2017 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 between the 2014-15 and 2016-17 growing seasons. The 2016-17 experiments had the following objectives: 1) Measure crop productivity, quality, disease resistance, and agronomic characteristics for commercially available small grain varieties and advanced breeding lines across a range of environmental and management conditions that represent Californian agro-ecosystems; 2) Study the magnitude of management effects on variety performance by directly manipulating crop water and nitrogen availability at a subset of trial locations; 3) Measure in-season changes, and variety-specific differences in growth directly via crop-phenotyping platforms; 4) Apply multi-level statistical models to trial data to better understand and communicate varietal differences due to genotypic, environmental, and management effects, and; 5) Report results of the research and analysis on our program website, at extension meetings, and in other agricultural forums.

Supplementary information for the current report, including summary information for individual locations, is available at http://smallgrains.ucanr.edu/Variety/.

2. METHODS

2.1 Regional trials

Entries & test locations

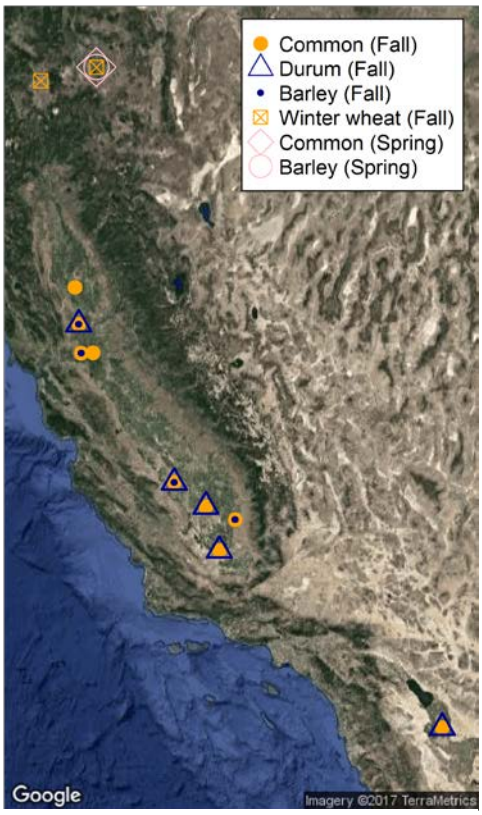

Figure 1. Map depicting the California small grain regional trial test locations used in the 2016-17 season.

Commercially available and advanced breeding lines of common wheat, durum wheat, triticale, and barley were grown in statewide multi-environment trials between 2014-15 and 2016-17 (Tables 1-3). Tests were conducted at University of California Field Stations or in fields of cooperating growers (Figure 1).

Field methods

Field methods and results are reported for the 2016-17 season only. For methodological details regarding earlier field seasons please consult program reports from those years.

Trial design and establishment

A randomized complete block design with four replications was used at all trial locations. In the 2016-17 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. 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. (LOW_N: low nitrogen fertilization. LOW_water: reduced irrigation. RF: Rainfed/no supplemental irrigation.)

Location	Year	Common Wheat	Durum Wheat	Triticale	Barley	Wheat (Spring-planted)	Wheat (Fall-planted)
CHICO	2015				36		
CLARKSBURG	2015	50		11	36		
CLARKSBURG	2016	41		8	34		
COLUSA	2016	41		8			
COLUSA	2017	45		9			
DAVIS	2015	50	34	11			
DAVIS	2016	41	28	8			
DAVIS	2017	45	27	9	12		
DAVIS_LOW_N	2017	45		9			
DAVIS_RF	2015	50		11	36		
DAVIS_RF	2016	41		8	34		
DELTA	2015	50		11			
DELTA	2016	41		8			
DELTA	2017	45		9			
FRESNO	2015	50	36	11	36		
FRESNO	2016	41	28	8	34		
FRESNO	2017	45	28	9	12		
FRESNO_LOW_N	2017	45		9			
FRESNO_LOW_water	2017	45		9			
FRESNO2	2016	41	28	8			
IMPERIAL	2015	50	36	11			
IMPERIAL	2016	41	28	7			
IMPERIAL	2017	45	28	9			
IREC	2017	5			42	48	12
KERN	2015	50	33	11			
KERN	2016	41	28	8			
KERN	2017	45	28	9			
KINGS	2015	50	36	11			
KINGS	2017	45	28	9			
LASSEN	2015				25	45	
SISKIYOU	2015				25	45	53
SISKIYOU	2016						46
SISKIYOU	2017						42
SLO_RF	2016				34		
SOLANO_RF	2017	45		10	12		
TEHAMA_RF	2015				36		
TEHAMA_RF	2016				34		
TULARE_RF	2016	41		7	33		
TULARE_RF	2017	45		9	12		
TULELAKE	2015				25	45	53
TULELAKE	2016				41	51	46
TULELAKE	2017						41

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

Region	Species	2015	2016	2017
Non-Intermountain	BARLEY	36	34	12
	COMMON	50	41	45
	DURUM	35	28	28
	TRITICALE	11	8	11
Intermountain	BARLEY	25	41	42
	SPRINGWHEAT	45	51	48
	WINTERWHEAT	53	46	42

Pre-plant soil sampling

Pre-plant soil samples were taken at depths of 0-50 cm, 50-100 cm and 100-150 cm at all locations unless where limited by distinct profile differences or impenetrable layers. Sample collection was carried out using a manual bucket-type auger system. If the location had not previously been sampled, soil bulk density of all layers was determined via a volumetric soil corer. 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.* [1] and Soil Survey Staff [2].

Nitrogen fertilization & irrigation

A range of nitrogen fertilizer types and amounts were used depending on location (Table 4). 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 200 and 250 lb of nitrogen per acre. Less fertilizer was delivered to the barley trials and wheat trials with lower yield potential, such as the rainfed Solano and Tulare locations. Fertilizer was applied as a split application at planting and tillering, unless otherwise specified. The Kings location received a blend of animal manures and plant composts, the source and composition of which is unknown. At the Davis

and Fresno locations, the low-nitrogen common wheat trials received no nitrogen fertilization. At the Fresno location the low-water common wheat received a total of 150 lb of nitrogen per acre, relative to 200 lb for the conventionally managed trial. A range of irrigation amounts were applied depending on location (Table 5). At the on-farm locations the irrigation management was in accordance with the typical irrigation management of that specific grower.

Table 3. Test locations used by the state wide regional trials between 2014 and 2017.

Site Name	Year	Tests	Latitude	Longitude	Soil Type	Previous Crop	Planting Date
Chico	2015	Barley			Chico loam	Barley	11/18/14
Clarksburg	2015	Wheat, Barley			Clay loam class 3-4	Fallow	1/14/15
Clarksburg	2016	Common & Triticale; Barley	38.4152	-121.5683	Omni silty clay		12/1/15
Colusa	2016	Common & Triticale	39.0413	-121.8664	Scribner silt loam	vineseed	11/14/15
Colusa	2017	Wheat	39.04103854	-121.84862	Grandbend loam	safflfower	11/10/16
Corning	2015	Barley			Maywood loam	Fallow	2/3/15
Davis	2015	Wheat, Durum, RF barley, RF Wheat			Yolo loam	Corn	11/28/14
Davis	2016	Common & Triticale; Durum	38.5366	-121.7815	Yolo loam	corn	11/12/15
Davis	2017	Wheat, Durum, Barley	38.52729	-121.772354	Yolo loam/Yolo silt clay loam	corn	11/15/16
Davis RF	2016	Common & Triticale; Barley	38.5366	-121.7815	Yolo loam	corn	11/12/15
Davis_Low_N	2017	Wheat	38.52729	-121.772354	Yolo loam/Yolo silt clay loam	corn	11/17/16
Delta	2015	Wheat			Egbert muck	Tomatoes	1/7/15
Delta	2016	Common & Triticale	37.9017	-121.5056	Egbert muck	tomato	11/23/15
Delta	2017	Wheat	38.14651544	-121.5326353	Ryde clay loam/Rindge muck	potatoes	11/18/16
Etna	2015	Spring Barley, Spring wheat			Settlemeyer loam	Fallow	3/30/15
Fresno	2015	Wheat, Durum, Barley			Panoche Clay loam	Cotton	12/8/14
Fresno	2016	Common & Triticale; Durum; Barley	36.3398	-120.1192	Panoche Clay loam	cotton	11/16/15
Fresno	2017	Wheat, Durum	36.3398027	-120.1192358	Panoche clay loam	barley	12/1/16
Fresno_Low_N	2017	Wheat	36.3398027	-120.1192358	Panoche clay loam	sudan grass	11/30/16
Fresno_Low_Water	2017	Wheat, Barley	36.3398027	-120.1192358	Panoche clay loam	barley	11/30/16
Fresno2	2016	Common & Triticale; Durum	36.4083	-120.0752	Posochanet clay loam	tomato	11/30/15
Imperial	2015	Wheat, Durum			Imperial-Glenbar silty clay loam	Alfalfa	12/11/14
Imperial	2016	Common & Triticale; Durum	32.811	-115.4437	Imperial-Glenbar silty clay loam	sudangrass	11/18/15
Imperial	2017	Wheat, Durum	32.81096967	-115.4437065	Imperial silty clay	sudan grass	12/9/16
Kern	2015	Wheat, Durum			Sandy Loam	Cotton	11/24/14
Kern	2016	Common & Triticale; Durum	35.3696	-119.3332	Westhaven fine sandy loam	cotton	11/18/15
Kern	2017	Wheat, Durum	35.37705	-119.33246	Wasco sandy loam	cotton	11/21/16
Kings	2015	Wheat, Durum			Armona Loam and Gepford Clay	Cotton	11/25/14
Kings	2017	Wheat, Durum	36.000538	-119.565334	Gepford clay		11/29/16
MacArthur	2015	Spring Barley, spring wheat			Loamy Fine Sandy	Fallow	4/22/15
San Luis Obispo	2016	Barley	35.6642	-120.4147	Pico fine sandy loam	pasture	11/28/16
Siskiyou	2015	Winter Wheat			Clay loam	Fallow	10/30/14
Siskiyou	2016	Winter Wheat	41.7869	-122.4418	Montague clay	fallow	10/26/15
Solano_RF	2017	Wheat, Barley	38.14015178	-121.7378712	Diablo-Ayar clays	fallow	11/16/16
Tehama	2016	Barley	39.8663	-122.3771	Newville gravelly loam	fallow	11/30/15
Tulare	2016	Common & Triticale; Barley	35.8127	-119.0471	Centerville clay	fallow	11/19/15
Tulare_RF	2017	Wheat, Barley	35.81501	-119.0552	Centerville clay	fallow	11/29/16
Tulelake	2015	Winter Wheat			Tule basin mucky silty clay loam	Sudan Grass	10/29/14
Tulelake	2015	Spring Barley, Spring wheat			Tule basin mucky silty clay loam	Sudan Grass	4/22/15
Tulelake	2016	Winter Wheat	41.9653	-121.4735	Tulebasin mucky silty clay loam	sudangrass	10/30/16
Tulelake	2016	Spring Wheart	41.9653	-121.4735	Tulebasin mucky silty clay loam	sudangrass	4/21/16

Table 4. Nitrogen fertilizer management details for the regional trial test locations in the 2016-17 season.

Site Name	Fertilizer management
Colusa	166lbs N (124#N preplant, 32#N top dress)
Davis	Wheat 200lb N (50#N preplant, 150#N topdress) Barley 75lbs N topdress.
Davis_Low_N	No fertilizer
Delta	50lb N preplant
Fresno	200lb N (50#N preplant, 150#N top dress)
Fresno_Low_N	No fertilizer
Fresno_Low_Water	Wheat 150 lb N (50#N preplant, 100#N top dress) Barley 100 lb N (50#N preplant, 50#N top dress)
Imperial	250lb N (50#N preplant, 200#N as three applications, water run)
Kern	125lb N (75#N preplant as UAN32 50#N water run)
Kings	Organic compost preplant. Total N approx. 160lb
Solano_RF	170lb N (50#N preplant 120#N top dress) 100lb N (50#N preplant 50#N top dress)
Tulare_RF	8lb N preplant as 11-52-0

Table 5. Irrigation management details for the regional trial test locations in the 2016-17 season.

Site Name	Irrigation
Colusa	No irrigation
Davis	No irrigation
Davis_Low_N	No irrigation
Delta	No irrigation
Fresno	Two as sprinkler 3.5", two as furrow 7"
Fresno_Low_N	Two as sprinkler 3.5", two as furrow 7"
Fresno_Low_Water	One as sprinkler 1", two as furrow 5.8"
Imperial	Five as flood 28.3"
Kern	Three as flood 19.7"
Kings	Irrigated to crop need
Solano_RF	No irrigation
Tulare_RF	No irrigation

Table 6. Rating scale used for rating the occurrence of the majority of disease and disease-like symptoms in the in the 2016-17 season.

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

Disease observations

Observations of foliar diseases and other disease-like symptoms were made at all test locations. Disease of economic importance - stripe rust, leaf rust, septoria, and barley yellow dwarf virus – were routinely rated at all trial locations. In addition to these, in the 2016-17 season a glume-darkening symptom, physiological leaf spotting, net blotch, and powdery mildew were observed and their incidence rated. Stripe Rust, leaf rust, septoria, physiological leaf spot, net blotch, and powdery mildew were assessed at the soft-to-medium dough stage of growth by estimating the percentages of the flag leaf affected (Table 6). Barley Yellow Dwarf Virus assessments were based on the percentage of plants showing symptoms. Stripe rust samples were sent for race analysis by Xianming Chen, Research Plant Pathologist with the USDA-ARS at Washington State University.

Table 7. Locations where disease and disease-like symptoms were observed and recorded in the 2016-17 season.

Species	Location	Stem Rust	BYDV	Leaf Rust	Septoria	False Black Chaff	Physiological Leaf Spot	Net Blotch	Powdery Mildew
BARLEY	DAVIS		X	X				X	X
BARLEY	FRESNO							X	
BARLEY	SOLANO_RF								
BARLEY	TULARE_RF		X					X	
COMMON	COLUSA	X	X	X	X		X		
COMMON	DAVIS	X	X	X	X	X	X		
COMMON	DAVIS_LOW_N								
COMMON	DELTA		X		X	X	X		
COMMON	FRESNO	X			X		X		
COMMON	FRESNO_LOW_N								
COMMON	FRESNO_LOW_water								
COMMON	IMPERIAL								
COMMON	KERN	X	X	X	X	X	X		
COMMON	KINGS		X	X		X	X		
COMMON	SOLANO_RF	X	X		X	X	X		
COMMON	TULARE_RF		X		X		X		
DURUM	DAVIS	X	X		X				
DURUM	FRESNO		X		X			X	
DURUM	IMPERIAL								
DURUM	KERN	X	X		X		X		X
DURUM	KINGS		X	X		X	X		
TRITICALE	COLUSA	X	X	X	X		X		
TRITICALE	DAVIS	X	X	X	X	X	X		
TRITICALE	DAVIS_LOW_N								
TRITICALE	DELTA		X		X	X	X		
TRITICALE	FRESNO	X			X		X		
TRITICALE	FRESNO_LOW_N								
TRITICALE	FRESNO_LOW_water								
TRITICALE	IMPERIAL								
TRITICALE	KERN	X	X	X	X	X			
TRITICALE	KINGS		X	X		X			
TRITICALE	SOLANO_RF	X	X		X	X			
TRITICALE	TULARE_RF		X		X				

Table 8. The locations at which agronomic traits were recorded in the 2016-17 season.

Species	Location	Yield	Protein	Test Weight	Height	Lodging (In season)	Lodging (harvest)	Shattering
BARLEY	DAVIS	X		X	X	X	X	
BARLEY	FRESNO	X		X	X		X	
BARLEY	IREC	X	X	X	X		X	
BARLEY	SOLANO_RF	X		X	X	X	X	
BARLEY	TULARE_RF	X		X	X	X		
COMMON	COLUSA	X	X	X	X	X	X	
COMMON	DAVIS	X	X	X	X	X	X	
COMMON	DAVIS_LOW_N	X	X	X	X			
COMMON	DELTA	X	X	X	X			
COMMON	FRESNO	X	X	X	X		X	X
COMMON	FRESNO_LOW_N	X	X	X	X			
COMMON	FRESNO_LOW_water	X	X	X	X			
COMMON	IMPERIAL	X	X	X	X			
COMMON	IREC	X	X	X	X		X	
COMMON	KERN	X	X	X	X	X	X	
COMMON	KINGS	X	X	X	X		X	
COMMON	SOLANO_RF	X	X	X	X		X	
COMMON	TULARE_RF	X	X	X	X			
DURUM	DAVIS	X	X	X	X		X	
DURUM	FRESNO	X	X	X	X		X	
DURUM	IMPERIAL	X	X	X	X		X	
DURUM	KERN	X	X	X	X	X		
DURUM	KINGS	X	X	X	X		X	
TRITICALE	COLUSA	X	X	X	X	X	X	
TRITICALE	DAVIS	X	X	X	X	X	X	
TRITICALE	DAVIS_LOW_N	X	X	X	X			
TRITICALE	DELTA	X	X	X	X			
TRITICALE	FRESNO	X	X	X	X		X	
TRITICALE	FRESNO_LOW_N	X	X	X	X			
TRITICALE	FRESNO_LOW_water	X	X	X	X			
TRITICALE	IMPERIAL	X	X	X	X			
TRITICALE	KERN	X	X	X	X	X	X	
TRITICALE	KINGS	X	X	X	X		X	
TRITICALE	SOLANO_RF	X	X	X	X		X	
TRITICALE	TULARE_RF	X	X	X	X			
SPRINGWHEAT	IREC	X	X	X	X		X	
WINTERWHEAT	IREC	X	X	X	X		X	
WINTERWHEAT	SISKIYOU	X	X	X	X		X	
WINTERWHEAT	TULELAKE	X	X	X	X		X	

Agronomic observations

Early lodging of plants was rated during growing season prior to plant senescence; the area of plot with lodged plants was qualitatively rated using the system in Table 6. Heading and maturity observations were taken from individual plots at least twice weekly at the Davis and Imperial locations. 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. At harvest, mean plant height, plot lodging, and shattering 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 8.

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 4 lb was then taken from three of the four replicates and weighed in-field before returning the sample to the laboratory for additional processing (detailed below).

Post harvest seed processing & yield estimates

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

Grain sub-samples were stored in seed processing facilities at the University of California, Davis until reaching equilibrium moisture content. Given average conditions in the seed processing facilities, equilibrium moisture content for grain of all species is estimated to have been approximately 10% [3]. Grain sub-samples were re-weighed and differences from the field weight were used to correct plot yields for changes in moisture content since harvest. The sub-sample was then cleaned with an air-blower to remove any chaff or other extraneous material. Weight loss after this cleaning was used to correct estimated final grain yields.

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

Climate measurements

Climate data for each location was obtained from the nearest weather station in the California Irrigation Management Information System network [4] or from infield weather stations [5] if a suitable CIMIS weather station was not available. Cumulative precipitation and growing degree-days from sowing are estimated for each location and compared to long-term means (for some locations long-term records were not available). Degree-days were estimated using the corrected single triangle method [6-8]. Temperature thresholds of 87°F (30°C) and 44°F (7°C) were used [6, 9].

Grain & flour quality analyses

Grain samples from the conventionally managed common wheat trials at the Davis and Fresno locations, and from the durum wheat trials at the Fresno and Kern locations, where analyzed for grain and flour quality by the California wheat commission (Table 9). Grain quality analyses for both common and durum wheat included protein content, ash content, kernel weight, kernel diameter, kernel hardness, 1000 kernel weight, and kernel size distribution. Flour quality analyses for the common wheat included flour yield, protein content, ash content, falling number, gluten index, wet gluten, absorption, development time, stability, MTI, baking, mixing time, loaf volume, dough handling, crumb color, crumb grain, crumb texture, and bread symmetry. Flour quality analyses for the durum wheat included semolina extract, ash content, specks, protein, gluten index, falling number, alveograph values, semolina color, and the color, weight, loss and firmness of pasta.

Table 9. 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

Soil analyses

Soil samples were air-dried in the laboratory until the weight stabilized, which took approximately one week for an unconsolidated sample of around 1 kg. The mass difference before and after drying was used to determine the gravimetric soil water content above the air dry point. Air-dry soils were stored for future nitrogen analyses. A sub-sample of the soil was then oven dried to determine the total soil water content. Soil bulk density was used to convert total soil water content to soil volumetric water content. Soil water content above the soil wilting point was assumed to be the plant available soil water content. Published values were used to determine the approximate wilting point for the different soil types [10, 11]. Pre-plant soil nitrogen content was measured using both WaterWorks nitrate/nitrite test strips (https://sensafe.com/) and the nitrate quick test method described on our program website (http://smallgrains.ucanr.edu/files/256250.pdf), and the soil nitrate method of Doane and Horwath [12] modified to use potassium chloride rather than ammonium chloride. Other soil handling and analytical methods were developed from Schoeneberger *et al.* [1] and Soil Survey Staff [2].

2.2 Collaborative quality trials

In the 2016-17 season, stands of advanced experimental varieties of both common wheat and durum wheat were established at the Davis, Fresno, and Imperial locations to produce bulk quantities of grain to supply to domestic millers and bakers for independent baking tests. Fourteen varieties of common wheat were grown at the Davis and Fresno locations, and 6 varieties of durum wheat at the Fresno and Imperial locations (Table 10). The plots of individual varieties were approximately 10 ft wide by 80 ft long. The commercial common wheat varieties Blanca Grande 515 and Cal Rojo, and the commercial durum wheat variety APB Kronos, where grown as check lines. The check lines were replicated three times and remaining varieties were replicated once. Other trial establishment and management details were comparable to the conventionally managed common and durum wheat regional trials conducted at the same locations. The performance of the varieties in the collaborative trials was compared to the performance of the same varieties in the regional trials at the same location.

Table 10. Common wheat and durum wheat varieties included in the collaborative quality trials conducted in in the 2016-17 season.

Species	Name	Entry Number	Seed Source
Common Wheat	SY CAL ROJO	1478	Syngenta
Common Wheat	SY BLANCA GRANDE 515	1657	Syngenta
Common Wheat	LCS 12SB0197	1830	Limagrain
Common Wheat	LCS 12SB0224	1831	Limagrain
Common Wheat	13W00850	1834	Syngenta
Common Wheat	13W00886	1835	Syngenta
Common Wheat	14657-170	1836	UC
Common Wheat	15080-49	1837	UC
Common Wheat	16010-20	1838	UC
Common Wheat	16010-32	1839	UC
Common Wheat	APB 410117	1840	Arizona Plant Breeders
Common Wheat	APB 510453	1841	Arizona Plant Breeders
Common Wheat	WB 9350	1842	WestBred/Monsanto
Common Wheat	XA 9301	1843	WestBred/Monsanto
Durum Wheat	APB KRONOS	951	Arizona Plant Breeder
Durum Wheat	APB 540165	1827	Arizona Plant Breeder
Durum Wheat	16051-1	1848	UC
Durum Wheat	16051-12	1849	UC
Durum Wheat	16051-25	1850	UC
Durum Wheat	APB 450311	1851	Arizona Plant Breeders

2.3 Repeat harvests for crop growth model testing

To quantify biomass accumulation, and the timing of key phenological stages throughout the growing season, repeated harvests were taken from two widely grown common wheat varieties, Blanca Grande 515 and Cal Rojo, at the Davis location. The varieties were grown under both conventional and low nitrogen management. Trial establishment and management methods were the same as for the conventional and low nitrogen management common wheat regional trials at the Davis location.

Within the conventional and low nitrogen management, the design for the repeat harvest was a randomized complete block with six replicates. Harvest times were randomly assigned to 1 m^2 plots within planted strips of each variety. Harvests were conducted on thirteen occasions throughout the season: January 27th, February 13th, February 24th, March 2nd, March 10th, March 17th, March 23rd, April 4th, April 11th, April 21st, April 28th, and May 9th.

At each harvest, the total aboveground biomass was manually removed from a 1 m^2 plot and weighed. A sub-sample was taken and weighed before and after oven drying at approximately 50°C for one week. This was used to estimate the total aboveground yield of dry biomass for the whole plot sample. A sub-sample of five plants from each plot was used to obtain plant height, Feekes stage, and tiller number.

Data from the repeat harvests was compared to simulations using the APSIM crop model (APSIM v 7.4) for the same locations [13]. Model parameterization for the Davis location was based on those methods previously described by George and Kaffka [10]. Parameters for the wheat varieties from the repeat harvest study were not available in the current APSIM-wheat module. Field data were therefore compared to simulations using the mid-season spring-type Baxter already parameterized in the model.

2.4 Repeated reflectance measurements

Canopy spectral reflectance was obtained throughout the growing season using both hand-held GreenSeekers [14] and a 3DR solo [15] small Unmanned Aircraft System (sUAS) with a Parrot Sequoia camera [16]. Both the GreenSeekers and sUAS cameras were calibrated using a MicaSense Calibrated Reflectance Panel [16].

GreenSeekers record normalized difference vegetation index (NDVI), and provide a measure of photosynthetic activity. At the Davis location, NDVI was recorded for all plots in the conventionally managed common wheat and durum wheat regional trials. Measurements were also taken in conventional and low nitrogen management treatments of Blanca Grande 515 and Cal Rojo. Measurements were taken at approximately weekly intervals from December 2016 to May 2017. At the Fresno location, NDVI measurements were taken in all plots of the conventionally managed common wheat and durum wheat regional trials at three intervals: January 31st, March 24th, and March 27th. At the Colusa location, NDVI measurements were taken in all plots of Blanca Grande 515 and Cal Rojo at five intervals: January 30th, February 24th, March 14th, March 29th, and April 20th. At the Imperial location, NDVI measurements were taken in all plots of Blanca Grande 515 and Cal Rojo at 3 intervals: January 26th, March 8th, and March 27th.

A Parrot Sequoia camera collects data at the green (540 nm), red (660 nm), red edge (735 nm), and NIR (790 nm) wavelengths. Data was collected from the Davis location on January 27th, February 7th, February 15th, February 23rd, March 10th, March 23rd, April 5th, April 14th, April

21st, and May 10th; the Rio Vista location on January 26th, February 14th, March 16th, April 6th, and May 12th; and the Fresno location on February 1st. The software programs PIX4D, R, and QGIS [17-19] were used to capture, compile, and extract plot-level spectral data from images using a modified method of Haghighattalab *et al.* [20].

