0.24	-	-	-	-
2017-2019	AS MAESTRALE	1582	7568	1120	38	-389	223	0.33	9288	542	26	11.63	1.19	26	-0.04	0.19	0.87	11.78	0	16	Released
2017-2019	ASC 122	1912	7553	1287	39	-403	660	0.81	9356	702	25	11.54	1.34	28	-0.13	0.64	0.87	11.75	0	17	-
2017-2019	DPG CANDURA	1867	7552	1165	40	-404	385	0.68	-	-	-	11.04	1.21	41	-0.64	0.29	0.09	-	-	-	Released
2017-2019	WESTMORE HP	1484	7543	1126	41	-413	252	0.33	9239	702	28	12.72	1.19	3	1.04	0.20	0.00	12.31	0	10	Released
2017-2019	WB MOHAVE	1654	7513	1120	42	-443	223	0.23	9209	600	29	12.36	1.19	6	0.69	0.18	0.00	13.64	0	1	Released
2017-2019	KRONOS	951	7495	1131	43	-461	272	0.33	9263	702	27	11.66	1.19	25	-0.02	0.21	0.94	11.39	0	24	Released
2017-2019	UC MIWOK	1690	7478	1110	44	-478	172	0.05	11429	702	2	12.03	1.18	9	0.36	0.14	0.05	12.36	0	8.5	Released
2017-2019	WB HAVASU	1479	7408	1149	45	-548	337	0.33	-	-	-	12.01	1.21	11	0.33	0.26	0.36	-	-	-	Released
2017-2019	ASC 102	1856	7384	1149	46	-572	337	0.33	-	-	-	11.94	1.21	18	0.26	0.26	0.49	-	-	-	-
2017-2019	UC DESERT KING HP	1627	7199	1121	47	-757	229	0.02	8458	600	30	13.18	1.19	1	1.50	0.20	0.00	13.42	0	2	Released
2017-2019	UC 16051 1	1848	7127	1149	48	-830	337	0.10	-	-	-	12.71	1.21	4	1.03	0.26	0.00	-	-	-	-

Table 26: South San Joaquin Valley region, durum wheat yield and protein from the 2016-17 to 2018-19 seasons.

Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Protein diff. from overall mean	Protein st.err.diff. from overall mean	Protein p-Value	2019 Protein (%)	2019 St.Err.Protein (%)	2019 Protein Rank	Status
2017-2019	APB 540165	1827	9831	829	1	2247	512	0.00	-	-	-	13.34	0.60	41	-0.78	0.32	0.06	-	-	-	-
2017-2019	ASC 124	1914	8783	788	2	1199	446	0.04	9630	371	3	13.33	0.75	43	-0.79	0.55	0.33	12.83	1.27	23	-
2017-2019	TIBURON	1640	8700	699	3	1116	268	0.00	6714	415	30	13.84	0.54	32	-0.27	0.20	0.34	14.21	1.27	7	Released
2017-2019	SY VOLANTE	1431	8559	695	4	975	257	0.00	9511	371	5	13.54	0.53	39	-0.57	0.19	0.02	12.71	0.98	24	Released
2017-2019	SY FORTISSIMO	1429	8314	695	5	729	257	0.03	9437	371	6	13.88	0.54	30	-0.24	0.21	0.46	13.96	1.27	9	Released
2017-2019	UC 1910	1910	8310	788	6	726	446	0.26	9157	371	7	15.92	0.75	2	1.81	0.55	0.01	15.43	1.27	2	-
2017-2019	UC 1870	1870	8296	742	7	712	362	0.18	7882	491	22	13.31	0.60	44	-0.80	0.32	0.05	-	-	-	-
2017-2019	UC MIWOK	1690	8291	672	8	707	190	0.00	9750	371	2	13.83	0.52	33	-0.29	0.14	0.12	14.02	1.27	8	Released
2017-2019	DPG TOPPER	1211	8249	787	9	665	444	0.30	-	-	-	13.03	0.60	48	-1.09	0.32	0.01	-	-	-	Released
2017-2019	APB 450311	1851	8210	719	10	626	314	0.18	-	-	-	14.66	0.56	7	0.55	0.25	0.09	-	-	-	-
2017-2019	POWELL	1868	8172	719	11	588	315	0.22	9552	371	4	13.85	0.59	31	-0.27	0.32	0.59	13.45	1.27	13	Released
2017-2019	DPG DURAKING	878	8063	787	12	479	444	0.44	-	-	-	13.33	0.64	42	-0.79	0.39	0.12	-	-	-	Released
2017-2019	UC 1872	1872	8040	787	13	455	444	0.46	-	-	-	14.06	0.60	23	-0.05	0.32	0.91	-	-	-	-
2017-2019	UC 1771	1771	8003	788	14	419	446	0.50	8850	371	10	13.78	0.75	34	-0.34	0.55	0.72	13.28	1.27	16	-
2017-2019	UC DESERT KING	1375	7988	695	15	404	257	0.28	8552	371	15	14.34	0.54	15	0.22	0.21	0.50	14.51	1.27	4	Released
2017-2019	ALBERTO	1813	7981	699	16	396	268	0.30	8774	371	13	14.19	0.54	19	0.08	0.20	0.84	13.05	1.27	21	Released
2017-2019	APB 471400	1853	7919	699	17	334	268	0.40	8408	415	16	13.07	0.54	47	-1.05	0.20	0.00	11.77	1.27	29	-
2017-2019	UC DESERT GOLD	1850	7878	695	18	293	257	0.44	10003	371	1	14.14	0.54	21	0.03	0.20	0.91	13.21	1.27	18	Released
2017-2019	SHASTA	1869	7864	719	19	280	315	0.50	8791	371	11	14.04	0.57	24	-0.08	0.28	0.86	13.42	1.27	14	Released
2017-2019	APB 152308	1900	7857	788	20	273	446	0.63	8704	371	14	13.77	0.75	35	-0.35	0.55	0.72	13.27	1.27	17	-
2017-2019	WB MOHAVE	1654	7714	695	21	130	257	0.68	8282	371	18	14.15	0.54	20	0.04	0.20	0.91	13.51	1.27	12	Released
2017-2019	DPG CANDURA	1867	7620	787	22	36	444	0.98	-	-	-	13.49	0.64	40	-0.62	0.39	0.25	-	-	-	Released
2017-2019	WB ORITA	1215	7597	695	23	13	257	0.98	8898	371	9	14.70	0.54	6	0.58	0.20	0.02	13.69	1.27	11	Released
2017-2019	APB 450333	1866	7578	787	24	-6	444	0.99	-	-	-	14.22	0.60	17	0.10	0.32	0.86	-	-	-	-
2017-2019	UC 16051 12	1849	7551	788	25	-33	446	0.98	-	-	-	14.60	0.58	11	0.49	0.28	0.21	-	-	-	-
2017-2019	WB MEAD	1607	7463	695	26	-121	257	0.70	8789	371	12	14.60	0.54	10	0.49	0.21	0.07	14.30	1.27	5	Released
2017-2019	UC DESERT KING HP	1627	7400	695	27	-184	257	0.57	8371	371	17	15.33	0.54	4	1.21	0.20	0.00	16.22	1.27	1	Released
2017-2019	AS MAESTRALE	1582	7341	699	28	-243	268	0.50	7628	371	24	13.57	0.54	38	-0.55	0.21	0.04	13.10	1.27	20	Released
2017-2019	UC 1873	1873	7323	787	29	-261	444	0.64	-	-	-	14.45	0.60	13	0.33	0.32	0.51	-	-	-	-
2017-2019	AS SARAGOLLA	1583	7305	695	30	-279	257	0.44	8169	371	19	13.31	0.54	45	-0.81	0.20	0.00	12.64	1.27	27	Released
2017-2019	AS COLOMBO	1800	7292	695	31	-292	257	0.44	9093	371	8	14.29	0.54	16	0.18	0.21	0.59	12.52	1.27	28	Released
2017-2019	DPG PLATINUM	1210	7276	729	32	-308	336	0.50	7573	415	26	13.97	0.59	25	-0.15	0.32	0.79	12.70	1.27	25	Released
2017-2019	APB 450275	1865	7255	787	33	-330	444	0.56	-	-	-	14.42	0.60	14	0.30	0.32	0.56	-	-	-	-
2017-2019	LCS KIKO	1697	7224	788	34	-360	446	0.53	-	-	-	14.20	0.58	18	0.08	0.28	0.86	-	-	-	Released
2017-2019	ASC 123	1913	7215	788	35	-370	446	0.53	8062	371	20	13.19	0.75	46	-0.93	0.55	0.22	12.69	1.27	26	-
2017-2019	WB HAVASU	1479	7087	788	36	-497	446	0.44	-	-	-	13.97	0.58	26	-0.15	0.28	0.76	-	-	-	Released
2017-2019	UC 1871	1871	7057	742	37	-527	361	0.30	7583	415	25	13.96	0.57	27	-0.16	0.28	0.74	13.87	1.27	10	-
2017-2019	ASC 101	1855	7032	788	38	-552	446	0.40	-	-	-	13.74	0.58	36	-0.38	0.28	0.34	-	-	-	-
2017-2019	UC 16051 1	1848	6847	829	39	-737	512	0.30	-	-	-	16.22	0.60	1	2.10	0.32	0.00	-	-	-	-
2017-2019	APB 470442	1852	6809	788	40	-776	446	0.22	-	-	-	14.45	0.58	12	0.33	0.28	0.44	-	-	-	-
2017-2019	WESTMORE HP	1484	6805	699	41	-779	268	0.03	7522	415	28	14.64	0.54	8	0.52	0.20	0.04	14.29	1.27	6	Released
2017-2019	ASC 100	1854	6805	788	42	-779	446	0.22	-	-	-	14.63	0.58	9	0.51	0.28	0.18	-	-	-	-
2017-2019	APB 152356	1902	6800	788	43	-784	446	0.22	7647	371	23	13.68	0.75	37	-0.43	0.55	0.62	13.19	1.27	19	-
2017-2019	ASC 122	1912	6686	828	44	-898	511	0.22	7573	415	27	13.91	0.75	29	-0.20	0.55	0.84	13.42	1.27	15	-
2017-2019	KRONOS	951	6535	704	45	-1050	280	0.00	7890	491	21	13.92	0.54	28	-0.19	0.21	0.57	13.02	1.27	22	Released
2017-2019	ASC 102	1856	6500	788	46	-1084	446	0.07	-	-	-	14.14	0.58	22	0.02	0.28	0.95	-	-	-	-
2017-2019	ASC 103	1857	6428	788	47	-1156	446	0.05	-	-	-	14.90	0.58	5	0.79	0.28	0.03	-	-	-	-
2017-2019	APB 153541	1901	6188	828	48	-1396	511	0.04	7075	415	29	15.69	0.75	3	1.58	0.55	0.03	15.20	1.27	3	-

Table 27: Imperial Valley region, durum wheat yield and protein from the 2016-17 to 2018-19 seasons.

Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Protein diff. from overall mean	Protein st.err.diff. from overall mean	Protein p-Value	Status
2017-2019	APB 471400	1853	7843	460	1	840	221	0.01	8933	493	1	12.15	0.51	38	-1.16	0.09	0.00	-
2017-2019	POWELL	1868	7739	487	2	736	271	0.11	8562	493	3	13.75	0.52	12	0.45	0.13	0.00	Released
2017-2019	APB 540165	1827	7669	561	3	666	384	0.31	-	-	-	13.09	0.52	27	-0.21	0.13	0.14	-
2017-2019	APB 152308	1900	7642	560	4	639	383	0.31	8137	493	6	-	-	-	-	-	-	-
2017-2019	APB 470442	1852	7642	561	5	638	384	0.31	-	-	-	12.70	0.52	31	-0.60	0.13	0.00	-
2017-2019	ASC 101	1855	7597	561	6	594	384	0.36	-	-	-	12.25	0.52	36	-1.06	0.13	0.00	-
2017-2019	SHASTA	1869	7585	487	7	581	271	0.18	7802	493	10	12.94	0.52	29	-0.36	0.13	0.01	Released
2017-2019	LCS KIKO	1697	7558	561	8	555	384	0.36	-	-	-	11.91	0.52	39	-1.39	0.13	0.00	Released
2017-2019	DPG DURAKING	878	7452	560	9	449	383	0.48	-	-	-	12.49	0.52	34	-0.81	0.13	0.00	Released
2017-2019	ASC 124	1914	7430	560	10	427	383	0.51	7925	493	9	-	-	-	-	-	-	-
2017-2019	TIBURON	1640	7317	460	11	313	221	0.36	7622	493	15	13.24	0.51	22	-0.06	0.09	0.55	Released
2017-2019	UC DESERT KING	1375	7311	460	12	308	221	0.36	8190	493	5	13.17	0.51	24	-0.14	0.09	0.19	Released
2017-2019	ASC 103	1857	7270	561	13	267	384	0.72	-	-	-	11.86	0.52	40	-1.44	0.13	0.00	-
2017-2019	UC MIWOK	1690	7250	434	14	247	163	0.36	8123	493	7	13.61	0.50	15	0.31	0.06	0.00	Released
2017-2019	UC DESERT GOLD	1850	7242	460	15	238	221	0.52	8509	493	4	13.20	0.51	23	-0.11	0.09	0.28	Released
2017-2019	APB 450311	1851	7230	487	16	226	271	0.67	-	-	-	13.67	0.51	14	0.36	0.09	0.00	-
2017-2019	UC 1771	1771	7209	560	17	206	383	0.77	7703	493	12	-	-	-	-	-	-	-
2017-2019	APB 153541	1901	7171	560	18	168	383	0.81	7665	493	13	-	-	-	-	-	-	-
2017-2019	SY VOLANTE	1431	7169	460	19	165	221	0.70	7651	493	14	12.38	0.51	35	-0.92	0.09	0.00	Released
2017-2019	ASC 102	1856	7151	561	20	147	384	0.82	-	-	-	13.25	0.52	21	-0.05	0.13	0.72	-
2017-2019	AS SARAGOLLA	1583	7145	460	21	142	221	0.72	7202	493	22	12.20	0.51	37	-1.10	0.09	0.00	Released
2017-2019	SY FORTISSIMO	1429	7137	460	22	134	221	0.73	8086	493	8	13.28	0.51	20	-0.02	0.09	0.80	Released
2017-2019	UC 1873	1873	7087	560	23	84	383	0.88	-	-	-	12.85	0.52	30	-0.45	0.13	0.00	-
2017-2019	KRONOS	951	7067	460	24	64	221	0.86	7371	493	19	13.42	0.51	19	0.11	0.09	0.25	Released
2017-2019	ALBERTO	1813	7067	460	25	63	221	0.86	7418	493	17	13.60	0.51	16	0.30	0.09	0.00	Released
2017-2019	APB 450275	1865	7016	560	26	13	383	0.97	-	-	-	13.74	0.52	13	0.43	0.13	0.00	-
2017-2019	WB ORITA	1215	6976	460	27	-28	221	0.92	7570	493	16	13.99	0.51	7	0.68	0.09	0.00	Released
2017-2019	APB 450333	1866	6943	560	28	-60	383	0.91	-	-	-	13.93	0.52	8	0.62	0.13	0.00	-
2017-2019	ASC 123	1913	6914	560	29	-89	383	0.88	7408	493	18	-	-	-	-	-	-	-
2017-2019	WB MEAD	1607	6896	460	30	-107	221	0.79	7780	493	11	13.84	0.51	10	0.53	0.09	0.00	Released
2017-2019	ASC 122	1912	6856	560	31	-147	383	0.82	7351	493	20	-	-	-	-	-	-	-
2017-2019	UC 1871	1871	6825	487	32	-179	271	0.72	6668	493	26	13.48	0.52	18	0.17	0.13	0.23	-
2017-2019	APB 152356	1902	6751	560	33	-252	383	0.72	7246	493	21	-	-	-	-	-	-	-
2017-2019	WESTMORE HP	1484	6721	460	34	-282	221	0.42	6212	493	29	14.26	0.51	3	0.95	0.09	0.00	Released
2017-2019	UC 1872	1872	6717	560	35	-286	383	0.70	-	-	-	13.52	0.52	17	0.21	0.13	0.14	-
2017-2019	UC 1910	1910	6668	560	36	-335	383	0.65	7163	493	23	-	-	-	-	-	-	-
2017-2019	AS COLOMBO	1800	6654	471	37	-350	241	0.36	8776	493	2	14.08	0.51	4	0.78	0.09	0.00	Released
2017-2019	DPG TOPPER	1211	6624	560	38	-379	383	0.57	-	-	-	12.56	0.52	32	-0.75	0.13	0.00	Released
2017-2019	WB MOHAVE	1654	6531	460	39	-472	221	0.18	5977	493	30	14.02	0.51	6	0.71	0.09	0.00	Released
2017-2019	UC 1870	1870	6520	487	40	-483	271	0.31	6678	493	25	12.55	0.52	33	-0.75	0.13	0.00	-
2017-2019	AS MAESTRALE	1582	6450	460	41	-553	221	0.13	6646	493	27	13.10	0.51	26	-0.21	0.09	0.04	Released
2017-2019	WB HAVASU	1479	6440	561	42	-563	384	0.36	-	-	-	13.90	0.52	9	0.60	0.13	0.00	Released
2017-2019	UC DESERT KING HP	1627	6400	460	43	-603	221	0.11	6820	493	24	14.60	0.51	2	1.30	0.09	0.00	Released
2017-2019	DPG CANDURA	1867	6338	560	44	-665	383	0.31	-	-	-	12.97	0.52	28	-0.33	0.13	0.02	Released
2017-2019	DPG PLATINUM	1210	6329	487	45	-674	271	0.13	6602	493	28	13.12	0.52	25	-0.19	0.13	0.20	Released
2017-2019	UC 16051 12	1849	6321	561	46	-682	384	0.31	-	-	-	14.04	0.52	5	0.74	0.13	0.00	-
2017-2019	ASC 100	1854	6184	561	47	-820	384	0.18	-	-	-	13.76	0.52	11	0.46	0.13	0.00	-
2017-2019	UC 16051 1	1848	6104	561	48	-899	384	0.16	-	-	-	15.70	0.52	1	2.39	0.13	0.00	-

Table 28: Statewide durum wheat yield and protein from the 2016-17 to 2018-19 seasons.

Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Protein diff. from overall mean	Protein st.err.diff. from overall mean	Protein p-Value	2019 Protein (%)	2019 St.Err.Protein (%)	2019 Protein Rank	Status
2017-2019	UC DESERT KING	1375	7911	325	1	571	121	0.00	8482	951	4	12.38	0.65	30	-0.18	0.11	0.16	12.25	0.66	18	Released
2017-2019	TIBURON	1640	7894	325	2	554	122	0.00	8005	953	15	12.62	0.65	22	0.06	0.11	0.69	12.62	0.66	13	Released
2017-2019	APB 152308	1900	7867	379	3	527	226	0.08	8451	951	5	12.87	0.74	11	0.30	0.37	0.51	12.63	0.66	12	-
2017-2019	ASC 124	1914	7858	379	4	518	226	0.08	8441	951	6	11.86	0.74	45	-0.70	0.37	0.11	11.63	0.66	26	-
2017-2019	DPG DURAKING	878	7853	365	5	513	202	0.05	-	-	-	12.02	0.66	42	-0.55	0.17	0.00	-	-	-	Released
2017-2019	UC 1771	1771	7844	384	6	504	233	0.09	8412	953	7	12.08	0.74	37	-0.48	0.37	0.27	11.84	0.66	23	-
2017-2019	SHASTA	1869	7838	338	7	498	151	0.01	8226	951	11	12.42	0.66	29	-0.15	0.15	0.42	12.98	0.66	5	Released
2017-2019	APB 471400	1853	7816	325	8	476	122	0.00	8061	953	14	11.66	0.65	48	-0.90	0.11	0.00	11.44	0.66	27	-
2017-2019	UC DESERT GOLD	1850	7794	326	9	454	124	0.00	8961	953	1	12.20	0.65	34	-0.36	0.11	0.00	11.84	0.66	24	Released
2017-2019	UC 1870	1870	7735	341	10	395	157	0.05	7871	958	20	12.19	0.66	35	-0.37	0.15	0.03	12.97	0.75	7	-
2017-2019	APB 540165	1827	7647	371	11	307	213	0.25	-	-	-	12.42	0.66	28	-0.14	0.17	0.50	-	-	-	-
2017-2019	SY VOLANTE	1431	7592	327	12	252	126	0.11	8003	951	16	12.04	0.65	40	-0.52	0.11	0.00	11.98	0.62	22	Released
2017-2019	DPG TOPPER	1211	7567	365	13	227	202	0.42	-	-	-	11.74	0.66	46	-0.83	0.17	0.00	-	-	-	Released
2017-2019	AS SARAGOLLA	1583	7546	326	14	206	124	0.18	8075	953	13	11.71	0.65	47	-0.85	0.11	0.00	11.27	0.66	29	Released
2017-2019	UC MIWOK	1690	7529	315	15	189	92	0.11	8947	955	2	12.66	0.65	18	0.09	0.08	0.35	12.26	0.66	17	Released
2017-2019	POWELL	1868	7495	338	16	155	151	0.47	8669	951	3	13.23	0.66	6	0.67	0.15	0.00	13.01	0.66	4	Released
2017-2019	UC 1910	1910	7495	379	17	155	226	0.66	8078	951	12	13.58	0.74	4	1.02	0.37	0.01	13.35	0.66	3	-
2017-2019	ASC 101	1855	7457	365	18	117	203	0.68	-	-	-	12.04	0.66	41	-0.53	0.16	0.00	-	-	-	-
2017-2019	UC 1873	1873	7455	365	19	115	202	0.68	-	-	-	12.53	0.66	27	-0.03	0.17	0.92	-	-	-	-
2017-2019	SY FORTISSIMO	1429	7440	325	20	100	121	0.56	8355	951	9	12.56	0.65	24	0.00	0.11	0.99	12.08	0.66	19	Released
2017-2019	ALBERTO	1813	7411	326	21	71	124	0.68	7940	951	18	12.54	0.65	26	-0.03	0.11	0.88	12.06	0.66	20	Released
2017-2019	ASC 103	1857	7405	365	22	65	203	0.82	-	-	-	11.95	0.66	44	-0.61	0.16	0.00	-	-	-	-
2017-2019	WB MEAD	1607	7374	325	23	34	121	0.83	8231	951	10	12.86	0.65	12	0.29	0.11	0.02	12.52	0.66	14	Released
2017-2019	APB 450311	1851	7349	335	24	9	145	0.97	-	-	-	12.82	0.65	14	0.26	0.12	0.07	-	-	-	-
2017-2019	ASC 123	1913	7346	384	25	6	233	0.98	7914	953	19	11.96	0.74	43	-0.60	0.37	0.17	11.72	0.66	25	-
2017-2019	UC 16051 12	1849	7301	365	26	-39	203	0.89	-	-	-	12.55	0.66	25	-0.01	0.16	0.97	-	-	-	-
2017-2019	WB ORITA	1215	7288	326	27	-52	123	0.79	7944	951	17	13.12	0.65	7	0.56	0.11	0.00	12.77	0.66	10	Released
2017-2019	LCS KIKO	1697	7272	365	28	-67	203	0.82	-	-	-	12.26	0.66	33	-0.30	0.16	0.11	-	-	-	Released
2017-2019	UC 1872	1872	7263	375	29	-77	219	0.82	-	-	-	12.33	0.67	31	-0.24	0.18	0.27	-	-	-	-
2017-2019	DPG PLATINUM	1210	7240	340	30	-100	155	0.67	7455	955	26	12.29	0.66	32	-0.28	0.15	0.12	12.27	0.66	16	Released
2017-2019	UC 1871	1871	7178	347	31	-162	170	0.50	7501	958	23	12.65	0.66	19	0.09	0.16	0.69	12.84	0.66	8	-
2017-2019	APB 450333	1866	7170	365	32	-169	202	0.56	-	-	-	12.85	0.66	13	0.29	0.16	0.14	-	-	-	-
2017-2019	APB 450275	1865	7133	368	33	-207	207	0.48	-	-	-	12.89	0.66	10	0.32	0.17	0.11	-	-	-	-
2017-2019	AS COLOMBO	1800	7070	326	34	-270	123	0.08	8370	951	8	12.08	0.65	38	-0.49	0.11	0.00	10.66	0.66	30	Released
2017-2019	AS MAESTRALE	1582	7062	326	35	-277	124	0.08	7375	951	28	12.12	0.65	36	-0.44	0.11	0.00	11.43	0.66	28	Released
2017-2019	WB MOHAVE	1654	7057	326	36	-283	123	0.08	7249	953	29	13.04	0.65	9	0.47	0.11	0.00	12.98	0.66	6	Released
2017-2019	APB 470442	1852	7032	365	37	-308	203	0.22	-	-	-	12.82	0.66	15	0.26	0.16	0.17	-	-	-	-
2017-2019	DPG CANDURA	1867	7003	371	38	-337	213	0.20	-	-	-	12.04	0.66	39	-0.52	0.17	0.01	-	-	-	Released
2017-2019	ASC 102	1856	7002	365	39	-338	203	0.18	-	-	-	12.57	0.66	23	0.01	0.16	0.97	-	-	-	-
2017-2019	APB 153541	1901	6960	384	40	-380	233	0.19	7553	953	21	13.63	0.74	3	1.07	0.37	0.01	13.40	0.66	2	-
2017-2019	ASC 100	1854	6936	368	41	-404	208	0.12	-	-	-	12.73	0.66	17	0.16	0.16	0.42	-	-	-	-
2017-2019	KRONOS	951	6936	331	42	-404	134	0.01	7487	960	24	12.63	0.65	20	0.07	0.12	0.66	12.04	0.66	21	Released
2017-2019	UC DESERT KING HP	1627	6935	326	43	-405	124	0.01	7467	953	25	13.77	0.65	2	1.20	0.11	0.00	14.19	0.66	1	Released
2017-2019	WB HAVASU	1479	6934	365	44	-406	203	0.11	-	-	-	12.73	0.66	16	0.16	0.16	0.41	-	-	-	Released
2017-2019	APB 152356	1902	6933	379	45	-407	226	0.15	7517	951	22	13.06	0.74	8	0.49	0.37	0.27	12.82	0.66	9	-
2017-2019	ASC 122	1912	6886	394	46	-454	250	0.15	7444	958	27	12.62	0.74	21	0.06	0.37	0.94	12.38	0.66	15	-
2017-2019	WESTMORE HP	1484	6863	328	47	-477	129	0.00	6830	958	30	13.35	0.65	5	0.78	0.11	0.00	12.71	0.66	11	Released
2017-2019	UC 16051 1	1848	6341	368	48	-999	208	0.00	-	-	-	14.02	0.66	1	1.46	0.16	0.00	-	-	-	-

Triticale performance tables

Table 29: Sacramento Valley region, triticale yield and protein from the 2016-17 to 2018-19 seasons.

Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	Status
2017-2019	NS GOLD RUSH 91	3178	7259	718	1	861	250	0.01	8372	816	1	Released
2017-2019	UC 3185	3185	7040	712	2	642	238	0.04	7978	820	2	-
2017-2019	UC 3184	3184	6912	718	3	515	251	0.11	7668	821	7	-
2017-2019	UC 3190	3190	6885	764	4	487	350	0.27	7855	818	4	-
2017-2019	NS SWIFT 77	3188	6836	760	5	438	343	0.27	7776	816	5	Released
2017-2019	NS TRICAL 158EP	3169	6656	701	6	259	203	0.27	7856	821	3	-
2017-2019	NS TRICAL 115T	3170	6518	700	7	121	201	0.68	7690	816	6	-
2017-2019	WB PACHECO	3164	6514	712	8	117	238	0.71	-	-	-	Released
2017-2019	NS 13T00903	3189	6496	764	9	98	350	0.83	7466	818	8	-
2017-2019	AGS 133	3182	6444	770	10	46	363	0.90	-	-	-	-
2017-2019	NS TRICAL 105	3097	5947	699	11	-451	198	0.07	6883	818	9	Released
2017-2019	UC 3183	3183	5930	756	12	-468	338	0.27	-	-	-	-
2017-2019	NS CAMELOT	3168	5844	700	13	-554	201	0.04	6280	821	10	Released
2017-2019	XB T401	3186	5799	748	14	-598	324	0.15	-	-	-	-
2017-2019	NS 12T01486	3180	5792	781	15	-606	382	0.23	-	-	-	-
2017-2019	AGS 230	3181	5492	770	16	-905	363	0.05	-	-	-	-

Table 30: North Cental San Joaquin Valley region, triticale yield and protein from the 2016-17 to 2018-19 seasons.

Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	Status
2017-2019	UC 3184	3184	7727	605	1	837	397	0.43	7867	707	3	-
2017-2019	UC 3190	3190	7627	795	2	737	630	0.62	7978	707	2	-
2017-2019	UC 3185	3185	7578	573	3	688	356	0.43	8179	697	1	-
2017-2019	NS GOLD RUSH 91	3178	7251	569	4	361	348	0.62	7463	697	4	Released
2017-2019	NS 13T00903	3189	7079	763	5	189	594	0.93	7428	697	5	-
2017-2019	NS TRICAL 158EP	3169	6855	523	6	-35	278	0.93	7368	697	6	-
2017-2019	NS TRICAL 115T	3170	6844	521	7	-46	275	0.93	7089	697	9	-
2017-2019	NS SWIFT 77	3188	6839	763	8	-51	594	0.93	7188	697	7	Released
2017-2019	NS 12T01486	3180	6788	632	9	-102	433	0.93	-	-	-	-
2017-2019	AGS 133	3182	6784	632	10	-106	433	0.93	-	-	-	-
2017-2019	WB PACHECO	3164	6577	545	11	-313	312	0.62	-	-	-	Released
2017-2019	NS CAMELOT	3168	6552	524	12	-338	278	0.62	6916	697	10	Released
2017-2019	NS TRICAL 105	3097	6535	523	13	-355	278	0.62	7090	697	8	Released
2017-2019	UC 3183	3183	6488	682	14	-402	494	0.67	-	-	-	-
2017-2019	AGS 230	3181	6485	632	15	-405	433	0.62	-	-	-	-
2017-2019	XB T401	3186	6228	640	16	-662	447	0.62	-	-	-	-

Table 31: South San Joaquin Valley region, triticale yield and protein from the 2016-17 to 2018-19 seasons.

Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	Status
2017-2019	UC 3190	3190	8205	1496	1	1061	471	0.06	9076	637	1	-
2017-2019	NS 13T00903	3189	7994	1477	2	850	415	0.09	8752	586	3	-
2017-2019	NS GOLD RUSH 91	3178	7849	1432	3	705	245	0.04	8327	586	6	Released
2017-2019	WB PACHECO	3164	7779	1434	4	635	257	0.04	-	-	-	Released
2017-2019	NS 12T01486	3180	7732	1443	5	588	305	0.10	-	-	-	-
2017-2019	NS SWIFT 77	3188	7519	1477	6	374	415	0.49	8277	586	7	Released
2017-2019	UC 3185	3185	7497	1443	7	353	294	0.34	8777	586	2	-
2017-2019	NS TRICAL 115T	3170	7246	1426	8	101	211	0.68	8470	586	4	-
2017-2019	NS TRICAL 158EP	3169	7132	1426	9	-12	211	0.95	8346	586	5	-
2017-2019	AGS 230	3181	6999	1443	10	-146	305	0.68	-	-	-	-
2017-2019	UC 3184	3184	6860	1453	11	-285	334	0.49	6439	637	10	-
2017-2019	AGS 133	3182	6672	1443	12	-473	305	0.20	-	-	-	-
2017-2019	NS TRICAL 105	3097	6570	1426	13	-575	211	0.04	7553	586	8	Released
2017-2019	NS CAMELOT	3168	6537	1426	14	-608	211	0.04	6848	586	9	Released
2017-2019	XB T401	3186	6046	1477	15	-1098	420	0.04	-	-	-	-
2017-2019	UC 3183	3183	5677	1534	16	-1468	570	0.04	-	-	-	-

Table 32: Imperial Valley region, triticale yield and protein from the 2016-17 to 2018-19 seasons.

Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	Status
2016-2018	UC 3184	3184	7195	375	1	613	290	0.18	-
2016-2018	WB PACHECO	3164	6987	274	2	405	169	0.18	Released
2016-2018	NS GOLD RUSH 91	3178	6894	303	3	312	210	0.33	Released
2016-2018	UC 3185	3185	6865	375	4	283	290	0.52	-
2016-2018	NS TRICAL 158EP	3169	6669	274	5	87	169	0.79	-
2016-2018	NS TRICAL 105	3097	6667	274	6	84	169	0.79	Released
2016-2018	AGS 230	3181	6663	374	7	81	290	0.84	-
2016-2018	NS 12T01486	3180	6636	374	8	54	290	0.85	-
2016-2018	UC 3183	3183	6461	375	9	-122	290	0.79	-
2016-2018	XB T401	3186	6299	375	10	-283	290	0.52	-
2016-2018	PRL 011TS 429	3177	6287	374	11	-296	296	0.52	-
2016-2018	NS TRICAL 115T	3170	6280	274	12	-303	169	0.21	-
2016-2018	NS CAMELOT	3168	6228	274	13	-354	169	0.18	Released
2016-2018	AGS 133	3182	6020	374	14	-562	290	0.20	-

Table 33: Rainfed locations, triticale yield and protein from the 2016-17 to 2018-19 seasons.

Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	Status
2017-2019	UC 3190	3190	6937	1002	1	1198	691	0.27	7539	471	1	-
2017-2019	NS GOLD RUSH 91	3178	6487	744	2	748	306	0.24	7062	471	3	Released
2017-2019	UC 3185	3185	6326	735	3	587	297	0.27	7157	471	2	-
2017-2019	UC 3184	3184	6282	744	4	544	313	0.27	6028	471	10	-
2017-2019	WB PACHECO	3164	5777	712	5	39	243	0.90	-	-	-	Released
2017-2019	NS TRICAL 158EP	3169	5672	712	6	-66	237	0.90	6283	471	5	-
2017-2019	NS TRICAL 115T	3170	5664	712	7	-74	237	0.90	6256	471	7	-
2017-2019	NS SWIFT 77	3188	5654	1002	8	-84	691	0.90	6256	471	6	Released
2017-2019	NS 13T00903	3189	5612	1002	9	-127	691	0.90	6214	471	8	-
2017-2019	AGS 133	3182	5504	760	10	-235	345	0.72	-	-	-	-
2017-2019	NS CAMELOT	3168	5484	711	11	-255	234	0.49	6068	471	9	Released
2017-2019	NS 12T01486	3180	5430	760	12	-309	345	0.59	-	-	-	-
2017-2019	NS TRICAL 105	3097	5384	710	13	-354	232	0.29	6718	471	4	Released
2017-2019	UC 3183	3183	5266	761	14	-472	353	0.36	-	-	-	-
2017-2019	XB T401	3186	5219	751	15	-520	337	0.29	-	-	-	-
2017-2019	AGS 230	3181	5118	760	16	-621	345	0.27	-	-	-	-

Table 34: Statewide triticale yield and protein from the 2016-17 to 2018-19 seasons.

Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	Status
2017-2019	NS GOLD RUSH 91	3178	7288	445	1	627	167	0.00	8140	517	2	Released
2017-2019	UC 3185	3185	7241	445	2	580	169	0.00	8143	520	1	-
2017-2019	UC 3190	3190	7233	499	3	572	270	0.06	8022	521	3	-
2017-2019	UC 3184	3184	7167	451	4	505	181	0.01	7606	522	8	-
2017-2019	NS SWIFT 77	3188	6934	492	5	273	259	0.47	7692	517	5	Released
2017-2019	NS 13T00903	3189	6846	495	6	185	262	0.58	7621	519	7	-
2017-2019	NS TRICAL 158EP	3169	6770	432	7	109	135	0.58	7792	520	4	-
2017-2019	WB PACHECO	3164	6701	439	8	40	156	0.85	-	-	-	Released
2017-2019	NS TRICAL 115T	3170	6678	432	9	17	134	0.90	7638	517	6	-
2017-2019	NS 12T01486	3180	6511	472	10	-150	225	0.58	-	-	-	-
2017-2019	AGS 133	3182	6506	469	11	-155	220	0.58	-	-	-	-
2017-2019	NS TRICAL 105	3097	6232	432	12	-429	134	0.01	7021	519	9	Released
2017-2019	NS CAMELOT	3168	6163	432	13	-498	135	0.00	6526	520	10	Released
2017-2019	UC 3183	3183	6163	479	14	-499	237	0.06	-	-	-	-
2017-2019	AGS 230	3181	6142	469	15	-519	220	0.04	-	-	-	-
2017-2019	XB T401	3186	6004	469	16	-657	220	0.01	-	-	-	-

Barley performance tables

Table 35: Sacramento Valley region, barley yield and protein from the 2016-17 to 2018-19 seasons.

Crop Classification	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	Status
6RSF	2017-2019	ISHI	1047	5539	591	1	1262	190	0.00	5247	911	2	Released
6RSF	2017-2019	UC 1280	1280	5503	636	2	1226	294	0.00	5256	910	1	-
2RSM	2017-2019	LCS ODYSSEY	1415	4822	586	3	545	179	0.01	4651	901	4	-
6RSN	2017-2019	UC 937	937	4758	600	4	481	215	0.07	4540	905	5	-
6RSF	2017-2019	UC 933	933	4734	586	5	457	179	0.03	4287	905	8	Released
6RSF	2017-2019	UC 960	960	4616	606	6	339	229	0.27	4690	918	3	-
6RSF	2017-2019	UC 969	969	4551	585	7	273	173	0.24	3911	911	12	Released
2RSM	2017-2019	UC 1410	1410	4547	660	8	269	343	0.62	-	-	-	-
2RSM	2017-2019	LCS GENIE	1414	4407	578	9	130	154	0.61	4392	905	7	Released
6RSF	2017-2019	UC 603	603	4326	589	10	48	186	0.87	4406	905	6	Released
6RSN	2017-2019	TAMALPAIS	1134	4302	586	11	24	179	0.93	4053	905	10	Released
2RSM	2017-2019	UC 1911	1911	4268	623	12	-10	268	0.97	4019	901	11	-
2RSM	2017-2019	UC TAHOE	1409	4218	590	13	-59	190	0.87	4218	905	9	Released
6RSF	2017-2019	MAX	816	4175	660	14	-103	343	0.87	-	-	-	-
2RSM	2017-2019	OSU FULL PINT	1411	4140	606	15	-137	229	0.74	3907	905	13	Released
2RSM	2017-2019	UC B9K94	1861	4135	645	16	-143	316	0.83	-	-	-	-
2RSM	2017-2019	UC BUTTA 12	1360	4061	585	17	-217	176	0.39	3846	905	14	Released
2RSM	2017-2019	UC 1915	1915	4028	629	18	-249	280	0.61	3781	905	15	-
6RSF(H)	2017-2019	SCHALLER	1355	3781	629	19	-497	280	0.18	3533	905	16	Released
2RSM	2017-2019	CDC COPELAND	1858	3657	594	20	-620	201	0.01	3420	905	17	Released
2RSM	2017-2019	UC CAPAY	1390	3503	590	21	-774	190	0.00	3297	911	18	-
2RSM	2017-2019	ACC SYNERGY	1859	3426	600	22	-852	216	0.00	2642	901	19	Released
2RSM	2017-2019	KLAGES	1860	2884	600	23	-1393	215	0.00	2542	901	20	Released

Table 36: North Cental San Joaquin Valley region, barley yield and protein from the 2016-17 to 2018-19 seasons.