2.5 Data summarization & analytical procedures

Single season summaries of regional trial data

Yield and protein data, corrected for chaff and moisture content, were standardized to 12% moisture. Mean and standard deviations of the data were then derived for individual varieties and species at each trial location. If the yield of a plot was found to be more than two standard deviations from either the variety mean or trial mean at a location, it was flagged as a potential outlier and the data checked for potential errors. Following this quality control step, the coefficient of variation for individual trials was used to assess overall data quality for that location [21, 22]. The "inter-variety method" for estimating coefficient of variation was used – whereby the coefficient of variation for a variety trial is calculated by averaging across the coefficient of variation estimated for individual varieties within the trial. A coefficient of variation of 16% was used as a threshold to indicate potential data quality problems with data from a specific location. Data from the location with a coefficient of variation of 16% or greater was then subject to further quality checks. Note that coefficient of variation was not used as the sole justification for excluding trial data [21-25]. 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 [17]. Tables summarizing data for individual test locations in the 2016-17 season are available on the Small Grains website (http://smallgrains.ucanr.edu/Variety_Results/2017/), 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 [22, 26, 27]. All data manipulation and analyses were conducted using the computer program R [17]. For the purpose of reporting and summarizing variety trial results, the UC Small Grains program has historically divided California into different sub-regions: the Sacramento Valley, the San Joaquin Valley, and the Imperial Valley. Variety evaluations conducted in the Intermountain region generally include a different population of varieties to other regions of California, and therefore the Intermountain region has also been summarized separately. Genotype by environment patterns in the trial data suggest that the Northern and Southern San Joaquin Valleys may require different variety recommendations. Small grain performance in California is therefore currently summarized by grouping the test locations as follows: the Sacramento Valley (Chico, Clarksburg, Colusa, Davis, Delta, Rio Vista, and Tehama locations); the North Central San Joaquin Valley San Joaquin Valley (Fresno and Kings locations); the South San Joaquin Valley (Tulare and Kern location); the Imperial Valley (Imperial location); and the Intermountain region (Lassen, Siskiyou, and Tulelake locations). Within these regional groupings, variety performance was modeled as a fixed effect, with replication nested within location nested within year modeled as a random effect.

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

Genotype-by-environment analysis

To explore the yield performance patterns of small grain varieties across California a *Genotype plus Genotype-by-Environment* (GGE) analysis was conducted [28], using the R package *gge* [29], with the *Genotype plus Genotype-by-Block of Environments* method of Laffont *et al.* [30]. 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, 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 90^{th} percentile of all plot-level observations for a given variety at a single location. The 90^{th} 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 [31]

For the multi-environment summaries, the quartiles of the data for all 90^{th} percentile values for each disease and agronomic trait across all locations in the five years prior to and including 2016-17 were calculated. The four quartiles were assigned to the following classes: S = Susceptible; MS = Moderately Susceptible; MR = Moderately Resistant; and R = Resistant.

Collaborative trials

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

Repeated reflectance measures

Plot-specific NDVI values measured as a time-series across the season, were summarized quantitatively using the segmented() package in R [32]. For each variety, a 3-slope, 2-breakpoint model was fit with initial breakpoints values that were average days to heading and initiation of senescence across all varieties. The variety-specific parameter values resulting from these

broken-line regression models were then used as quantitative variables to describe the variance in crop productivity among varieties in a multiple regression environment.

2.6 Extension of results

Results of the analyses were published on the UC Small Grains website (http://smallgrains.ucanr.edu/Variety/) and announcements of the availability of newly available results were made on the UC Small Grains Blog (http://ucanr.edu/blogs/smallgrains/). During the 2016-17 season, a newly developed webtool for summarizing results and assisting with variety selection in an interactive environment was completed (http://smallgrainselection.plantsciences.ucdavis.edu/). In addition, presentations of results of the research were made at the 2017 UC Davis Small Grains and Alfalfa-Forages Field Day, the Westside Research and Extension Small Grains Field Day, the Intermountain Research and Extension Field Day, and the UC Davis/California Wheat Commission Wheat Collaborators Meeting.

3. RESULTS

3.1 Regional trials

Seasonal summary

Site conditions

The 2014-15 and 2015-16 seasons were characterized by considerably below average rainfall and growing season temperatures that were above average. In contrast, higher-than-average rainfall was received throughout California in the 2016-17 seasons, particularly in northern parts of the state during the period from late January to early March (Figures 2 to 15). Consequently, locations in the Sacramento Valley, notably Colusa and Davis, that may have received supplemental irrigation in more average seasons did not receive any supplemental irrigation in 2016-17. Details regarding the outcomes at individual test locations in 2016-17 are described as follows: Colusa displayed extensive lodging, with 13% of plots considered unharvestable as a result. The Davis common wheat trial managed for low water received the same quantity of rainfall as the conventionally managed common wheat, and therefore a low-water treatment was not available at this location. Otherwise the trial location looked excellent. The Delta was inundated by water for several days during February, resulting in notable stand-loss, stunting, and heavy weed growth, approximately 15% of plots in the trial were considered empty or unharvestable. At Fresno volunteer barley was present in the conventionally managed common wheat and durum trials, also some late season lodging due to high winds after irrigation was present in these trials. At Kern some seed movement between adjacent plots was observed, contaminating plants were manually rouged from plots; high disease incidence were also observed; otherwise plant growth and yields were good. At Kings approximately 2% of plots exhibited lodging that resulted in them being unharvestable. At Rio Vista only the first two replicates of the common wheat trial were harvested due to difficulty accessing the remainder of the site with the combine harvester; the location also had a sparse stand and heavy weed growth in places. At Tulare, leaf-curl and stunting was observed, most probably from water stress in both common wheat and barley. At Imperial temperatures greater than 35°C were experienced around 160 days after sowing; no other location experienced temperatures this high at this phenological stage (see Figure 16).

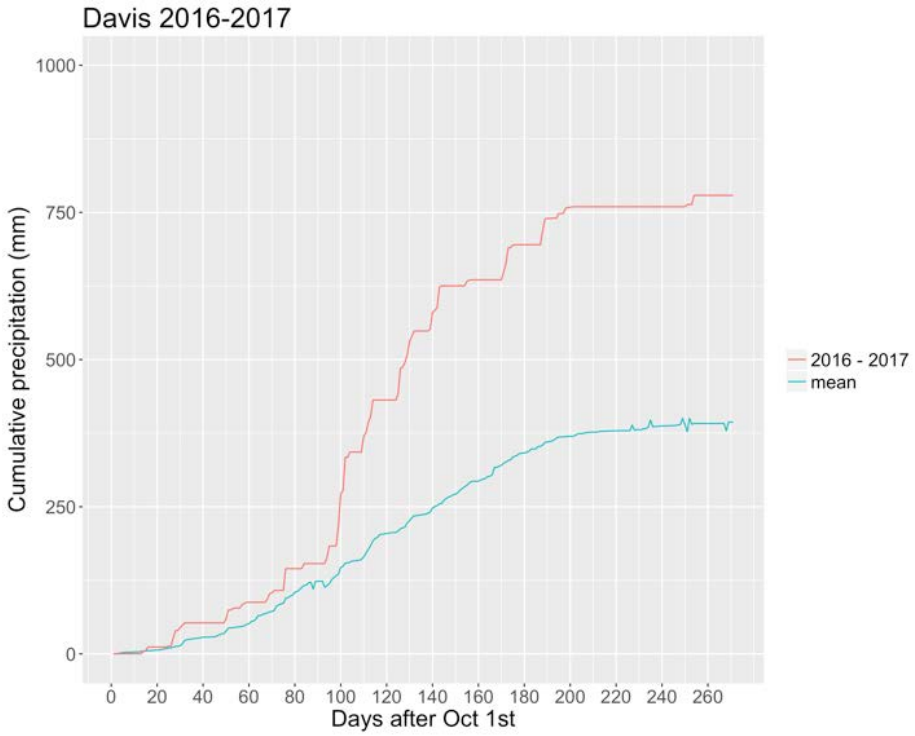

Figure 2. The cumulative rainfall for the 2016-17 season at the Davis location compared with the long-term mean for the region.

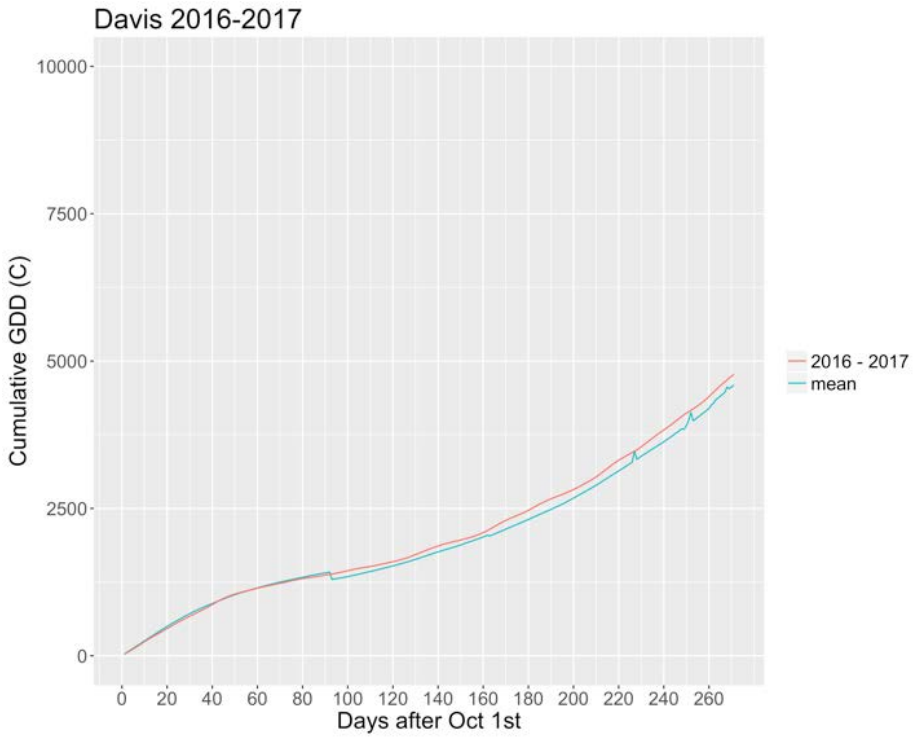

Figure 3. The cumulative growing degree days for the 2016-17 season at the Davis location compared with the long-term mean for the region.

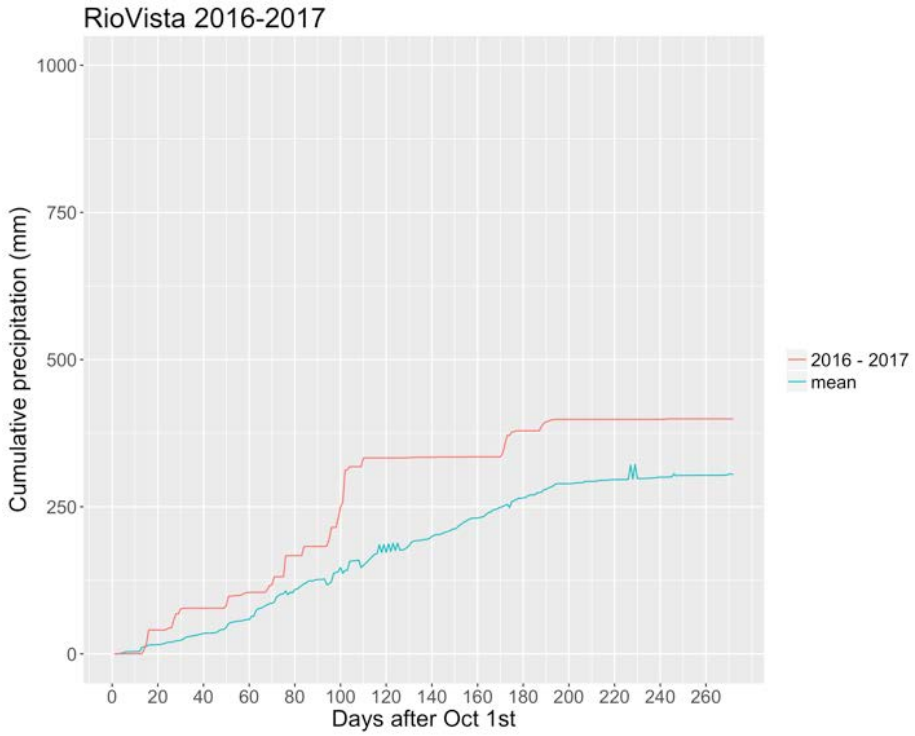

Figure 4: The cumulative rainfall for the 2016-17 season at the Rio Vista location compared with the long-term mean for the region.

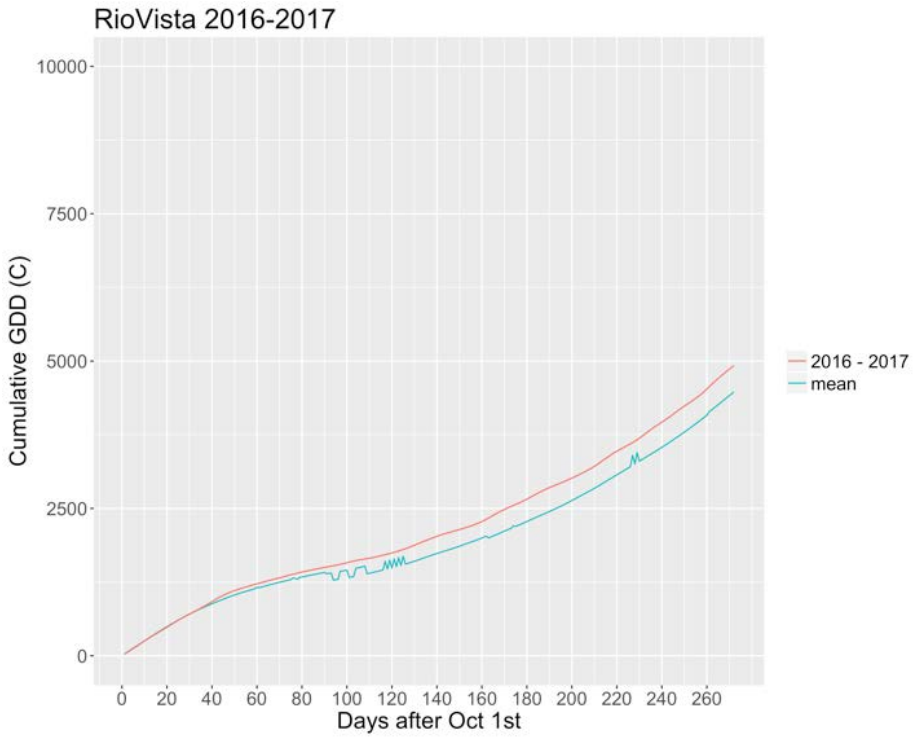

Figure 5: The cumulative growing degree days for the 2016-17 season at the Rio Vista location compared with the long-term mean for the region.

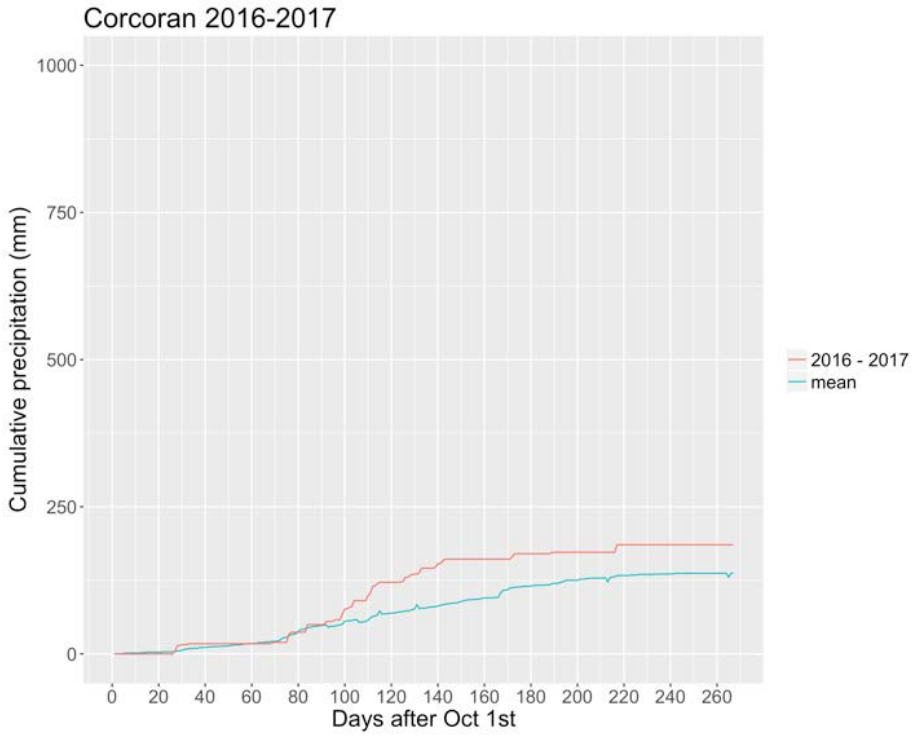

Figure 6: The cumulative rainfall for the 2016-17 season at the Kings location compared with the long-term mean for the region.

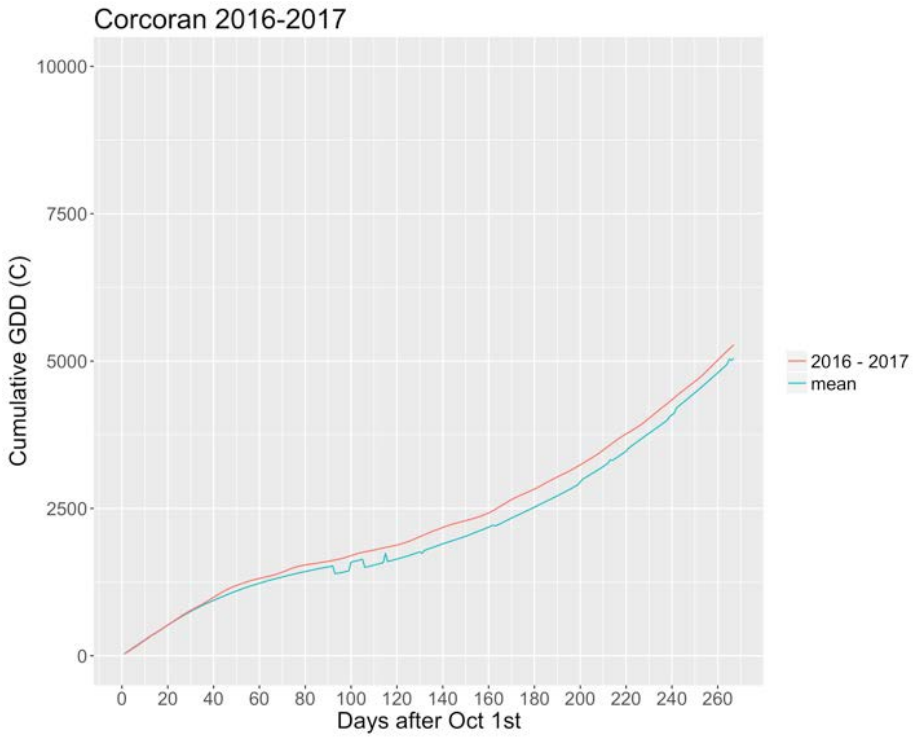

Figure 7: The cumulative growing degree days for the 2016-17 season at the Kings location compared with the long-term mean for the region.

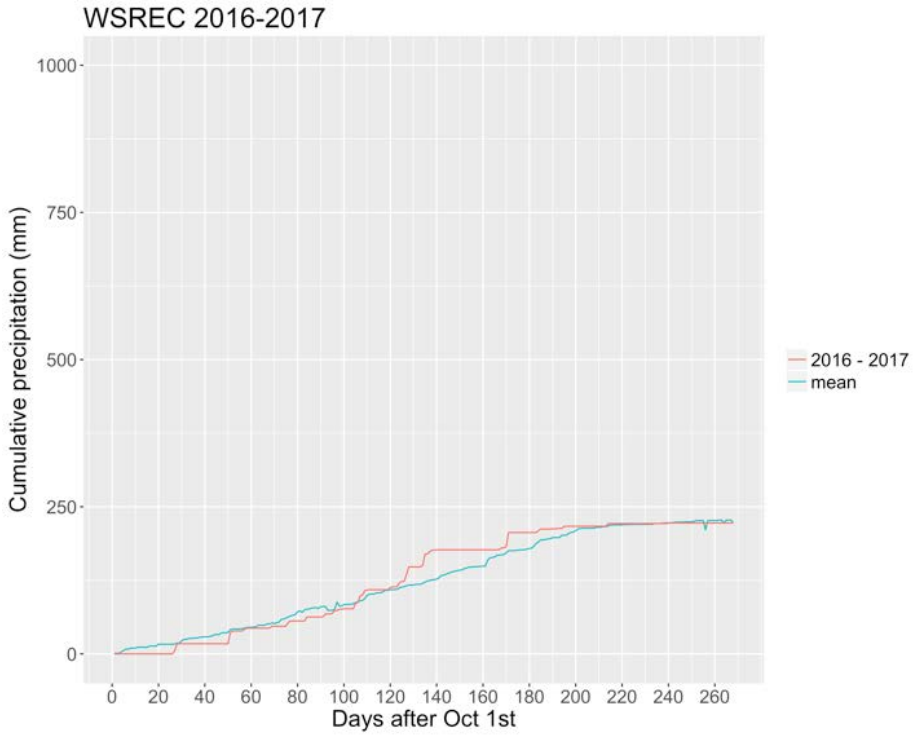

Figure 8: The cumulative rainfall for the 2016-17 season at the Fresno location compared with the long-term mean for the region.

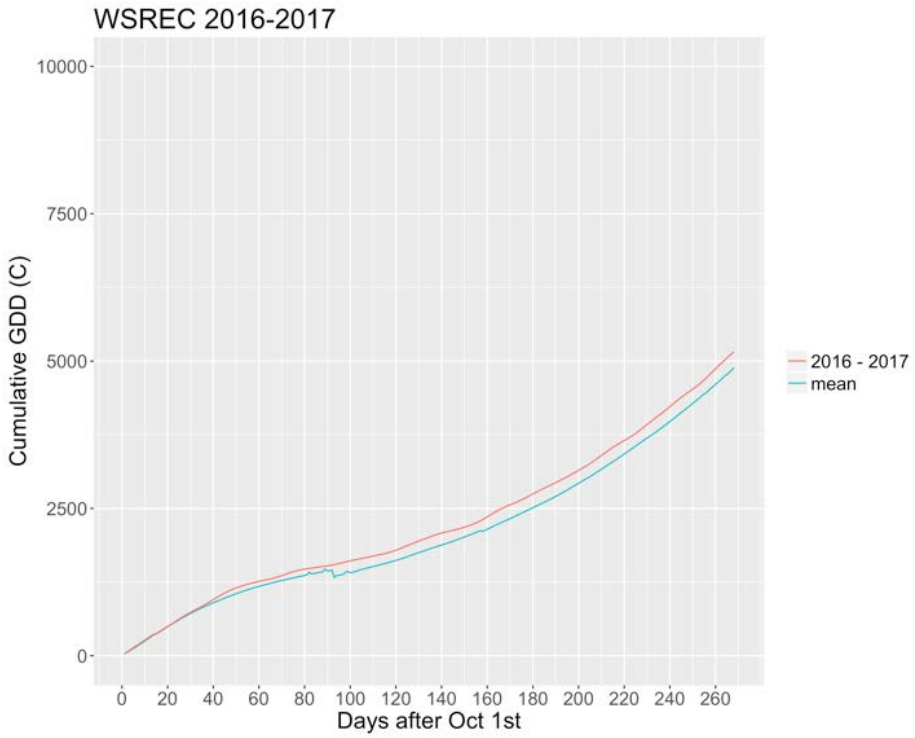

Figure 9: The cumulative growing degree days for the 2016-17 season at the Fresno location compared with the long-term mean for the region.

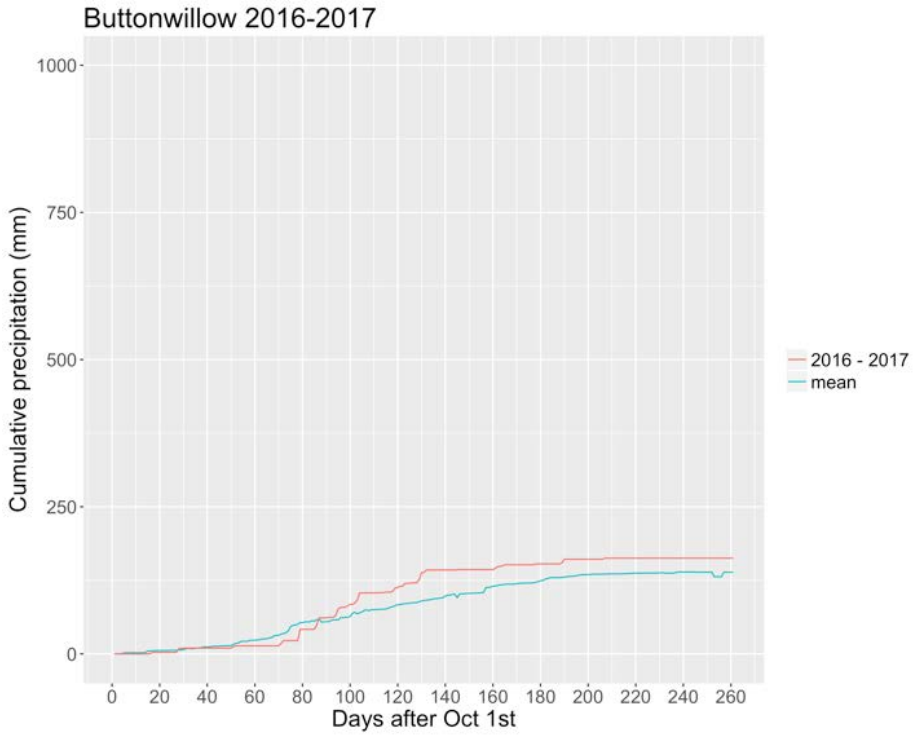

Figure 10: The cumulative rainfall for the 2016-17 season at the Kern location compared with the long-term mean for the region.

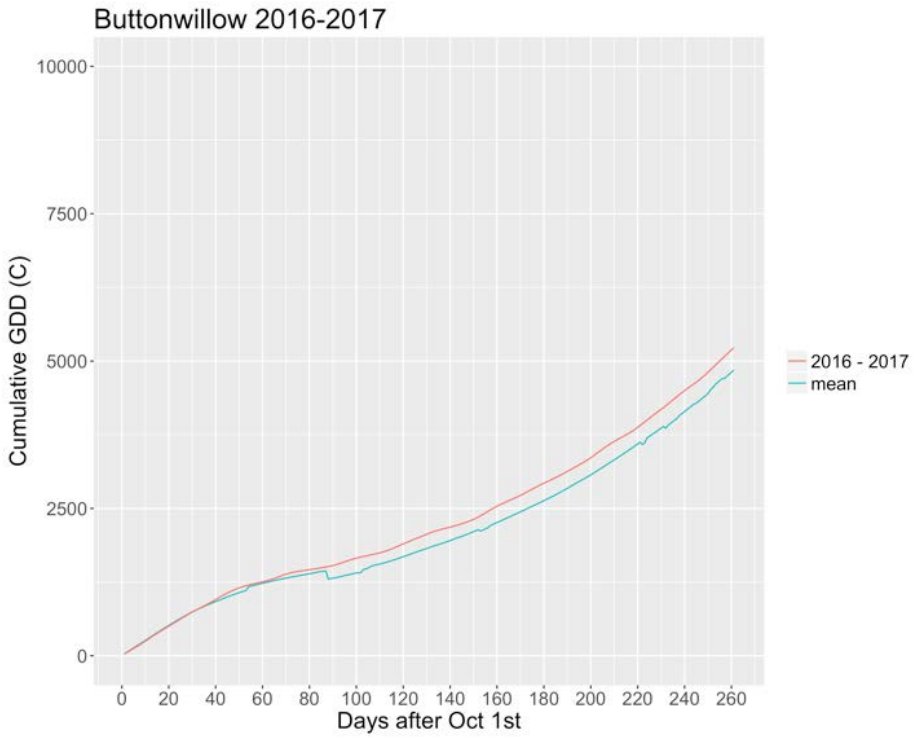

Figure 11: The cumulative growing degree days for the 2016-17 season at the Kern location compared with the long-term mean for the region.

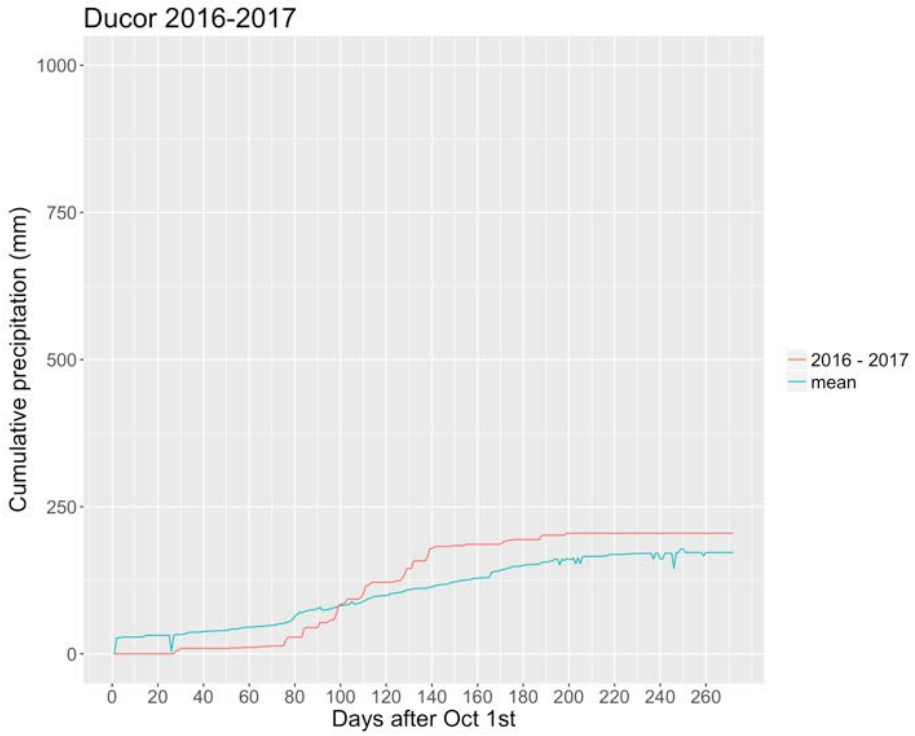

Figure 12: The cumulative rainfall for the 2016-17 season at the Tulare location compared with the long-term mean for the region.

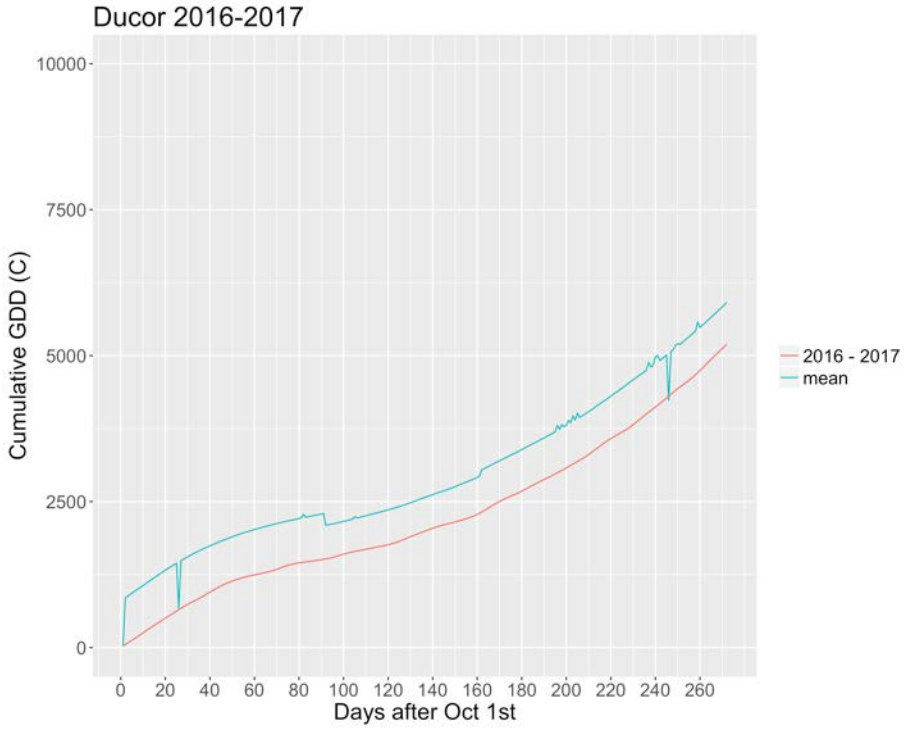

Figure 13: The cumulative growing degree days for the 2016-17 season at the Tulare location compared with the long-term mean for the region.

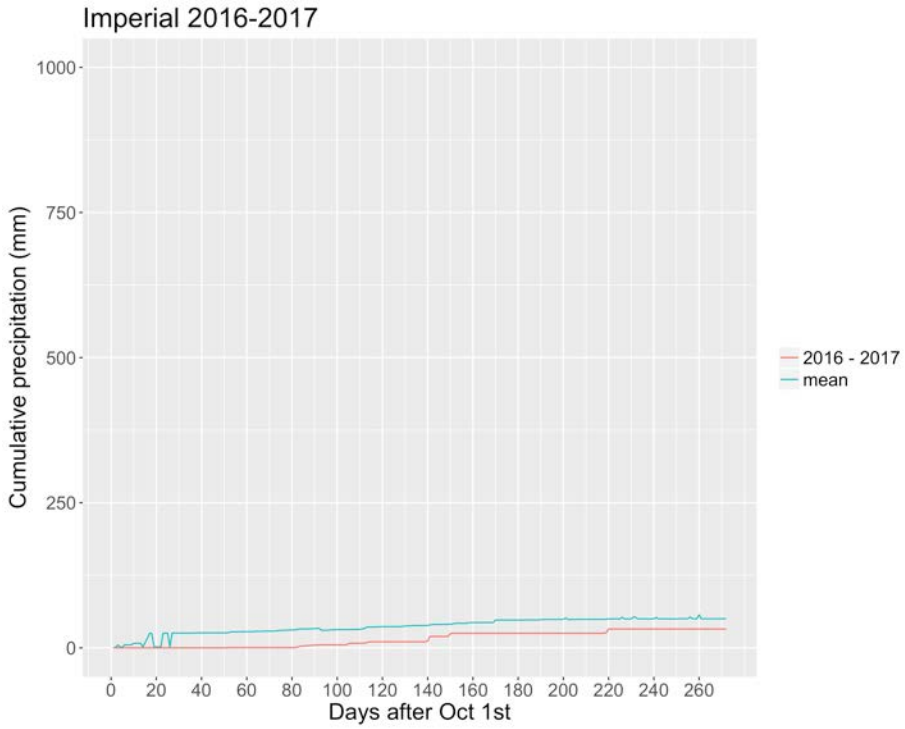

Figure 14: The cumulative rainfall for the 2016-17 season at the Imperial location compared with the long-term mean for the region.

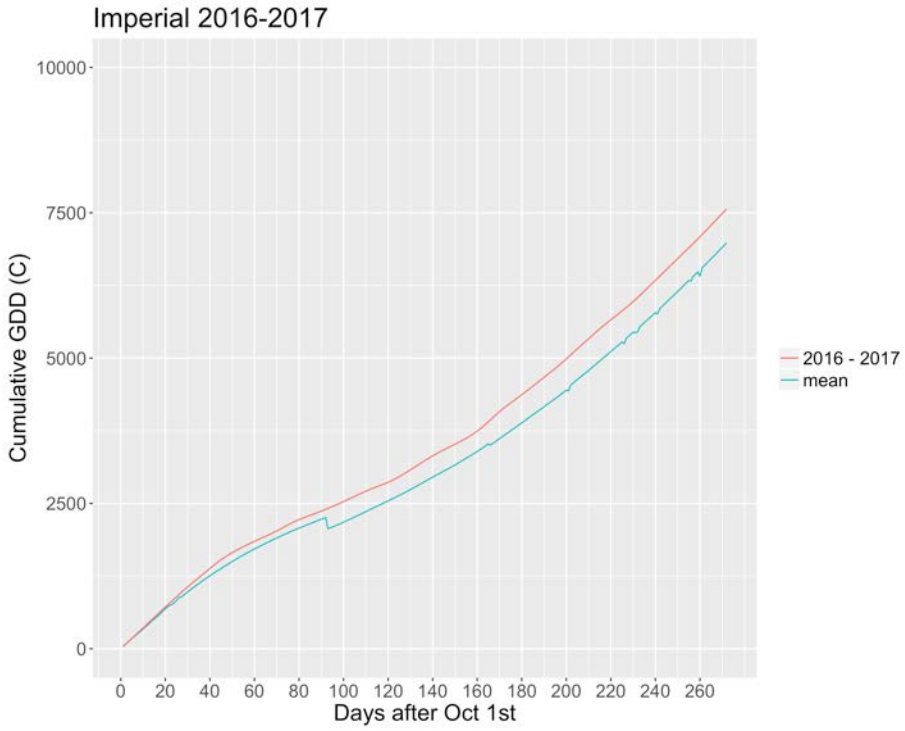

Figure 15: The cumulative growing degree days for the 2016-17 season at the Imperial location compared with the long-term mean for the region.

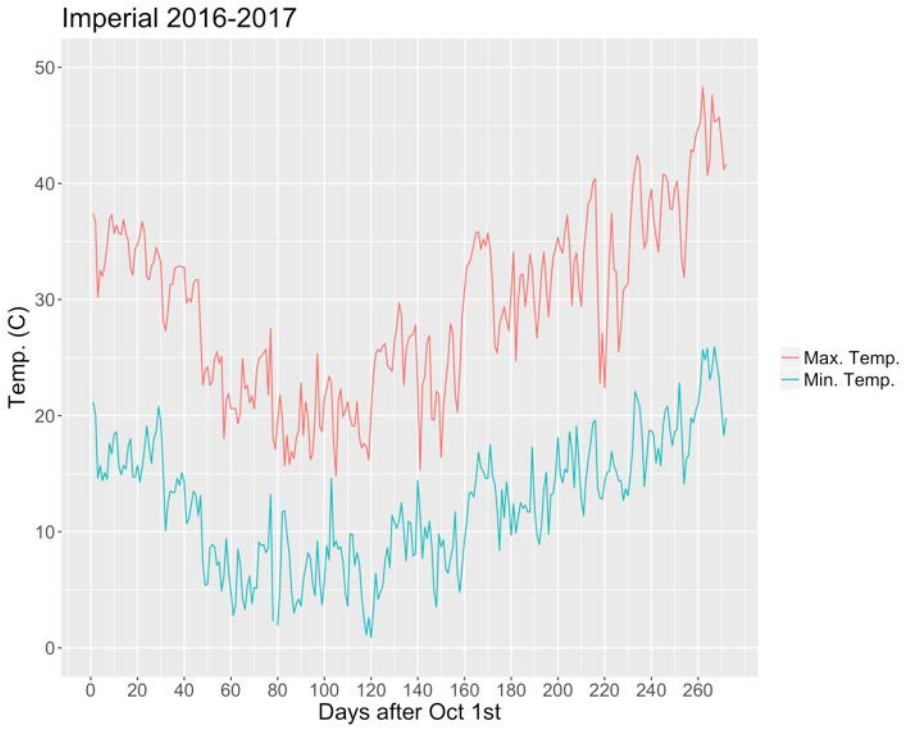

Figure 16: The maximum and minimum daily temperatures for the 2016-17 season at the Imperial location compared with the long-term mean for the region.

Table 11. Details regarding the mean plot dimensions for each location and species in the 2016-17 trials.

Species	Location	Mean Plot Length (ft)	Plot Length Stdev. (ft)	Plot Width (ft)
Common wheat	Colusa	13	5.2	4.7
Common wheat	**Davis**	**14**	**0.8**	**4.7**
Common wheat	Davis_low_n	17	1.0	4.7
Common wheat	**Delta**	**15**	**0.9**	**4.3**
Common wheat	Fresno	12	0.6	4.7
Common wheat	**Fresno_low_n**	**14**	**0.4**	**4.7**
Common wheat	Fresno_low_water	14	0.7	4.7
Common wheat	**Imperial**	**17**	**0.2**	**5.0**
Common wheat	Kern	15	1.5	4.3
Common wheat	**Kings**	**14**	**0.7**	**4.7**
Common wheat	Rio Vista	14	1.2	4.7
Common wheat	**Tulare**	**15**	**0.9**	**4.7**
Durum	Davis	14	0.7	4.7
Durum	**Fresno**	**13**	**0.5**	**4.7**
Durum	Imperial	17	0.2	5.0
Durum	**Kern**	**15**	**1.4**	**4.3**
Durum	Kings	14	0.7	4.7
Barley	**Davis**	**16**	**0.9**	**4.7**
Barley	Fresno	15	0.6	4.7
Barley	**Rio Vista**	**14**	**1.5**	**4.7**
Barley	Tulare	15	1.4	4.7

The plot width varied between locations, depending on the grain drill used to sow the trial. With the exception of the Davis location, the mean harvested plot length at all the locations was 15 ft, with a standard deviation of 1 ft (Table 12). At the Davis location a longer plot length was used to accommodate the passage of equipment through the field.

Table 12. The approximate soil water content (inches/layer) above the wilting point at sowing and harvest time for the test locations.

Sample Time	Location	0-1.5 ft	1.5-3 ft	3-4.5 ft
Pre-plant	Colusa	0.9	-0.6	-0.8
	Davis	0.7	2.6	1.5
	Delta	12.3	20.2	38.5
	Fresno (north)	3.1	3.6	3.8
	Fresno (south)	0.2	0.7	4.1
	Kern	0.8	2.8	3.1
	Kings	0.7	4.7	3.3
	Rio Vista	-1.0	-1.3	-2.4
	Tulare	-3.0	-2.7	-3.0
Post-harvest	Colusa	-1.4	3.2	
	Davis	-0.2	1.2	
	Davis (low N)	0.0	1.7	
	Fresno	-1.2	1.1	
	Fresno (low N)	0.7	2.4	
	Fresno (low water)	0.3	2.2	
	Kern	-1.4	0.4	
	Kings	0.6	5.6	
	Rio Vista	-1.8	-2.4	
	Tulare	-2.2	-3.4	

Plant available soil water content at sowing varied considerably across the test locations (Table 12). At the Fresno location, the northern half of the field, which had the conventionally managed common wheat, durum and collaborative trials, had higher starting moisture than the remaining parts of the field, as indicated by two Fresno inclusions in the table. A number of locations started with a soil water content below wilting point, notably Rio Vista and Tulare. The plant available soil moisture at harvest was similar, to within a few inches, of the starting moisture content at most locations. The pre-plant soil nitrate concentrations in the top 18 inches varied considerably across sites (Table 13).

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 15. In most cases, yields in the 2016-17 were similar to or higher than previous seasons where such data is available. Commercial varieties of all species with higher than average yields, lower than average protein (where measured), and no stripe rust susceptibility are presented in Table 14. Performance summaries for the entries in the regional trials for the individual test locations in the 2016-17 season are provided on the Small Grains website (http://smallgrains.ucanr.edu/Variety_Results/2017/) under the 'Single site data' section for each crop type.

Table 13. Soil nitrate concentration in the top 1.5 ft of soil determine from pre-plant quick tests.

Location	Nitrate
Colusa	20
Davis	5
Delta	50
Fresno (high N)	2
Fresno (low N)	0.5
Imperial	22
Kern	50
Kings	20
Rio Vista	5
Tulare	20
Tulare	20

Table 14. Top-performing commercial varieties based on 2015 to 2017 trial data.

Species	Sub-region	Top-performing varieties
Common	Sacramento Valley	WB 9350, LCS Star, UC Patwin 515HP, SY Summit 515, WB 7618, UC Yurok
	Northern Central San Joaquin	WB 7566, UC Patwin 515, WB 9350, LCS Atomo, WB 9904, SY Cal Rojo, SY 314, UC Lassik, SY Blanca Royale
	Southern San Joaquin Valley	LCS Atomo, SY Blanca Grande 515
	Imperial Valley	SY Summit 515, WB 9229
Durum	Sacramento Valley	WWW Crown, APB Westmore HP
	Northern Cntral San Joaquin	UC Desert King, LCS Kiko, UC Miwok, APB Tiburon
	Southern San Joaquin Valley	none
	Imperial Valley	UC Miwok
Triticale	Sacramento Valley	NS Camelot, NS Pacheco,
	Northern Central San Joaquin	NS Camelot, NS Pacheco, NS Trical 105
	Southern San Joaquin Valley	NS Pacheo
	Imperial Valley	NS Pacheco, NS Trical 105
Barley	Sacramento Valley	Ishi
	Northern Central San Joaquin	Ishi
	Southern San Joaquin Valley	none

Table 15. The mean yield by location in the regional trials for each species over the past five seasons.

Species	Location	2013	2014	2015	2016	2017
BARLEY	CHICO			3670		
	CLARKSBURG	2541	5527	6243	4268	
	DAVIS					5954
	DAVIS_RF	3684	4233	6296	4647	
	FRESNO	6107	5115	4670	6164	4569
	LASSEN	3064	2839	4250		
	SISKIYOU			2891		
	SLO_RF				3201	
	SOLANO_RF					4992
	TEHAMA_RF	2234	2570	1337	1650	
	TULARE_RF				2140	2745
	TULELAKE	5584	4182	4083	4691	6456
COMMON	CLARKSBURG	1643	4264	4084	6210	
	COLUSA	3306	6836		6336	7355
	DAVIS	6008	4737	5443	5848	7810
	DAVIS_LOW_N					3977
	DAVIS_RF	4123	3678	5242	5035	
	DELTA	3950	5515	6257	5836	2799
	FRESNO	5604	5339	5690	7059	6716
	FRESNO_LOW_N					1723
	FRESNO_LOW_water					5784
	FRESNO2				6917	
	IMPERIAL	6200	4428	5952	6807	5991
	KERN	7462	5630	6093	5926	9208
	KINGS		6429	4844		6447
	SOLANO_RF					4587
	TULARE_RF				2135	3421
	TULELAKE					6714
DURUM	CLARKSBURG	2280				
	DAVIS	6821	4880	6921	6091	7853
	DAVIS_RF	3350				
	FRESNO	5712	6008	6814	7425	6283
	FRESNO2				8065	
	IMPERIAL	6036	6372	6740	7022	6211
	KERN	7936	7209	5710	5203	7955
	KINGS		6618	5775		6515
	TEHAMA_RF	3040				
TRITICALE	CLARKSBURG	1967	5455	4837	5552	
	COLUSA	4856	8322		6687	9017
	DAVIS	6715	5241	5471	6579	8752
	DAVIS_LOW_N					4082
	DAVIS_RF	4847	3693	5373	5585	
	DELTA	5124	7861	7535	6890	2946
	FRESNO	5791	5250	5812	7835	6615
	FRESNO_LOW_N					1931
	FRESNO_LOW_water					5867
	FRESNO2				8335	
	IMPERIAL	6530	6056	5917	6980	6199
	KERN	7978	6854	5286	5942	9838
	KINGS		6537	5065		7705
	SOLANO_RF					5051
	TULARE_RF				1822	3180

Common & durum wheat

Common wheat performance is summarized in Table 17 to Table 21. From 2014-15 to 2016-17, average grain yields of common wheat ranged from 4,500 lb/acre at the rainfed locations to 6,300 lb/acre in the Imperial Valley. Commercial varieties with higher than average yields, lower than average protein, and no stripe rust susceptibility differed, for the most part, between the sub-regions. In terms of yield alone, the released varieties WB 7566 and LCS Atomo, and the advanced entries APB 500553, UC 15010 27, XA 9301, XA 9503, and XA 9501 displayed broad adaptation, being among the top five highest yielding varieties in at least two sub-regions. Other top-yielding varieties display more locally specific adaptation, being in the top five in only a single sub-region. Varieties that were in the top five in only one sub-region were: UC 15010 5 and UC 15013 15 in the Sacramento Valley; LCS 11SB0197 in the Northern Central San Joaquin Valley; LCS 11SB0097, UC 14010 29 and APB 501189 in the Southern San Joaquin Valley; APB 500709 in the Imperial Valley; and XA 9502 and XA 9302 in the rainfed locations. Average grain protein content of the common wheat entries ranged from 11.0% to 13.8% for samples from the Sacramento Valley, 10.2% to 13.5% in the North Central San Joaquin Valley, 12.7 % to 15.6 % for the Southern San Joaquin Valley, and 11.0% to 15.4% in Imperial Valley.

Durum wheat performance is summarized in Table 22 to Table 25. Average grain yields for Durum

wheat were similar across sub-regions, ranging from 6200 lb/acre at the southern San Joaquin Valley to 7,000 lb/acre in the Sacramento Valley. The maximum yielding variety was the experimental line UC 15210 12 with 8,600 lbs/acre in the Sacramento Valley. The four sub-regions displayed considerable differences in variety rankings. Commercial varieties with higher than average yields, lower than average protein, and no stripe rust susceptibility differed between the sub-regions. The Southern San Joaquin had no varieties that met these criteria. In terms of yield alone, the Sacramento Valley and Northern Central San Joaquin Valley share a number of highly ranked varieties, whilst the Northern San Joaquin, Southern San Joaquin and Imperial Valley shared few top-ranked varieties. The top five highest yielding varieties were: UC 15210 12, UC 16051 25, APB 471400, UC 13210 21, and UC Desert King in the Sacramento Valley; UC 13210 5, UC 16051 25, UC 13210 21, LCS 13SD0056, and UC 15210 24 in the Northern San Joaquin Valley; APB 540505, APB 540165, APB Tiburon, APB 450311, and UC 14215 9 in the Southern San Joaquin Valley; and UC 13210 21, LCS 12E4006, WWW D3085, UC 14215 9 and APB 470442 in the Imperial Valley. Average grain protein content for the durum wheat ranged from 11.0% to 15.9% for samples from the Sacramento Valley, and from 10.3% to 14.4% for samples from Northern Central San Joaquin Valley, 13.9 % to 17.2 % for the Southern San Joaquin, 11.8 to 15.6 % for the Imperial Valley 17.2 % for the experimental line UC 16051 1, and 16.2 % for the released variety UC Desert King HP.

Triticale

The performance of the triticale entries is summarized in Table 27 to Table 30 Average yields of triticale ranged from 4,200 lb/acre at rainfed locations to 6,000 lbs/acre in the Imperial Valley, with the highest yield being NS 10T50020 with nearly 7,500 lbs/acre in the Sacramento Valley. The triticale varieties showed broadly similar variety rankings across all sub-regions. The variety NS 10T50020 was the highest yielding variety in all sub-regions with the exception of the Imperial Valley where it was the second highest yielding. Commercial varieties with higher than average yields, and no stripe rust susceptibility, were mostly consistent among the sub-regions, NS Pacheo met these criteria in all the sub-regions.

Barley

Performance of barley entries is summarized in Table 31 to Table 34. Average yields of Barley ranged from 2,700 lb/acre in the Southern San Joaquin to 5,200 in the Northern San Joaquin Valley. The highest yield was 6,715 lb/acre for UC B369 in the Northern San Central Joaquin Valley. The malting varieties showed similar rankings across all the sub-regions. Among the commercial malting varieties, LCS Odyssey and LCS Genie did consistently well across all sub-regions. The variety UC 1390 was the second highest yielding in the Southern San Joaquin Valley, but was one of the lowest yielding in all other sub-regions.

The feed barleys showed less consistency in their rankings between sub-regions. The top five highest yielding varieties were: UC UYP 210A, UC UYP 210B, UC UOP 102, ISHI, and UC UOP 96 in the Sacramento Valley; UC B369, UC 08YP 111 1231, UC A237, UC UOP 102, and UC B398 in the Northern Central San Joaquin Valley; UC UOP 98, UC UOP 100, UC B398, UC 1280, and UC UOP 105 in the Southern San Joaquin Valley; and UC UOP 98, UC UYP 210B, UC UOP 100, UC B398, and UC 1280 in the rainfed trials. Of the commercial feed varieties, Ishi performed consistently well across the sub-regions except the southern San Joaquin, which had no varieties that met the criteria of higher than average yields and no stripe rust susceptibility.

Intermountain

The results of the Intermountain trials are summarized in Table 35, Table 36, and Table 37. Grain yields for fall-sown winter wheat in the Intermountain region ranged from 4,300 lb/acre to 8,300 lb/acre, the highest yielding variety over three seasons was ORI2101841. Yields for spring-sown wheat in the Intermountain ranged from 4,200 lb/acre to 7,300 lb/acre, the highest yielding variety over three seasons was XA 9301 EXP. For the spring-sown barley test, average grain yields ranged from 3,400 lb/acre to 7,700 lbs/acre, the highest yielding variety being UC 1337.