Crop Classification	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	Status
6RSF	2017-2019	UC 1280	1280	6434	510	1	1382	316	0.00	7083	345	2	-
6RSF	2017-2019	ISHI	1047	6064	454	2	1012	232	0.00	7306	365	1	Released
6RSN	2017-2019	TAMALPAIS	1134	5887	450	3	835	225	0.00	6705	345	4	Released
6RSF	2017-2019	UC 969	969	5741	441	4	689	209	0.00	5920	345	7	Released
6RSF	2017-2019	UC 603	603	5699	454	5	647	232	0.02	6448	345	5	Released
6RSF	2017-2019	UC 933	933	5678	454	6	626	232	0.02	6749	345	3	Released
2RSM	2017-2019	LCS ODYSSEY	1415	5592	464	7	540	248	0.07	6286	365	6	-
2RSM	2017-2019	OSU FULL PINT	1411	5408	478	8	356	270	0.29	5904	365	8	Released
2RSM	2017-2019	UC 1410	1410	5188	607	9	136	456	0.80	-	-	-	-
2RSM	2017-2019	UC 1911	1911	5038	510	10	-14	316	0.96	5686	345	10	-
2RSM	2017-2019	LCS GENIE	1414	4878	435	11	-174	197	0.48	5552	345	12	Released
2RSM	2017-2019	UC B9K94	1861	4869	658	12	-183	513	0.79	-	-	-	-
6RSN	2017-2019	UC 937	937	4861	472	13	-191	259	0.56	5658	345	11	-
6RSF	2017-2019	MAX	816	4842	607	14	-210	456	0.74	-	-	-	-
6RSF	2017-2019	UC 960	960	4782	472	15	-270	259	0.40	5738	345	9	-
6RSF(H)	2017-2019	SCHALLER	1355	4683	524	16	-369	337	0.39	5299	365	13	Released
2RSM	2017-2019	UC TAHOE	1409	4672	454	17	-380	232	0.18	5232	345	15	Released
2RSM	2017-2019	UC CAPAY	1390	4583	450	18	-469	225	0.08	4328	345	20	-
2RSM	2017-2019	ACC SYNERGY	1859	4533	472	19	-519	259	0.09	5238	345	14	Released
2RSM	2017-2019	UC 1915	1915	4524	524	20	-528	337	0.19	5139	365	16	-
2RSM	2017-2019	UC BUTTA 12	1360	4421	464	21	-630	248	0.03	4759	365	17	Released
2RSM	2017-2019	CDC COPELAND	1858	3985	479	22	-1067	270	0.00	4689	345	18	Released
2RSM	2017-2019	KLAGES	1860	3836	472	23	-1216	259	0.00	4626	345	19	Released

Table 37: South San Joaquin Valley region, barley yield and protein from the 2016-17 to 2018-19 seasons.

Crop Classification	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	Status
-	2016-2018	UC UOP 98	1402	3301	754	1	1191	387	0.05	-
-	2016-2018	UC UOP 100	1404	2932	754	2	823	387	0.36	-
6RSF	2016-2018	UC B398	1256	2860	754	3	750	387	0.37	-
6RSF	2016-2018	UC 1280	1280	2736	754	4	627	387	0.60	-
-	2016-2018	UC UOP 105	1406	2700	754	5	590	387	0.60	-
2RSM	2016-2018	UC CAPAY	1390	2537	695	6	428	277	0.60	-
2RSM	2016-2018	ACC SYNERGY	1859	2496	852	7	387	560	0.94	Released
6RSF	2016-2018	UC A237	1261	2423	754	8	314	387	0.93	-
6RSN	2016-2018	UC 1318	1318	2412	754	9	302	387	0.93	-
-	2016-2018	UC UYP 210B	1383	2405	754	10	295	387	0.93	-
-	2016-2018	UC UYP 3B	1379	2394	754	11	284	387	0.93	-
2RSM	2016-2018	LCS GENIE	1414	2344	703	12	234	309	0.93	Released
2RSM	2016-2018	UC B9K94	1861	2311	852	13	201	560	0.97	-
-	2016-2018	UC 08YP 111 1231 LATE	1385	2262	754	14	152	387	0.97	-
2RSM	2016-2018	UC 1410	1410	2258	721	15	149	333	0.97	-
6RSN	2016-2018	UC 937	937	2210	852	16	101	560	0.97	-
2RSM	2016-2018	UC UOP 111	1408	2178	754	17	68	387	0.97	-
2RSM	2016-2018	LCS ODYSSEY	1415	2159	750	18	49	401	0.97	-
2RSM	2016-2018	UC UOP 95	1399	2108	754	19	-2	387	1.00	-
6RSF	2016-2018	UC 603	603	2099	695	20	-11	277	0.99	Released
2RSM	2016-2018	KLAGES	1860	2088	852	21	-22	560	0.99	Released
6RSF	2016-2018	UC 933	933	2069	698	22	-41	286	0.97	Released
-	2016-2018	UC UOP 99	1403	2063	754	23	-47	387	0.97	-
6RSF	2016-2018	ISHI	1047	2032	702	24	-78	295	0.97	Released
6RSF	2016-2018	UC 969	969	2024	686	25	-86	259	0.97	Released
6RSN	2016-2018	UC 1263	1263	2024	754	26	-86	387	0.97	-
2RSM	2016-2018	UC BUTTA 12	1360	2014	695	27	-96	277	0.97	Released
2RSM	2016-2018	CDC COPELAND	1858	1994	852	28	-116	560	0.97	Released
6RSF	2016-2018	UC 960	960	1991	852	29	-118	560	0.97	-
6RSN	2016-2018	UC 1266	1266	1979	754	30	-130	387	0.97	-
-	2016-2018	UC UOP 96	1400	1978	754	31	-132	387	0.97	-
2RSM	2016-2018	UC TAHOE	1409	1904	695	32	-206	277	0.93	Released
6RSF	2016-2018	UC B369	1255	1903	754	33	-207	387	0.97	-
6RSN	2016-2018	TAMALPAIS	1134	1901	695	34	-208	277	0.93	Released
2RSM	2016-2018	OSU FULL PINT	1411	1829	715	35	-281	315	0.93	Released
-	2016-2018	UC UOP 102	1405	1802	754	36	-307	387	0.93	-
6RSN	2016-2018	UC 1317	1317	1676	754	37	-433	387	0.92	-
-	2016-2018	UC UOP 97	1401	1667	754	38	-443	387	0.92	-
6RSF(H)	2016-2018	SCHALLER	1355	1657	754	39	-452	387	0.92	Released
6RSF	2016-2018	MAX	816	1439	721	40	-671	333	0.37	-
6RSF	2016-2018	UC UYP 210A	1351	1285	754	41	-825	387	0.36	-
6RSF	2016-2018	UC71 183 1	162	162	850	42	-1947	546	0.02	-

Table 38: Rainfed locations, barley yield and protein from the 2016-17 to 2018-19 seasons.

Crop Classification	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	Status
6RSF	2017-2019	UC 1280	1280	4680	792	1	1109	358	0.02	3898	190	1	-
6RSF	2017-2019	ISHI	1047	4449	714	2	878	150	0.00	3818	190	2	Released
2RSM	2017-2019	UC 1911	1911	3951	792	3	380	358	0.44	3168	190	5	-
2RSM	2017-2019	LCS ODYSSEY	1415	3895	712	4	324	145	0.12	3311	190	4	-
6RSF	2017-2019	UC 933	933	3857	712	5	286	143	0.18	2763	190	7	Released
2RSM	2017-2019	UC 1410	1410	3789	734	6	218	225	0.48	-	-	-	-
6RSN	2017-2019	UC 937	937	3741	724	7	170	187	0.49	2658	190	11	-
2RSM	2017-2019	LCS GENIE	1414	3704	706	8	133	116	0.42	3524	190	3	Released
6RSF	2017-2019	UC 969	969	3645	709	9	74	129	0.65	2713	190	9	Released
2RSM	2017-2019	ACC SYNERGY	1859	3598	725	10	27	194	0.89	2319	190	18	Released
2RSM	2017-2019	UC B9K94	1861	3534	730	11	-37	211	0.89	-	-	-	-
2RSM	2017-2019	OSU FULL PINT	1411	3488	728	12	-83	200	0.74	3098	190	6	Released
6RSF	2017-2019	UC 960	960	3408	724	13	-163	187	0.49	2440	190	15	-
2RSM	2017-2019	UC BUTTA 12	1360	3383	711	14	-188	141	0.35	2547	190	13	Released
6RSN	2017-2019	TAMALPAIS	1134	3375	712	15	-196	142	0.35	2461	190	14	Released
6RSF(H)	2017-2019	SCHALLER	1355	3359	792	16	-212	358	0.65	2577	190	12	Released
2RSM	2017-2019	UC TAHOE	1409	3340	714	17	-231	150	0.29	2321	190	17	Released
6RSF	2017-2019	UC 603	603	3330	713	18	-241	148	0.27	2684	190	10	Released
2RSM	2017-2019	UC CAPAY	1390	3312	713	19	-259	148	0.25	2723	190	8	-
6RSF	2017-2019	MAX	816	3183	734	20	-388	225	0.25	-	-	-	-
2RSM	2017-2019	UC 1915	1915	3162	792	21	-409	358	0.42	2379	190	16	-
2RSM	2017-2019	CDC COPELAND	1858	3091	719	22	-480	174	0.03	2310	190	19	Released
2RSM	2017-2019	KLAGES	1860	2860	726	23	-712	193	0.00	2239	190	20	Released

Table 39: Statewide barley yield and protein from the 2016-17 to 2018-19 seasons.

Crop Classification	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	Status
6RSF	2017-2019	UC 1280	1280	5472	505	1	1299	211	0.00	5987	671	2	-
6RSF	2017-2019	ISHI	1047	5178	475	2	1005	132	0.00	6062	674	1	Released
2RSM	2017-2019	LCS ODYSSEY	1415	4639	474	3	466	129	0.00	5315	669	3	-
6RSF	2017-2019	UC 933	933	4609	473	4	436	127	0.00	5301	669	4	Released
6RSF	2017-2019	UC 969	969	4449	470	5	276	117	0.05	4722	671	10	Released
2RSM	2017-2019	UC 1410	1410	4441	513	6	268	231	0.33	-	-	-	-
6RSN	2017-2019	TAMALPAIS	1134	4391	473	7	218	126	0.15	5148	669	6	Released
6RSF	2017-2019	UC 603	603	4371	474	8	199	130	0.21	5233	669	5	Released
6RSN	2017-2019	UC 937	937	4355	482	9	183	152	0.33	4956	669	8	-
2RSM	2017-2019	LCS GENIE	1414	4231	467	10	58	106	0.71	4827	669	9	Released
6RSF	2017-2019	UC 960	960	4206	483	11	34	157	0.91	5036	674	7	-
2RSM	2017-2019	OSU FULL PINT	1411	4190	484	12	18	159	0.95	4699	671	11	Released
2RSM	2017-2019	UC 1911	1911	4163	501	13	-10	200	0.96	4685	667	12	-
2RSM	2017-2019	UC B9K94	1861	4104	511	14	-68	226	0.88	-	-	-	-
2RSM	2017-2019	UC TAHOE	1409	4030	474	15	-142	131	0.35	4588	669	13	Released
6RSF	2017-2019	MAX	816	3904	513	16	-268	231	0.33	-	-	-	-
2RSM	2017-2019	UC BUTTA 12	1360	3895	473	17	-278	129	0.07	4206	671	16	Released
2RSM	2017-2019	UC 1915	1915	3807	505	18	-366	211	0.15	4318	671	14	-
2RSM	2017-2019	UC CAPAY	1390	3750	474	19	-422	130	0.00	3664	671	19	-
6RSF(H)	2017-2019	SCHALLER	1355	3727	505	20	-446	211	0.07	4237	671	15	Released
2RSM	2017-2019	ACC SYNERGY	1859	3588	481	21	-585	152	0.00	3694	667	18	Released
2RSM	2017-2019	CDC COPELAND	1858	3467	480	22	-706	149	0.00	3903	669	17	Released
2RSM	2017-2019	KLAGES	1860	3004	482	23	-1169	152	0.00	3379	667	20	Released

Intermountin region performance tables

Table 40: Intermountin region, winter wheat yield and protein from the 2016-17 to 2018-19 seasons.