Common and durum wheat performance tables

(Continued on following 10 pages)

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

http://smallgrains.ucanr.edu/Variety_Results/2017/)

Table 16. Sacramento Valley region, common wheat yield and protein 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	2016 Yield (lb/acre)	2016 St.Err.Yield (lb/acre)	2016 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2017 Protein (%)	2017 St.Err.Protein (%)	2017 Protein Rank	Status
SacV	COMMON	HRS	2015-2017	APB 500553	1806	6492	444	1	1086	260	0	-	-	-	-	-	-	11.72	0.7	71	-0.63	0.61	0.54	-	-	-	
SacV	**COMMON**	**HWS**	**2015-2017**	**UC 15013 15**	**1816**	**6382**	**424**	**2**	**976**	**227**	**0**	-	-	-	**6676**	**283**	**3**	**11.66**	**0.46**	**72**	**-0.69**	**0.31**	**0.13**	-	-	-	
SacV	COMMON	HWS	2015-2017	LCS ATOMO	1723	6355	384	3	949	140	0	6070	1013	1	6737	283	2	11.99	0.4	61	-0.37	0.22	0.3	11.33	0.71	28	Released
SacV	**COMMON**	**HWS**	**2015-2017**	**WB 7566**	**1802**	**6313**	**385**	**4**	**907**	**141**	**0**	**5266**	**1015**	**24**	**6821**	**283**	**1**	**11.96**	**0.4**	**62**	**-0.39**	**0.22**	**0.26**	**11.54**	**0.71**	**22**	**Released**
SacV	COMMON	HRS	2015-2017	UC 15010 5	1814	6169	424	5	763	227	0	-	-	-	6462	283	7	12.6	0.47	25	0.25	0.32	0.68	-	-	-	
SacV	**COMMON**	**HRS**	**2015-2017**	**XA 9501**	**1845**	**6148**	**431**	**6**	**742**	**239**	**0.01**	**5849**	**1011**	**4**	-	-	-	**12**	**0.48**	**59**	**-0.35**	**0.33**	**0.54**	**11.26**	**0.71**	**31**	
SacV	COMMON	HRS	2015-2017	XA 9502	1846	6144	435	7	738	245	0.01	5834	1013	5	-	-	-	11.55	0.48	74	-0.81	0.34	0.1	10.87	0.71	42	
SacV	**COMMON**	**HRS**	**2015-2017**	**WB 9350**	**1842**	**6125**	**435**	**8**	**719**	**245**	**0.01**	**5815**	**1013**	**7**	-	-	-	**11.89**	**0.48**	**67**	**-0.47**	**0.34**	**0.46**	**11.21**	**0.71**	**34**	**Released**
SacV	COMMON	HRS	2015-2017	XA 9503	1847	6105	435	9	699	245	0.01	5799	1013	8	-	-	-	12.28	0.48	40	-0.07	0.33	0.93	11.54	0.71	23	
SacV	**COMMON**		**2015-2017**	**APB 8238**	**1821**	**6046**	**427**	**10**	**640**	**232**	**0.02**	-	-	-	**6348**	**285**	**10**	**12.25**	**0.47**	**42**	**-0.11**	**0.32**	**0.89**	-	-	-	
SacV	COMMON	HRS	2015-2017	UC 13010 23	1767	6046	444	11	640	260	0.04	-	-	-	-	-	-	12.06	0.7	54	-0.29	0.61	0.82	-	-	-	
SacV	**COMMON**	**HRS**	**2015-2017**	**UC 15014 4**	**1817**	**6006**	**395**	**12**	**600**	**167**	**0**	**5380**	**1013**	**19**	**6568**	**283**	**4**	**12.49**	**0.41**	**28**	**0.13**	**0.23**	**0.8**	**12.18**	**0.71**	**7**	
SacV	COMMON	HWS	2015-2017	LCS 12SB0224	1831	5999	394	13	593	165	0	5588	1011	12	6393	283	8	12.06	0.41	53	-0.29	0.23	0.46	11.5	0.71	26	
SacV	**COMMON**	**HWS**	**2015-2017**	**LCS STAR**	**1688**	**5996**	**384**	**14**	**590**	**140**	**0**	**5560**	**1013**	**13**	**6053**	**283**	**18**	**12.23**	**0.4**	**44**	**-0.12**	**0.22**	**0.8**	**11.3**	**0.71**	**29**	**Released**
SacV	COMMON	HWS	2015-2017	UC 15010 27	1815	5985	395	15	579	167	0	5399	1013	17	6518	283	6	12.05	0.41	55	-0.3	0.24	0.46	11.24	0.71	32	
SacV	**COMMON**	**HRS**	**2015-2017**	**LCS 12SB0197**	**1830**	**5971**	**395**	**16**	**566**	**167**	**0**	**6034**	**1013**	**2**	**5964**	**283**	**21**	**11.73**	**0.41**	**70**	**-0.63**	**0.24**	**0.06**	**10.73**	**0.71**	**44**	
SacV	COMMON	HWS	2015-2017	LCS UI PLATINUM	1805	5964	444	17	559	260	0.07	-	-	-	-	-	-	11.55	0.7	73	-0.8	0.61	0.46	-	-	-	
SacV	**COMMON**	**HRS**	**2015-2017**	**XA 9302**	**1844**	**5930**	**435**	**18**	**524**	**245**	**0.07**	**5620**	**1013**	**10**	-	-	-	**11.47**	**0.49**	**76**	**-0.88**	**0.36**	**0.08**	**10.83**	**0.71**	**43**	
SacV	COMMON	HWS	2015-2017	UC PATWIN 515HP	1743	5930	394	19	524	165	0.01	5256	1011	25	6561	283	5	13.22	0.41	6	0.87	0.23	0	12.53	0.71	2	Released
SacV	**COMMON**	**HRS**	**2015-2017**	**SY 034**	**1794**	**5918**	**444**	**20**	**512**	**260**	**0.1**	-	-	-	-	-	-	**12.33**	**0.7**	**38**	**-0.03**	**0.61**	**0.99**	-	-	-	
SacV	COMMON	HRS	2015-2017	SY SUMMIT 515	1658	5869	384	21	463	140	0	5338	1013	20	6351	283	9	12.3	0.4	39	-0.05	0.22	0.92	11.83	0.71	13	Released
SacV	**COMMON**	**HRS**	**2015-2017**	**APB 500709**	**1819**	**5824**	**396**	**22**	**419**	**169**	**0.04**	**5326**	**1015**	**21**	**6275**	**283**	**12**	**12.4**	**0.41**	**33**	**0.05**	**0.23**	**0.94**	**11.77**	**0.71**	**15**	
SacV	COMMON	HWS	2015-2017	WB 7618	1749	5823	397	23	417	171	0.04	-	-	-	6118	283	15	12.95	0.44	13	0.6	0.28	0.15	-	-	-	Released
SacV	**COMMON**	**HRS**	**2015-2017**	**SY 13WD08850**	**1834**	**5800**	**431**	**24**	**394**	**239**	**0.17**	**5500**	**1011**	**14**	-	-	-	**12.45**	**0.48**	**30**	**0.1**	**0.33**	**0.9**	**11.71**	**0.71**	**18**	
SacV	COMMON	HRS	2015-2017	SY ULTRA	1590	5796	384	25	390	140	0.02	5720	1011	9	6164	285	13	12.16	0.4	49	-0.19	0.22	0.62	11.52	0.71	25	Released
SacV	**COMMON**	**HRS**	**2015-2017**	**UC 14010 20**	**1790**	**5783**	**444**	**26**	**377**	**260**	**0.23**	-	-	-	-	-	-	**12.42**	**0.7**	**32**	**0.07**	**0.61**	**0.96**	-	-	-	
SacV	COMMON	SRS	2015-2017	ASSL TAM 204	1778	5765	384	27	359	139	0.03	5832	1011	6	5714	283	28	11.9	0.4	65	-0.46	0.22	0.15	11.12	0.71	36	Released
SacV	**COMMON**	**HRS**	**2015-2017**	**UC YUROK**	**1745**	**5744**	**384**	**28**	**338**	**140**	**0.04**	**5126**	**1013**	**32**	**5708**	**283**	**29**	**12.24**	**0.4**	**43**	**-0.11**	**0.22**	**0.8**	**12**	**0.71**	**11**	**Released**
SacV	COMMON	HWS	2015-2017	SY BLANCA GRANDE 515	1522	5740	385	29	334	141	0.04	5452	1015	15	6113	283	16	11.96	0.4	63	-0.4	0.22	0.26	11.18	0.71	35	Released
SacV	**COMMON**	**HRS**	**2015-2017**	**APB 510453**	**1841**	**5720**	**439**	**30**	**314**	**253**	**0.32**	**5407**	**1015**	**16**	-	-	-	**12.75**	**0.48**	**20**	**0.39**	**0.34**	**0.52**	**12.07**	**0.71**	**9**	
SacV	COMMON	HRS	2015-2017	XA 9301	1843	5713	444	31	307	261	0.34	5391	1018	18	-	-	-	11.87	0.5	68	-0.48	0.37	0.46	11.37	0.72	27	
SacV	**COMMON**	**HWS**	**2015-2017**	**SY BLANCA GRANDE 515**	**1657**	**5681**	**387**	**32**	**275**	**147**	**0.12**	**5269**	**1024**	**23**	**5778**	**285**	**26**	**12.84**	**0.41**	**17**	**0.48**	**0.23**	**0.15**	**12.2**	**0.72**	**6**	**Released**
SacV	COMMON	HRS	2015-2017	SY REDWING	1521	5630	385	33	224	143	0.2	5208	1018	27	6158	283	14	12.03	0.41	56	-0.32	0.22	0.43	11.22	0.72	33	Released
SacV	**COMMON**	**HRS**	**2015-2017**	**SY 13WD08886**	**1835**	**5619**	**439**	**34**	**213**	**253**	**0.52**	**5301**	**1015**	**22**	-	-	-	**12.69**	**0.48**	**21**	**0.34**	**0.34**	**0.57**	**12.01**	**0.71**	**10**	
SacV	COMMON	HRS	2015-2017	SY CAL ROJO	1478	5615	384	35	210	140	0.22	5243	1013	26	6021	283	19	12.16	0.4	48	-0.19	0.22	0.62	11.27	0.71	30	Released
SacV	**COMMON**		**2015-2017**	**APB 501129**	**1820**	**5605**	**424**	**36**	**199**	**227**	**0.5**	-	-	-	**5899**	**283**	**24**	**12.18**	**0.46**	**46**	**-0.17**	**0.31**	**0.8**	-	-	-	
SacV	COMMON	HRS	2015-2017	UC 14010 17	1789	5594	444	37	188	260	0.57	-	-	-	-	-	-	12.67	0.7	22	0.32	0.61	0.8	-	-	-	
SacV	**COMMON**	**HWS**	**2015-2017**	**UC PATWIN 515**	**1680**	**5566**	**384**	**38**	**160**	**139**	**0.35**	**5119**	**1011**	**33**	**5975**	**283**	**20**	**12.43**	**0.4**	**31**	**0.07**	**0.22**	**0.89**	**11.61**	**0.71**	**20**	**Released**
SacV	COMMON	HRS	2015-2017	APB 501089	1828	5531	395	39	125	167	0.56	5095	1013	34	5934	283	23	11.95	0.41	64	-0.4	0.23	0.28	11.12	0.71	37	
SacV	**COMMON**	**HWS**	**2015-2017**	**WB 7390**	**1750**	**5493**	**397**	**40**	**87**	**171**	**0.71**	-	-	-	**6277**	**283**	**11**	**12.02**	**0.44**	**58**	**-0.33**	**0.28**	**0.5**	-	-	-	
SacV	COMMON	HRS	2015-2017	UC 16010 20	1838	5480	431	41	74	239	0.81	5181	1011	29	-	-	-	12.36	0.48	36	0.01	0.33	0.99	11.62	0.71	19	
SacV	**COMMON**	**HRS**	**2015-2017**	**SY 314**	**1660**	**5471**	**385**	**42**	**65**	**143**	**0.73**	**4965**	**1018**	**37**	**5894**	**283**	**25**	**12**	**0.4**	**60**	**-0.36**	**0.22**	**0.32**	**11.02**	**0.71**	**38**	**Released**
SacV	COMMON	HRS	2015-2017	WB 9904	1751	5458	384	43	52	139	0.78	5594	1011	11	5753	283	27	12.21	0.4	45	-0.15	0.22	0.71	11.82	0.71	14	Released
SacV	**COMMON**	**HRS**	**2015-2017**	**WB 9229**	**1730**	**5453**	**384**	**44**	**47**	**139**	**0.8**	**4789**	**1011**	**40**	**5952**	**283**	**22**	**13.13**	**0.4**	**8**	**0.77**	**0.22**	**0**	**12.46**	**0.71**	**4**	**Released**
SacV	COMMON	HRS	2015-2017	UC LASSIK	1495	5441	385	45	35	141	0.83	5144	1015	31	5485	283	30	11.89	0.41	66	-0.46	0.22	0.16	11.53	0.71	24	Released
SacV	**COMMON**	**HWS**	**2015-2017**	**UC 14010 22**	**1791**	**5436**	**444**	**46**	**30**	**260**	**0.91**	-	-	-	-	-	-	**12.99**	**0.7**	**12**	**0.64**	**0.61**	**0.54**	-	-	-	
SacV	COMMON	HRS	2015-2017	LCS 11SB0096	1772	5373	444	47	-32	260	0.91	-	-	-	-	-	-	12.25	0.7	41	-0.11	0.61	0.94	-	-	-	
SacV	**COMMON**	**HRS**	**2015-2017**	**LCS 10SB0087 B**	**1804**	**5361**	**444**	**48**	**-45**	**260**	**0.89**	-	-	-	-	-	-	**12.18**	**0.7**	**47**	**-0.17**	**0.61**	**0.9**	-	-	-	
SacV	COMMON	HWS	2015-2017	UC 16010 32	1839	5333	444	49	-73	261	0.82	5024	1018	36	-	-	-	12.91	0.5	15	0.56	0.37	0.4	12.37	0.72	5	
SacV	**COMMON**	**HRS**	**2015-2017**	**APB 410117**	**1840**	**5318**	**439**	**50**	**-88**	**253**	**0.8**	**5028**	**1015**	**35**	-	-	-	**12.34**	**0.49**	**37**	**-0.01**	**0.36**	**0.99**	**11.75**	**0.71**	**16**	
SacV	COMMON	HRS	2015-2017	WB 9112	1748	5313	385	51	-93	141	0.6	4667	1015	42	6054	283	17	12.62	0.4	24	0.27	0.22	0.47	11.58	0.71	21	Released
SacV	**COMMON**	**HRS**	**2015-2017**	**WB DA9070 05**	**1803**	**5277**	**444**	**52**	**-128**	**260**	**0.71**	-	-	-	-	-	-	**13.13**	**0.7**	**9**	**0.77**	**0.61**	**0.46**	-	-	-	
SacV	COMMON	HRS	2015-2017	APB 501189	1807	5276	397	53	-130	171	0.56	-	-	-	5149	283	38	12.15	0.44	50	-0.21	0.28	0.68	-	-	-	
SacV	**COMMON**	**HRS**	**2015-2017**	**LCS 11SB0097**	**1773**	**5222**	**444**	**54**	**-184**	**260**	**0.57**	-	-	-	-	-	-	**12.07**	**0.7**	**52**	**-0.28**	**0.61**	**0.82**	-	-	-	
SacV	COMMON	HWS	2015-2017	UC PATWIN	1419	5191	444	55	-215	260	0.52	-	-	-	-	-	-	12.59	0.7	26	0.23	0.61	0.87	-	-	-	Released
SacV	**COMMON**	**HRS**	**2015-2017**	**UC 14010 29**	**1792**	**5173**	**444**	**56**	**-233**	**260**	**0.5**	-	-	-	-	-	-	**13.01**	**0.7**	**10**	**0.65**	**0.61**	**0.54**	-	-	-	
SacV	COMMON	SRS	2015-2017	SY VACA	1766	5160	384	57	-246	140	0.15	5879	1011	3	4595	285	39	10.96	0.4	79	-1.4	0.22	0	9.78	0.71	45	Released
SacV	**COMMON**	**HRS**	**2015-2017**	**UC ANZA**	**20**	**5160**	**396**	**58**	**-246**	**169**	**0.23**	**5188**	**1013**	**28**	**5155**	**285**	**37**	**11.26**	**0.41**	**77**	**-1.1**	**0.23**	**0**	**11**	**0.71**	**39**	**Released**
SacV	COMMON	HRS	2015-2017	WB PATRON	1731	5143	385	59	-262	141	0.12	5145	1015	30	5343	283	33	12.66	0.4	23	0.31	0.22	0.43	11.75	0.71	17	Released
SacV	**COMMON**	**HRS**	**2015-2017**	**UC 15014 35**	**1818**	**5127**	**424**	**60**	**-279**	**227**	**0.32**	-	-	-	**5421**	**283**	**31**	**13.59**	**0.47**	**3**	**1.23**	**0.32**	**0**	-	-	-	
SacV	COMMON	HWS	2015-2017	UC 14014 42	1793	5124	444	61	-282	260	0.38	-	-	-	-	-	-	13.38	0.7	5	1.02	0.61	0.31	-	-	-	
SacV	**COMMON**	**HWS**	**2015-2017**	**UC CLEAR WHITE**	**1361**	**5094**	**444**	**62**	**-312**	**260**	**0.33**	-	-	-	-	-	-	**12.08**	**0.7**	**51**	**-0.27**	**0.61**	**0.82**	-	-	-	**Released**
SacV	COMMON	HWS	2015-2017	SY DAYN	1795	5078	444	63	-327	260	0.32	-	-	-	-	-	-	13	0.7	11	0.64	0.61	0.54	-	-	-	Released
SacV	**COMMON**	**HRS**	**2015-2017**	**WB ROCKLAND**	**1650**	**5078**	**397**	**64**	**-328**	**171**	**0.11**	-	-	-	**5322**	**283**	**35**	**13.75**	**0.44**	**2**	**1.39**	**0.28**	**0**	-	-	-	**Released**
SacV	COMMON		2015-2017	APB 8155	1829	5048	424	65	-358	227	0.2	-	-	-	5342	283	34	13.18	0.46	7	0.82	0.31	0.06	-	-	-	
SacV	**COMMON**	**HRS**	**2015-2017**	**UC 14657 170**	**1836**	**5015**	**439**	**66**	**-391**	**253**	**0.2**	**4700**	**1015**	**41**	-	-	-	**12.55**	**0.49**	**27**	**0.19**	**0.36**	**0.8**	**11.95**	**0.71**	**12**	
SacV	COMMON	HRS	2015-2017	WWW FV 2808	1608	4977	384	67	-429	139	0.01	4835	1011	39	5182	283	36	11.08	0.4	78	-1.27	0.22	0	10.93	0.71	40	Released
SacV	**COMMON**	**SWS**	**2015-2017**	**BAG NEW DIRKWIN HP**	**1779**	**4967**	**444**	**68**	**-439**	**260**	**0.16**	-	-	-	-	-	-	**12.8**	**0.7**	**19**	**0.44**	**0.61**	**0.7**	-	-	-	**Released**
SacV	COMMON	HRS	2015-2017	WB PR 1404	1526	4965	444	69	-440	260	0.16	-	-	-	-	-	-	11.5	0.7	75	-0.85	0.61	0.44	-	-	-	Released
SacV	**COMMON**	**HWS**	**2015-2017**	**WB PERLA**	**1729**	**4790**	**444**	**70**	**-616**	**260**	**0.04**	-	-	-	-	-	-	**12.82**	**0.7**	**18**	**0.46**	**0.61**	**0.68**	-	-	-	**Released**
SacV	COMMON	HRS	2015-2017	WB JOAQUIN ORO	1728	4753	386	71	-652	146	0	4007	1024	45	5350	283	32	13.55	0.41	4	1.19	0.23	0	12.52	0.72	3	Released
SacV	**COMMON**	**HRS**	**2015-2017**	**YECORA ROJO**	**112**	**4718**	**471**	**72**	**-688**	**304**	**0.05**	**4416**	**1032**	**43**	-	-	-	**12.4**	**0.53**	**34**	**0.04**	**0.41**	**0.96**	**12.15**	**0.73**	**8**	**Released**
SacV	COMMON	HWS	2015-2017	UC 15080 49	1837	4714	439	73	-692	253	0.02	4405	1015	44	-	-	-	13.76	0.49	1	1.4	0.36	0	13.16	0.71	1	
SacV	**COMMON**	**SWS**	**2015-2017**	**BAG NEW DIRKWIN**	**1667**	**4184**	**386**	**74**	**-1222**	**144**	**0**	**4926**	**1013**	**38**	**3460**	**291**	**41**	**11.77**	**0.41**	**69**	**-0.58**	**0.22**	**0.06**	**10.88**	**0.71**	**41**	**Released**
SacV	COMMON	HRS	2015-2017	APB 430429	1808	3908	444	75	-1498	260	0	-	-	-	-	-	-	12.37	0.79	35	0.01	0.7	0.99	-	-	-	
SacV	**COMMON**	**HRS**	**2015-2017**	**WB TRIPLE IV**	**1550**	**3715**	**398**	**76**	**-1691**	**173**	**0**	-	-	-	**4406**	**285**	**40**	**12.03**	**0.45**	**57**	**-0.32**	**0.29**	**0.53**	-	-	-	**Released**
SacV	COMMON	HRS	2015-2017	WB JOAQUIN	1424	3076	444	77	-2330	260	0	-	-	-	-	-	-	12.45	0.7	29	0.1	0.61	0.94	-	-	-	Released
SacV	**COMMON**	**HRS**	**2015-2017**	**WWW MIKA**	**1340**	**3073**	**444**	**78**	**-2332**	**260**	**0**	-	-	-	-	-	-	**12.91**	**0.7**	**16**	**0.55**	**0.61**	**0.62**	-	-	-	**Released**
SacV	COMMON	HWS	2015-2017	APB 717	1809	2687	444	79	-2719	260	0	-	-	-	-	-	-	12.93	0.79	14	0.57	0.7	0.67	-	-	-	

Table 17. North Central San Joaquin Valley region, common wheat yield and protein 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	2016 Yield (lb/acre)	2016 St.Err.Yield (lb/acre)	2016 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2017 Protein (%)	2017 St.Err.Protein (%)	2017 Protein Rank	Status
NCenSJV	COMMON	HRS	2015-2017	XA 9501	1845	6525	645	1	948	172	0	5942	1174	1	-	-	-	11.13	0.81	69	-0.62	0.37	0.46	9.69	0.67	39	
NCenSJV	COMMON	HRS	2015-2017	LCS 12SB0197	1830	6464	637	2	887	141	0	5819	1174	2	7935	249	3	10.99	0.78	73	-0.76	0.31	0.11	9.52	0.67	43	
NCenSJV	COMMON	HRS	2015-2017	APB 500553	1806	6408	668	3	830	241	0	-	-	-	-	-	-	12.02	1.15	26	0.27	0.89	0.91	-	-	-	
NCenSJV	COMMON	HWS	2015-2017	UC 15010 27	1815	6399	637	4	822	141	0	5648	1174	5	8085	249	2	11.47	0.78	51	-0.28	0.31	0.63	9.94	0.67	28	
NCenSJV	COMMON	HWS	2015-2017	WB 7566	1802	6381	634	5	804	121	0	5540	1174	10	8105	249	1	11.23	0.78	66	-0.53	0.29	0.38	9.85	0.67	32	Released
NCenSJV	COMMON	HRS	2015-2017	SY ULTRA	1590	6294	634	6	716	121	0	5753	1174	3	7685	249	4	11.33	0.78	63	-0.42	0.29	0.51	9.88	0.67	30	Released
NCenSJV	COMMON	HRS	2015-2017	SY 13W00850	1834	6207	645	7	630	172	0	5624	1174	6	-	-	-	11.84	0.81	33	0.09	0.37	0.92	10.4	0.67	15	
NCenSJV	COMMON	HRS	2015-2017	SY REDWING	1521	6206	634	8	629	121	0	5655	1174	4	7547	249	9	11.5	0.78	49	-0.25	0.29	0.64	10.13	0.67	19	Released
NCenSJV	COMMON	HWS	2015-2017	LCS 12SB0224	1831	6189	637	9	611	141	0	5568	1174	8	7612	249	5	11.32	0.78	64	-0.43	0.31	0.51	9.91	0.67	29	
NCenSJV	COMMON	HRS	2015-2017	SY 034	1794	6183	668	10	606	241	0.03	-	-	-	-	-	-	11.96	1.15	27	0.21	0.89	0.92	-	-	-	
NCenSJV	COMMON	HRS	2015-2017	XA 9301	1843	6176	645	11	599	172	0	5592	1174	7	-	-	-	11.04	0.81	71	-0.71	0.37	0.35	9.61	0.67	41	
NCenSJV	COMMON	HRS	2015-2017	SY 13WB0886	1835	6143	645	12	566	172	0	5560	1174	9	-	-	-	12.09	0.81	21	0.34	0.37	0.63	10.65	0.67	10	
NCenSJV	COMMON	HWS	2015-2017	UC 14010 22	1791	6129	668	13	552	241	0.05	-	-	-	-	-	-	11.6	1.15	42	-0.15	0.89	0.93	-	-	-	
NCenSJV	COMMON	HRS	2015-2017	XA 9503	1847	6102	645	14	525	172	0.01	5518	1174	12	-	-	-	11.39	0.81	57	-0.36	0.37	0.63	9.96	0.67	27	
NCenSJV	COMMON		2015-2017	APB 8238	1821	6095	668	15	518	242	0.06	-	-	-	7445	249	11	11.96	0.89	28	0.21	0.52	0.84	-	-	-	
NCenSJV	COMMON	HRS	2015-2017	APB 510453	1841	6060	645	16	483	172	0.01	5477	1174	16	-	-	-	11.53	0.81	47	-0.22	0.37	0.74	10.1	0.67	21	
NCenSJV	COMMON	HWS	2015-2017	WB 7390	1750	6051	645	17	474	170	0.01	-	-	-	7604	249	7	11.55	0.85	44	-0.2	0.45	0.84	-	-	-	
NCenSJV	COMMON	HWS	2015-2017	UC PATWIN 515	1680	6050	634	18	473	121	0	5486	1174	15	7570	249	8	11.58	0.78	43	-0.17	0.29	0.74	10.07	0.67	24	Released
NCenSJV	COMMON	HRS	2015-2017	APB 501089	1828	6041	637	19	464	141	0	5456	1174	17	7395	249	12	11.39	0.78	56	-0.36	0.31	0.58	10	0.67	25	
NCenSJV	COMMON	HRS	2015-2017	WB 9350	1842	6036	645	20	459	172	0.02	5452	1174	18	-	-	-	11.2	0.81	68	-0.55	0.37	0.51	9.76	0.67	36	Released
NCenSJV	COMMON	HWS	2015-2017	LCS ATOMO	1723	5990	634	21	413	121	0	5501	1174	14	7344	249	14	11.3	0.78	65	-0.45	0.29	0.51	9.87	0.67	31	Released
NCenSJV	COMMON	HRS	2015-2017	UC 14010 20	1790	5977	668	22	400	241	0.15	-	-	-	-	-	-	11.38	1.15	59	-0.37	0.89	0.84	-	-	-	
NCenSJV	COMMON	HRS	2015-2017	XA 9502	1846	5964	645	23	386	172	0.05	5380	1174	21	-	-	-	11.22	0.81	67	-0.53	0.37	0.51	9.78	0.67	34	
NCenSJV	COMMON	HRS	2015-2017	WB 9904	1751	5960	634	24	383	121	0	5401	1174	20	7349	249	13	11.53	0.77	46	-0.22	0.28	0.69	10.18	0.66	17	Released
NCenSJV	COMMON	HRS	2015-2017	UC 15010 5	1814	5959	668	25	381	242	0.17	-	-	-	7308	249	18	11.63	0.89	38	-0.12	0.52	0.92	-	-	-	
NCenSJV	COMMON	HRS	2015-2017	SY CAL ROJO	1478	5957	634	26	380	123	0.01	5322	1175	22	7605	249	6	11.35	0.78	61	-0.4	0.29	0.51	9.97	0.67	26	Released
NCenSJV	COMMON	HRS	2015-2017	SY 314	1660	5948	634	27	371	121	0.01	5535	1174	11	7237	249	19	11.37	0.78	60	-0.38	0.29	0.54	9.76	0.67	37	Released
NCenSJV	COMMON	HRS	2015-2017	LCS 11SB0097	1773	5943	668	28	366	241	0.18	-	-	-	-	-	-	11.83	1.15	34	0.08	0.89	0.94	-	-	-	
NCenSJV	COMMON	HRS	2015-2017	APB 500709	1819	5929	637	29	352	141	0.03	5402	1174	19	7165	249	23	11.46	0.79	53	-0.29	0.31	0.63	9.75	0.67	38	
NCenSJV	COMMON	HRS	2015-2017	LCS 11SB0096	1772	5910	668	30	333	241	0.23	-	-	-	-	-	-	11.62	1.15	41	-0.13	0.89	0.93	-	-	-	
NCenSJV	COMMON	HRS	2015-2017	XA 9302	1844	5895	645	31	318	172	0.11	5312	1174	23	-	-	-	11.12	0.81	70	-0.63	0.37	0.46	9.69	0.67	40	
NCenSJV	COMMON	HRS	2015-2017	UC LASSIK	1495	5872	634	32	295	121	0.03	5167	1174	26	7317	249	17	11.48	0.78	50	-0.27	0.29	0.63	10.28	0.67	16	Released
NCenSJV	COMMON	HRS	2015-2017	UC 13010 23	1767	5869	668	33	292	241	0.29	-	-	-	-	-	-	11.62	1.15	39	-0.13	0.89	0.93	-	-	-	
NCenSJV	COMMON	HWS	2015-2017	SY BLANCA ROYALE	1522	5866	634	34	289	123	0.04	5505	1174	13	7171	266	22	11.45	0.78	54	-0.3	0.29	0.63	10.17	0.67	18	Released
NCenSJV	COMMON		2015-2017	APB 501129	1820	5853	668	35	276	242	0.32	-	-	-	7203	249	21	11.62	0.89	40	-0.13	0.52	0.92	-	-	-	
NCenSJV	COMMON	HRS	2015-2017	SY SUMMIT 515	1658	5827	634	36	250	121	0.07	5027	1174	29	7480	249	10	11.87	0.78	32	0.12	0.29	0.84	10.42	0.67	14	Released
NCenSJV	COMMON	HRS	2015-2017	UC YUROK	1745	5818	634	37	241	121	0.08	5189	1174	25	6833	249	29	12.04	0.78	24	0.29	0.29	0.63	10.73	0.67	8	Released
NCenSJV	COMMON	HWS	2015-2017	LCS UI PLATINUM	1805	5816	668	38	239	241	0.4	-	-	-	-	-	-	10.66	1.15	77	-1.09	0.89	0.55	-	-	-	
NCenSJV	COMMON	HWS	2015-2017	WB 7618	1749	5811	645	39	234	170	0.23	-	-	-	7337	249	15	12.07	0.85	22	0.32	0.45	0.7	-	-	-	Released
NCenSJV	COMMON	HWS	2015-2017	UC PATWIN 515HP	1743	5801	637	40	224	141	0.17	5130	1174	27	7327	249	16	12.52	0.78	11	0.77	0.31	0.11	11.32	0.67	2	Released
NCenSJV	COMMON	SRS	2015-2017	ASSL TAM 204	1778	5799	634	41	222	121	0.11	5204	1174	24	7019	249	26	11.33	0.78	62	-0.42	0.29	0.51	9.78	0.67	35	Released
NCenSJV	COMMON	HRS	2015-2017	UC 14010 29	1792	5670	668	42	93	241	0.83	-	-	-	-	-	-	12.37	1.15	15	0.62	0.89	0.71	-	-	-	
NCenSJV	COMMON	HRS	2015-2017	UC 15014 4	1817	5603	637	43	26	141	0.95	4945	1174	34	7102	249	24	12.16	0.78	19	0.41	0.31	0.53	10.6	0.67	12	
NCenSJV	COMMON	HRS	2015-2017	WB DA907 005	1803	5601	668	44	24	241	0.96	-	-	-	-	-	-	11.91	1.15	31	0.16	0.89	0.93	-	-	-	
NCenSJV	COMMON	HWS	2015-2017	WB PERLA	1729	5581	668	45	4	241	0.99	-	-	-	-	-	-	12.73	1.15	6	0.98	0.89	0.59	-	-	-	Released
NCenSJV	COMMON	HRS	2015-2017	WB 9229	1730	5569	634	46	-9	121	0.96	4853	1174	36	7220	249	20	12.19	0.78	18	0.44	0.29	0.51	10.61	0.67	11	Released
NCenSJV	COMMON	HWS	2015-2017	LCS STAR	1688	5567	634	47	-10	125	0.96	4809	1175	37	7093	249	25	11.39	0.78	58	-0.36	0.29	0.55	9.81	0.67	33	Released
NCenSJV	COMMON	HWS	2015-2017	SY DAYN	1795	5558	668	48	-19	241	0.96	-	-	-	-	-	-	12.03	1.15	25	0.28	0.89	0.91	-	-	-	Released
NCenSJV	COMMON	HRS	2015-2017	APB 410117	1840	5550	645	49	-27	172	0.96	4967	1174	32	-	-	-	11.52	0.81	48	-0.23	0.37	0.74	10.09	0.67	22	
NCenSJV	COMMON	HWS	2015-2017	UC PATWIN	1419	5549	668	50	-28	241	0.96	-	-	-	-	-	-	11.63	1.15	37	-0.12	0.89	0.93	-	-	-	Released
NCenSJV	COMMON	HWS	2015-2017	UC CLEAR WHITE	1361	5546	668	51	-31	241	0.96	-	-	-	-	-	-	11.02	1.15	72	-0.73	0.89	0.67	-	-	-	Released
NCenSJV	COMMON	HWS	2015-2017	UC 16010 32	1839	5546	645	52	-32	172	0.95	4962	1174	33	-	-	-	12.58	0.81	9	0.83	0.37	0.19	11.14	0.67	4	
NCenSJV	COMMON	HRS	2015-2017	UC 16010 20	1838	5524	645	53	-53	172	0.87	4940	1174	35	-	-	-	12.46	0.81	12	0.71	0.37	0.35	11.02	0.67	5	
NCenSJV	COMMON	HRS	2015-2017	UC 14010 17	1789	5500	668	54	-77	241	0.87	-	-	-	-	-	-	11.77	1.15	35	0.02	0.89	0.98	-	-	-	
NCenSJV	COMMON	HWS	2015-2017	SY BLANCA GRANDE 515	1657	5493	634	55	-84	121	0.6	5016	1174	30	6834	249	28	12.43	0.78	13	0.68	0.29	0.14	11.02	0.67	6	Released
NCenSJV	COMMON	HRS	2015-2017	WB PR 1404	1526	5474	668	56	-103	241	0.8	-	-	-	-	-	-	10.76	1.15	75	-0.99	0.89	0.59	-	-	-	Released
NCenSJV	COMMON	HRS	2015-2017	WB PATRON	1731	5419	634	57	-158	121	0.25	4765	1174	38	6867	249	27	11.92	0.78	29	0.17	0.29	0.74	10.09	0.67	23	Released
NCenSJV	COMMON	HWS	2015-2017	UC 15013 15	1816	5413	668	58	-164	242	0.61	-	-	-	6763	249	30	11.53	0.89	45	-0.22	0.52	0.84	-	-	-	
NCenSJV	COMMON	HRS	2015-2017	WWW FV 2808	1608	5391	634	59	-186	121	0.18	5078	1174	28	6545	249	32	10.41	0.78	78	-1.34	0.29	0	9.24	0.67	44	Released
NCenSJV	COMMON	HRS	2015-2017	WB 9112	1748	5359	634	60	-218	123	0.13	4650	1174	40	6749	266	31	12.15	0.78	20	0.4	0.3	0.54	10.85	0.67	7	Released
NCenSJV	COMMON	HRS	2015-2017	YECORA ROJO	112	5276	647	61	-301	177	0.14	4688	1175	39	-	-	-	12.04	0.82	23	0.29	0.39	0.69	10.55	0.67	13	Released
NCenSJV	COMMON	HRS	2015-2017	UC ANZA	20	5267	637	62	-310	141	0.05	5010	1174	31	5964	249	37	10.72	0.78	76	-1.03	0.31	0.01	9.54	0.67	42	Released
NCenSJV	COMMON	HRS	2015-2017	LCS 10SB0087 B	1804	5208	668	63	-369	241	0.18	-	-	-	-	-	-	12.29	1.15	16	0.54	0.89	0.74	-	-	-	
NCenSJV	COMMON		2015-2017	APB 8155	1829	5185	668	64	-392	242	0.16	-	-	-	6534	249	33	12.58	0.89	10	0.83	0.52	0.51	-	-	-	
NCenSJV	COMMON	HWS	2015-2017	UC 14014 42	1793	5168	668	65	-409	241	0.14	-	-	-	-	-	-	12.84	1.15	4	1.09	0.89	0.55	-	-	-	
NCenSJV	COMMON	HRS	2015-2017	UC 15014 35	1818	5138	668	66	-440	242	0.12	-	-	-	6487	249	34	13.48	0.89	1	1.73	0.52	0.01	-	-	-	
NCenSJV	COMMON	HRS	2015-2017	WB ROCKLAND	1650	5110	645	67	-467	170	0.02	-	-	-	6373	249	35	13.26	0.85	2	1.51	0.45	0.01	-	-	-	Released
NCenSJV	COMMON	HRS	2015-2017	UC 14657 170	1836	5085	645	68	-493	172	0.01	4501	1174	41	-	-	-	12.22	0.82	17	0.47	0.39	0.55	10.72	0.67	9	
NCenSJV	COMMON	HRS	2015-2017	APB 430429	1808	4919	668	69	-658	241	0.02	-	-	-	-	-	-	12.41	1.15	14	0.66	0.89	0.69	-	-	-	
NCenSJV	COMMON	HRS	2015-2017	WB JOAQUIN ORO	1728	4742	634	70	-835	123	0	3984	1174	44	5913	266	38	13.22	0.78	3	1.47	0.29	0	11.81	0.67	1	Released
NCenSJV	COMMON	HRS	2015-2017	APB 501189	1807	4705	645	71	-872	170	0	-	-	-	5200	249	40	11.4	0.85	55	-0.35	0.45	0.69	-	-	-	
NCenSJV	COMMON	HWS	2015-2017	UC 15080 49	1837	4690	645	72	-887	172	0	4107	1174	43	-	-	-	12.7	0.81	7	0.95	0.37	0.11	11.27	0.67	3	
NCenSJV	COMMON	SWS	2015-2017	BAG NEW DIRKWIN HP	1779	4541	668	73	-1036	241	0	-	-	-	-	-	-	11.92	1.15	30	0.17	0.89	0.93	-	-	-	Released
NCenSJV	COMMON	SRS	2015-2017	SY VACA	1766	4355	634	74	-1222	125	0	3678	1175	45	5973	249	36	10.21	0.78	79	-1.54	0.29	0	8.78	0.67	45	Released
NCenSJV	COMMON	SWS	2015-2017	BAG NEW DIRKWIN	1667	4263	634	75	-1315	121	0	4178	1174	42	4790	249	41	11.46	0.78	52	-0.29	0.29	0.63	10.13	0.67	20	Released
NCenSJV	COMMON	HRS	2015-2017	WB TRIPLE IV	1550	3859	645	76	-1719	170	0	-	-	-	5256	249	39	11.7	0.85	36	-0.05	0.45	0.93	-	-	-	Released
NCenSJV	COMMON	HRS	2015-2017	WB JOAQUIN	1424	3846	668	77	-1731	241	0	-	-	-	-	-	-	10.89	1.15	74	-0.86	0.89	0.63	-	-	-	Released
NCenSJV	COMMON	HRS	2015-2017	WWW MIKA	1340	3484	668	78	-2093	241	0	-	-	-	-	-	-	12.59	1.15	8	0.84	0.89	0.63	-	-	-	Released
NCenSJV	COMMON	HWS	2015-2017	APB 717	1809	2938	668	79	-2639	241	0	-	-	-	-	-	-	12.75	1.15	5	1	0.89	0.59	-	-	-	

Table 18. South San Joaquin Valley region, common wheat yield and protein 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	2016 Yield (lb/acre)	2016 St.Err.Yield (lb/acre)	2016 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2017 Protein (%)	2017 St.Err.Protein (%)	2017 Protein Rank	Status
SoSJV	COMMON	HRS	2015-2017	UC 14010 29	1792	6680	1297	1	1256	439	0.02	-	-	-	-	-	-	13.27	1.17	76	-1.02	1.12	0.8	-	-	-	
SoSJV	**COMMON**	**HRS**	**2015-2017**	**APB 501189**	**1807**	**6387**	**1238**	**2**	**963**	**221**	**0**	-	-	-	**5242**	**1912**	**1**	**13.43**	**0.53**	**74**	**-0.87**	**0.43**	**0.35**	-	-	-	
SoSJV	COMMON	HRS	2015-2017	XA 9301	1843	6344	1248	3	919	272	0.01	7283	2904	3	-	-	-	14.19	0.56	39	-0.11	0.47	0.92	13.87	0.59	26	
SoSJV	**COMMON**	**HRS**	**2015-2017**	**APB 500553**	**1806**	**6258**	**1278**	**4**	**834**	**382**	**0.1**	-	-	-	-	-	-	**14.03**	**1.17**	**55**	**-0.26**	**1.12**	**0.92**	-	-	-	
SoSJV	COMMON	HRS	2015-2017	LCS 11SB0097	1773	6198	1278	5	774	382	0.13	-	-	-	-	-	-	14.03	1.17	54	-0.26	1.12	0.92	-	-	-	
SoSJV	**COMMON**	**HRS**	**2015-2017**	**XA 9302**	**1844**	**6194**	**1248**	**6**	**770**	**272**	**0.02**	**7133**	**2904**	**4**	-	-	-	**13.83**	**0.56**	**63**	**-0.47**	**0.47**	**0.73**	**13.52**	**0.59**	**36**	
SoSJV	COMMON	HWS	2015-2017	UC 16010 32	1839	6189	1248	7	765	272	0.02	7129	2904	5	-	-	-	14.53	0.56	29	0.24	0.47	0.87	14.22	0.59	20	
SoSJV	**COMMON**	**HRS**	**2015-2017**	**WB JOAQUIN**	**1424**	**6111**	**1297**	**8**	**687**	**439**	**0.25**	-	-	-	-	-	-	**14.09**	**1.17**	**49**	**-0.2**	**1.12**	**0.92**	-	-	-	**Released**
SoSJV	COMMON	HWS	2015-2017	LCS ATOMO	1723	6097	1230	9	673	177	0	7454	2904	1	4276	1912	15	13.84	0.45	62	-0.46	0.33	0.73	12.97	0.62	44	Released
SoSJV	**COMMON**	**HWS**	**2015-2017**	**UC 15010 27**	**1815**	**6095**	**1233**	**10**	**671**	**194**	**0**	**7408**	**2904**	**2**	**4416**	**1912**	**11**	**14.12**	**0.45**	**45**	**-0.18**	**0.34**	**0.87**	**13.85**	**0.59**	**27**	
SoSJV	COMMON	HRS	2015-2017	XA 9501	1845	6086	1248	11	662	272	0.06	7025	2904	6	-	-	-	13.6	0.56	71	-0.69	0.47	0.64	13.29	0.59	41	
SoSJV	**COMMON**	**HWS**	**2015-2017**	**LCS ULTIMATUM**	**1805**	**6070**	**1297**	**12**	**646**	**439**	**0.26**	-	-	-	-	-	-	**12.82**	**1.17**	**78**	**-1.47**	**1.12**	**0.73**	-	-	-	
SoSJV	COMMON	HRS	2015-2017	XA 9502	1846	6018	1248	13	594	272	0.1	6957	2904	8	-	-	-	13.7	0.56	68	-0.6	0.47	0.73	13.39	0.59	39	
SoSJV	**COMMON**	**HWS**	**2015-2017**	**WB PERLA**	**1729**	**6012**	**1278**	**14**	**588**	**382**	**0.25**	-	-	-	-	-	-	**13.89**	**1.17**	**61**	**-0.4**	**1.12**	**0.89**	-	-	-	**Released**
SoSJV	COMMON	HWS	2015-2017	WB 7390	1750	6008	1238	15	584	221	0.04	-	-	-	4834	1912	4	13.57	0.53	72	-0.72	0.43	0.53	-	-	-	
SoSJV	**COMMON**	**HRS**	**2015-2017**	**UC 15014 4**	**1817**	**6000**	**1234**	**16**	**576**	**200**	**0.02**	**6672**	**2906**	**18**	**4901**	**1912**	**2**	**14.11**	**0.45**	**47**	**-0.18**	**0.34**	**0.87**	**13.89**	**0.59**	**24**	
SoSJV	COMMON	HRS	2015-2017	APB 500709	1819	5978	1233	17	554	194	0.02	6952	2904	9	4637	1912	6	13.95	0.45	59	-0.34	0.34	0.73	13.73	0.59	31	
SoSJV	**COMMON**	**HRS**	**2015-2017**	**SY BLANCA GRANDE 515**	**1657**	**5969**	**1231**	**18**	**544**	**182**	**0.02**	**6669**	**2904**	**19**	**4858**	**1912**	**3**	**14.06**	**0.44**	**52**	**-0.23**	**0.32**	**0.82**	**14.04**	**0.59**	**22**	**Released**
SoSJV	COMMON	HWS	2015-2017	UC 14010 22	1791	5929	1278	19	505	382	0.33	-	-	-	-	-	-	14.97	1.17	13	0.68	1.12	0.86	-	-	-	
SoSJV	**COMMON**	**HRS**	**2015-2017**	**XA 9503**	**1847**	**5892**	**1248**	**20**	**468**	**272**	**0.2**	**6832**	**2904**	**13**	-	-	-	**14.76**	**0.56**	**19**	**0.46**	**0.47**	**0.73**	**14.45**	**0.59**	**11**	
SoSJV	COMMON	HRS	2015-2017	SY 034	1794	5880	1278	21	456	382	0.39	-	-	-	-	-	-	14.16	1.17	40	-0.13	1.12	0.92	-	-	-	
SoSJV	**COMMON**	**HWS**	**2015-2017**	**UC 15013 15**	**1816**	**5865**	**1248**	**22**	**441**	**272**	**0.24**	-	-	-	**4559**	**1912**	**7**	**13.83**	**0.56**	**64**	**-0.47**	**0.47**	**0.73**	-	-	-	
SoSJV	COMMON	HRS	2015-2017	SY SUMMIT 515	1658	5846	1231	23	422	182	0.08	6918	2904	10	4433	1912	10	13.96	0.44	57	-0.33	0.32	0.73	13.95	0.59	23	Released
SoSJV	**COMMON**	**HRS**	**2015-2017**	**APB 410117**	**1840**	**5837**	**1248**	**24**	**412**	**272**	**0.26**	**6776**	**2904**	**15**	-	-	-	**14.67**	**0.56**	**24**	**0.38**	**0.47**	**0.82**	**14.36**	**0.59**	**14**	
SoSJV	COMMON	HRS	2015-2017	SY 13W00886	1835	5827	1248	25	403	272	0.26	6766	2904	16	-	-	-	15.04	0.56	9	0.74	0.47	0.6	14.72	0.59	5	
SoSJV	**COMMON**	**HWS**	**2015-2017**	**LCS 12SB0224**	**1831**	**5812**	**1233**	**26**	**387**	**194**	**0.13**	**6907**	**2904**	**11**	**4350**	**1912**	**13**	**14.53**	**0.45**	**30**	**0.23**	**0.34**	**0.82**	**14.32**	**0.59**	**16**	
SoSJV	COMMON	HRS	2015-2017	WB 9350	1842	5800	1252	27	376	290	0.34	6708	2906	17	-	-	-	14.16	0.56	41	-0.14	0.47	0.92	13.85	0.59	28	Released
SoSJV	**COMMON**	**HWS**	**2015-2017**	**WB 7618**	**1749**	**5745**	**1238**	**28**	**321**	**221**	**0.26**	-	-	-	**4456**	**1912**	**9**	**14.79**	**0.53**	**17**	**0.5**	**0.43**	**0.73**	-	-	-	**Released**
SoSJV	COMMON	HRS	2015-2017	UC 14010 17	1789	5738	1297	29	314	439	0.66	-	-	-	-	-	-	14.42	1.17	35	0.13	1.12	0.92	-	-	-	
SoSJV	**COMMON**	**HRS**	**2015-2017**	**WB 9112**	**1748**	**5726**	**1230**	**30**	**302**	**176**	**0.2**	**6248**	**2906**	**32**	**4518**	**1912**	**8**	**13.96**	**0.44**	**58**	**-0.33**	**0.32**	**0.73**	**13.88**	**0.59**	**25**	**Released**
SoSJV	COMMON		2015-2017	APB 8238	1821	5695	1248	31	271	272	0.48	-	-	-	4389	1912	12	14.1	0.56	48	-0.19	0.47	0.87	-	-	-	
SoSJV	**COMMON**	**HRS**	**2015-2017**	**UC 14010 20**	**1790**	**5661**	**1297**	**32**	**237**	**439**	**0.78**	-	-	-	-	-	-	**14.13**	**1.17**	**44**	**-0.16**	**1.12**	**0.92**	-	-	-	
SoSJV	COMMON	HRS	2015-2017	APB 501089	1828	5621	1233	33	197	194	0.47	6834	2904	12	4042	1912	27	13.9	0.45	60	-0.39	0.34	0.73	13.66	0.59	33	
SoSJV	**COMMON**	**HWS**	**2015-2017**	**UC 14014 42**	**1793**	**5597**	**1278**	**34**	**172**	**382**	**0.78**	-	-	-	-	-	-	**13.66**	**1.17**	**69**	**-0.63**	**1.12**	**0.87**	-	-	-	
SoSJV	COMMON	HRS	2015-2017	SY REDWING	1521	5577	1230	35	152	177	0.56	6600	2904	21	4197	1912	17	14.56	0.44	26	0.27	0.32	0.82	14.26	0.59	17	Released
SoSJV	**COMMON**	**HRS**	**2015-2017**	**SY 314**	**1660**	**5563**	**1231**	**36**	**139**	**181**	**0.63**	**6631**	**2906**	**20**	**4103**	**1912**	**23**	**14.04**	**0.44**	**53**	**-0.25**	**0.32**	**0.82**	**13.77**	**0.59**	**30**	**Released**
SoSJV	COMMON	HRS	2015-2017	SY 13W00850	1834	5562	1248	37	138	272	0.78	6501	2904	23	-	-	-	14.16	0.56	42	-0.14	0.47	0.92	13.84	0.59	29	
SoSJV	**COMMON**	**HRS**	**2015-2017**	**LCS 10SB0087 B**	**1804**	**5555**	**1278**	**38**	**131**	**382**	**0.81**	-	-	-	-	-	-	**14.54**	**1.17**	**27**	**0.25**	**1.12**	**0.92**	-	-	-	
SoSJV	COMMON	HRS	2015-2017	APB 510453	1841	5554	1248	39	129	272	0.78	6493	2904	24	-	-	-	14.81	0.56	16	0.51	0.47	0.73	14.49	0.59	10	
SoSJV	**COMMON**	**HRS**	**2015-2017**	**UC 15010 5**	**1814**	**5547**	**1248**	**40**	**123**	**272**	**0.78**	-	-	-	**4242**	**1912**	**16**	**14.57**	**0.56**	**25**	**0.27**	**0.47**	**0.87**	-	-	-	
SoSJV	COMMON	HWS	2015-2017	UC PATWIN 515HP	1743	5507	1233	41	83	194	0.79	6802	2904	14	3845	1912	31	15.43	0.45	4	1.13	0.34	0.03	14.96	0.59	3	Released
SoSJV	**COMMON**	**HWS**	**2015-2017**	**UC CLEAR WHITE**	**1361**	**5494**	**1278**	**42**	**70**	**382**	**0.9**	-	-	-	-	-	-	**14.73**	**1.17**	**20**	**0.44**	**1.12**	**0.87**	-	-	-	**Released**
SoSJV	COMMON	HRS	2015-2017	SY CAL ROJO	1478	5489	1230	43	64	177	0.81	6988	2904	7	3909	1912	29	14.07	0.44	51	-0.23	0.32	0.82	13.6	0.59	34	Released
SoSJV	**COMMON**	**HWS**	**2015-2017**	**APB 717**	**1809**	**5485**	**1438**	**44**	**61**	**755**	**0.96**	-	-	-	-	-	-	**14.11**	**1.17**	**46**	**-0.18**	**1.12**	**0.92**	-	-	-	
SoSJV	COMMON	HRS	2015-2017	WB JOAQUIN ORO	1728	5484	1230	45	60	172	0.81	5672	2904	36	4794	1912	5	14.73	0.44	21	0.43	0.32	0.73	14.67	0.59	6	Released
SoSJV	**COMMON**	**HRS**	**2015-2017**	**UC 13010 23**	**1767**	**5464**	**1297**	**46**	**39**	**439**	**0.96**	-	-	-	-	-	-	**13.76**	**1.17**	**65**	**-0.53**	**1.12**	**0.87**	-	-	-	
SoSJV	COMMON	HWS	2015-2017	SY BLANCA ROYALE	1522	5436	1230	47	12	172	0.96	6348	2904	28	4129	1912	20	14.93	0.44	14	0.63	0.32	0.36	14.53	0.59	9	Released
SoSJV	**COMMON**	**HRS**	**2015-2017**	**UC 15014 35**	**1818**	**5430**	**1248**	**48**	**6**	**272**	**0.98**	-	-	-	**4124**	**1912**	**21**	**15**	**0.56**	**12**	**0.7**	**0.47**	**0.64**	-	-	-	
SoSJV	COMMON		2015-2017	APB 8155	1829	5375	1248	49	-49	272	0.9	-	-	-	4069	1912	26	14.08	0.56	50	-0.22	0.47	0.87	-	-	-	
SoSJV	**COMMON**	**HRS**	**2015-2017**	**WB PATRON**	**1731**	**5357**	**1230**	**50**	**-67**	**172**	**0.81**	**6280**	**2904**	**30**	**4095**	**1912**	**24**	**14.43**	**0.44**	**33**	**0.14**	**0.32**	**0.87**	**14.41**	**0.59**	**12**	**Released**
SoSJV	COMMON	HRS	2015-2017	LCS 11SB0096	1772	5348	1278	51	-76	382	0.9	-	-	-	-	-	-	13.04	1.17	77	-1.25	1.12	0.73	-	-	-	
SoSJV	**COMMON**	**HRS**	**2015-2017**	**UC LASSIK**	**1495**	**5336**	**1231**	**52**	**-88**	**182**	**0.78**	**6404**	**2904**	**25**	**4184**	**1912**	**19**	**13.63**	**0.44**	**70**	**-0.67**	**0.32**	**0.33**	**13.45**	**0.59**	**38**	**Released**
SoSJV	COMMON	HRS	2015-2017	APB 430429	1808	5325	1278	53	-99	382	0.87	-	-	-	-	-	-	15.52	1.17	3	1.23	1.12	0.73	-	-	-	
SoSJV	**COMMON**	**HRS**	**2015-2017**	**LCS 12SB0197**	**1830**	**5295**	**1233**	**54**	**-129**	**194**	**0.69**	**6358**	**2904**	**27**	**3866**	**1912**	**30**	**14.52**	**0.45**	**31**	**0.22**	**0.34**	**0.83**	**13.69**	**0.59**	**32**	
SoSJV	COMMON	HRS	2015-2017	UC 16010 20	1838	5286	1248	55	-138	272	0.78	6225	2904	33	-	-	-	14.68	0.56	22	0.39	0.47	0.82	14.37	0.59	13	
SoSJV	**COMMON**	**HWS**	**2015-2017**	**LCS STAR**	**1688**	**5244**	**1230**	**56**	**-180**	**177**	**0.47**	**5691**	**2904**	**35**	**4124**	**1912**	**22**	**15.31**	**0.44**	**5**	**1.01**	**0.32**	**0.05**	**15.01**	**0.59**	**2**	**Released**
SoSJV	COMMON	HRS	2015-2017	WB DA907 005	1803	5215	1278	57	-210	382	0.78	-	-	-	-	-	-	14.76	1.17	18	0.47	1.12	0.87	-	-	-	
SoSJV	**COMMON**	**HRS**	**2015-2017**	**WB TRIPLE IV**	**1550**	**5183**	**1238**	**58**	**-241**	**221**	**0.45**	-	-	-	**4087**	**1912**	**25**	**13.37**	**0.53**	**75**	**-0.93**	**0.43**	**0.32**	-	-	-	**Released**
SoSJV	COMMON	HRS	2015-2017	WB ROCKLAND	1650	5180	1244	59	-244	256	0.5	-	-	-	3927	1912	28	14.84	0.56	15	0.54	0.47	0.73	-	-	-	Released
SoSJV	**COMMON**	**HRS**	**2015-2017**	**WB 9904**	**1751**	**5157**	**1231**	**60**	**-267**	**182**	**0.26**	**6283**	**2904**	**29**	**3652**	**1912**	**35**	**13.75**	**0.44**	**66**	**-0.54**	**0.32**	**0.53**	**13.56**	**0.59**	**35**	**Released**
SoSJV	COMMON		2015-2017	APB 501129	1820	5149	1248	61	-275	272	0.47	-	-	-	3843	1912	32	13.97	0.56	56	-0.33	0.47	0.82	-	-	-	
SoSJV	**COMMON**	**HRS**	**2015-2017**	**WB 9229**	**1730**	**5141**	**1230**	**62**	**-284**	**177**	**0.24**	**5383**	**2904**	**40**	**4338**	**1912**	**14**	**14.42**	**0.44**	**34**	**0.13**	**0.32**	**0.87**	**14.33**	**0.59**	**15**	**Released**
SoSJV	COMMON	HWS	2015-2017	WB 7566	1802	5103	1230	63	-321	172	0.16	6380	2904	26	3462	1912	37	14.15	0.44	43	-0.14	0.32	0.87	13.48	0.59	37	Released
SoSJV	**COMMON**	**HRS**	**2015-2017**	**SY ULTRA**	**1590**	**5098**	**1230**	**64**	**-326**	**177**	**0.16**	**6249**	**2904**	**31**	**3801**	**1912**	**33**	**14.34**	**0.44**	**37**	**0.05**	**0.32**	**0.92**	**13.2**	**0.59**	**42**	**Released**
SoSJV	COMMON	HRS	2015-2017	UC YUROK	1745	5071	1231	65	-353	182	0.14	5649	2904	38	4197	1912	18	13.72	0.44	67	-0.58	0.32	0.48	13.16	0.59	43	Released
SoSJV	**COMMON**	**HWS**	**2015-2017**	**UC PATWIN 515**	**1680**	**5046**	**1230**	**66**	**-378**	**176**	**0.1**	**6511**	**2906**	**22**	**3258**	**1912**	**38**	**15.11**	**0.44**	**7**	**0.82**	**0.32**	**0.18**	**14.67**	**0.59**	**7**	**Released**
SoSJV	COMMON	HWS	2015-2017	UC PATWIN	1419	4878	1333	67	-546	536	0.47	-	-	-	-	-	-	15.59	1.17	2	1.3	1.12	0.73	-	-	-	Released
SoSJV	**COMMON**	**HWS**	**2015-2017**	**UC 15080 49**	**1837**	**4858**	**1248**	**68**	**-566**	**272**	**0.12**	**5798**	**2904**	**34**	-	-	-	**15.61**	**0.56**	**1**	**1.32**	**0.47**	**0.1**	**15.3**	**0.59**	**1**	
SoSJV	COMMON	HRS	2015-2017	WWW FV 2808	1608	4817	1230	69	-607	177	0	5321	2904	41	3746	1912	34	12.68	0.44	79	-1.61	0.32	0	12.41	0.59	45	Released
SoSJV	**COMMON**	**HRS**	**2015-2017**	**YECORA ROJO**	**112**	**4758**	**1252**	**70**	**-666**	**290**	**0.08**	**5655**	**2906**	**37**	-	-	-	**14.27**	**0.6**	**38**	**-0.03**	**0.51**	**0.95**	**14.26**	**0.62**	**18**	**Released**
SoSJV	COMMON	HRS	2015-2017	WB PR 1404	1526	4746	1297	71	-678	439	0.25	-	-	-	-	-	-	14.47	1.17	32	0.18	1.12	0.92	-	-	-	Released
SoSJV	**COMMON**	**HWS**	**2015-2017**	**SY DAYN**	**1795**	**4557**	**1297**	**72**	**-867**	**439**	**0.13**	-	-	-	-	-	-	**15.08**	**1.17**	**8**	**0.79**	**1.12**	**0.82**	-	-	-	**Released**
SoSJV	COMMON	HRS	2015-2017	UC ANZA	20	4498	1233	73	-926	194	0	5119	2904	43	3511	1912	36	13.56	0.45	73	-0.73	0.34	0.32	13.3	0.59	40	Released
SoSJV	**COMMON**	**HRS**	**2015-2017**	**UC 14657 170**	**1836**	**4356**	**1248**	**74**	**-1068**	**272**	**0**	**5295**	**2904**	**42**	-	-	-	**14.38**	**0.56**	**36**	**0.09**	**0.47**	**0.92**	**14.07**	**0.59**	**21**	
SoSJV	COMMON	SRS	2015-2017	ASSL TAM 204	1778	4093	1231	75	-1331	181	0	5388	2906	39	2401	1912	39	15.01	0.44	11	0.71	0.32	0.32	14.75	0.59	4	Released
SoSJV	**COMMON**	**HRS**	**2015-2017**	**WWW MIKA**	**1340**	**3551**	**1297**	**76**	**-1873**	**439**	**0**	-	-	-	-	-	-	**15.19**	**1.17**	**6**	**0.9**	**1.12**	**0.82**	-	-	-	**Released**
SoSJV	COMMON	SWS	2015-2017	BAG NEW DIRKWIN HP	1779	3402	1297	77	-2022	439	0	-	-	-	-	-	-	15.02	1.17	10	0.73	1.12	0.83	-	-	-	Released
SoSJV	**COMMON**	**SRS**	**2015-2017**	**SY VACA**	**1766**	**3020**	**1230**	**78**	**-2404**	**177**	**0**	**4172**	**2904**	**44**	**1648**	**1912**	**41**	**14.68**	**0.44**	**23**	**0.38**	**0.32**	**0.73**	**14.57**	**0.59**	**8**	**Released**
SoSJV	COMMON	SWS	2015-2017	BAG NEW DIRKWIN	1667	2755	1230	79	-2670	177	0	3036	2904	45	1778	1912	40	14.54	0.44	28	0.25	0.32	0.82	14.24	0.59	19	Released