Crop Classification	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Protein diff. from overall mean	Protein st.err.diff. from overall mean	Protein p-Value	2019 Protein (%)	2019 St.Err.Protein (%)	2019 Protein Rank	Status
SWW	2017-2019	LCS BLACKJACK	29199	10604	1002	1	1821	298	0.00	12120	525	2	10.23	0.62	45	-0.32	0.19	0.11	9.93	0.87	23.5	-
SWW	2017-2019	WA 8232	29113	10178	1041	2	1396	410	0.01	-	-	-	9.34	0.63	96	-1.21	0.22	0.00	-	-	-	Released
SWW	2017-2019	LWW16 71088	29216	10083	1052	3	1300	433	0.02	11905	525	4	9.12	0.69	98	-1.44	0.35	0.00	8.80	0.87	68	-
SWW	2017-2019	LCS GHOST	29138	10080	987	4	1297	247	0.00	12793	525	1	9.49	0.61	91	-1.07	0.14	0.00	9.13	0.87	63	-
SWW	2017-2019	WB 1783	29146	9882	986	5	1099	242	0.00	11788	525	7	10.03	0.61	64	-0.52	0.14	0.00	9.56	0.87	47	Released
SWW	2017-2019	IDO 1005	29197	9841	1040	6	1058	410	0.06	-	-	-	9.74	0.63	82	-0.81	0.22	0.00	-	-	-	-
HRW	2017-2019	WB 4303	29237	9826	1166	7	1043	659	0.30	11577	785	10	11.85	0.69	11	1.30	0.35	0.00	9.94	0.87	22	-
HRW	2017-2019	LCS JET	29241	9799	1166	8	1016	659	0.31	11550	785	11	11.52	0.69	21	0.96	0.35	0.01	9.60	0.87	45	Released
SWW	2017-2019	ROSALYN	29090	9707	986	9	924	242	0.00	11730	525	8	9.65	0.61	89	-0.90	0.14	0.00	9.36	0.87	59	Released
SWW	2017-2019	WA 8293	29210	9675	1040	10	892	410	0.14	-	-	-	10.08	0.63	60	-0.48	0.22	0.04	-	-	-	-
SWW	2017-2019	SY BANKS	29205	9598	1040	11	815	410	0.19	-	-	-	10.09	0.63	58	-0.46	0.22	0.05	-	-	-	Released
SWW	2017-2019	MARY	29059	9583	986	12	800	242	0.01	11606	525	9	10.10	0.61	55	-0.46	0.14	0.00	8.90	0.87	67	Released
-	2017-2019	SY 04PN062 18	29095	9548	1041	13	765	410	0.22	-	-	-	9.77	0.63	80	-0.79	0.22	0.00	-	-	-	-
HRW	2017-2019	UI BRONZE JADE	29230	9502	1166	14	719	659	0.58	11253	785	14	10.92	0.69	29	0.36	0.35	0.33	9.00	0.87	64	Released
SWW	2017-2019	WA 8206	29112	9498	1041	15	715	410	0.26	-	-	-	10.08	0.63	59	-0.48	0.22	0.04	-	-	-	Released
SWW	2017-2019	LCS SONIC	29137	9468	999	16	685	292	0.10	-	-	-	10.01	0.61	69	-0.55	0.16	0.00	-	-	-	-
SWW	2017-2019	LEGION	29043	9459	1041	17	676	410	0.29	-	-	-	9.46	0.63	92	-1.09	0.22	0.00	-	-	-	Released
SWW	2017-2019	WA 8234	29145	9435	1041	18	652	410	0.30	-	-	-	9.71	0.63	87	-0.84	0.22	0.00	-	-	-	Released
SWW	2017-2019	IDN 02 29001A	29030	9417	1041	19	634	410	0.31	-	-	-	10.38	0.63	38	-0.17	0.22	0.47	-	-	-	-
SWW	2017-2019	BOBTAIL	29011	9415	986	20	632	242	0.06	11019	525	19	10.05	0.61	63	-0.50	0.14	0.00	9.73	0.87	39	Released
HRW	2017-2019	KELDIN	29039	9321	1166	21	538	659	0.74	11072	785	16	11.22	0.69	27	0.66	0.35	0.08	9.30	0.87	60	Released
HRW	2017-2019	AP REDEYE	29236	9320	1166	22	537	659	0.74	11071	785	17	11.82	0.69	12	1.26	0.35	0.00	9.90	0.87	25	Released
SWW	2017-2019	NORTHWEST DUET	29044	9285	986	23	502	242	0.16	10778	525	26	9.80	0.61	79	-0.75	0.14	0.00	9.16	0.87	62	Released
SWW	2017-2019	LCS HULK	29058	9268	986	24	485	242	0.19	9782	525	58	10.01	0.61	68	-0.55	0.14	0.00	9.43	0.87	54	-
SWW	2017-2019	LCS BIANCOR	29042	9261	1002	25	478	298	0.30	11239	525	15	10.09	0.62	56	-0.46	0.19	0.02	9.53	0.87	49	Released
SWW	2017-2019	NIXON	29075	9238	986	26	455	242	0.22	11049	525	18	9.71	0.61	88	-0.85	0.14	0.00	9.26	0.87	61	-
SWW	2017-2019	SY OVATION	29102	9223	987	27	441	247	0.25	10777	558	27	10.15	0.61	51	-0.40	0.14	0.01	10.00	0.87	19	Released
SWW	2017-2019	TUBBS 06	29105	9221	999	28	439	292	0.31	-	-	-	9.46	0.61	94	-1.10	0.16	0.00	-	-	-	Released
SWW	2017-2019	OR 2130485	29140	9212	1041	29	429	410	0.59	-	-	-	9.72	0.63	84	-0.83	0.22	0.00	-	-	-	-
HRW	2017-2019	SCORPIO	29232	9211	1166	30	428	659	0.84	10962	785	21	11.32	0.69	26	0.76	0.35	0.04	9.40	0.87	55	Released
SWW	2017-2019	SY 05PN100 63	29141	9188	1041	31	405	410	0.63	-	-	-	9.72	0.63	85	-0.83	0.22	0.00	-	-	-	-
SWW	2017-2019	SY RAPTOR	29143	9180	986	32	397	242	0.29	10997	525	20	10.20	0.61	46	-0.35	0.14	0.02	10.10	0.87	16	-
HRW	2017-2019	WB 4394	29239	9160	1166	33	378	659	0.87	10911	785	22	11.59	0.69	20	1.03	0.35	0.01	9.67	0.87	41	-
SWW	2017-2019	LCS SHINE	29136	9160	986	34	377	242	0.31	11837	525	5	9.96	0.61	70	-0.60	0.14	0.00	9.63	0.87	44	-
SWW	2017-2019	OR 2121285	29139	9152	1041	35	369	410	0.70	-	-	-	10.07	0.63	61	-0.48	0.22	0.04	-	-	-	-
-	2017-2019	WA 8292	29209	9139	1040	36	356	410	0.72	-	-	-	9.95	0.63	71	-0.60	0.22	0.01	-	-	-	-
SWW	2017-2019	LCS SHARK	29057	9135	986	37	352	242	0.34	12047	525	3	10.34	0.61	39	-0.22	0.14	0.15	10.13	0.87	15	-
SWW	2017-2019	SY CANDOR	29142	9125	989	38	342	253	0.40	10447	603	42	10.02	0.61	67	-0.54	0.15	0.00	10.60	0.88	8	-
SWW	2017-2019	UI SPARROW	29036	9106	1041	39	323	410	0.75	-	-	-	9.46	0.63	93	-1.10	0.22	0.00	-	-	-	Released
SWW	2017-2019	IV BULLDOG	29035	9097	986	40	314	242	0.43	10743	525	30	10.06	0.61	62	-0.49	0.14	0.00	9.83	0.87	33	-
SWW	2017-2019	LWW15 71898	29215	9069	1052	41	286	433	0.84	10892	525	24	10.12	0.69	54	-0.44	0.35	0.25	9.80	0.87	35	-
HRW	2017-2019	OR2160008R	29250	9016	1166	42	233	659	0.90	10767	785	28	11.65	0.69	18	1.10	0.35	0.00	9.74	0.87	38	-
SWW	2017-2019	YS 201	29213	8997	1040	43	214	410	0.87	-	-	-	9.65	0.63	90	-0.90	0.22	0.00	-	-	-	-
SWW	2017-2019	IDO 1708	29198	8986	1040	44	203	410	0.87	-	-	-	10.28	0.63	41	-0.28	0.22	0.24	-	-	-	-
SWW	2017-2019	STEPHENS	29093	8979	986	45	196	242	0.74	10858	525	25	10.14	0.61	52	-0.42	0.14	0.01	9.36	0.87	58	Released
SWW	2017-2019	TUBBS	29104	8978	1041	46	195	410	0.87	-	-	-	9.74	0.63	83	-0.82	0.22	0.00	-	-	-	Released
HRW	2017-2019	OR2160089R	29252	8949	1166	47	166	659	0.94	10700	785	31	11.92	0.69	10	1.36	0.35	0.00	10.00	0.87	18	-
SWW	2017-2019	JASPER	29037	8928	1041	48	145	410	0.90	-	-	-	9.88	0.63	74	-0.67	0.22	0.00	-	-	-	Released
SWW	2017-2019	SY COMMAND	29096	8913	986	49	131	242	0.87	9452	525	61	9.83	0.61	76	-0.72	0.14	0.00	9.93	0.87	23.5	-
SWW	2017-2019	OR2121285	29203	8911	1040	50	128	410	0.92	-	-	-	10.03	0.63	66	-0.53	0.22	0.03	-	-	-	-
HRW	2017-2019	OR2160011R	29251	8896	1166	51	113	659	0.96	10647	785	32	10.89	0.69	30	0.33	0.35	0.38	8.97	0.87	65	-
SWW	2017-2019	LCS ARTDECO	29041	8893	986	52	110	242	0.87	11264	525	13	10.13	0.61	53	-0.42	0.14	0.01	9.90	0.87	26	Released
SWW	2017-2019	IDN 09 08357A	29135	8877	1041	53	94	410	0.94	-	-	-	10.15	0.63	48	-0.40	0.22	0.09	-	-	-	-
HRW	2017-2019	LCS AYMERIC	29243	8876	1166	54	93	659	0.96	10627	785	33	11.35	0.69	25	0.80	0.35	0.03	9.44	0.87	53	Released
SWW	2017-2019	WB 1604	29116	8854	1002	55	71	298	0.94	11792	525	6	10.24	0.62	44	-0.31	0.19	0.12	10.53	0.87	10	Released
SWW	2017-2019	SY 107	29099	8841	1041	56	58	410	0.96	-	-	-	10.03	0.63	65	-0.53	0.22	0.03	-	-	-	-
HRW	2017-2019	OR2150169R	29249	8838	1166	57	55	659	0.97	10589	785	34	11.42	0.69	24	0.86	0.35	0.02	9.50	0.87	51	-
SWW	2017-2019	SY DAYTON	29207	8783	1002	58	0	298	1.00	9998	525	55	9.87	0.62	75	-0.68	0.19	0.00	9.40	0.87	56.5	Released
HRW	2017-2019	WA 8289	29233	8781	1166	59	-2	659	1.00	10532	785	38	11.45	0.69	22	0.90	0.35	0.02	9.54	0.87	48	-
SWW	2017-2019	ORI2161244 CL+	29225	8757	1066	60	-26	467	0.97	10561	558	36	10.15	0.69	50	-0.40	0.35	0.29	9.83	0.87	31	-
SWW	2017-2019	OR2140233	29221	8755	1052	61	-28	433	0.97	10578	525	35	9.95	0.69	72	-0.60	0.35	0.11	9.63	0.87	43	-
SWW	2017-2019	KASEBERG	29038	8744	987	62	-38	247	0.96	9520	558	60	9.45	0.61	95	-1.10	0.14	0.00	8.96	0.87	66	Released
HWW	2017-2019	OR2150168H	29247	8742	1166	63	-41	659	0.97	10493	785	39	11.99	0.69	9	1.43	0.35	0.00	10.07	0.87	17	-
HRW	2017-2019	LCS ROCKET	29242	8724	1166	64	-59	659	0.97	10475	785	40	11.69	0.69	16.5	1.13	0.35	0.00	9.77	0.87	36	Released
SWW	2017-2019	11 163 1C	29222	8715	1052	65	-68	433	0.96	10537	525	37	9.82	0.69	77	-0.74	0.35	0.05	9.50	0.87	52	-
SWW	2017-2019	LCS DRIVE	29052	8698	986	66	-85	242	0.90	11503	525	12	10.09	0.61	57	-0.46	0.14	0.00	9.70	0.87	40	Released
SWW	2017-2019	OR2130081	29204	8671	1040	67	-112	410	0.94	-	-	-	9.92	0.63	73	-0.64	0.22	0.01	-	-	-	-
HWW	2017-2019	IRV	29245	8665	1166	68	-118	659	0.96	10416	785	43	11.59	0.69	19	1.03	0.35	0.01	9.67	0.87	42	Released
SWW	2017-2019	NORTHWEST TANDEM	29045	8657	986	69	-126	242	0.87	10900	525	23	10.15	0.61	47	-0.40	0.14	0.01	9.83	0.87	32	Released
HRW	2017-2019	LCS EVINA	29240	8626	1166	70	-157	659	0.94	10377	785	46	12.39	0.69	6	1.83	0.35	0.00	10.47	0.87	11	Released
SWW	2017-2019	06PN212 25	29217	8625	1052	71	-158	433	0.90	10447	525	41	10.32	0.69	40	-0.24	0.35	0.53	10.00	0.87	20	-
SWW	2017-2019	M PRESS	29200	8593	1002	72	-190	298	0.84	9896	525	57	9.82	0.62	78	-0.74	0.19	0.00	9.83	0.87	30	Released
SWW	2017-2019	OR2140401	29220	8582	1052	73	-201	433	0.87	10405	525	44	8.82	0.69	99	-1.74	0.35	0.00	8.50	0.87	69	-
SWW	2017-2019	DYNA GRO IMPACT	29218	8557	1052	74	-226	433	0.87	10379	525	45	10.45	0.69	37	-0.10	0.35	0.80	10.13	0.87	14	-
HRW	2017-2019	LCS ZOOM	29244	8552	1166	75	-231	659	0.90	10303	785	47	11.42	0.69	23	0.86	0.35	0.02	9.50	0.87	50	Released
-	2017-2019	MANDALA	29253	8534	1166	76	-249	659	0.90	10284	785	49	11.72	0.69	15	1.16	0.35	0.00	9.80	0.87	34	Released
SWW	2017-2019	OR2121252	29076	8527	1041	77	-256	410	0.84	-	-	-	10.25	0.63	43	-0.31	0.22	0.19	-	-	-	-
HWW	2017-2019	MILLIE	29246	8476	1166	78	-307	659	0.87	10226	785	50	11.69	0.69	16.5	1.13	0.35	0.00	9.77	0.87	37	Released
SWW	2017-2019	OR2130755	29219	8465	1052	79	-318	433	0.79	10288	525	48	10.52	0.69	36	-0.04	0.35	0.92	10.20	0.87	12.5	-
HRW	2017-2019	SY CLEARSTONE CL2	29235	8446	1166	80	-337	659	0.87	10197	785	51	11.79	0.69	13	1.23	0.35	0.00	9.87	0.87	27	Released
SWW	2017-2019	WB 1532	29211	8441	1002	81	-342	298	0.54	9301	525	63	10.26	0.62	42	-0.29	0.19	0.14	9.56	0.87	46	-
-	2017-2019	SY 04PN005 25	29094	8354	1041	82	-428	410	0.59	-	-	-	9.33	0.63	97	-1.23	0.22	0.00	-	-	-	-
HRW	2017-2019	SY TOUCHSTONE	29234	8315	1166	83	-468	659	0.80	10066	785	53	11.75	0.69	14	1.20	0.35	0.00	9.84	0.87	28	Released
SWW	2017-2019	APPLEBY CL+	29226	8314	1052	84	-469	433	0.58	10137	525	52	10.15	0.69	49	-0.40	0.35	0.29	9.83	0.87	29	-
SWW	2017-2019	WB 1529	29115	8280	986	85	-503	242	0.16	10010	525	54	10.69	0.61	32	0.14	0.14	0.37	10.93	0.87	7	Released
SWW	2017-2019	SY ASSURE	29144	8169	986	86	-614	242	0.07	10764	525	29	10.52	0.61	34	-0.03	0.14	0.83	9.96	0.87	21	Released
SWW	2017-2019	OR 2 X 2 CL+	29224	8126	1052	87	-657	433	0.31	9949	525	56	10.52	0.69	35	-0.04	0.35	0.92	10.20	0.87	12.5	-
-	2017-2019	ARS DH08X117 83C	29196	8083	1040	88	-700	410	0.27	-	-	-	10.72	0.63	31	0.16	0.22	0.50	-	-	-	-
SWW	2017-2019	STINGRAY CL+	29223	7929	1052	89	-854	433	0.19	9752	525	59	9.72	0.69	86	-0.84	0.35	0.03	9.40	0.87	56.5	Released
SWW	2017-2019	XB 1104 (EXP)	29212	7831	1040	90	-952	410	0.10	-	-	-	9.77	0.63	81	-0.79	0.22	0.00	-	-	-	-
HWW	2017-2019	OR2160065H	29248	7586	1166	91	-1197	659	0.24	9337	785	62	12.45	0.69	5	1.90	0.35	0.00	10.54	0.87	9	-
-	2017-2019	ARS DH08X028 9C	29195	7500	1040	92	-1283	410	0.01	-	-	-	10.63	0.63	33	0.07	0.22	0.77	-	-	-	-
HRW	2017-2019	WB 4311	29238	7165	1166	93	-1618	659	0.08	8915	785	64	13.32	0.69	2	2.76	0.35	0.00	11.40	0.87	5	-
HRW	2017-2019	WB 4623 CLP	29214	7099	1025	94	-1683	364	0.00	8900	441	65	12.35	0.64	7	1.80	0.25	0.00	11.23	0.83	6	-
SWW	2017-2019	YAMHILL	29128	6919	1118	95	-1863	576	0.01	-	-	-	11.03	0.67	28	0.47	0.31	0.15	-	-	-	Released
-	2017-2019	CAL 1	29227	6559	1052	96	-2224	433	0.00	8381	525	66	12.25	0.69	8	1.70	0.35	0.00	11.93	0.87	4	-
-	2017-2019	CAL 3	29229	5486	1052	97	-3297	433	0.00	7309	525	67	12.95	0.69	4	2.40	0.35	0.00	12.63	0.87	2	-
HRW	2017-2019	BRAWL CL+	29231	5270	1256	98	-3513	804	0.00	7016	934	68	14.35	0.69	1	3.80	0.35	0.00	12.44	0.87	3	Released
-	2017-2019	CAL 2	29228	5005	1032	99	-3778	383	0.00	6836	477	69	13.09	0.67	3	2.54	0.31	0.00	12.82	0.86	1	-

Table 41: Intermountin region, spring wheat yield and protein from the 2016-17 to 2018-19 seasons.