Table 19. Imperial Valley region, common wheat yield and protein 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	2016 Yield (lb/acre)	2016 St.Err.Yield (lb/acre)	2016 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2017 Protein (%)	2017 St.Err.Protein (%)	2017 Protein Rank	Status
ImpV	COMMON	HRS	2015-2017	XA 9301	1843	7963	401	1	1739	282	0	7560	251	1	-	-	-	12.32	0.54	70	-0.86	0.15	0	11.61	0.11	36	
ImpV	**COMMON**	**HRS**	**2015-2017**	**XA 9501**	**1845**	**7591**	**401**	**2**	**1367**	**282**	**0**	**7188**	**251**	**2**	-	-	-	**12.82**	**0.54**	**51**	**-0.36**	**0.15**	**0.03**	**12.11**	**0.11**	**24**	
ImpV	COMMON	HWS	2015-2017	UC 15010 27	1815	7463	347	3	1239	200	0	7049	251	4	8018	259	1	13.02	0.53	43	-0.16	0.12	0.21	12.4	0.11	21	
ImpV	**COMMON**	**HRS**	**2015-2017**	**APB 500709**	**1819**	**7451**	**347**	**4**	**1227**	**200**	**0**	**7074**	**251**	**3**	**7967**	**259**	**2**	**13.45**	**0.53**	**29**	**0.27**	**0.12**	**0.03**	**12.76**	**0.11**	**15**	
ImpV	COMMON	HRS	2015-2017	XA 9503	1847	7135	401	5	911	282	0	6732	251	5	-	-	-	12.24	0.54	71	-0.95	0.15	0	11.52	0.11	39	
ImpV	**COMMON**	**HRS**	**2015-2017**	**APB 510453**	**1841**	**7115**	**401**	**6**	**891**	**282**	**0.01**	**6712**	**251**	**7**	-	-	-	**13.51**	**0.54**	**25**	**0.33**	**0.15**	**0.05**	**12.8**	**0.11**	**14**	
ImpV	COMMON	HRS	2015-2017	XA 9502	1846	7099	401	7	875	282	0.01	6696	251	8	-	-	-	11.57	0.54	77	-1.61	0.15	0	10.86	0.11	43	
ImpV	**COMMON**	**HRS**	**2015-2017**	**SY SUMMIT 515**	**1658**	**7094**	**326**	**8**	**870**	**162**	**0**	**6632**	**251**	**10**	**7739**	**259**	**3**	**13.1**	**0.53**	**41**	**-0.08**	**0.11**	**0.54**	**12.42**	**0.11**	**20**	**Released**
ImpV	COMMON	HRS	2015-2017	UC 13010 23	1767	7072	401	9	848	281	0.01	-	-	-	-	-	-	12.64	0.6	60	-0.54	0.3	0.1	-	-	-	
ImpV	**COMMON**	**HRS**	**2015-2017**	**WB PR 1404**	**1526**	**6901**	**401**	**10**	**677**	**281**	**0.04**	-	-	-	-	-	-	**11.73**	**0.6**	**75**	**-1.45**	**0.3**	**0**	-	-	-	**Released**
ImpV	COMMON	HRS	2015-2017	LCS 11SB0096	1772	6832	401	11	608	281	0.07	-	-	-	-	-	-	12.79	0.6	52	-0.39	0.3	0.25	-	-	-	
ImpV	**COMMON**	**HRS**	**2015-2017**	**SY ULTRA**	**1590**	**6826**	**326**	**12**	**602**	**162**	**0**	**6718**	**251**	**6**	**7228**	**259**	**11**	**12.33**	**0.53**	**69**	**-0.85**	**0.11**	**0**	**11.29**	**0.11**	**40**	**Released**
ImpV	COMMON	HWS	2015-2017	LCS ATOMO	1723	6812	326	13	588	162	0	6562	251	12	7453	259	4	12.67	0.53	57	-0.52	0.11	0	12.24	0.11	23	Released
ImpV	**COMMON**	**HWS**	**2015-2017**	**WB 7566**	**1802**	**6778**	**326**	**14**	**554**	**162**	**0**	**6393**	**251**	**14**	**7122**	**259**	**16**	**12.76**	**0.53**	**53**	**-0.42**	**0.11**	**0**	**11.89**	**0.11**	**30**	**Released**
ImpV	COMMON	HRS	2015-2017	LCS 11SB0097	1773	6765	401	15	541	281	0.1	-	-	-	-	-	-	12.74	0.6	55	-0.44	0.3	0.2	-	-	-	
ImpV	**COMMON**	**HWS**	**2015-2017**	**SY DAYN**	**1795**	**6764**	**401**	**16**	**540**	**281**	**0.1**	-	-	-	-	-	-	**13.48**	**0.6**	**27**	**0.3**	**0.3**	**0.38**	-	-	-	**Released**
ImpV	COMMON	HRS	2015-2017	SY 13W00850	1834	6761	401	17	537	282	0.1	6358	251	16	-	-	-	12.61	0.54	62	-0.58	0.15	0	11.89	0.11	29	
ImpV	**COMMON**	**HRS**	**2015-2017**	**UC 15014 4**	**1817**	**6744**	**347**	**18**	**520**	**200**	**0.03**	**6191**	**251**	**21**	**7436**	**259**	**5**	**13.56**	**0.53**	**22**	**0.38**	**0.12**	**0**	**12.95**	**0.11**	**10**	
ImpV	COMMON	HRS	2015-2017	UC LASSIK	1495	6736	326	19	512	162	0.01	6642	251	9	7226	259	12	12.53	0.53	63	-0.65	0.11	0	11.94	0.11	27	Released
ImpV	**COMMON**	**HRS**	**2015-2017**	**WB 9350**	**1842**	**6725**	**401**	**20**	**501**	**282**	**0.13**	**6322**	**251**	**17**	-	-	-	**11.97**	**0.54**	**73**	**-1.21**	**0.15**	**0**	**11.26**	**0.11**	**41**	**Released**
ImpV	COMMON	HWS	2015-2017	UC 15013 15	1816	6719	401	21	495	282	0.14	-	-	-	7261	259	9	11.86	0.55	74	-1.32	0.18	0	-	-	-	
ImpV	**COMMON**	**HWS**	**2015-2017**	**WB 7618**	**1749**	**6671**	**347**	**22**	**447**	**199**	**0.06**	-	-	-	**7067**	**259**	**19**	**13.89**	**0.54**	**15**	**0.71**	**0.15**	**0**	-	-	-	**Released**
ImpV	COMMON	HRS	2015-2017	UC 15010 5	1814	6658	401	23	434	282	0.21	-	-	-	7200	259	13	13.66	0.55	19	0.48	0.18	0.01	-	-	-	
ImpV	**COMMON**	**HRS**	**2015-2017**	**WB 9904**	**1751**	**6642**	**326**	**24**	**418**	**162**	**0.03**	**6196**	**251**	**20**	**7168**	**259**	**14**	**12.22**	**0.53**	**72**	**-0.96**	**0.11**	**0**	**11.73**	**0.11**	**32**	**Released**
ImpV	COMMON	HWS	2015-2017	WB 7390	1750	6625	347	25	401	199	0.09	-	-	-	7379	259	7	12.49	0.54	65	-0.69	0.15	0	-	-	-	
ImpV	**COMMON**	**HWS**	**2015-2017**	**LCS 12SB0224**	**1831**	**6617**	**347**	**26**	**393**	**200**	**0.1**	**6251**	**251**	**18**	**7123**	**259**	**15**	**12.95**	**0.53**	**46**	**-0.23**	**0.12**	**0.07**	**12.11**	**0.11**	**25**	
ImpV	COMMON	HRS	2015-2017	WB 9229	1730	6613	326	27	389	162	0.04	5985	251	27	7401	259	6	14.24	0.53	11	1.06	0.11	0	13.49	0.11	4	Released
ImpV	**COMMON**	**HRS**	**2015-2017**	**UC 14657 170**	**1836**	**6608**	**401**	**28**	**384**	**282**	**0.28**	**6205**	**251**	**19**	-	-	-	**14.26**	**0.54**	**9**	**1.08**	**0.15**	**0**	**13.55**	**0.11**	**3**	
ImpV	COMMON	HWS	2015-2017	UC PATWIN 515	1680	6581	326	29	358	162	0.06	6541	251	13	7059	259	20	13.14	0.53	40	-0.04	0.11	0.72	12.5	0.11	17	Released
ImpV	**COMMON**	**HWS**	**2015-2017**	**UC 15080 49**	**1837**	**6571**	**401**	**30**	**347**	**282**	**0.33**	**6168**	**251**	**22**	-	-	-	**15.21**	**0.54**	**3**	**2.03**	**0.15**	**0**	**14.5**	**0.11**	**2**	
ImpV	COMMON		2015-2017	APB 501129	1820	6546	401	31	322	282	0.37	-	-	-	7088	259	17	12.93	0.55	47	-0.25	0.18	0.2	-	-	-	
ImpV	**COMMON**	**HWS**	**2015-2017**	**UC PATWIN**	**1419**	**6519**	**401**	**32**	**295**	**281**	**0.41**	-	-	-	-	-	-	**13.62**	**0.6**	**21**	**0.44**	**0.3**	**0.2**	-	-	-	**Released**
ImpV	COMMON		2015-2017	APB 8238	1821	6502	401	33	278	282	0.43	-	-	-	7045	259	21	13.26	0.55	37	0.08	0.18	0.68	-	-	-	
ImpV	**COMMON**	**HWS**	**2015-2017**	**UC PATWIN 515HP**	**1743**	**6482**	**347**	**34**	**258**	**200**	**0.3**	**6374**	**251**	**15**	**6730**	**259**	**29**	**13.96**	**0.53**	**12**	**0.77**	**0.12**	**0**	**13.34**	**0.11**	**5**	**Released**
ImpV	COMMON	HWS	2015-2017	SY BLANCA GRANDE 515	1657	6449	326	35	225	162	0.27	5879	251	31	7320	259	8	13.53	0.53	23	0.35	0.11	0	13	0.11	9	Released
ImpV	**COMMON**	**HWS**	**2015-2017**	**UC 14010 22**	**1791**	**6413**	**401**	**36**	**189**	**281**	**0.59**	-	-	-	-	-	-	**13.94**	**0.6**	**13**	**0.76**	**0.3**	**0.02**	-	-	-	
ImpV	COMMON	HRS	2015-2017	SY 034	1794	6412	401	37	188	281	0.59	-	-	-	-	-	-	13.46	0.6	28	0.28	0.3	0.42	-	-	-	
ImpV	**COMMON**	**HRS**	**2015-2017**	**APB 501089**	**1828**	**6407**	**347**	**38**	**183**	**200**	**0.46**	**6083**	**251**	**25**	**6870**	**259**	**24**	**12.7**	**0.53**	**56**	**-0.49**	**0.12**	**0**	**11.71**	**0.11**	**33**	
ImpV	COMMON	HRS	2015-2017	WB 9112	1748	6390	326	39	166	162	0.41	6055	251	26	7070	259	18	13.9	0.53	14	0.72	0.11	0	13.03	0.11	8	Released
ImpV	**COMMON**	**HWS**	**2015-2017**	**LCS UI PLATINUM**	**1805**	**6327**	**401**	**40**	**103**	**281**	**0.8**	-	-	-	-	-	-	**12.38**	**0.6**	**67**	**-0.8**	**0.3**	**0.01**	-	-	-	
ImpV	COMMON	HRS	2015-2017	SY 13W00886	1835	6321	401	41	97	282	0.8	5918	251	28	-	-	-	13.36	0.54	34	0.17	0.15	0.32	12.64	0.11	16	
ImpV	**COMMON**	**HRS**	**2015-2017**	**UC ANZA**	**20**	**6312**	**347**	**42**	**88**	**200**	**0.77**	**5866**	**251**	**32**	**6898**	**259**	**23**	**11.13**	**0.53**	**78**	**-2.05**	**0.12**	**0**	**10.19**	**0.11**	**45**	**Released**
ImpV	COMMON	HRS	2015-2017	XA 9302	1844	6303	401	43	79	282	0.84	5900	251	29	-	-	-	12.33	0.54	68	-0.85	0.15	0	11.62	0.11	35	
ImpV	**COMMON**	**HRS**	**2015-2017**	**UC YUROK**	**1745**	**6281**	**326**	**44**	**57**	**162**	**0.8**	**6160**	**251**	**23**	**6669**	**259**	**30**	**12.66**	**0.53**	**58**	**-0.52**	**0.11**	**0**	**11.96**	**0.11**	**26**	**Released**
ImpV	COMMON	HRS	2015-2017	APB 500553	1806	6281	401	45	57	281	0.87	-	-	-	-	-	-	12.76	0.6	54	-0.42	0.3	0.21	-	-	-	
ImpV	**COMMON**	**HRS**	**2015-2017**	**WB DA907 005**	**1803**	**6273**	**401**	**46**	**49**	**281**	**0.87**	-	-	-	-	-	-	**13.37**	**0.6**	**33**	**0.19**	**0.3**	**0.58**	-	-	-	
ImpV	COMMON	HRS	2015-2017	SY REDWING	1521	6259	326	47	35	162	0.87	6569	251	11	7254	259	10	12.52	0.53	64	-0.66	0.11	0	11.54	0.11	38	Released
ImpV	**COMMON**	**HRS**	**2015-2017**	**SY CAL ROJO**	**1478**	**6219**	**326**	**48**	**-5**	**162**	**0.98**	**5773**	**251**	**33**	**6976**	**259**	**22**	**12.62**	**0.53**	**61**	**-0.56**	**0.11**	**0**	**11.57**	**0.11**	**37**	**Released**
ImpV	COMMON	HRS	2015-2017	SY 314	1660	6187	326	49	-37	162	0.87	5888	251	30	6798	259	26	12.89	0.53	50	-0.29	0.11	0.01	11.91	0.11	28	Released
ImpV	**COMMON**	**HRS**	**2015-2017**	**UC 14010 17**	**1789**	**6175**	**401**	**50**	**-49**	**281**	**0.87**	-	-	-	-	-	-	**13.5**	**0.6**	**26**	**0.32**	**0.3**	**0.35**	-	-	-	
ImpV	COMMON	HRS	2015-2017	YECORA ROJO	112	6113	401	51	-111	282	0.79	5710	251	34	-	-	-	13.19	0.54	39	0	0.15	0.99	12.47	0.11	18	Released
ImpV	**COMMON**	**HRS**	**2015-2017**	**APB 501189**	**1807**	**6048**	**347**	**52**	**-176**	**199**	**0.47**	-	-	-	**6805**	**259**	**25**	**13.42**	**0.54**	**31**	**0.24**	**0.15**	**0.16**	-	-	-	
ImpV	COMMON	HWS	2015-2017	SY BLANCA ROYALE	1522	6040	326	53	-183	162	0.37	6102	251	24	5913	259	36	12.49	0.53	66	-0.69	0.11	0	11.79	0.11	31	Released
ImpV	**COMMON**	**HRS**	**2015-2017**	**WB ROCKLAND**	**1650**	**6040**	**347**	**54**	**-184**	**199**	**0.46**	-	-	-	**6756**	**259**	**28**	**14.49**	**0.54**	**7**	**1.31**	**0.15**	**0**	-	-	-	**Released**
ImpV	COMMON	HRS	2015-2017	WB PATRON	1731	6032	326	55	-192	162	0.36	5278	251	38	6760	259	27	13.41	0.53	32	0.23	0.11	0.05	12.82	0.11	13	Released
ImpV	**COMMON**	**HRS**	**2015-2017**	**UC 14010 20**	**1790**	**6027**	**401**	**56**	**-197**	**281**	**0.59**	-	-	-	-	-	-	**13.19**	**0.6**	**38**	**0.01**	**0.3**	**0.99**	-	-	-	
ImpV	COMMON	HRS	2015-2017	WB JOAQUIN	1424	5984	401	57	-240	281	0.49	-	-	-	-	-	-	14.41	0.6	8	1.23	0.3	0	-	-	-	Released
ImpV	**COMMON**	**HWS**	**2015-2017**	**UC 16010 32**	**1839**	**5931**	**401**	**58**	**-293**	**282**	**0.41**	**5528**	**251**	**36**	-	-	-	**13.65**	**0.54**	**20**	**0.47**	**0.15**	**0**	**12.94**	**0.11**	**11**	
ImpV	COMMON	HRS	2015-2017	UC 14010 29	1792	5929	401	59	-295	281	0.41	-	-	-	-	-	-	14.26	0.6	10	1.08	0.3	0	-	-	-	
ImpV	**COMMON**	**HRS**	**2015-2017**	**LCS 12SB0197**	**1830**	**5820**	**347**	**60**	**-404**	**200**	**0.09**	**5708**	**251**	**35**	**6071**	**259**	**33**	**12.65**	**0.53**	**59**	**-0.53**	**0.12**	**0**	**11.68**	**0.11**	**34**	
ImpV	COMMON	HWS	2015-2017	WB PERLA	1729	5740	401	61	-483	281	0.15	-	-	-	-	-	-	15.1	0.6	4	1.92	0.3	0	-	-	-	Released
ImpV	**COMMON**	**HRS**	**2015-2017**	**WWW FV 2808**	**1608**	**5671**	**326**	**62**	**-552**	**162**	**0**	**5519**	**251**	**37**	**5775**	**259**	**37**	**11**	**0.53**	**79**	**-2.18**	**0.11**	**0**	**10.29**	**0.11**	**44**	**Released**
ImpV	COMMON	SRS	2015-2017	SY VACA	1766	5647	326	63	-577	162	0	4136	251	44	6144	259	32	12.91	0.53	49	-0.27	0.11	0.02	12.92	0.11	12	Released
ImpV	**COMMON**	**SRS**	**2015-2017**	**ASSL TAM 204**	**1778**	**5640**	**326**	**64**	**-584**	**162**	**0**	**4538**	**251**	**41**	**6029**	**259**	**34**	**13.07**	**0.53**	**42**	**-0.12**	**0.11**	**0.35**	**12.43**	**0.11**	**19**	**Released**
ImpV	COMMON	HRS	2015-2017	APB 430429	1808	5620	401	65	-604	281	0.07	-	-	-	-	-	-	13.43	0.6	30	0.25	0.3	0.47	-	-	-	
ImpV	**COMMON**	**HWS**	**2015-2017**	**UC 14014 42**	**1793**	**5567**	**401**	**66**	**-657**	**281**	**0.05**	-	-	-	-	-	-	**13.85**	**0.6**	**17**	**0.67**	**0.3**	**0.05**	-	-	-	
ImpV	COMMON	HRS	2015-2017	LCS 10SB0087 B	1804	5542	401	67	-682	281	0.04	-	-	-	-	-	-	13.34	0.6	36	0.16	0.3	0.64	-	-	-	
ImpV	**COMMON**	**HRS**	**2015-2017**	**APB 410117**	**1840**	**5519**	**401**	**68**	**-705**	**282**	**0.03**	**5116**	**251**	**39**	-	-	-	**13.76**	**0.54**	**18**	**0.58**	**0.15**	**0**	**13.05**	**0.11**	**7**	
ImpV	COMMON	HWS	2015-2017	UC CLEAR WHITE	1361	5475	401	69	-749	281	0.02	-	-	-	-	-	-	13	0.6	44	-0.18	0.3	0.58	-	-	-	Released
ImpV	**COMMON**		**2015-2017**	**APB 8155**	**1829**	**5378**	**401**	**70**	**-846**	**282**	**0.01**	-	-	-	**5921**	**259**	**35**	**14.56**	**0.55**	**6**	**1.38**	**0.18**	**0**	-	-	-	
ImpV	COMMON	HRS	2015-2017	WWW MIKA	1340	5285	401	71	-938	281	0	-	-	-	-	-	-	14.57	0.6	5	1.39	0.3	0	-	-	-	Released
ImpV	**COMMON**	**HRS**	**2015-2017**	**WB JOAQUIN ORO**	**1728**	**5204**	**326**	**72**	**-1020**	**162**	**0**	**4658**	**251**	**40**	**6160**	**259**	**31**	**15.29**	**0.53**	**2**	**2.1**	**0.11**	**0**	**14.88**	**0.11**	**1**	**Released**
ImpV	COMMON	HWS	2015-2017	LCS STAR	1688	5165	340	73	-1059	187	0	4284	251	43	4761	484	40	12.92	0.53	48	-0.26	0.12	0.06	12.3	0.11	22	Released
ImpV	**COMMON**	**SWS**	**2015-2017**	**BAG NEW DIRKWIN**	**1667**	**5061**	**326**	**74**	**-1163**	**162**	**0**	**4305**	**251**	**42**	**5758**	**259**	**38**	**11.7**	**0.53**	**76**	**-1.48**	**0.11**	**0**	**10.87**	**0.11**	**42**	**Released**
ImpV	COMMON	SWS	2015-2017	BAG NEW DIRKWIN HP	1779	4971	401	75	-1253	281	0	-	-	-	-	-	-	12.99	0.6	45	-0.19	0.3	0.57	-	-	-	Released
ImpV	**COMMON**	**HRS**	**2015-2017**	**WB TRIPLE IV**	**1550**	**4689**	**347**	**76**	**-1535**	**199**	**0**	-	-	-	**5274**	**259**	**39**	**13.35**	**0.54**	**35**	**0.17**	**0.15**	**0.33**	-	-	-	**Released**
ImpV	COMMON	HRS	2015-2017	UC 16010 20	1838	4480	401	77	-1744	282	0	4077	251	45	-	-	-	13.87	0.54	16	0.69	0.15	0	13.16	0.11	6	
ImpV	**COMMON**	**HRS**	**2015-2017**	**UC 15014 35**	**1818**	**3715**	**432**	**78**	**-2509**	**325**	**0**	-	-	-	**4253**	**293**	**41**	**15.44**	**0.56**	**1**	**2.26**	**0.21**	**0**	-	-	-	
ImpV	COMMON	HWS	2015-2017	APB 717	1809	3370	401	79	-2854	281	0	-	-	-	-	-	-	13.52	0.6	24	0.34	0.3	0.33	-	-	-	

Table 20. Rainfed locations, common wheat yield and protein 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	2016 Yield (lb/acre)	2016 St.Err.Yield (lb/acre)	2016 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2017 Protein (%)	2017 St.Err.Protein (%)	2017 Protein Rank	Status
Rainfed	COMMON	HRS	2015-2017	APB 500553	1806	5521	769	1	996	369	0.05	-	-	-	-	-	-	12.2	2.24	73	-0.78	2.12	1	-	-	-	
Rainfed	COMMON	HRS	2015-2017	UC 13010 23	1767	5210	769	2	685	369	0.18	-	-	-	-	-	-	12.71	2.24	57	-0.27	2.12	1	-	-	-	
Rainfed	COMMON	HWS	2015-2017	LCS ATOMO	1723	5160	686	3	635	146	0	5683	1009	1	4018	1448	2	12.55	0.83	62	-0.43	0.54	1	11.24	1.17	41	Released
Rainfed	COMMON	HWS	2015-2017	LCS UI PLATINUM	1805	5138	769	4	612	369	0.23	-	-	-	-	-	-	12.36	2.24	67	-0.62	2.12	1	-	-	-	
Rainfed	COMMON	HRS	2015-2017	SY 034	1794	5119	769	5	593	369	0.24	-	-	-	-	-	-	12.98	2.24	35	0	2.12	1	-	-	-	
Rainfed	COMMON	HRS	2015-2017	UC 14010 20	1790	5062	769	6	536	369	0.3	-	-	-	-	-	-	12.97	2.24	38	0.01	2.12	1	-	-	-	
Rainfed	COMMON	HRS	2015-2017	WB 9350	1842	5037	700	7	512	200	0.06	5338	1009	5	-	-	-	12.63	0.92	59	-0.34	0.66	1	11.53	1.17	33	Released
Rainfed	COMMON	HWS	2015-2017	LCS STAR	1688	5031	686	8	505	146	0.01	5316	1009	6	3886	1448	6	13.46	0.82	16	0.48	0.52	1	12.15	1.17	8	Released
Rainfed	COMMON	HRS	2015-2017	XA 9302	1844	5005	700	9	480	200	0.07	5306	1009	7	-	-	-	12.48	0.92	63	-0.5	0.66	1	11.38	1.17	37	
Rainfed	COMMON	HRS	2015-2017	APB 500709	1819	4994	689	10	468	160	0.03	5363	1009	4	3850	1448	12	12.77	0.83	51	-0.2	0.54	1	11.8	1.17	24	
Rainfed	COMMON	HWS	2015-2017	UC 15013 15	1816	4991	721	11	465	263	0.19	-	-	-	3968	1448	5	12.58	1.09	61	-0.4	0.88	1	-	-	-	
Rainfed	COMMON	HRS	2015-2017	APB 510453	1841	4962	702	12	436	207	0.11	5259	1011	9	-	-	-	13.19	0.92	24	0.21	0.66	1	12.08	1.17	10	
Rainfed	COMMON	HRS	2015-2017	XA 9502	1846	4959	700	13	434	200	0.11	5260	1009	8	-	-	-	12.16	0.92	75	-0.82	0.66	1	11.06	1.17	44	
Rainfed	COMMON	HRS	2015-2017	UC 15014 4	1817	4952	689	14	426	160	0.05	5100	1009	21	4196	1448	1	12.94	0.83	39	-0.04	0.54	1	12.02	1.17	14	
Rainfed	COMMON	HRS	2015-2017	XA 9501	1845	4951	700	15	425	200	0.11	5251	1009	10	-	-	-	12.34	0.92	69	-0.64	0.66	1	11.24	1.17	40	
Rainfed	COMMON	HWS	2015-2017	UC 14010 22	1791	4946	769	16	421	369	0.41	-	-	-	-	-	-	13.49	2.24	13	0.51	2.12	1	-	-	-	
Rainfed	COMMON	SWS	2015-2017	BAG NEW DIRKWIN HP	1779	4944	769	17	418	369	0.41	-	-	-	-	-	-	13.48	2.24	14	0.5	2.12	1	-	-	-	Released
Rainfed	COMMON	HWS	2015-2017	UC 15010 27	1815	4921	689	18	395	160	0.07	5164	1009	19	3999	1448	4	12.67	0.83	58	-0.31	0.54	1	11.59	1.17	29	
Rainfed	COMMON	HWS	2015-2017	SY BLANCA GRANDE 515	1657	4918	686	19	393	146	0.05	5183	1009	14	3869	1448	10	13.18	0.82	25	0.2	0.52	1	12.19	1.17	7	Released
Rainfed	COMMON	HRS	2015-2017	XA 9503	1847	4915	700	20	389	200	0.16	5216	1009	11	-	-	-	13.16	0.92	26	0.19	0.66	1	12.06	1.17	12	
Rainfed	COMMON	HRS	2015-2017	LCS 11SB0097	1773	4902	769	21	376	369	0.44	-	-	-	-	-	-	12.9	2.24	41	-0.08	2.12	1	-	-	-	
Rainfed	COMMON	HRS	2015-2017	UC 15010 5	1814	4894	721	22	369	263	0.31	-	-	-	3871	1448	9	12.85	1.09	44	-0.12	0.88	1	-	-	-	
Rainfed	COMMON	HRS	2015-2017	LCS 12SB0197	1830	4892	689	23	367	160	0.09	5449	1009	2	3421	1448	30	13.14	0.84	28	0.16	0.56	1	11.58	1.17	30	
Rainfed	COMMON	HWS	2015-2017	UC 16010 32	1839	4879	700	24	353	200	0.19	5180	1009	15	-	-	-	13.37	0.92	19	0.4	0.66	1	12.27	1.17	5	
Rainfed	COMMON	HRS	2015-2017	SY SUMMIT 515	1658	4879	686	25	353	146	0.07	5203	1009	13	3716	1448	18	12.76	0.82	52	-0.22	0.52	1	11.87	1.17	23	Released
Rainfed	COMMON	HRS	2015-2017	APB 410117	1840	4878	700	26	352	200	0.19	5179	1009	16	-	-	-	13.07	0.92	29	0.09	0.66	1	11.97	1.17	16	
Rainfed	COMMON	HWS	2015-2017	LCS 12SB0224	1831	4878	689	27	352	160	0.11	5091	1009	22	4007	1448	3	13.04	0.83	33	0.06	0.54	1	12.07	1.17	11	
Rainfed	COMMON	HWS	2015-2017	WB 7566	1802	4878	686	28	352	146	0.07	4900	1009	28	3886	1448	7	12.73	0.82	55	-0.25	0.52	1	11.58	1.17	31	Released
Rainfed	COMMON	HRS	2015-2017	UC 16010 20	1838	4873	700	29	348	200	0.2	5174	1009	17	-	-	-	13.2	0.92	23	0.23	0.66	1	12.1	1.17	9	
Rainfed	COMMON	HRS	2015-2017	UC 14010 17	1789	4863	769	30	337	369	0.47	-	-	-	-	-	-	13.72	2.24	7	0.74	2.12	1	-	-	-	
Rainfed	COMMON	HWS	2015-2017	SY BLANCA ROYALE	1522	4833	686	31	307	146	0.11	5142	1009	20	3800	1448	13	13.33	0.82	20	0.35	0.52	1	12.25	1.17	6	Released
Rainfed	COMMON		2015-2017	APB 501129	1820	4804	721	32	279	263	0.42	-	-	-	3781	1448	15	12.74	1.09	53	-0.23	0.88	1	-	-	-	
Rainfed	COMMON	HRS	2015-2017	SY REDWING	1521	4789	686	33	264	146	0.19	5173	1009	18	3648	1448	22	12.93	0.82	40	-0.05	0.52	1	11.66	1.17	27	Released
Rainfed	COMMON	HRS	2015-2017	UC 14010 29	1792	4786	769	34	260	369	0.6	-	-	-	-	-	-	14.08	2.24	2	1.1	2.12	1	-	-	-	
Rainfed	COMMON		2015-2017	APB 8238	1821	4780	721	35	255	263	0.45	-	-	-	3757	1448	17	12.84	1.09	45	-0.14	0.88	1	-	-	-	
Rainfed	COMMON	HRS	2015-2017	XA 9301	1843	4780	700	36	254	200	0.36	5081	1009	23	-	-	-	13.05	0.92	32	0.08	0.66	1	11.95	1.17	19	
Rainfed	COMMON	HWS	2015-2017	UC PATWIN	1419	4776	769	37	250	369	0.61	-	-	-	-	-	-	13.53	2.24	12	0.55	2.12	1	-	-	-	Released
Rainfed	COMMON	HRS	2015-2017	APB 501189	1807	4757	705	38	232	214	0.41	-	-	-	3767	1448	16	12.18	1.03	74	-0.8	0.81	1	-	-	-	
Rainfed	COMMON	HRS	2015-2017	SY 13W00850	1834	4748	700	39	222	200	0.41	5049	1009	24	-	-	-	12.77	0.92	50	-0.2	0.66	1	11.67	1.17	25	
Rainfed	COMMON	HWS	2015-2017	WB 7618	1749	4743	705	40	217	214	0.44	-	-	-	3706	1448	19	13.66	1.03	10	0.68	0.81	1	-	-	-	Released
Rainfed	COMMON	HRS	2015-2017	WB 9904	1751	4730	686	41	204	146	0.31	5390	1009	3	3280	1448	35	12.86	0.82	43	-0.12	0.52	1	11.95	1.17	17	Released
Rainfed	COMMON	HRS	2015-2017	APB 501089	1828	4675	689	42	150	160	0.47	4843	1009	29	3885	1448	8	12.47	0.83	64	-0.51	0.54	1	11.37	1.17	38	
Rainfed	COMMON	HRS	2015-2017	SY ULTRA	1590	4669	686	43	144	146	0.45	5208	1009	12	3612	1448	24	12.87	0.82	42	-0.11	0.52	1	11.64	1.17	28	Released
Rainfed	COMMON	HRS	2015-2017	LCS 11SB0096	1772	4618	769	44	92	369	0.89	-	-	-	-	-	-	13.06	2.24	30	0.08	2.12	1	-	-	-	
Rainfed	COMMON	HRS	2015-2017	WB 9112	1748	4581	686	45	56	146	0.81	4742	1009	32	3692	1448	20	12.72	0.82	56	-0.26	0.52	1	11.51	1.17	34	Released
Rainfed	COMMON	HRS	2015-2017	SY CAL ROJO	1478	4581	687	46	55	149	0.81	5040	1011	25	3341	1448	34	12.81	0.82	47	-0.16	0.52	1	11.57	1.17	32	Released
Rainfed	COMMON	HRS	2015-2017	UC 15014 35	1818	4563	721	47	38	263	0.92	-	-	-	3540	1448	26	13.44	1.09	17	0.47	0.88	1	-	-	-	
Rainfed	COMMON	HWS	2015-2017	UC PATWIN 515HP	1743	4561	689	48	36	160	0.89	4905	1009	26	3463	1448	29	13.98	0.83	4	1	0.54	1	12.91	1.17	2	Released
Rainfed	COMMON	HRS	2015-2017	SY 314	1660	4522	686	49	-4	146	0.98	4736	1009	33	3561	1448	25	12.41	0.82	65	-0.57	0.52	1	11.13	1.17	42	Released
Rainfed	COMMON	HWS	2015-2017	WB 7390	1750	4502	705	50	-24	214	0.93	-	-	-	3517	1448	27	12.84	1.03	46	-0.14	0.81	1	-	-	-	
Rainfed	COMMON	HRS	2015-2017	UC LASSIK	1495	4490	686	51	-36	146	0.89	4677	1009	35	3652	1448	21	12.35	0.82	68	-0.62	0.52	1	11.46	1.17	35	Released
Rainfed	COMMON	HRS	2015-2017	WB DA907 005	1803	4489	769	52	-36	369	0.93	-	-	-	-	-	-	13.82	2.24	6	0.84	2.12	1	-	-	-	
Rainfed	COMMON	HRS	2015-2017	UC YUROK	1745	4486	686	53	-40	146	0.89	4540	1009	40	3473	1448	28	12.61	0.82	60	-0.37	0.52	1	11.41	1.17	36	Released
Rainfed	COMMON	HRS	2015-2017	WB ROCKLAND	1650	4485	705	54	-40	214	0.9	-	-	-	3637	1448	23	14.07	1.03	3	1.09	0.81	1	-	-	-	Released
Rainfed	COMMON	HRS	2015-2017	SY 13W00886	1835	4484	700	55	-41	200	0.89	4785	1009	30	-	-	-	13.03	0.92	34	0.05	0.66	1	11.93	1.17	21	
Rainfed	COMMON	HRS	2015-2017	WB 9229	1730	4452	686	56	-74	146	0.74	4562	1009	38	3863	1448	11	13.53	0.82	11	0.56	0.52	1	12.65	1.17	3	Released
Rainfed	COMMON	HWS	2015-2017	UC PATWIN 515	1680	4411	686	57	-114	146	0.56	4619	1009	36	3354	1448	32	13.23	0.82	22	0.25	0.52	1	11.95	1.17	20	Released
Rainfed	COMMON		2015-2017	APB 8155	1829	4383	721	58	-143	263	0.71	-	-	-	3360	1448	31	12.98	1.09	36	0	0.88	1	-	-	-	
Rainfed	COMMON	HRS	2015-2017	WB PATRON	1731	4365	686	59	-160	146	0.41	4900	1009	27	3130	1448	38	13.15	0.82	27	0.18	0.52	1	12.03	1.17	13	Released
Rainfed	COMMON	SRS	2015-2017	ASSL TAM 204	1778	4358	686	60	-167	146	0.41	4747	1009	31	3068	1448	39	12.97	0.82	37	-0.01	0.52	1	11.92	1.17	22	Released
Rainfed	COMMON	HRS	2015-2017	LCS 10SB0087 B	1804	4346	769	61	-180	369	0.74	-	-	-	-	-	-	13.39	2.24	18	0.41	2.12	1	-	-	-	
Rainfed	COMMON	HRS	2015-2017	WWW FV 2808	1608	4291	686	62	-234	146	0.24	4681	1009	34	3224	1448	37	11.85	0.82	77	-1.12	0.52	1	11.05	1.17	45	Released
Rainfed	COMMON	HRS	2015-2017	YECORA ROJO	112	4282	702	63	-243	207	0.41	4568	1011	37	-	-	-	12.74	0.94	54	-0.23	0.69	1	12	1.17	15	Released
Rainfed	COMMON	HWS	2015-2017	WB PERLA	1729	4260	769	64	-266	369	0.6	-	-	-	-	-	-	13.78	2.24	21	0.3	2.12	1	-	-	-	Released
Rainfed	COMMON	HWS	2015-2017	UC 15080 49	1837	4259	700	65	-267	200	0.34	4559	1009	39	-	-	-	14.27	0.92	1	1.3	0.66	1	13.17	1.17	1	
Rainfed	COMMON	HRS	2015-2017	WB JOAQUIN 080	1728	4255	686	66	-270	146	0.18	4273	1009	44	3791	1448	14	13.47	0.82	15	0.49	0.52	1	12.28	1.17	4	Released
Rainfed	COMMON	HRS	2015-2017	UC 14657 170	1836	4223	700	67	-302	200	0.28	4524	1009	41	-	-	-	13.06	0.92	31	0.08	0.66	1	11.95	1.17	18	
Rainfed	COMMON	HRS	2015-2017	UC ANZA	20	4149	689	68	-377	160	0.08	4383	1009	43	3241	1448	36	12.32	0.83	70	-0.66	0.54	1	11.31	1.17	39	Released
Rainfed	COMMON	HRS	2015-2017	WB PR 1404	1526	4114	769	69	-412	369	0.41	-	-	-	-	-	-	11.89	2.24	76	-1.09	2.12	1	-	-	-	Released
Rainfed	COMMON	HWS	2015-2017	UC CLEAR WHITE	1361	4051	769	70	-474	369	0.36	-	-	-	-	-	-	12.41	2.24	66	-0.57	2.12	1	-	-	-	Released
Rainfed	COMMON	HWS	2015-2017	UC 14014 42	1793	4032	769	71	-493	369	0.34	-	-	-	-	-	-	13.68	2.24	8	0.7	2.12	1	-	-	-	
Rainfed	COMMON	HWS	2015-2017	SY DAYN	1795	3971	769	72	-555	369	0.28	-	-	-	-	-	-	13.67	2.24	9	0.69	2.12	1	-	-	-	Released
Rainfed	COMMON	SRS	2015-2017	SY VACA	1766	3897	687	73	-628	149	0	4435	1009	42	1971	1450	41	12.29	0.84	71	-0.69	0.55	1	11.09	1.17	43	Released
Rainfed	COMMON	HRS	2015-2017	WB TRIPLE IV	1550	3740	705	74	-785	214	0	-	-	-	3351	1448	33	12.2	1.03	72	-0.78	0.81	1	-	-	-	Released
Rainfed	COMMON	SWS	2015-2017	BAG NEW DIRKWIN	1667	3323	688	75	-1202	152	0	3519	1009	45	2266	1452	40	12.78	0.83	49	-0.2	0.54	1	11.67	1.17	26	Released
Rainfed	COMMON	HRS	2015-2017	APB 430429	1808	2846	769	76	-1679	369	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Rainfed	COMMON	HRS	2015-2017	WB JOAQUIN	1424	2315	769	77	-2211	369	0	-	-	-	-	-	-	12.8	2.24	48	-0.18	2.12	1	-	-	-	Released
Rainfed	COMMON	HRS	2015-2017	WWW MIKA	1340	1889	769	78	-2637	369	0	-	-	-	-	-	-	13.83	2.24	5	0.85	2.12	1	-	-	-	Released
Rainfed	COMMON	HWS	2015-2017	APB 717	1809	1517	769	79	-3008	369	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Table 21. Sacramento Valley region, durum wheat yield and protein 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	2016 Yield (lb/acre)	2016 St.Err.Yield (lb/acre)	2016 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2017 Protein (%)	2017 St.Err.Protein (%)	2017 Protein Rank	Status
SacV	DURUM	DURUM	2015-2017	UC 15210 12	1825	8620	633	1	1713	365	0	-	-	-	7721	333	1	12.11	0.65	35	-0.52	0.37	0.33	-	-	-	
SacV	DURUM	DURUM	2015-2017	UC 16051 25	1850	8201	634	2	1295	366	0	9077	339	1	-	-	-	11.9	0.65	44	-0.73	0.37	0.15	10.91	0.39	23	
SacV	DURUM	DURUM	2015-2017	APB 471400	1853	8149	634	3	1243	366	0.01	9025	339	2	-	-	-	11.97	0.65	41	-0.66	0.37	0.18	10.98	0.39	21	
SacV	DURUM	DURUM	2015-2017	UC 13210 21	1771	7958	633	4	1052	363	0.02	-	-	-	-	-	-	12.33	0.83	33	-0.3	0.64	0.77	-	-	-	
SacV	DURUM	DURUM	2015-2017	UC DESERT KING	1375	7905	556	5	999	210	0	8844	339	4	7030	333	3	12.04	0.58	37	-0.59	0.24	0.07	11.23	0.39	19	Released
SacV	DURUM	DURUM	2015-2017	WWW CROWN	1166	7834	633	6	928	363	0.05	-	-	-	-	-	-	12.45	0.83	31	-0.18	0.64	0.86	-	-	-	Released
SacV	DURUM	DURUM	2015-2017	LCS 13SD0056	1833	7798	667	7	892	419	0.09	-	-	-	6920	373	5	11.82	0.7	46	-0.81	0.45	0.18	-	-	-	
SacV	DURUM	DURUM	2015-2017	UC 16051 12	1849	7773	634	8	867	366	0.07	8649	339	5	-	-	-	11.76	0.65	49	-0.87	0.37	0.08	10.77	0.39	24	
SacV	DURUM	DURUM	2015-2017	AS SARAGOLLA	1583	7748	556	9	842	210	0	8981	339	3	7200	333	2	11.66	0.58	51	-0.97	0.24	0	10.77	0.39	25	Released
SacV	DURUM	DURUM	2015-2017	UC 15210 24	1826	7728	633	10	822	365	0.08	-	-	-	6830	333	6	11.82	0.65	47	-0.81	0.37	0.11	-	-	-	
SacV	DURUM	DURUM	2015-2017	UC 15210 11	1824	7683	633	11	777	365	0.09	-	-	-	6785	333	7	12.41	0.65	32	-0.22	0.37	0.7	-	-	-	
SacV	DURUM	DURUM	2015-2017	ASC 101	1855	7681	634	12	775	366	0.09	8557	339	6	-	-	-	12.72	0.65	27	0.09	0.37	0.86	11.72	0.39	14	
SacV	DURUM	DURUM	2015-2017	LCS 12E4006	1832	7629	633	13	723	365	0.11	-	-	-	6731	333	9	11.49	0.65	52	-1.14	0.37	0.02	-	-	-	
SacV	DURUM	DURUM	2015-2017	UC 13210 5	1770	7453	633	14	547	363	0.24	-	-	-	-	-	-	12.73	0.83	26	0.1	0.64	0.9	-	-	-	
SacV	DURUM	DURUM	2015-2017	APB WESTMORE HP	1484	7423	556	15	517	210	0.05	7825	339	17	7002	333	4	13.28	0.58	11	0.65	0.24	0.04	12.53	0.39	2	Released
SacV	DURUM	DURUM	2015-2017	WWW D3085	1801	7364	633	16	458	363	0.33	-	-	-	-	-	-	11.77	0.83	48	-0.86	0.64	0.34	-	-	-	
SacV	DURUM	DURUM	2015-2017	APB 540505	1822	7362	633	17	456	365	0.33	-	-	-	6464	333	10	12.46	0.65	30	-0.17	0.37	0.77	-	-	-	
SacV	DURUM	DURUM	2015-2017	AS MAESTRALE	1582	7349	556	18	443	210	0.09	8349	339	7	6781	333	13	11.69	0.58	50	-0.94	0.24	0	10.54	0.39	26	Released
SacV	DURUM	DURUM	2015-2017	ASC 102	1856	7338	634	19	432	366	0.35	8214	339	9	-	-	-	12.58	0.65	29	-0.05	0.37	0.9	11.58	0.39	18	
SacV	DURUM	DURUM	2015-2017	ASC 103	1857	7331	634	20	425	366	0.35	8207	339	10	-	-	-	11.92	0.65	43	-0.71	0.37	0.16	10.92	0.39	22	
SacV	DURUM	DURUM	2015-2017	AS COLOMBO	1800	7324	576	21	418	257	0.2	7580	339	19	-	-	-	11.01	0.62	53	-1.62	0.32	0	9.91	0.39	27	Released
SacV	DURUM	DURUM	2015-2017	UC 14215 14	1798	7211	633	22	305	363	0.47	-	-	-	-	-	-	12.79	0.83	23	0.16	0.64	0.86	-	-	-	
SacV	DURUM	DURUM	2015-2017	UC DESERT KING HP	1627	7178	556	23	272	210	0.33	7641	339	18	6751	333	8	13.67	0.58	5	1.04	0.24	0	12.33	0.39	7	Released
SacV	DURUM	DURUM	2015-2017	UC 14215/9	1796	7154	576	24	248	257	0.42	-	-	-	6449	333	11	13.41	0.62	8	0.78	0.32	0.07	-	-	-	
SacV	DURUM	DURUM	2015-2017	WWW Q MAX	1473	7016	633	25	110	363	0.78	-	-	-	-	-	-	12.02	0.83	39	-0.61	0.64	0.48	-	-	-	Released
SacV	DURUM	DURUM	2015-2017	ASC 100	1854	7015	634	26	109	366	0.78	7891	339	16	-	-	-	12.08	0.65	36	-0.55	0.37	0.29	11.08	0.39	20	
SacV	DURUM	DURUM	2015-2017	WWW TOPPER	1211	6909	633	27	2	363	0.99	-	-	-	-	-	-	11.86	0.83	45	-0.77	0.64	0.39	-	-	-	Released
SacV	DURUM	DURUM	2015-2017	UC MIWOK	1690	6813	556	28	-93	210	0.73	7978	339	13	6082	333	14	13.09	0.58	14	0.46	0.24	0.16	12.39	0.39	5	Released
SacV	DURUM	DURUM	2015-2017	SY VOLANTE	1431	6805	576	29	-101	257	0.75	-	-	-	5463	333	20	12.66	0.62	28	0.03	0.32	0.92	-	-	-	Released
SacV	DURUM	DURUM	2015-2017	ALBERTO	1813	6797	556	30	-109	210	0.68	7924	339	15	4888	333	27	12.89	0.58	19	0.26	0.24	0.44	11.71	0.39	15	Released
SacV	DURUM	DURUM	2015-2017	APB 571353	1812	6797	633	31	-109	365	0.78	-	-	-	5898	333	19	12.32	0.65	34	-0.31	0.37	0.56	-	-	-	
SacV	DURUM	DURUM	2015-2017	APB KRONOS	951	6695	556	32	-211	210	0.41	8325	339	8	5983	333	16	12.89	0.58	20	0.26	0.24	0.44	11.91	0.39	10	Released
SacV	DURUM	DURUM	2015-2017	WWW DURAKING	878	6676	633	33	-230	363	0.61	-	-	-	-	-	-	11.98	0.83	40	-0.65	0.64	0.45	-	-	-	Released
SacV	DURUM	DURUM	2015-2017	APB TIBURON	1640	6670	556	34	-237	210	0.36	7979	339	12	5097	333	25	13.36	0.58	10	0.73	0.24	0.02	12.25	0.39	8	Released
SacV	DURUM	DURUM	2015-2017	APB 540165	1827	6627	576	35	-279	258	0.37	7277	339	23	5955	333	18	12.98	0.59	17	0.35	0.27	0.34	11.84	0.39	12	
SacV	DURUM	DURUM	2015-2017	LCS KIKO	1697	6604	556	36	-302	210	0.26	7005	339	24	6073	333	15	12.8	0.58	21	0.17	0.24	0.62	12.08	0.39	9	Released
SacV	DURUM	DURUM	2015-2017	WWW D2517BELL025	1776	6588	633	37	-318	363	0.46	-	-	-	-	-	-	13.97	0.83	3	1.34	0.64	0.11	-	-	-	
SacV	DURUM	DURUM	2015-2017	APB 450311	1851	6580	634	38	-326	366	0.46	7456	339	20	-	-	-	12.74	0.65	24	0.11	0.37	0.86	11.75	0.39	13	
SacV	DURUM	DURUM	2015-2017	APB 571217	1810	6534	576	39	-372	257	0.26	-	-	-	5228	333	22	13.54	0.62	7	0.91	0.32	0.03	-	-	-	
SacV	DURUM	DURUM	2015-2017	SY FORTISSIMO	1429	6532	556	40	-374	210	0.15	5564	339	27	6283	333	12	13.06	0.58	15	0.43	0.24	0.18	12.45	0.39	4	Released
SacV	DURUM	DURUM	2015-2017	UC 14215 11	1797	6509	633	41	-397	363	0.37	-	-	-	-	-	-	13.67	0.83	4	1.04	0.64	0.22	-	-	-	
SacV	DURUM	DURUM	2015-2017	WB HAVASU	1479	6482	556	42	-425	210	0.1	7945	339	14	5212	333	24	12.92	0.58	18	0.29	0.24	0.4	11.68	0.39	17	Released
SacV	DURUM	DURUM	2015-2017	WB MEAD	1607	6473	556	43	-433	210	0.1	8126	339	11	4915	333	26	13.15	0.58	12	0.52	0.24	0.11	11.7	0.39	16	Released
SacV	DURUM	DURUM	2015-2017	LCS AURON	1721	6473	633	44	-433	363	0.35	-	-	-	-	-	-	11.94	0.83	42	-0.69	0.64	0.44	-	-	-	
SacV	DURUM	DURUM	2015-2017	APB HELIOS	1440	6460	576	45	-446	257	0.17	-	-	-	5225	333	23	13.05	0.62	16	0.42	0.32	0.34	-	-	-	Released
SacV	DURUM	DURUM	2015-2017	WB ORITA	1215	6361	556	46	-545	210	0.04	7284	339	22	5981	333	17	13.55	0.58	6	0.92	0.24	0	12.51	0.39	3	Released
SacV	DURUM	DURUM	2015-2017	UC 14215 42	1799	6203	633	47	-703	363	0.11	-	-	-	-	-	-	12.03	0.83	38	-0.6	0.64	0.48	-	-	-	
SacV	DURUM	DURUM	2015-2017	WWW PLATINUM	1210	6096	633	48	-810	363	0.08	-	-	-	-	-	-	13.11	0.83	13	0.48	0.64	0.6	-	-	-	Released
SacV	DURUM	DURUM	2015-2017	WB MOHAVE	1654	6049	556	49	-857	210	0	7443	339	21	5443	333	21	12.73	0.58	25	0.1	0.24	0.77	11.87	0.39	11	Released
SacV	DURUM	DURUM	2015-2017	APB 470442	1852	5823	634	50	-1083	366	0.02	6699	339	25	-	-	-	14.14	0.65	2	1.51	0.37	0	13.14	0.39	1	
SacV	DURUM	DURUM	2015-2017	APB 410077	1823	5773	633	51	-1133	365	0.01	-	-	-	4874	333	28	12.8	0.65	22	0.17	0.37	0.77	-	-	-	
SacV	DURUM	DURUM	2015-2017	UC 16051 1	1848	5310	634	52	-1596	366	0	6186	339	26	-	-	-	13.37	0.65	9	0.74	0.37	0.14	12.38	0.39	6	
SacV	DURUM	TURG	2015-2017	KAMUT	1786	1158	633	53	-5748	363	0	-	-	-	-	-	-	14.87	0.83	1	2.24	0.64	0	-	-	-	