Crop Classification	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Protein diff. from overall mean	Protein st.err.diff. from overall mean	Protein p-Value	2019 Protein (%)	2019 St.Err.Protein (%)	2019 Protein Rank	Status
SWS	2017-2019	IDO01405S	29190	10216	853	1	1828	210	0.00	10944	290	2	10.82	0.91	89	-2.03	0.18	0.00	9.50	0.32	23.5	-
HRS	2017-2019	XA 9301 EXP	29156	10035	873	2	1647	276	0.00	-	-	-	12.28	0.92	65	-0.57	0.24	0.02	-	-	-	-
SWS	2017-2019	WB 6341	19091	9897	843	3	1508	167	0.00	10624	290	3	10.40	0.90	96	-2.46	0.14	0.00	9.17	0.32	28	-
SWS	2017-2019	WB 6430	19092	9763	839	4	1374	143	0.00	10978	290	1	10.80	0.90	90	-2.06	0.12	0.00	9.40	0.32	26	-
SWS	2017-2019	UI STONE	19078	9581	843	5	1193	167	0.00	10060	290	7	10.71	0.90	91	-2.14	0.14	0.00	9.53	0.32	22	-
HRS	2017-2019	WALKER	19117	9573	888	6	1184	323	0.00	10212	290	6	12.57	0.94	60	-0.28	0.28	0.35	11.47	0.32	17	-
SWS	2017-2019	WA TEKOA	29150	9493	843	7	1104	167	0.00	10551	290	4	10.94	0.90	87	-1.91	0.14	0.00	9.37	0.32	27	-
HWS	2017-2019	LCS STAR	19046	9412	873	8	1023	276	0.00	-	-	-	12.11	0.92	69	-0.75	0.24	0.00	-	-	-	Released
HRS	2017-2019	12SB0224	19008	9337	850	9	948	195	0.00	-	-	-	12.19	0.91	67	-0.67	0.18	0.00	-	-	-	-
-	2017-2019	14 FAC 2019	19114	9329	873	10	940	276	0.00	-	-	-	10.83	0.92	88	-2.02	0.24	0.00	-	-	-	-
SWS	2017-2019	ALTURAS	19015	9281	888	11	892	323	0.02	9920	290	8	10.61	0.94	94	-2.25	0.28	0.00	9.50	0.32	23.5	-
HWS	2017-2019	IDO1202S	19032	9200	850	12	811	195	0.00	-	-	-	13.50	0.91	29	0.64	0.17	0.00	-	-	-	-
HRS	2017-2019	AP RENEGADE	19113	9124	853	13	735	209	0.00	9825	290	9	13.04	0.91	46	0.18	0.18	0.37	12.17	0.32	13	Released
SWS	2017-2019	WA MELBA	19050	9052	843	14	663	167	0.00	10527	290	5	10.42	0.90	95	-2.44	0.14	0.00	9.40	0.32	25	-
SWS	2017-2019	ALPOWA	19014	9037	853	15	648	209	0.01	9591	290	11	11.08	0.91	86	-1.78	0.18	0.00	9.13	0.32	29	-
SWS	2017-2019	RYAN WA 8214	29148	8997	873	16	608	276	0.06	-	-	-	11.58	0.92	81	-1.27	0.24	0.00	-	-	-	-
HWS	2017-2019	IDO1203S A	19033	8983	843	17	594	167	0.00	9409	290	15	13.16	0.91	42	0.30	0.15	0.06	12.10	0.32	14	-
HRS	2017-2019	XB 9610	29175	8940	872	18	551	276	0.10	-	-	-	13.32	0.93	36	0.46	0.28	0.13	-	-	-	-
SWS	2017-2019	WA RYAN	29192	8921	872	19	532	276	0.11	-	-	-	11.10	0.92	85	-1.76	0.24	0.00	-	-	-	Released
HRS	2017-2019	WB 9904	19119	8918	888	20	529	323	0.18	9557	290	12	12.74	0.94	54	-0.12	0.28	0.70	11.63	0.32	16	Released
SWS	2017-2019	14SWW1030	19012	8900	873	21	511	276	0.13	-	-	-	11.83	0.92	77	-1.02	0.24	0.00	-	-	-	-
HRS	2017-2019	UC 16010 20	29181	8878	872	22	490	276	0.14	-	-	-	13.02	0.93	47	0.16	0.28	0.61	-	-	-	-
SWS	2017-2019	WB 1035 CLP	19089	8874	872	23	485	276	0.15	-	-	-	12.54	0.92	61	-0.32	0.24	0.23	-	-	-	-
HRS	2017-2019	JEFFERSON	19041	8822	873	24	433	276	0.20	-	-	-	13.46	0.92	31	0.60	0.24	0.02	-	-	-	-
SWS	2017-2019	IDO01702S	29191	8821	853	25	432	210	0.09	9472	290	13	11.19	0.91	82	-1.67	0.18	0.00	10.53	0.32	20	-
HRS	2017-2019	WB 9717	29172	8788	853	26	399	210	0.12	9439	290	14	12.88	0.91	49	0.02	0.20	0.94	11.87	0.32	15	Released
SWS	2017-2019	YS 603	29161	8783	843	27	394	167	0.04	9751	290	10	11.79	0.90	78	-1.07	0.14	0.00	10.87	0.32	19	-
SWS	2017-2019	WB 1035 CL	29151	8776	873	28	387	276	0.27	-	-	-	11.76	0.92	79	-1.10	0.24	0.00	-	-	-	-
SWS	2017-2019	14 FAC 2043	29187	8776	850	29	387	195	0.10	-	-	-	11.64	0.91	80	-1.22	0.17	0.00	-	-	-	-
HWS	2017-2019	WB 7566	29167	8771	843	30	382	160	0.04	-	-	-	12.79	0.90	52	-0.07	0.15	0.66	-	-	-	Released
SWS	2017-2019	IDO01403S	29189	8699	850	31	310	195	0.19	-	-	-	11.18	0.91	83	-1.68	0.17	0.00	-	-	-	-
SWS	2017-2019	WB 6121	19090	8688	843	32	299	167	0.14	8780	290	21	11.97	0.90	72	-0.89	0.14	0.00	11.13	0.32	18	-
HRS	2017-2019	SY3017 9	29179	8687	872	33	298	276	0.43	-	-	-	14.18	0.93	15	1.32	0.28	0.00	-	-	-	-
HRS	2017-2019	SY BASALT 04W40240R	19062	8653	873	34	264	276	0.47	-	-	-	12.36	0.92	63	-0.50	0.24	0.05	-	-	-	-
SWS	2017-2019	YS 604	29162	8651	873	35	262	276	0.47	-	-	-	10.71	0.92	92	-2.15	0.24	0.00	-	-	-	-
HRS	2017-2019	LCS IRON	19045	8645	850	36	256	195	0.31	-	-	-	12.59	0.91	56	-0.27	0.18	0.17	-	-	-	-
HWS	2017-2019	WB 7417	19093	8621	873	37	232	276	0.52	-	-	-	14.43	0.92	11	1.58	0.24	0.00	-	-	-	-
HRS	2017-2019	UC CENTRAL RED	29180	8619	872	38	230	276	0.52	-	-	-	13.17	0.93	41	0.31	0.28	0.30	-	-	-	Released
HRS	2017-2019	WB PATRON	29147	8587	853	39	198	209	0.47	9388	290	16	13.68	0.91	24	0.82	0.18	0.00	12.70	0.32	9	Released
SWS	2017-2019	WA SEAHAWK	19054	8583	850	40	194	195	0.47	-	-	-	11.13	0.91	84	-1.73	0.17	0.00	-	-	-	-
HRS	2017-2019	XB 9591	29174	8569	872	41	180	276	0.61	-	-	-	11.91	0.93	74	-0.95	0.28	0.00	-	-	-	-
HRS	2017-2019	SY SELWAY	19065	8555	843	42	167	167	0.47	9164	290	18	13.49	0.91	30	0.63	0.15	0.00	12.30	0.32	10.5	-
HRS	2017-2019	12SB0199	19007	8543	873	43	154	276	0.67	-	-	-	12.58	0.92	58	-0.27	0.24	0.29	-	-	-	-
HRS	2017-2019	XA 9860 EXP	29158	8523	873	44	134	276	0.70	-	-	-	13.06	0.92	45	0.20	0.24	0.45	-	-	-	-
HRS	2017-2019	12SB0197	19006	8499	850	45	110	195	0.67	-	-	-	12.07	0.91	70	-0.79	0.18	0.00	-	-	-	-
HRS	2017-2019	SY COHO	19064	8480	843	46	91	167	0.67	9338	290	17	13.50	0.91	28	0.65	0.15	0.00	12.20	0.32	12	-
HRS	2017-2019	XA 9861 EXP	29159	8474	873	47	85	276	0.82	-	-	-	12.53	0.92	62	-0.32	0.24	0.22	-	-	-	-
HRS	2017-2019	SY STEELHEAD	19066	8433	873	48	44	276	0.90	-	-	-	14.58	0.92	8	1.73	0.24	0.00	-	-	-	-
HRS	2017-2019	WB 9200	19094	8371	873	49	-18	276	0.95	-	-	-	13.83	0.92	21	0.98	0.24	0.00	-	-	-	-
HWS	2017-2019	LCS ATOMO	19044	8367	873	50	-22	276	0.95	-	-	-	13.11	0.92	44	0.25	0.24	0.34	-	-	-	Released
HRS	2017-2019	WB 9411	29153	8366	873	51	-23	276	0.95	-	-	-	13.38	0.92	35	0.53	0.24	0.04	-	-	-	-
HWS	2017-2019	UI PLATINUM	19077	8337	850	52	-52	195	0.84	-	-	-	12.59	0.91	57	-0.27	0.18	0.17	-	-	-	-
HRS	2017-2019	XB 9290	29173	8337	872	53	-52	276	0.89	-	-	-	12.98	0.93	48	0.12	0.28	0.70	-	-	-	-
HWS	2017-2019	WB 7202 CLP	29171	8320	872	54	-69	276	0.85	-	-	-	12.19	0.93	68	-0.67	0.28	0.02	-	-	-	-
HRS	2017-2019	WB 9229	19095	8292	873	55	-97	276	0.79	-	-	-	13.31	0.92	37	0.45	0.24	0.08	-	-	-	-
HRS	2017-2019	WB 9668	19097	8280	843	56	-109	167	0.61	8338	290	22	14.67	0.91	6	1.82	0.15	0.00	14.00	0.32	2	-
HWS	2017-2019	XA 7320 CL EXP	29155	8266	873	57	-123	276	0.72	-	-	-	12.71	0.92	55	-0.15	0.24	0.58	-	-	-	-
HRS	2017-2019	WB 9518	19096	8254	843	58	-135	167	0.53	8916	290	19	14.43	0.91	12	1.57	0.16	0.00	13.20	0.32	6	-
DURUM	2017-2019	SOFT SVEVO	19118	8217	888	59	-171	323	0.67	8856	290	20	14.14	0.94	17	1.28	0.28	0.00	13.03	0.32	7	-
SWS	2017-2019	14 SSW 1059	29188	8213	850	60	-176	195	0.49	-	-	-	12.30	0.91	64	-0.56	0.17	0.00	-	-	-	-
HRS	2017-2019	LCS TRIGGER	29193	8200	872	61	-189	276	0.60	-	-	-	12.19	0.93	66	-0.67	0.28	0.02	-	-	-	Released
HRS	2017-2019	UC LASSIK	19043	8194	872	62	-195	276	0.59	-	-	-	12.85	0.96	51	-0.01	0.34	0.97	-	-	-	Released
HRS	2017-2019	WB 9350	29152	8186	850	63	-203	195	0.45	-	-	-	13.13	0.91	43	0.28	0.18	0.17	-	-	-	Released
HRS	2017-2019	APB 8238	29168	8167	873	64	-222	276	0.53	-	-	-	12.58	0.92	59	-0.27	0.24	0.29	-	-	-	-
HRS	2017-2019	SY GUNSIGHT	29178	8160	872	65	-229	276	0.52	-	-	-	13.22	0.93	40	0.36	0.28	0.24	-	-	-	Released
SWS	2017-2019	SY SALTESE	29149	8153	850	66	-236	195	0.35	-	-	-	11.90	0.91	75	-0.95	0.17	0.00	-	-	-	-
HWS	2017-2019	IDO1602S	29182	8148	850	67	-241	195	0.34	-	-	-	13.44	0.91	33	0.58	0.18	0.00	-	-	-	-
HRS	2017-2019	WB 9662	29154	8140	850	68	-249	195	0.32	-	-	-	14.16	0.91	16	1.30	0.18	0.00	-	-	-	-
HWS	2017-2019	UC PATWIN 515 HP	29164	8131	873	69	-258	276	0.47	-	-	-	13.63	0.92	25	0.78	0.24	0.00	-	-	-	Released
HRS	2017-2019	XA 9660 EXP	29157	8125	873	70	-263	276	0.47	-	-	-	13.41	0.92	34	0.55	0.24	0.03	-	-	-	-
HRS	2017-2019	ALUM	19016	8048	850	71	-341	195	0.15	-	-	-	13.72	0.91	23	0.86	0.18	0.00	-	-	-	-
HRS	2017-2019	YS 802	19110	8004	872	72	-385	276	0.27	-	-	-	14.46	0.93	10	1.60	0.28	0.00	-	-	-	-
HRS	2017-2019	IDO1603S	29183	7925	850	73	-464	195	0.04	-	-	-	14.00	0.91	18	1.14	0.18	0.00	-	-	-	-
HRS	2017-2019	WA 8282 HRS	29186	7902	853	74	-486	210	0.05	8213	290	24	13.45	0.91	32	0.59	0.20	0.00	12.30	0.32	10.5	-
HRS	2017-2019	GLEE	19025	7900	850	75	-489	195	0.03	-	-	-	13.23	0.91	39	0.37	0.18	0.06	-	-	-	-
HRS	2017-2019	LCS LUNA	29169	7860	850	76	-529	195	0.02	-	-	-	12.87	0.91	50	0.02	0.18	0.94	-	-	-	Released
HRS	2017-2019	16 HRS 5172	29170	7781	872	77	-608	276	0.06	-	-	-	13.27	0.96	38	0.41	0.34	0.27	-	-	-	-
HRS	2017-2019	SY 06PN3015 08	19059	7761	873	78	-628	276	0.05	-	-	-	13.51	0.92	27	0.65	0.24	0.01	-	-	-	-
HRS	2017-2019	LCS BUCK PRONTO	19018	7735	853	79	-654	210	0.01	8266	290	23	14.62	0.91	7	1.76	0.20	0.00	13.43	0.32	4	-
HRS	2017-2019	WB 9879 CLP	19099	7704	872	80	-685	276	0.04	-	-	-	13.86	0.93	20	1.00	0.28	0.00	-	-	-	-
HRS	2017-2019	MSU LANNING	29176	7672	853	81	-717	210	0.00	7794	290	28	15.24	0.91	4	2.38	0.20	0.00	14.30	0.32	1	Released
HRS	2017-2019	IDO1701S	29184	7598	872	82	-791	276	0.01	-	-	-	13.63	0.96	26	0.77	0.34	0.03	-	-	-	-
HRS	2017-2019	WA 8280 CLP	29185	7566	872	83	-823	276	0.01	-	-	-	13.73	0.93	22	0.87	0.28	0.00	-	-	-	-
SWS	2017-2019	BAG NEW DIRKWIN HP	29166	7558	873	84	-831	276	0.01	-	-	-	12.78	0.92	53	-0.07	0.24	0.78	-	-	-	Released
SWS	2017-2019	AP COACHMAN	19115	7551	888	85	-838	323	0.03	8190	290	25	10.71	0.94	93	-2.15	0.28	0.00	9.60	0.32	21	Released
HRS	2017-2019	YECORA ROJO	19106	7543	843	86	-846	167	0.00	7941	290	27	14.30	0.91	14	1.44	0.15	0.00	13.60	0.32	3	Released
HRS	2017-2019	KELSE	19042	7440	850	87	-949	195	0.00	-	-	-	14.50	0.91	9	1.64	0.18	0.00	-	-	-	-
SWS	2017-2019	YS 605	29163	7328	873	88	-1061	276	0.00	-	-	-	11.93	0.92	73	-0.92	0.24	0.00	-	-	-	-
HRS	2017-2019	AP KIMBER CL2	19116	7306	888	89	-1083	323	0.00	7944	290	26	14.34	0.94	13	1.48	0.28	0.00	13.23	0.32	5	-
HRS	2017-2019	SY 605 CL	19112	7229	873	90	-1160	276	0.00	-	-	-	15.93	0.92	1	3.08	0.24	0.00	-	-	-	-
HRS	2017-2019	LCS REBEL	29194	7192	872	91	-1197	276	0.00	-	-	-	15.08	0.93	5	2.22	0.28	0.00	-	-	-	Released
SWS	2017-2019	DIVA	19023	7111	873	92	-1278	276	0.00	-	-	-	12.06	0.92	71	-0.80	0.24	0.00	-	-	-	-
SWS	2017-2019	WA LOUISE	19048	6985	850	93	-1404	195	0.00	-	-	-	11.90	0.91	76	-0.96	0.17	0.00	-	-	-	-
DURUM	2017-2019	UC DESERT KING HP	19120	6773	888	94	-1616	323	0.00	7411	290	29	13.94	0.94	19	1.08	0.28	0.00	12.83	0.32	8	Released
HRS	2017-2019	YECORA ROJO 515	29160	6742	850	95	-1646	195	0.00	-	-	-	15.62	0.91	2	2.76	0.18	0.00	-	-	-	-
HRS	2017-2019	MSU VIDA	29177	6107	872	96	-2282	276	0.00	-	-	-	15.34	0.93	3	2.48	0.28	0.00	-	-	-	-

Table 42: Intermountin region, barley yield and protein from the 2016-17 to 2018-19 seasons.

Crop Classification	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Yield diff. from overall mean	Yield st.err.diff. from overall mean	Yield p-Value	2019 Yield (lb/acre)	2019 St.Err.Yield (lb/acre)	2019 Yield Rank	Status
2RSF	2017-2019	LCS VESPA	9159	9237	489	1	2226	359	0.00	9151	528	1	Released
2RSF	2017-2019	CLAYMORE	9162	9042	489	2	2031	359	0.00	8956	528	2	-
2RSM	2017-2019	LCS OPERA	9158	8585	489	3	1574	359	0.00	8499	528	3	Released
-	2017-2019	UTSB10902 91	9135	8583	454	4	1572	283	0.00	-	-	-	-
2RSF	2017-2019	LYON	9160	8375	489	5	1364	359	0.00	8289	528	4	Released
-	2017-2019	08ARS028 20	9001	8173	454	6	1162	283	0.00	-	-	-	-
2RSM	2017-2019	FRANCIN	9148	8093	381	7	1083	182	0.00	7213	528	9	-
2RSM	2017-2019	EXPLORER	9147	7858	454	8	848	283	0.01	-	-	-	-
2RSM	2017-2019	2B10 4378	9035	7729	454	9	719	283	0.03	-	-	-	-
2RSM	2017-2019	OSU FULL PINT	9059	7696	406	10	686	217	0.01	7533	528	7	Released
-	2017-2019	AD120341	9161	7680	489	11	669	359	0.14	7594	528	5	-
-	2017-2019	BZ512 220	9143	7601	454	12	590	283	0.09	-	-	-	-
2RSM	2017-2019	UC 1410	9086	7490	408	13	479	205	0.05	-	-	-	-
2RSM	2017-2019	ACC SYNERGY	9154	7435	454	14	424	283	0.25	-	-	-	Released
-	2017-2019	10ARS191 3	9140	7387	454	15	376	283	0.28	-	-	-	-
2RSM	2017-2019	LCS GENIE	9149	7374	406	16	363	217	0.19	7512	528	8	Released
-	2017-2019	UTSB10905 72	9136	7367	454	17	356	283	0.31	-	-	-	-
-	2017-2019	08ARS116 91	9003	7263	454	18	253	283	0.46	-	-	-	-
2RSM	2017-2019	2B11 4949	9038	7254	454	19	244	283	0.46	-	-	-	-
-	2017-2019	08ARS112 75	9002	7251	454	20	241	283	0.46	-	-	-	-
-	2017-2019	BZ512 282	9144	7213	454	21	203	283	0.54	-	-	-	-
2RSM	2017-2019	CDC BOW	9145	7193	454	22	183	283	0.57	-	-	-	-
-	2017-2019	11WA 107 43	9021	7164	454	23	154	283	0.64	-	-	-	-
2RSM	2017-2019	UC BUTTA 12	9049	7128	460	24	117	326	0.76	-	-	-	Released
-	2017-2019	MT090190	9066	7099	454	25	88	283	0.79	-	-	-	-
2RSM	2017-2019	CDC COPELAND	9054	7037	381	26	26	182	0.90	7573	528	6	Released
-	2017-2019	11WA 107 58	9022	6987	454	27	-23	283	0.93	-	-	-	-
-	2017-2019	2ND32529	9141	6771	454	28	-240	283	0.46	-	-	-	-
6RSF	2017-2019	STEPTOE	9077	6760	454	29	-251	283	0.46	-	-	-	-
-	2017-2019	2ND33760	9142	6759	454	30	-252	283	0.46	-	-	-	-
2RSF	2017-2019	BARONESSE	9048	6757	454	31	-254	283	0.46	-	-	-	-
2RSM	2017-2019	UC TAHOE	9085	6704	400	32	-307	215	0.26	-	-	-	Released
2RSM	2017-2019	LCS ODYSSEY	9164	6701	489	33	-309	359	0.46	6616	528	10	-
2RSM	2017-2019	HARRINGTON	9060	6659	483	34	-352	325	0.39	-	-	-	-
-	2017-2019	MT124677	9153	6615	454	35	-395	283	0.26	-	-	-	-
2RSM	2017-2019	2B10 4162	9034	6614	454	36	-397	283	0.26	-	-	-	-
2RSM	2017-2019	CDC FRASER	9146	6613	454	37	-397	283	0.26	-	-	-	-
-	2017-2019	MEG'S SONG	9163	6597	489	38	-414	359	0.36	6511	528	11	-
-	2017-2019	MT124112	9150	6594	454	39	-417	283	0.26	-	-	-	-
-	2017-2019	2B12 5582	9041	6579	454	40	-431	283	0.25	-	-	-	-
2RSM	2017-2019	AC METCALFE	9047	6487	454	41	-524	283	0.14	-	-	-	-
-	2017-2019	MT124134	9152	6440	454	42	-570	283	0.10	-	-	-	-
-	2017-2019	MT124128	9151	6326	454	43	-685	283	0.04	-	-	-	-
-	2017-2019	12WA 120 14	9023	6157	483	44	-854	325	0.03	-	-	-	-
-	2017-2019	DH120285	9157	6099	489	45	-912	359	0.03	6013	528	12	-
2RSM	2017-2019	UC CAPAY	9018	6026	400	46	-985	215	0.00	-	-	-	-
2RSF	2017-2019	10WA 106 18	9013	5935	454	47	-1076	283	0.00	-	-	-	-
2RSM	2017-2019	2B11 5166	9039	5895	454	48	-1116	283	0.00	-	-	-	-
2RSF	2017-2019	10WA 117 17	9016	5878	454	49	-1133	283	0.00	-	-	-	-
2RSF(H)	2017-2019	2AB09 X06F058HL-31	9031	5605	454	50	-1406	283	0.00	-	-	-	-
-	2017-2019	DH120058	9156	4920	489	51	-2091	359	0.00	4834	528	13	-
2RSM	2017-2019	UC B9K94	9155	4774	460	52	-2237	326	0.00	-	-	-	-

Disease & agronomic summaries

The occurrence of diseases in the UC trial locations during the 2018-19 season is presented in Table 43. Yecora Rojo (UC 112) was included as known stripe rust-susceptible check, and it displayed a 90th percentile stripe rust score of 4. WB Triple IV (common wheat), WB Orita (durum), Kronos (durum), CDC Copeland (barley), and ACC Synergy also had stripe rust scores of 4 or above. Overall disease incidence was moderate during the 2018-19 season, resulting in a 90th percentile value of 3 for the entire population of stripe rust observations recorded during the season and a 90th percentile value of 4 for the entire population of septoria observations recorded during the season . Variety specific disease observations compiled during 2018-19 are presented in Tables 44 – 45. The 90th percentile disease incidence ratings for individual locations in the 2018-19 season and for the previous five seasons are presented in Tables 46 and 47.

A multi-year summary of disease and agronomic observations for common wheat, durum, triticale and barley are presented in Table 48, Table 49, Table 50, and Table 51, respectively. The varieties SY REDWING, SY ULTRA, LCS ATAOMO, KRONOS, AS COLOMBO, APB 471400, ASC 100, and MAX are considered moderately susceptible to stripe rust based on multi-year analyses. The varieties UC ANZA, YECORA ROJO, WB TRIPLE IV, DPG FV 2808, APB 501189, APB 510477, WB ORITA, WB HAVASU, WB MOHAVE, ASC 101, ASC 102, ASC 103, UC 603, UC 933, UC 969, CDC COPELAND, ACC SYNERGY, and KLAGES are considered susceptible to stripe rust based on multi-year analyses. The varieties WB TRIPLE IV, DPG FV 2808, WB 9229, APB 511829, YECORA ROJO 515, UC 1885, XB T401, and OSU FULL PINT are susceptible (a 90th percentile value > 4) to barley yellow dwarf virus. 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 48 – 51.

Table 43: The locations where agronomic traits were recorded in the current season

Location	Trial Group	BYDV	Leaf Blotch	Leaf Rust	Powdery Mildew	Scald	Septoria	Spot Blotch	Stripe Rust
Colusa	WHEAT	-	-	-	-	-	X	-	X
Fresno1	BARLEY	-	X	-	-	-	-	-	X
Fresno1	WHEAT	-	-	-	-	-	-	-	X
Fresno2	DURUM	X	-	-	X	-	-	-	X
Kern	DURUM	-	-	-	-	-	-	-	X
Kern	WHEAT	-	-	-	-	-	-	-	X
Merced	BARLEY	-	-	X	-	-	-	-	X
Merced	WHEAT	-	-	-	-	-	-	-	X
Yolo1	BARLEY	-	-	-	X	X	-	-	X
Yolo1	DURUM	-	-	-	-	-	-	-	X
Yolo1	WHEAT	-	-	-	-	-	-	-	X
Yolo2	BARLEY	-	-	-	-	-	-	X	-

Table 44: 2018-19 common wheat disease observation by variety (90th percentile).

Crop Classification	UC Entry Number	Variety Name	Septoria	Stripe Rust
HRS	112	YECORA ROJO	5	4
HRS	1478	SY CAL ROJO	2	1
HRS	1495	UC LASSIK	3	1
HRS	1521	SY REDWING	2	3
HRS	1550	WB TRIPLE IV	5	5
HRS	1608	DPG FV 2808	3	3
HRS	1658	SY SUMMIT 515	4	1
HRS	1728	WB JOAQUIN ORO	6	1
HRS	1730	WB 9229	3	1
HRS	1731	WB PATRON	3	1
HRS	1745	UC YUROK	2	1
HRS	1751	WB 9904	2	1
HRS	1817	UC CENTRAL RED	2	1
HRS	1835	SY SIENNA	2	1
HRS	1842	WB 9350	4	1
HRS	1847	WB 9433	3	2
HRS	1876	SY 64-1-9	3	1
HRS	1877	AP VENOM	2	1
HRS	1878	AP OCTANE	3	1
HRS	1880	UC 1880	3	1
HRS	1882	UC 1882	4	1
HRS	1887	WB 9490	3	2
HRS	1888	WB 9699	3	1
HRS	1903	APB 410089	4	1
HRS	1904	APB 510879	3	1
HRS	1905	XC 9407	3	1
HRS	1908	UC 1908	2	1
HRW	1778	ASSL TAM 204	1	2
HRW	1906	WINCAL 158-5	4	1
HWS	1657	SY BLANCA GRANDE 515	4	1
HWS	1680	UC PATWIN 515	3	1
HWS	1723	LCS ATOMO	3	2
HWS	1743	UC PATWIN 515 HP	2	1
HWS	1839	UC 1839	2	1
HWS	1907	UC 1907	3	1
HWS	1909	UC 1909	1	1
SRS	1766	SY VACA	4	3
SWS	1667	BAG NEW DIRKWIN	4	1

Rating scale, area of upper leaves affected except for BYDV which is measured as a 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 = 95-100%

Table 45: 2018-19 durum wheat disease observation by variety (90th percentile).

UC Entry Number	Variety Name	BYDV	Powderey Mildew	Stripe Rust
951	KRONOS	3	3	4
1210	DPG PLATINUM	2	4	2
1215	WB ORITA	1	3	4
1375	UC DESERT KING	1	2	2
1429	SY FORTISSIMO	1	3	1
1431	SY VOLANTE	1	2	2
1484	WESTMORE HP	2	2	1
1582	AS MAESTRALE	2	2	3
1583	AS SARAGOLLA	2	1	3
1607	WB MEAD	3	2	3
1627	UC DESERT KING HP	1	2	2
1640	TIBURON	2	1	1
1654	WB MOHAVE	2	3	4
1690	UC MIWOK	2	2	4
1771	UC 1771	2	3	1
1800	AS COLOMBO	2	1	3
1813	ALBERTO	1	3	3
1850	UC DESERT GOLD	2	3	1
1853	APB 471400	2	3	3
1868	POWELL	2	2	2
1869	SHASTA	2	1	3
1870	UC 1870	1	3	2
1871	UC 1871	2	3	1
1900	APB 152308	2	4	3
1901	APB 153541	3	2	1
1902	APB 152356	3	4	1
1910	UC 1910	2	1	1
1912	ASC 122	1	1	1
1913	ASC 123	2	1	3
1914	ASC 124	1	1	3

Rating scale, area of upper leaves affected except for BYDV which is measured as a 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 = 95-100%

Table 46: The 90th percentile for disease incidence across all individual test locations in the 2018-19 season.

Crop Type	Season	BYDV	Leaf Blotch	Leaf Rust	Powdery Mildew	Scald	Spot Blotch	Stripe Rust
BARLEY	Fresno1	-	3	-	-	-	-	3
BARLEY	Merced	-	-	4	-	-	-	3
BARLEY	Yolo1	-	-	-	5	5	-	1
BARLEY	Yolo2	-	-	-	-	-	4	-
COMMON	Colusa	-	-	-	-	-	-	2
COMMON	Fresno1	-	-	-	-	-	-	2
COMMON	Kern	-	-	-	-	-	-	2
COMMON	Merced	-	-	-	-	-	-	3
COMMON	Yolo1	-	-	-	-	-	-	2
DURUM	Fresno2	2	-	-	3	-	-	3
DURUM	Kern	-	-	-	-	-	-	3
DURUM	Yolo1	-	-	-	-	-	-	2
TRITICALE	Colusa	-	-	-	-	-	-	1
TRITICALE	Fresno1	-	-	-	-	-	-	1
TRITICALE	Kern	-	-	-	-	-	-	1
TRITICALE	Merced	-	-	-	-	-	-	1
TRITICALE	Yolo1	-	-	-	-	-	-	1

Table 47: The 90th percentile for disease incidence across all test locations within individual season between the 2014-14 season and the 2018-19 season.

Crop Type	Season	BYDV	Leaf Blotch	Leaf Rust	Powdery Mildew	Scald	Spot Blotch	Stripe Rust
BARLEY	2013_14	1	-	-	-	-	-	-
BARLEY	2014_15	2	-	2	-	-	-	-
BARLEY	2015_16	3	-	2	-	-	-	2
BARLEY	2016_17	2	-	2	-	-	-	-
BARLEY	2018_19	-	3	4	5	5	4	3
COMMON	2013_14	4	-	1	-	-	-	1
COMMON	2014_15	4	-	1	-	-	-	5
COMMON	2015_16	4	-	1	-	-	-	2
COMMON	2016_17	2	-	1	-	-	-	1
COMMON	2017_18	2	-	-	-	-	-	1
COMMON	2018_19	-	-	-	-	-	-	2
DURUM	2013_14	2	-	1	-	-	-	1
DURUM	2014_15	3	-	1	-	-	-	4
DURUM	2015_16	2	-	1	-	-	-	3
DURUM	2016_17	1	-	1	-	-	-	4
DURUM	2017_18	3	-	-	-	-	-	1
DURUM	2018_19	2	-	-	3	-	-	3
TRITICALE	2013_14	2	-	1	-	-	-	1
TRITICALE	2014_15	4	-	-	-	-	-	4
TRITICALE	2015_16	2	-	1	-	-	-	1
TRITICALE	2016_17	1	-	1	-	-	-	1
TRITICALE	2017_18	1	-	-	-	-	-	1
TRITICALE	2018_19	-	-	-	-	-	-	1
WINTERWHEAT	2013_14	3	-	-	-	-	-	-
WINTERWHEAT	2014_15	3	-	-	-	-	-	-
WINTERWHEAT	2015_16	2	-	-	-	-	-	-

Table 48: A summary of common wheat disease and agronomic observations taken from the 2014-14 to 2018-19 seasons.

Crop Classification	Name	UC Number	2015-2019 S. Rust rating	2015-2019 L. Rust rating	2015-2019 BYDV rating	2015-2019 Septoria rating	Test Weight (lb/bu)	Thousand Kernel Wt (g)	Days to heading (from Jan. 1, Davis)	Days to maturity (from Jan. 1, Davis)	Plant Height (in)	Lodging risk	Shatter risk	Plots observed (n)	Status
HRS	UC ANZA	20	S	R	R	R	62	37	82	126	-	Med. Low	Low	51	Released
HRS	YECORA ROJO	112	S	R	R	MS	62	43	75	127	31	High	-	53	Released
HRS	SY CAL ROJO	1478	R	R	MS	R	60	40	78	124	32	Low	Low	92	Released
HRS	UC LASSIK	1495	R	R	MS	MR	62	35	81	126	35	Med. High	Low	92	Released
HRS	SY REDWING	1521	MS	R	MR	R	60	40	79	124	33	Low	Low	89	Released
HWS	SY BLANCA ROYALE	1522	R	R	MR	R	61	38	77	124	33	Low	Low	80	Released
HRS	WB TRIPLE IV	1550	S	-	S	S	61	41	70	117	37	High	Low	63	Released
HRS	SY ULTRA	1590	MS	R	MR	MR	62	40	79	126	34	Low	Low	69	Released
HRS	DPG FV 2808	1608	S	R	S	MR	62	38	85	127	40	Med. High	Medium	78	Released
HRS	WB ROCKLAND	1650	R	-	MS	-	62	39	78	123	32	Low	Low	53	Released
HWS	SY BLANCA GRANDE 515	1657	R	R	MR	MS	64	41	75	122	35	Med. High	Low	90	Released
HRS	SY SUMMIT 515	1658	R	R	MS	MR	62	40	79	125	34	Low	Low	92	Released
HRS	SY 314	1660	R	R	MS	R	61	41	82	124	35	Low	Low	69	Released
SWS	BAG NEW DIRKWIN	1667	R	R	MS	R	57	37	91	133	39	Med. High	Low	89	Released
HWS	UC PATWIN 515	1680	R	R	MR	R	61	37	81	126	33	Low	Low	92	Released
HWS	LCS STAR	1688	R	R	MS	R	61	37	80	126	37	Med. High	Low	78	Released
HWS	LCS ATOMO	1723	MS	R	MS	R	62	39	76	124	34	Med. High	Low	90	Released
HRS	WB JOAQUIN ORO	1728	R	R	MS	MS	62	42	72	120	35	Med. Low	Low	91	Released
HRS	WB 9229	1730	R	R	S	R	63	38	80	125	34	Med. High	Low	92	Released
HRS	WB PATRON	1731	R	R	MS	R	61	42	78	124	36	Med. High	Low	92	Released
HWS	UC PATWIN 515 HP	1743	R	R	R	R	60	35	78	122	32	Med. High	Low	80	Released
HRS	UC YUROK	1745	R	R	MS	R	63	38	81	126	36	Med. High	Low	91	Released
HRS	WB 9112	1748	R	R	MS	R	62	37	75	122	36	Med. Low	Low	79	Released
HWS	WB 7618	1749	R	-	MS	-	62	39	78	124	34	Low	Low	55	Released
HWS	WB 7390	1750	R	-	MS	-	63	43	76	122	38	Low	Low	55	-
HRS	WB 9904	1751	R	R	MS	R	61	45	82	127	37	Med. High	Low	92	Released
SRS	SY VACA	1766	R	R	MS	MS	57	36	101	141	41	Med. Low	Low	76	Released
HRW	ASSL TAM 204	1778	MR	R	MR	R	59	32	90	131	38	Med. High	Low	92	Released
SWS	BAG NEW DIRKWIN HP	1779	R	-	MS	-	58	41	98	136	39	Low	Low	26	Released
HWS	WB 7566	1802	R	R	R	R	62	42	82	126	32	Med. Low	Low	79	Released
HRS	APB 501189	1807	S	-	MR	-	62	39	73	119	34	Med. Low	Medium	54	-
HRS	UC 15010 5	1814	R	-	R	-	60	38	78	120	-	Low	Low	36	-
HWS	UC 1815	1815	R	R	R	R	61	40	78	125	32	Low	Low	67	-
HWS	UC 15013 15	1816	R	-	R	-	64	40	75	122	-	Low	Low	36	-
HRS	UC CENTRAL RED	1817	R	R	MR	R	62	39	78	124	34	Med. Low	Low	80	Released
HRS	UC 15014 35	1818	R	-	R	-	64	35	78	121	-	Med. Low	Medium	36	-
HRS	APB 500709	1819	R	R	R	R	62	38	77	124	-	Low	Low	63	-
-	APB 501129	1820	MR	-	MR	-	60	38	77	123	-	Low	Low	36	-
HRS	APB 8238	1821	R	-	MR	-	61	39	76	121	-	Low	Low	35	-
HRS	APB 501089	1828	R	R	MR	R	61	40	76	122	-	Low	Low	47	-
-	APB 8155	1829	R	-	MR	-	62	39	75	121	-	Low	Low	36	-
HRS	LCS 12SB0197	1830	R	R	MR	R	60	38	79	126	36	Med. Low	Low	67	-
HWS	LCS 12SB0224	1831	R	R	MR	R	61	38	79	126	34	Med. Low	Low	67	-
HRS	SY 13W00850	1834	R	R	R	R	62	46	92	152	-	Low	-	16	-
HRS	SY SIENNA	1835	R	R	R	R	62	44	81	128	34	Low	-	53	Released
HRS	UC 14657 170	1836	R	R	R	R	58	40	92	152	-	Med. Low	-	16	-
HWS	UC 15080 49	1837	R	R	R	R	58	38	88	149	-	High	-	16	-
HRS	UC 16010 20	1838	R	R	MR	R	63	43	92	149	-	Med. Low	-	16	-
HWS	UC 1839	1839	R	R	R	R	61	40	98	145	39	High	-	33	-
HRS	APB 410117	1840	R	R	R	R	61	47	92	149	-	Med. Low	-	16	-
HRS	APB 510453	1841	R	R	R	R	62	46	92	152	-	Med. Low	-	16	-
HRS	WB 9350	1842	R	R	R	MS	62	40	81	128	31	Low	-	53	Released
HRS	XA 9301	1843	R	R	R	R	62	47	88	152	-	Med. Low	-	16	-
HRS	XA 9302	1844	R	R	R	MR	64	43	88	142	-	Low	-	16	-
HRS	XA 9501	1845	R	R	R	R	62	46	92	145	-	Med. Low	-	16	-
HRS	XA 9502	1846	R	R	R	R	63	44	92	149	-	Med. Low	-	16	-
HRS	WB 9433	1847	R	R	R	MR	62	38	83	129	31	Med. High	-	53	Released
HRS	APB 510477	1874	S	-	MS	-	61	36	76	124	34	Med. High	-	23	-
HRS	APB 511829	1875	R	-	S	-	61	35	75	126	33	Med. High	-	23	-
HRS	SY 64-1-9	1876	R	-	MR	MR	61	36	80	125	32	Med. High	-	44	-
HRS	AP VENOM	1877	R	-	MR	R	60	36	81	126	38	High	-	44	Released
HRS	AP OCTANE	1878	R	-	R	MR	61	41	77	125	35	High	-	44	Released
HRS	YECORA ROJO 515	1879	R	-	S	-	60	36	70	124	28	Low	-	23	-
HRS	UC 1880	1880	R	-	MS	MR	61	40	79	125	35	High	-	42	-
HRS	UC 1882	1882	R	-	MS	MS	61	39	78	125	33	Med. Low	-	44	-
HWS	UC 1883	1883	R	-	MS	-	61	37	76	124	32	Low	-	23	-
HRS	UC 1884	1884	R	-	MS	-	62	38	73	125	33	Med. High	-	23	-
HRS	UC 1885	1885	R	-	S	-	60	34	78	126	30	Low	-	23	-
HRS	XB 9512	1886	R	-	MR	-	62	35	76	125	32	Med. High	-	23	-
HRS	WB 9490	1887	MR	-	MS	MR	62	40	79	126	34	High	-	41	Released
HRS	WB 9699	1888	R	-	MR	MR	63	42	79	124	34	Med. High	-	45	Released
HRS	APB 410089	1903	R	-	-	MS	63	44	104	-	35	Med. Low	-	30	-
HRS	APB 510879	1904	R	-	-	MR	62	45	107	-	38	Med. High	-	26	-
HRS	XC 9407	1905	R	-	-	MR	62	41	107	-	34	High	-	29	-
HRW	WINCAL 158-5	1906	R	-	-	MS	62	42	107	-	35	High	-	26	-
HWS	UC 1907	1907	R	-	-	MR	63	42	104	-	34	High	-	28	-
HRS	UC 1908	1908	R	-	-	R	63	38	104	-	34	High	-	25	-
HWS	UC 1909	1909	R	-	-	R	63	34	104	-	33	High	-	28	-

Table 49: A summary of durum wheat disease and agronomic observations taken from the 2014-15 to 2018-19 seasons.

Name	UC Number	2015-2019 S. Rust rating	2015-2019 L. Rust rating	2015-2019 BYDV rating	2015-2019 Septoria rating	Test Weight (lb/bu)	Thousand Kernel Wt (g)	Days to heading (from Jan. 1, Davis)	Days to maturity (from Jan. 1, Davis)	Plant Height (in)	Lodging risk	Shatter risk	Plots observed (n)	Status
DPG DURAKING	878	R	-	MR	-	62	45	76	122	33	Low	Low	27	Released
KRONOS	951	MS	-	MR	R	62	55	71	121	35	High	Low	79	Released
DPG PLATINUM	1210	R	-	MR	-	62	45	77	123	32	Med. Low	Low	39	Released
DPG TOPPER	1211	MR	-	R	-	62	43	83	114	35	Low	Low	27	Released
WB ORITA	1215	S	-	R	R	61	53	82	125	36	Low	Low	79	Released
UC DESERT KING	1375	R	-	R	R	62	52	83	122	36	Low	Low	79	Released
SY FORTISSIMO	1429	R	-	R	R	62	48	79	124	36	Med. Low	Low	79	Released
SY VOLANTE	1431	R	-	R	R	62	54	78	121	35	Med. Low	Low	74	Released
WB HAVASU	1479	S	-	MR	R	63	51	71	119	38	Med. High	Low	59	Released
WESTMORE HP	1484	R	-	R	R	61	43	73	119	35	High	Medium	78	Released
AS MAESTRALE	1582	R	-	MR	R	63	49	80	124	38	Med. High	Low	73	Released
AS SARAGOLLA	1583	MR	-	MS	R	63	50	77	122	35	Med. High	Low	79	Released
WB MEAD	1607	MR	-	MS	R	61	47	84	122	38	Low	Medium	79	Released
UC DESERT KING HP	1627	R	-	MR	R	60	46	83	123	36	Med. Low	Low	79	Released
TIBURON	1640	R	-	R	MR	62	58	73	122	35	Med. Low	Low	79	Released
WB MOHAVE	1654	S	-	MR	R	62	49	74	122	36	Med. Low	Low	79	Released
UC MIWOK	1690	MR	-	MR	R	62	56	79	125	35	Med. High	Low	103	Released
LCS KIKO	1697	R	-	R	R	62	56	76	122	37	Med. Low	Low	59	Released
UC 1771	1771	R	-	R	-	63	49	82	117	37	Med. Low	Low	31	-
AS COLOMBO	1800	MS	-	R	R	61	49	86	123	37	Low	Low	56	Released
ALBERTO	1813	R	-	R	R	61	52	74	122	31	Med. Low	Low	75	Released
APB 540165	1827	R	-	R	MR	61	58	70	123	-	Med. Low	Low	36	-
UC 16051 1	1848	R	-	-	R	58	44	106	156	-	Med. High	-	20	-
UC 16051 12	1849	R	-	-	R	61	49	106	159	-	Low	-	20	-
UC DESERT GOLD	1850	R	-	MR	R	61	50	90	130	39	Med. Low	-	40	Released
APB 450311	1851	MR	-	R	R	61	49	74	128	28	Med. Low	-	28	-
APB 470442	1852	R	-	-	R	62	52	99	152	-	Med. Low	-	20	-
APB 471400	1853	MS	-	R	R	63	51	78	126	34	Med. High	-	40	-
ASC 100	1854	MS	-	-	R	62	49	109	159	-	Low	-	20	-
ASC 101	1855	S	-	-	R	62	49	99	156	-	High	-	20	-
ASC 102	1856	S	-	-	R	63	55	92	152	-	High	-	20	-
ASC 103	1857	S	-	-	R	62	51	99	156	-	Med. Low	-	20	-
APB 450275	1865	R	-	MR	-	60	48	74	124	27	Low	-	12	-
APB 450333	1866	R	-	R	-	61	49	72	125	28	Low	-	12	-
DPG CANDURA	1867	R	-	R	-	61	43	80	126	35	Med. Low	-	12	Released
POWELL	1868	R	-	MS	-	63	53	75	125	36	Med. High	-	20	Released
SHASTA	1869	R	-	MR	-	63	58	75	123	37	High	-	20	Released
UC 1870	1870	R	-	MR	-	62	48	84	126	36	Med. High	-	20	-
UC 1871	1871	R	-	MR	-	63	49	75	126	36	Med. High	-	20	-
UC 1872	1872	R	-	MR	-	61	46	82	105	34	Med. Low	-	12	-
UC 1873	1873	R	-	R	-	62	46	83	126	34	Low	-	12	-
APB 152308	1900	MR	-	R	-	61	55	107	-	34	Low	-	12	-
APB 153541	1901	R	-	MR	-	61	58	107	-	38	Med. High	-	12	-
APB 152356	1902	R	-	MR	-	62	49	104	-	35	Med. High	-	12	-
UC 1910	1910	R	-	R	-	60	51	110	-	40	Med. Low	-	12	-
ASC 122	1912	R	-	R	-	62	56	104	-	41	High	-	12	-
ASC 123	1913	MR	-	R	-	61	55	107	-	42	Med. High	-	12	-
ASC 124	1914	MR	-	R	-	61	47	121	-	39	Med. Low	-	12	-

Table 50: A summary of triticale disease and agronomic observations taken from the 2014-15 to 2018-19 seasons.

Name	UC Number	2015-2019 S. Rust rating	2015-2019 L. Rust rating	2015-2019 BYDV rating	2015-2019 Septoria rating	Test Weight (lb/bu)	Thousand Kernel Wt (g)	Days to heading (from Jan. 1, Davis)	Days to maturity (from Jan. 1, Davis)	Plant Height (in)	Lodging risk	Shatter risk	Plots observed (n)	Status
NS TRICAL 105	3097	R	R	MS	R	59	45	77	127	39	Med. High	Medium	92	Released
WB PACHECO	3164	R	R	R	R	60	45	76	124	39	Low	Medium	79	Released
NS CAMELOT	3168	R	R	R	R	57	41	76	122	39	Med. High	Medium	91	Released
NS TRICAL 158EP	3169	R	R	R	R	59	38	79	128	36	Low	Medium	92	-
NS TRICAL 115T	3170	R	R	MR	MR	59	39	79	128	36	Med. Low	Medium	94	-
PRL 011TS 429	3177	R	-	R	-	57	38	75	125	-	High	Medium	36	-
NS GOLD RUSH 91	3178	R	-	R	R	57	42	77	126	35	Low	Medium	40	Released
NS 12T01486	3180	R	R	R	R	57	-	85	152	-	Med. Low	-	16	-
AGS 230	3181	MR	R	R	MR	60	-	88	156	-	Med. Low	-	16	-
AGS 133	3182	R	R	R	R	59	-	92	159	-	Low	-	16	-
UC 3183	3183	R	-	MR	-	60	40	70	100	37	High	-	23	-
UC 3184	3184	R	-	MR	R	58	48	73	126	41	High	-	42	-
UC 3185	3185	R	-	R	R	58	50	76	125	40	Med. High	-	44	-
XB T401	3186	R	-	S	-	57	38	78	103	35	Low	-	23	-
NS SWIFT 77	3188	R	-	-	R	58	47	98	-	41	High	-	33	Released
NS 13T00903	3189	R	-	-	R	56	45	104	-	40	Med. Low	-	33	-
UC 3190	3190	R	-	-	R	60	50	104	-	42	High	-	27	-

Table 51: A summary of barley disease and agronomic observations taken from the 2014-15 to 2018-19 seasons.

Crop Classification	Name	UC Number	2015-2019 S. Rust rating	2015-2019 L. Rust rating	2015-2019 BYDV rating	2015-2019 Septoria rating	Test Weight (lb/bu)	Thousand Kernel Wt (g)	Days to heading (from Jan. 1, Davis)	Days to maturity (from Jan. 1, Davis)	Plant Height (in)	Lodging risk	Shatter risk	Plots observed (n)	Status
6RSF	UC71 183 1	162	R	R	MR	-	44	37	98	134	40	Low	Low	23	-
6RSF	UC 603	603	S	S	MS	-	50	39	90	121	34	Low	Medium	55	Released
6RSF	MAX	816	MS	MR	MR	-	51	41	94	132	31	Med. Low	Low	29	-
6RSF	UC 933	933	S	MS	MS	-	49	42	88	129	31	Low	Medium	54	Released
6RSN	UC 937	937	R	MR	-	-	48	41	97	134	29	Low	-	24	-
6RSF	UC 960	960	R	MS	-	-	48	38	100	134	29	Low	-	23	-
6RSF	UC 969	969	S	MR	MS	-	52	42	87	131	35	Low	Low	60	Released
6RSF	ISHI	1047	R	R	MS	-	50	43	92	132	32	Med. High	Low	52	Released
6RSN	TAMALPAIS	1134	MR	R	MR	-	54	40	89	133	31	Low	Low	53	Released
6RSF	UC B369	1255	R	R	R	-	49	46	86	128	34	Med. High	Low	27	-
6RSF	UC B398	1256	R	R	MS	-	49	44	90	129	34	Med. Low	Low	25	-
6RSF	UC A237	1261	R	R	MR	-	49	45	89	129	34	Med. High	Low	27	-
6RSN	UC 1263	1263	R	R	R	-	55	43	89	133	35	Low	Low	27	-
6RSN	UC 1266	1266	R	R	MR	-	56	42	89	131	34	Med. Low	Low	27	-
6RSF	UC 1280	1280	R	R	R	-	51	44	88	130	35	High	Low	43	-
6RSN	UC 1317	1317	R	R	MS	-	54	41	91	129	33	Med. Low	Low	26	-
6RSN	UC 1318	1318	R	R	MR	-	53	44	88	131	34	High	Low	28	-
6RSF	UC UYP 210A	1351	R	R	R	-	49	44	89	129	33	Low	Low	28	-
6RSF(H)	SCHALLER	1355	R	MR	R	-	47	40	96	131	37	Med. High	Low	40	Released
2RSM	UC BUTTA 12	1360	R	R	MS	-	52	48	97	129	34	High	Low	56	Released
-	UC UYP 3B	1379	R	R	MR	-	50	46	85	133	32	High	Low	28	-
-	UC UYP 210B	1383	R	R	R	-	49	44	86	135	33	Med. Low	Low	28	-
-	UC 08YP 111 1231 LATE	1385	R	R	MR	-	49	49	90	129	35	Low	Low	28	-
2RSM	UC CAPAY	1390	R	R	R	-	53	53	83	129	38	High	Low	52	-
2RSM	UC UOP 95	1399	R	R	MR	-	50	48	87	129	33	High	Low	28	-
-	UC UOP 96	1400	R	R	MR	-	51	49	86	131	34	Med. Low	Low	27	-
-	UC UOP 97	1401	R	R	R	-	50	46	88	131	35	Med. Low	Low	27	-
-	UC UOP 98	1402	R	MR	MR	-	50	42	84	131	34	High	Low	28	-
-	UC UOP 99	1403	R	R	R	-	50	45	86	135	34	High	Low	26	-
-	UC UOP 100	1404	R	R	MR	-	49	42	92	134	33	Med. High	Low	28	-
-	UC UOP 102	1405	R	R	R	-	49	46	88	129	34	Med. Low	Low	28	-
-	UC UOP 105	1406	R	MR	MR	-	51	47	87	130	34	High	Low	28	-
2RSM	UC UOP 111	1408	R	R	MS	-	58	44	90	132	33	Med. Low	Low	27	-
2RSM	UC TAHOE	1409	R	R	R	-	53	41	96	130	31	Med. Low	Low	54	Released
2RSM	UC 1410	1410	R	R	MR	-	52	42	98	126	31	High	Low	30	-
2RSM	OSU FULL PINT	1411	R	R	S	-	52	41	95	130	28	Low	Low	50	Released
2RSM	LCS GENIE	1414	MR	-	R	-	51	38	108	134	29	Low	-	43	Released
2RSM	LCS ODYSSEY	1415	MR	-	R	-	51	40	109	141	30	Med. Low	-	27	-
2RSM	CDC COPELAND	1858	S	-	-	-	51	36	94	134	35	Med. Low	-	24	Released
2RSM	ACC SYNERGY	1859	S	-	-	-	52	39	95	134	34	Med. Low	-	25	Released
2RSM	KLAGES	1860	S	-	-	-	52	38	97	134	32	High	-	24	Released
2RSM	UC B9K94	1861	R	-	-	-	-	32	94	134	32	Low	-	8	-
2RSM	UC 1911	1911	R	-	-	-	52	47	107	-	33	Low	-	20	-
2RSM	UC 1915	1915	R	-	-	-	52	46	110	-	32	Med. High	-	18	-
-	08ARS028 20	9001	R	-	-	-	55	-	189	228	40	Med. Low	-	8	-
-	08ARS112 75	9002	R	-	-	-	54	-	186	230	41	High	-	8	-
-	08ARS116 91	9003	R	-	-	-	54	-	185	229	40	High	-	8	-
2RSF	10WA 106 18	9013	R	-	-	-	54	-	187	229	35	High	-	8	-
2RSF	10WA 117 17	9016	R	-	-	-	52	-	190	228	39	High	-	8	-
2RSM	UC CAPAY	9018	R	-	-	-	53	-	178	225	44	Low	-	12	-
-	11WA 107 43	9021	R	-	-	-	54	-	187	230	39	High	-	8	-
-	11WA 107 58	9022	R	-	-	-	55	-	188	227	42	High	-	8	-
-	12WA 120 14	9023	R	-	-	-	53	-	188	228	37	High	-	8	-
2RSF(H)	2AB09 X06F058HL-31	9031	R	-	-	-	59	-	188	231	38	Med. Low	-	8	-
2RSM	2B10 4162	9034	R	-	-	-	55	-	188	229	36	High	-	8	-
2RSM	2B10 4378	9035	R	-	-	-	55	-	188	228	35	High	-	8	-
2RSM	2B11 4949	9038	R	-	-	-	54	-	188	228	37	Med. Low	-	8	-
2RSM	2B11 5166	9039	R	-	-	-	52	-	186	227	38	High	-	8	-
-	2B12 5582	9041	R	-	-	-	52	-	187	226	40	Low	-	8	-
2RSM	AC METCALFE	9047	R	-	-	-	53	40	187	224	37	Med. Low	-	11	-
2RSF	BARONESSE	9048	R	-	-	-	52	42	186	224	35	High	-	11	-
2RSM	UC BUTTA 12	9049	R	-	-	-	53	-	170	224	38	Med. Low	-	8	Released
2RSM	CDC COPELAND	9054	R	-	-	-	51	41	184	218	39	High	-	14	Released
2RSM	OSU FULL PINT	9059	R	-	-	-	53	48	188	225	30	Med. Low	-	13	Released
2RSM	HARRINGTON	9060	R	-	-	-	51	42	188	225	38	High	-	11	-
-	MT090190	9066	R	-	-	-	55	-	186	232	37	High	-	8	-
6RSF	STEPTOE	9077	R	-	-	-	48	42	182	225	34	Low	-	11	-
2RSM	UC TAHOE	9085	R	-	-	-	56	-	184	221	42	Med. Low	-	8	Released
2RSM	UC 1410	9086	R	-	-	-	53	-	186	225	31	High	-	12	-
6RSF	UC 960	9087	R	-	-	-	45	40	171	208	24	Low	-	3	-
-	UTSB10902 91	9135	R	-	-	-	50	-	185	228	44	High	-	8	-
-	UTSB10905 72	9136	R	-	-	-	53	-	182	229	41	Med. Low	-	8	-
-	10ARS191 3	9140	R	-	-	-	58	-	186	224	-	Med. Low	-	4	-
-	2ND32529	9141	R	-	-	-	56	-	183	226	-	Low	-	4	-
-	2ND33760	9142	R	-	-	-	56	-	182	224	-	Low	-	4	-
-	BZ512 220	9143	R	-	-	-	54	-	185	223	-	Low	-	4	-
-	BZ512 282	9144	R	-	-	-	55	-	182	223	-	Low	-	4	-
2RSM	CDC BOW	9145	R	-	-	-	56	-	189	222	-	Low	-	4	-
2RSM	CDC FRASER	9146	R	-	-	-	55	-	188	220	-	Low	-	4	-
2RSM	EXPLORER	9147	R	-	-	-	56	-	186	222	-	Low	-	4	-
2RSM	FRANCIN	9148	R	-	-	-	55	-	179	217	34	Low	-	8	-
2RSM	LCS GENIE	9149	R	-	-	-	54	-	189	225	30	Low	-	7	Released
-	MT124112	9150	R	-	-	-	56	-	184	226	-	Med. Low	-	4	-
-	MT124128	9151	R	-	-	-	58	-	183	225	-	Med. Low	-	4	-
-	MT124134	9152	R	-	-	-	56	-	183	227	-	High	-	4	-
-	MT124677	9153	R	-	-	-	55	-	185	226	-	Low	-	4	-
2RSM	ACC SYNERGY	9154	R	-	-	-	57	-	186	222	-	Low	-	4	Released
2RSM	UC B9K94	9155	R	-	-	-	-	-	160	212	45	-	-	4	-
-	DH120058	9156	R	-	-	-	51	-	-	-	23	-	-	3	-
-	DH120285	9157	R	-	-	-	51	-	-	-	24	-	-	3	-
2RSM	LCS OPERA	9158	R	-	-	-	51	-	-	-	28	-	-	3	Released
2RSF	LCS VESPA	9159	R	-	-	-	51	-	-	-	27	-	-	3	Released
2RSF	LYON	9160	R	-	-	-	52	-	-	-	29	-	-	3	Released
-	AD120341	9161	R	-	-	-	52	-	-	-	24	-	-	3	-
2RSF	CLAYMORE	9162	R	-	-	-	52	-	-	-	33	-	-	3	-
-	MEG'S SONG	9163	R	-	-	-	62	-	-	-	36	-	-	3	-
2RSM	LCS ODYSSEY	9164	R	-	-	-	50	-	-	-	26	-	-	3	-

Genotype-by-environment analyses

Summaries of the GGE analyses of yield data from the 2018-19 season are provided in Figures 6 to 13. 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 overlap with other sub-region axes in many cases, indicating different sub-regions in the 2018-19 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.

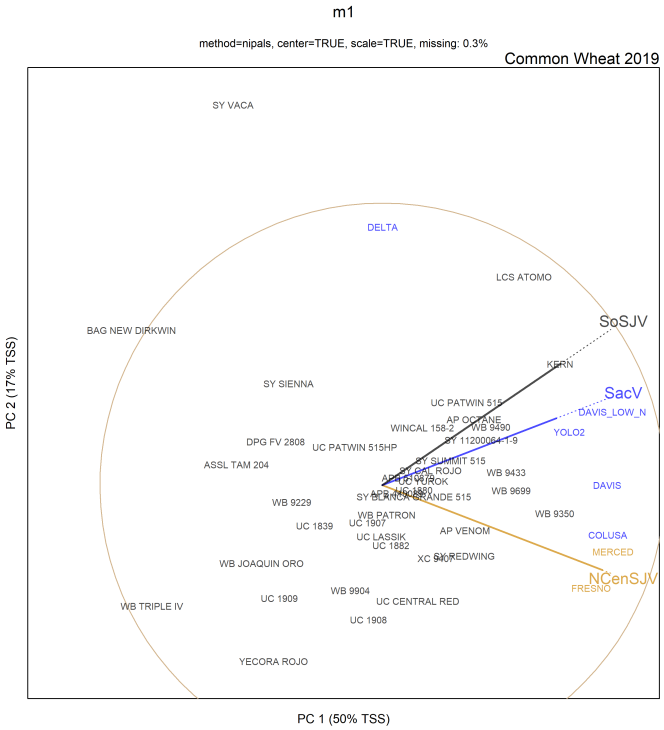

Figure 6: GGE biplot of common wheat yield data from the 2018-19regional variety trials.

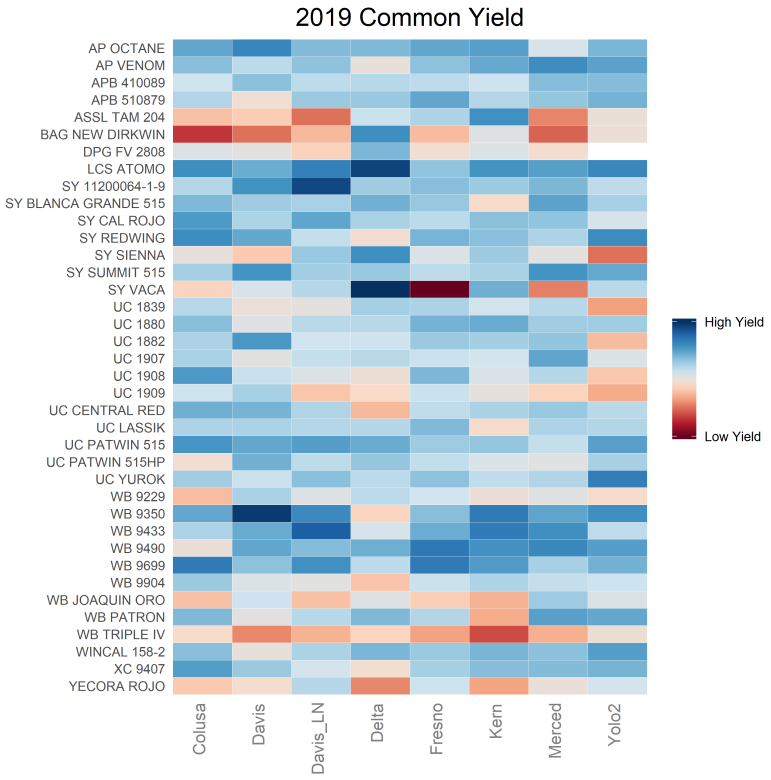

Figure 7: Heatmap of common wheat yield data from the 2018-19regional variety trials.

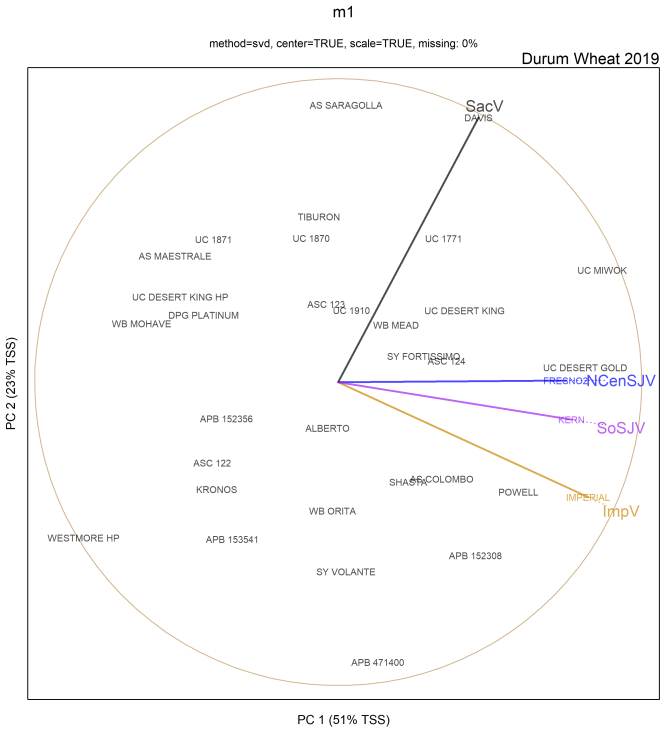

Figure 8: GGE biplot of durum wheat yield data from the 2018-19regional variety trials.

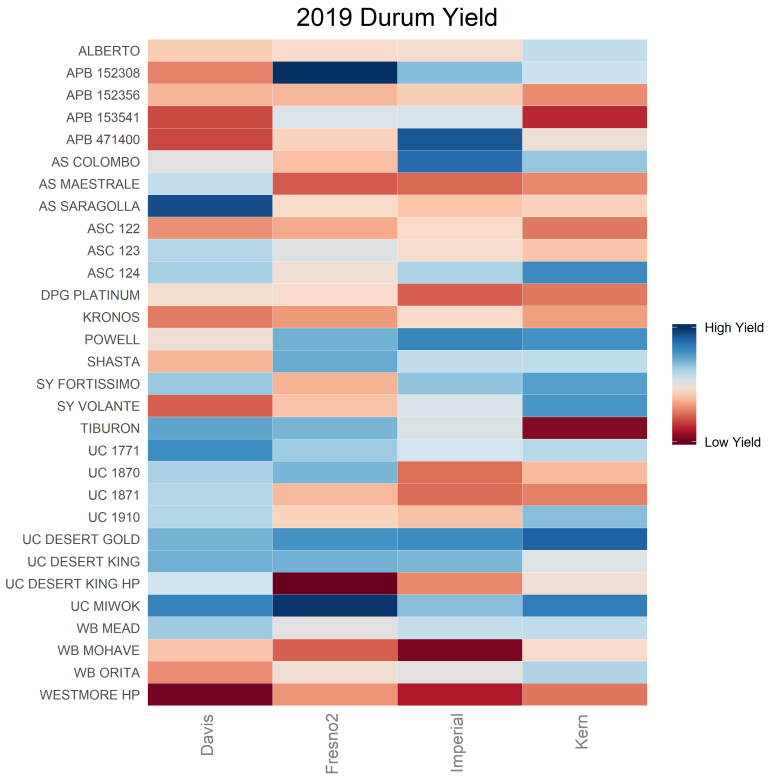

Figure 9: Heatmap of durum wheat yield data from the 2018-19regional variety trials.

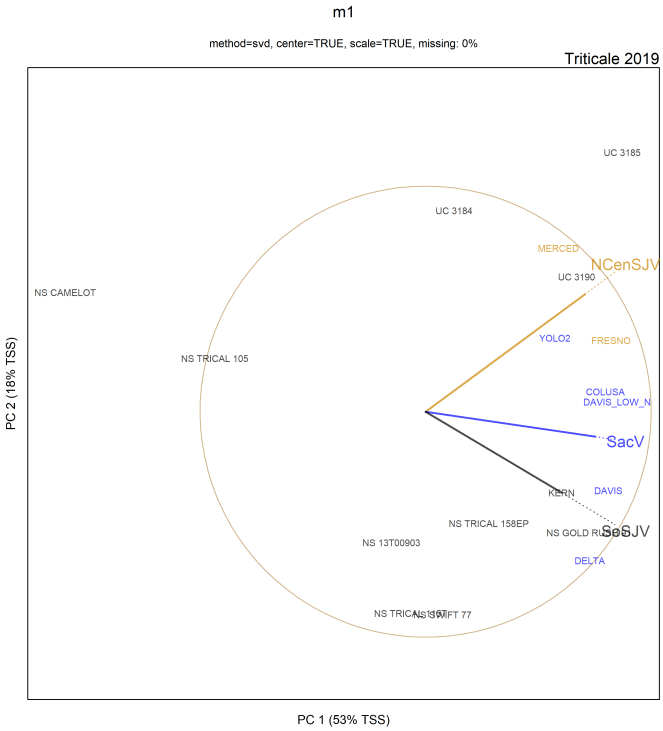

Figure 10: GGE biplot of triticale yield data from the 2018-19regional variety trials.

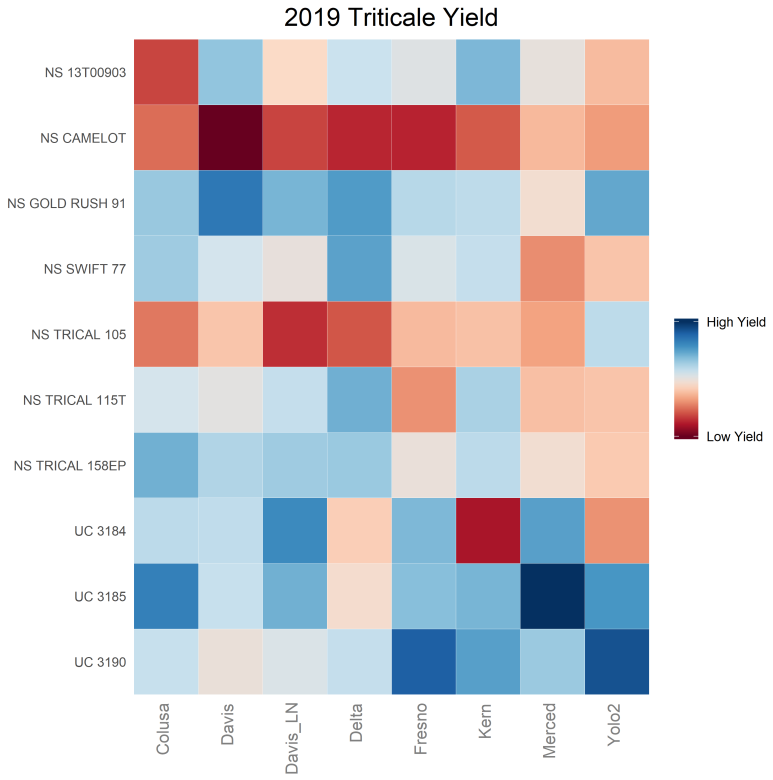

Figure 11: Heatmap of triticale yield data from the 2018-19regional variety trials.

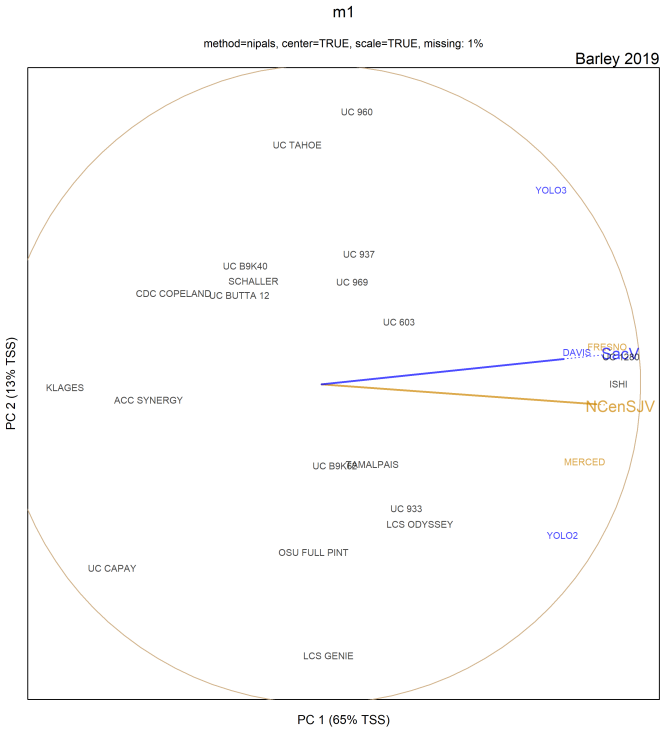

Figure 12: GGE biplot of barley yield data from the 2018-19regional variety trials.

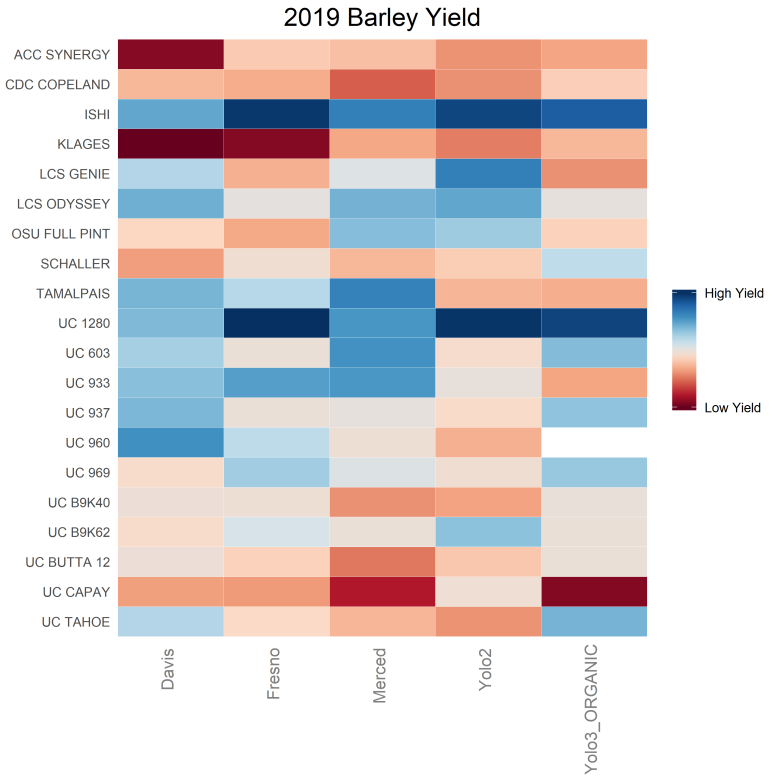

Figure 13: Heatmap of barley yield data from the 2018-19regional variety trials.

Crop productivity in the 2018-19 Collaborative Quality Trials

2019 Collaborative Common Wheat Productivity

Breeder	Wheat	Check	Sample #	Entry Name	Entry No.	Group	Collaborative Trial			UC Regional Variety Trials											
							Fresno Yield (lbs/acre)			Sacramento Valley (2017-19) 14 site-years Yield (lbs/acre)			Northern SJ Valley (2017-19) 7 site-years Yield (lbs/acre)			Southern SJ Valley (2017-19) 7 site-years Yield (lbs/acre)			Imperial Valley (2016-18) 3 site-years Yield (lbs/acre)		
							Mean	SD	Rank	Mean	SE	Rank	Mean	SE	Rank	Mean	SE	Rank	Mean	SE	Rank
Arizona Plant Breeders																					
	Hard Red	x	HRS CONTROL	SY Cal Rojo	1478	1	11078	765	4	5571	524	4	6467	515	7	6948	1229	3	6330	362	5
			HRS-1	APB 410089	1903	1	10886	-	6	5554	585	5	6575	750	4	6220	1317	8	-	-	-
Syngenta																					
	Hard Red	x	HRS CONTROL	SY Cal Rojo	1478	2	11078	765	4	5571	524	4	6467	515	7	6948	1229	3	6330	362	5
			HRS-2	AP Octane	1878	2	11774	-	1	6013	543	1	6711	568	3	6717	1250	6	7100	466	1
UC Davis																					
	Hard Red	x	HRS CONTROL	SY Cal Rojo	1478	3	11078	765	4	5571	524	4	6467	515	7	6948	1229	3	6330	362	5
			HRS-3	UC 1882	1882	3	11436	-	3	5458	537	6	6521	568	5	6458	1263	7	6639	466	2
	Hard White	x	HWS CONTROL	SY Blanca Grande 515	1657	4	10500	628	7	5444	529	7	6520	515	6	6865	1229	4	6560	357	3
			HWS-1	UC 1839	1839	4	9950	-	8	5109	546	8	6261	558	8	7028	1236	1	6087	465	7
			HWS-2	UC 1909	1909	4	9337	-	9	4905	580	9	5832	750	9	5917	1291	9	-	-	-
WestBred																					
	Hard Red	x	HRS CONTROL	SY Cal Rojo	1478	5	11078	765	4	5571	524	4	6467	515	7	6948	1229	3	6330	362	5
			HRS-4	WB 9490	1887	5	11606	-	2	5693	539	3	7082	574	2	6804	1250	5	6538	466	4
			HRS-5	WB 9699	1888	5	11053	-	5	5960	537	2	7118	568	1	6990	1250	2	6246	466	6

site-years indicates the number of test-year combinations the value is dervied from.

2019 Common Wheat Yield, Protein and Overall Rank

Region Group	Name	UC Number	Yield (lbs/acre)	Standard Error	Overall Rank	Protein (%)	Overall Rank
Sacramento Valley							
	WB 9490	1887	6372	483	9	9.69	33
	UC 1882	1882	6031	486	23	10.68	12
	AP Octane	1878	6648	486	5	9.41	36
	SY Cal Rojo	1478	6261	486	13	10	30
	WB 9699	1888	6508	486	6	10.27	24
	APB 410089	1903	6178	486	18	11.66	1
	SY Blanca Grande 515	1657	6363	486	10	10.38	20
	UC 1839	1839	5611	489	32	11	6
	UC 1909	1909	5552	483	33	10.5	14
Northern SJ Valley	WB 9490	1887	8193	712	1	12.02	28
	UC 1882	1882	7281	712	18	12.62	18
	AP Octane	1878	7167	707	23	12.21	23
	SY Cal Rojo	1478	7196	707	22	11.21	36
	WB 9699	1888	7657	707	4	12.3	21
	APB 410089	1903	7229	707	20	13.6	6
	SY Blanca Grande 515	1657	7544	707	7	12.6	19
	UC 1839	1839	7071	707	25	13.71	4
	UC 1909	1909	6486	707	33	12.92	15
Southern SJ Valley	WB 9490	1887	8084	457	4	11.71	33
	UC 1882	1882	7320	457	18	12.43	25
	AP Octane	1878	7923	457	8	12.19	28
	SY Cal Rojo	1478	7525	457	14	11.52	35
	WB 9699	1888	7976	457	6	12.91	19
	APB 410089	1903	7115	505	23	13.98	5
	SY Blanca Grande 515	1657	6387	457	34	13.53	9.5
	UC 1839	1839	6864	457	25	13.99	4
	UC 1909	1909	6627	457	31	13.92	6

2019 Collaborative Durum Wheat Productivity

Breeder	Wheat	Check	Sample #	Entry Name	Entry No.	Group	Collaborative Trial			UC Regional Variety Trials											
							Fresno Yield (lbs/acre)			Sacramento Valley (2017-19) 5 site-years Yield (lbs/acre)			Northern SJ Valley (2017-19) 5 site years Yield (lbs/acre)			Southern SJ Valley (2017-19) 3 site-years Yield (lbs/acre)			Imperial Valley (2017-19) 3 site-years Yield (lbs/acre)		
							Mean	SD	Rank	Mean	SE	Rank	Mean	SE	Rank	Mean	SE	Rank	Mean	SE	Rank
Arizona Plant Breeders																					
	Durum	X	Durum Control	SY Fortissimo	1429	1	11070	918	3	6774	793	5	7926	1117	3	8314	695	2	7137	460	2
			DUR-1	Alberto	1813	1	11033	-	4	6816	793	4	8083	1120	2	7981	699	5	7067	460	3
			DUR-2	Tiburon	1640	1	11785	-	2	7364	793	3	8532	1117	1	8700	699	1	7317	460	1
UC Davis																					
	Durum	X	Durum Control	SY Fortissimo	1429	2	11070	918	3	6774	793	3	7926	1117	3	8314	695	2	7137	460	2
			DUR-3	UC 1870	1870	2	11844	-	1	7905	810	1	8532	1134	1	8296	742	4	6520	487	5
			DUR-4	UC 1910	1910	2	10796	-	5	7522	859	2	7835	1197	4	8310	788	3	6668	560	4

site-year indicates the number of test-year combinations the value is dervied from.

2019 Durum Wheat Yield, Protein and Overall Rank

Region Group	Name	UC Number	Yield (lbs/acre)	Standard Error	Overall Rank	Protein (%)	Overall Rank
Sacramento Valley							
	SY Fortissimo	1429	6137	458	7	10.33	27
	Alberto	1813	5501	458	19	11.97	16
	Tiburon	1640	6362	458	4	11.08	23
	UC 1870	1870	6061	458	10	13.04	6
	UC 1910	1910	6006	458	13	12.53	9
Northern SJ Valley							
	SY Fortissimo	1429	9761	542	23	12.24	11
	Alberto	1813	10065	542	15	11.43	23
	Tiburon	1640	10860	542	7	12.85	4
	UC 1870	1870	10754	600	8	11.97	14
	UC 1910	1910	9987	542	16	12.36	8
Southern SJ Valley							
	SY Fortissimo	1429	9437	371	6	13.96	9
	Alberto	1813	8774	371	13	13.05	21
	Tiburon	1640	6714	415	30	14.21	7
	UC 1870	1870	7882	491	22	-	-
	UC 1910	1910	9157	371	7	15.43	2
Imperial Valley							
	SY Fortissimo	1429	8086	493	8	-	-
	Alberto	1813	7418	493	17	-	-
	Tiburon	1640	7622	493	15	-	-
	UC 1870	1870	6678	493	25	-	-

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 online at http://smallgrains.ucanr.edu/Grain_Quality/. 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 were incorporated into this quantitative quality metric and reported in https://ucanr.edu/sites/small-grains/files/323784.pdf.

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