Table 22. North Central San Joaquin Valley region, durum wheat yield and protein 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	2016 Yield (lb/acre)	2016 St.Err.Yield (lb/acre)	2016 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2017 Protein (%)	2017 St.Err.Protein (%)	2017 Protein Rank	Status
NCenSJV	DURUM	DURUM	2015-2017	UC 13210 5	1770	7741	491	1	1002	258	0	-	-	-	-	-	-	10.49	1.23	50	-0.79	0.95	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	UC 16051 25	1850	7564	492	2	825	261	0.01	7725	305	1	-	-	-	10.54	0.94	48	-0.74	0.56	0.98	9.21	1.43	26	
NCenSJV	DURUM	DURUM	2015-2017	UC 13210 21	1771	7443	491	3	705	258	0.03	-	-	-	-	-	-	11.46	1.23	20	0.18	0.95	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	LCS 13S00056	1833	7440	491	4	702	260	0.03	-	-	-	8264	351	4	10.52	0.94	49	-0.76	0.56	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	UC 15210 24	1826	7399	491	5	660	260	0.04	-	-	-	8223	351	5	11	0.94	37	-0.28	0.56	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	UC 15210 12	1825	7386	491	6	648	260	0.04	-	-	-	8210	351	6	11.53	0.94	16	0.25	0.56	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	LCS KIKO	1697	7361	441	7	623	150	0	6656	305	7	8383	351	2	11.04	0.84	36	-0.24	0.37	0.98	9.72	1.43	16	Released
NCenSJV	DURUM	DURUM	2015-2017	LCS 12E4006	1832	7378	491	8	589	260	0.07	-	-	-	8152	351	7	10.41	0.94	52	-0.87	0.56	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	UC 15210 11	1824	7304	491	9	566	260	0.09	-	-	-	8128	351	8	11.74	0.94	6	0.46	0.56	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	UC DESERT KING	1375	7301	441	10	563	150	0	6805	305	4	8563	351	1	10.97	0.84	38	-0.31	0.37	0.98	9.62	1.43	20	Released
NCenSJV	DURUM	DURUM	2015-2017	UC 14215/9	1796	7292	454	11	554	183	0.02	-	-	-	8023	351	9	11.7	0.9	7	0.42	0.48	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	ASC 103	1857	7266	492	12	528	261	0.11	6928	305	2	-	-	-	10.3	0.94	54	-0.98	0.56	0.9	8.98	1.43	27	
NCenSJV	DURUM	DURUM	2015-2017	APB 571189	1811	7215	491	13	477	258	0.15	-	-	-	-	-	-	10.42	1.23	51	-0.86	0.95	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	APB TIBURON	1640	7165	441	14	427	150	0.02	6600	305	10	7935	351	12	11.54	0.84	14	0.26	0.37	0.98	10.22	1.43	6	Released
NCenSJV	DURUM	DURUM	2015-2017	SY FORTISSIMO	1429	7143	441	15	405	150	0.03	6613	305	9	7892	351	14	11.6	0.84	11	0.31	0.37	0.98	10.29	1.43	4	Released
NCenSJV	DURUM	DURUM	2015-2017	WWW CROWN	1166	7136	491	16	398	258	0.24	-	-	-	-	-	-	10.95	1.23	40	-0.33	0.95	0.98	-	-	-	Released
NCenSJV	DURUM	DURUM	2015-2017	APB 540165	1827	7112	457	17	374	190	0.12	6303	321	19	8367	351	3	11.29	0.86	31	0.01	0.42	0.98	10.05	1.44	10	
NCenSJV	DURUM	DURUM	2015-2017	APB 540505	1822	7083	491	18	345	260	0.31	-	-	-	7907	351	13	10.91	0.94	41	-0.38	0.56	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	APB 571353	1812	7011	454	19	273	183	0.25	-	-	-	7843	351	16	11.13	0.9	34	-0.16	0.48	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	SY VOLANTE	1431	6977	442	20	238	153	0.24	6540	321	11	7568	351	19	10.86	0.84	42	-0.42	0.37	0.98	9.56	1.43	21	Released
NCenSJV	DURUM	DURUM	2015-2017	APB 571217	1810	6951	454	21	212	183	0.38	-	-	-	7792	351	17	11.4	0.9	24	0.12	0.48	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	UC MIWOK	1690	6948	441	22	209	150	0.28	6870	305	3	7958	351	10	11.4	0.84	26	0.12	0.37	0.98	10.05	1.43	12	Released
NCenSJV	DURUM	DURUM	2015-2017	WWW DURAKING	878	6915	491	23	177	258	0.65	-	-	-	-	-	-	11.22	1.23	32	-0.06	0.95	0.98	-	-	-	Released
NCenSJV	DURUM	DURUM	2015-2017	UC DESERT KING HP	1627	6910	441	24	172	150	0.38	6411	305	14	7940	351	11	12.29	0.84	2	1.01	0.37	0.17	11.04	1.43	1	Released
NCenSJV	DURUM	DURUM	2015-2017	AS SARAGOLLA	1583	6897	441	25	159	150	0.42	6763	305	5	7321	351	22	10.72	0.84	45	-0.56	0.37	0.98	9.3	1.43	24	Released
NCenSJV	DURUM	DURUM	2015-2017	APB 471400	1853	6794	492	26	55	261	0.94	6455	305	12	-	-	-	10.62	0.94	47	-0.66	0.56	0.98	9.3	1.43	25	
NCenSJV	DURUM	DURUM	2015-2017	LCS ALIRON	1721	6758	491	27	20	258	0.94	-	-	-	-	-	-	11.07	1.23	35	-0.21	0.95	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	ALBERTO	1813	6758	442	28	19	153	0.94	6627	321	8	7495	351	21	11.48	0.84	19	0.2	0.38	0.98	9.63	1.44	19	Released
NCenSJV	DURUM	DURUM	2015-2017	ASC 101	1855	6757	492	29	19	261	0.94	6419	305	13	-	-	-	10.67	0.94	46	-0.61	0.56	0.98	9.34	1.43	23	
NCenSJV	DURUM	DURUM	2015-2017	WWW Q MAX	1473	6718	491	30	-20	258	0.94	-	-	-	-	-	-	11.61	1.23	10	0.33	0.95	0.98	-	-	-	Released
NCenSJV	DURUM	DURUM	2015-2017	APB 470442	1852	6711	492	31	-27	261	0.94	6373	305	15	-	-	-	11.41	0.94	22	0.12	0.56	0.98	10.08	1.43	8	
NCenSJV	DURUM	DURUM	2015-2017	UC 16051 12	1849	6699	492	32	-39	261	0.94	6361	305	16	-	-	-	10.83	0.94	43	-0.45	0.56	0.98	9.51	1.43	22	
NCenSJV	DURUM	DURUM	2015-2017	WWW D2517BELL025	1776	6669	491	33	-69	258	0.91	-	-	-	-	-	-	11.4	1.23	25	0.12	0.95	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	ASC 100	1854	6639	501	34	-99	278	0.85	6322	321	18	-	-	-	11.63	0.97	8	0.35	0.61	0.98	10.05	1.44	11	
NCenSJV	DURUM	DURUM	2015-2017	APB HELIOS	1440	6638	454	35	-100	183	0.73	-	-	-	7518	351	20	11.49	0.9	18	0.21	0.48	0.98	-	-	-	Released
NCenSJV	DURUM	DURUM	2015-2017	APB WESTMORE HP	1484	6612	442	36	-126	153	0.55	6114	321	22	7848	351	15	11.97	0.84	4	0.69	0.37	0.83	10.74	1.43	3	Released
NCenSJV	DURUM	DURUM	2015-2017	APB 450311	1851	6611	492	37	-127	261	0.75	6273	305	20	-	-	-	11.37	0.94	27	0.09	0.56	0.98	10.04	1.43	13	
NCenSJV	DURUM	DURUM	2015-2017	WWW D3085	1801	6604	491	38	-134	258	0.74	-	-	-	-	-	-	11.21	1.23	33	-0.07	0.95	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	AS MAESTRALE	1582	6571	445	39	-167	160	0.42	6340	305	17	6664	377	28	10.79	0.85	44	-0.49	0.39	0.98	9.67	1.43	18	Released
NCenSJV	DURUM	DURUM	2015-2017	UC 14215 11	1797	6566	491	40	-172	258	0.65	-	-	-	-	-	-	11.77	1.23	5	0.49	0.95	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	WB MEAD	1607	6530	441	41	-209	150	0.28	6232	305	21	7685	351	18	11.32	0.84	29	0.04	0.37	0.98	9.72	1.43	17	Released
NCenSJV	DURUM	DURUM	2015-2017	WWW TOPPER	1211	6476	491	42	-263	258	0.43	-	-	-	-	-	-	11.46	1.23	21	0.18	0.95	0.98	-	-	-	Released
NCenSJV	DURUM	DURUM	2015-2017	WB ORITA	1215	6443	441	43	-295	150	0.12	6726	305	6	7045	351	24	11.53	0.84	15	0.25	0.37	0.98	10.09	1.43	7	Released
NCenSJV	DURUM	DURUM	2015-2017	WWW PLATINUM	1210	6419	491	44	-320	258	0.34	-	-	-	-	-	-	11.3	1.23	30	0.02	0.95	0.98	-	-	-	Released
NCenSJV	DURUM	DURUM	2015-2017	UC 14215 14	1798	6406	491	45	-332	258	0.33	-	-	-	-	-	-	11.62	1.23	9	0.34	0.95	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	WB HAVASU	1479	6310	441	46	-429	150	0.02	5967	305	23	6913	351	26	11.51	0.84	17	0.23	0.37	0.98	10.07	1.43	9	Released
NCenSJV	DURUM	DURUM	2015-2017	APB 410077	1823	6300	491	47	-439	260	0.19	-	-	-	7123	351	23	11.59	0.94	12	0.31	0.56	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	APB KRONOS	951	6296	444	48	-442	156	0.02	5913	342	25	7005	351	25	11.4	0.84	23	0.12	0.38	0.98	9.85	1.44	15	Released
NCenSJV	DURUM	DURUM	2015-2017	ASC 102	1856	6281	492	49	-458	261	0.17	5942	305	24	-	-	-	11.33	0.94	28	0.05	0.56	0.98	10	1.43	14	
NCenSJV	DURUM	DURUM	2015-2017	UC 14215 42	1799	6210	491	50	-529	258	0.11	-	-	-	-	-	-	10.97	1.23	39	-0.31	0.95	0.98	-	-	-	
NCenSJV	DURUM	DURUM	2015-2017	WB MOHAVE	1654	6083	441	51	-656	150	0	5864	305	26	6697	351	27	11.57	0.84	13	0.29	0.37	0.98	10.24	1.43	5	Released
NCenSJV	DURUM	DURUM	2015-2017	UC 16051 1	1848	6023	492	52	-715	261	0.03	5685	305	28	-	-	-	12.1	0.94	3	0.82	0.56	0.98	10.77	1.43	2	
NCenSJV	DURUM	DURUM	2015-2017	AS COLOMBO	1800	5862	454	53	-876	183	0	5728	305	27	-	-	-	10.33	0.9	53	-0.95	0.48	0.83	8.91	1.43	28	Released
NCenSJV	DURUM	TURG	2015-2017	KAMUT	1786	1840	491	54	-4898	258	0	-	-	-	-	-	-	14.39	1.23	1	3.11	0.95	0.07	-	-	-	

Table 23 South San Joaquin Valley region, durum wheat yield and protein 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	2016 Yield (lb/acre)	2016 St.Err.Yield (lb/acre)	2016 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2017 Protein (%)	2017 St.Err.Protein (%)	2017 Protein Rank	Status
SoSJV	DURUM	DURUM	2015-2017	APB 540505	1822	7632	1033	1	1397	432	0.01	-	-	-	6386	395	2	13.99	1.13	38	-1.05	0.26	0	-	-	-	
SoSJV	DURUM	DURUM	2015-2017	APB 540165	1827	7583	992	2	1349	326	0	10160	530	2	5711	395	8	14.47	1.12	31	-0.57	0.19	0.01	13.23	0.23	26	
SoSJV	DURUM	DURUM	2015-2017	APB TIBURON	1640	7528	971	3	1293	260	0	10731	474	1	5710	395	9	14.45	1.11	32	-0.59	0.17	0	13.27	0.21	25	Releas
SoSJV	DURUM	DURUM	2015-2017	APB 450311	1851	7443	1033	4	1208	433	0.04	9272	474	4	-	-	-	15.32	1.12	15	0.28	0.23	0.26	14.22	0.21	12	
SoSJV	DURUM	DURUM	2015-2017	UC 14215/9	1796	7292	992	5	1057	325	0.01	-	-	-	6551	395	1	14.66	1.13	27	-0.38	0.26	0.19	-	-	-	
SoSJV	DURUM	DURUM	2015-2017	UC 14215 11	1797	7285	1063	6	1051	495	0.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SoSJV	DURUM	DURUM	2015-2017	APB 410077	1823	7132	1033	7	898	432	0.13	-	-	-	5887	395	6	14.38	1.13	35	-0.66	0.26	0.03	-	-	-	
SoSJV	DURUM	DURUM	2015-2017	APB 571217	1810	7114	992	8	879	325	0.04	-	-	-	6137	395	4	14.7	1.13	24	-0.34	0.26	0.24	-	-	-	
SoSJV	DURUM	DURUM	2015-2017	APB 471400	1853	6971	1033	9	736	433	0.19	8800	474	8	-	-	-	13.93	1.12	39	-1.11	0.23	0	12.83	0.21	28	
SoSJV	DURUM	DURUM	2015-2017	APB HELIOS	1440	6962	992	10	728	325	0.1	-	-	-	5957	395	5	14.01	1.13	37	-1.03	0.26	0	-	-	-	Releas
SoSJV	DURUM	DURUM	2015-2017	SY VOLANTE	1431	6824	971	11	589	260	0.1	9471	474	3	4919	395	17	14.64	1.11	28	-0.4	0.17	0.04	13.16	0.21	27	Releas
SoSJV	DURUM	DURUM	2015-2017	UC 132105	1770	6752	1063	12	518	495	0.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SoSJV	DURUM	DURUM	2015-2017	UC 13210 21	1771	6749	1063	13	515	495	0.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SoSJV	DURUM	DURUM	2015-2017	UC MIWOK	1690	6734	971	14	500	260	0.14	8451	474	9	5604	395	11	14.85	1.11	21	-0.19	0.17	0.31	13.54	0.21	23	Releas
SoSJV	DURUM	DURUM	2015-2017	UC DESERT KING	1375	6691	971	15	456	260	0.19	8887	474	7	4960	395	16	15.34	1.11	14	0.3	0.17	0.12	14.16	0.21	13	Releas
SoSJV	DURUM	DURUM	2015-2017	APB 571353	1812	6685	1033	16	451	432	0.42	-	-	-	5440	395	13	14.38	1.13	34	-0.66	0.26	0.03	-	-	-	
SoSJV	DURUM	DURUM	2015-2017	LCS KIKO	1697	6676	971	17	441	260	0.19	7640	474	14	5803	395	7	14.73	1.11	22	-0.31	0.17	0.11	14.04	0.21	14	Releas
SoSJV	DURUM	DURUM	2015-2017	WWW D2517BELL025	1776	6652	1063	18	418	495	0.52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SoSJV	DURUM	DURUM	2015-2017	WB MOHAVE	1654	6646	971	19	412	260	0.22	7797	474	13	5685	395	10	14.62	1.11	29	-0.42	0.17	0.04	13.64	0.21	21	Releas
SoSJV	DURUM	DURUM	2015-2017	UC 152102 4	1826	6637	1033	20	403	432	0.48	-	-	-	5392	395	14	14.04	1.13	36	-1.01	0.26	0	-	-	-	
SoSJV	DURUM	DURUM	2015-2017	WWW DURAKING	878	6554	1063	21	320	495	0.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Releas
SoSJV	DURUM	DURUM	2015-2017	ALBERTO	1813	6473	971	22	238	260	0.48	9078	474	5	4751	395	21	15.12	1.11	18	0.08	0.17	0.66	13.8	0.21	17	Releas
SoSJV	DURUM	DURUM	2015-2017	WB HAVASU	1479	6414	971	23	179	260	0.61	7504	474	16	5541	395	12	14.72	1.11	23	-0.32	0.17	0.11	13.81	0.21	16	Releas
SoSJV	DURUM	DURUM	2015-2017	SY FORTISSIMO	1429	6317	971	24	83	260	0.81	8976	474	6	4473	395	23	14.95	1.11	20	-0.09	0.17	0.66	13.47	0.21	24	Releas
SoSJV	DURUM	DURUM	2015-2017	AS MAESTRALE	1582	6283	971	25	48	260	0.87	7897	474	12	4799	395	20	14.43	1.11	33	-0.61	0.17	0	13.7	0.21	18	Releas
SoSJV	DURUM	DURUM	2015-2017	UC 14215 14	1798	6175	1063	26	-59	495	0.91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SoSJV	DURUM	DURUM	2015-2017	UC 16051 12	1849	6138	1033	27	-96	433	0.86	7968	474	11	-	-	-	15.55	1.12	10	0.51	0.23	0.05	14.45	0.21	9	
SoSJV	DURUM	DURUM	2015-2017	UC 152102	1825	6114	1033	28	-120	432	0.83	-	-	-	4869	395	18	15.76	1.13	6	0.72	0.26	0.02	-	-	-	
SoSJV	DURUM	DURUM	2015-2017	APB KRONOS	951	6085	971	29	-149	260	0.67	6812	474	27	6371	395	3	14.59	1.11	30	-0.45	0.17	0.03	13.69	0.21	19	Releas
SoSJV	DURUM	DURUM	2015-2017	UC 14215 42	1799	6072	1063	30	-163	495	0.81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SoSJV	DURUM	DURUM	2015-2017	UC 15210 11	1824	6057	1033	31	-177	432	0.79	-	-	-	4812	395	19	15.17	1.13	17	0.13	0.26	0.66	-	-	-	
SoSJV	DURUM	DURUM	2015-2017	WWW CROWN	1166	6042	1063	32	-192	495	0.79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Releas
SoSJV	DURUM	DURUM	2015-2017	UC DESERT KING HP	1627	5906	971	33	-328	260	0.36	8272	474	10	4334	395	25	16.22	1.11	2	1.17	0.17	0	15.22	0.21	2	Releas
SoSJV	DURUM	DURUM	2015-2017	LCS ALURON	1721	5885	1063	34	-349	495	0.61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SoSJV	DURUM	DURUM	2015-2017	AS SARAGOLLA	1583	5784	971	35	-451	260	0.19	7301	474	18	4437	395	24	14.67	1.11	26	-0.37	0.16	0.05	13.66	0.21	20	Releas
SoSJV	DURUM	DURUM	2015-2017	APB WESTMORE HP	1484	5757	971	36	-478	260	0.17	7075	474	23	4565	395	22	15.43	1.11	11	0.39	0.17	0.05	14.49	0.21	7	Releas
SoSJV	DURUM	DURUM	2015-2017	UC 16051 25	1850	5752	1033	37	-483	433	0.42	7581	474	15	-	-	-	15.41	1.12	12	0.37	0.23	0.16	14.31	0.21	10	
SoSJV	DURUM	DURUM	2015-2017	WB ORITA	1215	5713	971	38	-522	260	0.14	6944	474	24	5077	395	15	15.77	1.11	5	0.73	0.17	0	14.84	0.21	3	Releas
SoSJV	DURUM	DURUM	2015-2017	WWW D3085	1801	5694	1063	39	-541	495	0.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SoSJV	DURUM	DURUM	2015-2017	WWW TOPPER	1211	5661	1063	40	-573	495	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Releas
SoSJV	DURUM	DURUM	2015-2017	WWW PLATINUM	1210	5627	1063	41	-607	495	0.37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Releas
SoSJV	DURUM	DURUM	2015-2017	ASC 101	1855	5620	1033	42	-615	433	0.28	7449	474	17	-	-	-	14.68	1.12	25	-0.36	0.23	0.16	13.58	0.21	22	
SoSJV	DURUM	DURUM	2015-2017	WWW Q MAX	1473	5504	1063	43	-730	495	0.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Releas
SoSJV	DURUM	DURUM	2015-2017	UC 160511	1848	5434	1062	44	-800	496	0.22	7176	530	22	-	-	-	17.16	1.13	1	2.12	0.26	0	16.11	0.23	1	
SoSJV	DURUM	DURUM	2015-2017	APB 470442	1852	5396	1033	45	-839	433	0.14	7225	474	20	-	-	-	15.39	1.12	13	0.35	0.23	0.17	14.29	0.21	11	
SoSJV	DURUM	DURUM	2015-2017	ASC 100	1854	5392	1033	46	-842	433	0.14	7222	474	21	-	-	-	15.57	1.12	8	0.53	0.23	0.04	14.48	0.21	8	
SoSJV	DURUM	DURUM	2015-2017	WB MEAD	1607	5273	971	47	-962	260	0	7287	474	19	3677	395	28	15.96	1.11	3	0.92	0.17	0	14.55	0.21	6	Releas
SoSJV	DURUM	DURUM	2015-2017	LCS 12E4006	1832	5194	1033	48	-1040	432	0.07	-	-	-	3949	395	26	15.56	1.13	9	0.51	0.26	0.09	-	-	-	
SoSJV	DURUM	DURUM	2015-2017	LCS 13SD0056	1833	5138	1033	49	-1096	432	0.06	-	-	-	3893	395	27	15.3	1.13	16	0.26	0.26	0.36	-	-	-	
SoSJV	DURUM	DURUM	2015-2017	ASC 102	1856	5087	1033	50	-1148	433	0.04	6916	474	25	-	-	-	15.08	1.12	19	0.04	0.23	0.87	13.98	0.21	15	
SoSJV	DURUM	DURUM	2015-2017	ASC 103	1857	5015	1033	51	-1219	433	0.04	6844	474	26	-	-	-	15.85	1.12	4	0.81	0.23	0	14.75	0.21	4	
SoSJV	DURUM	DURUM	2015-2017	AS COLOMBO	1800	4645	992	52	-1589	325	0	6220	474	28	-	-	-	15.75	1.12	7	0.71	0.23	0.01	14.65	0.21	5	Releas

Table 24. Imperial Valley region, durum wheat yield and protein 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	2016 Yield (lb/acre)	2016 St.Err.Yield (lb/acre)	2016 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2017 Protein (%)	2017 St.Err.Protein (%)	2017 Protein Rank	Status
ImpV	DURUM	DURUM	2015-2017	UC 13210 21	1771	7549	352	1	928	294	0.02	-	-	-	-	-	-	12.94	1.05	37	-0.25	0.27	0.45	-	-	-	
ImpV	DURUM	DURUM	2015-2017	LCS 12E4006	1832	7495	353	2	873	296	0.02	-	-	-	7799	286	2	12.28	1.03	47	-0.9	0.16	0	-	-	-	
ImpV	DURUM	DURUM	2015-2017	WWW D3085	1801	7412	352	3	790	294	0.04	-	-	-	-	-	-	11.98	1.05	52	-1.21	0.27	0	-	-	-	
ImpV	DURUM	DURUM	2015-2017	UC 14215/9	1796	7200	281	4	579	208	0.03	-	-	-	7890	286	1	13.33	1.02	24	0.14	0.13	0.41	-	-	-	
ImpV	DURUM	DURUM	2015-2017	APB 470442	1852	7180	353	5	559	296	0.2	6849	315	2	-	-	-	12.64	1.02	42	-0.55	0.14	0	12.21	0.12	22	
ImpV	DURUM	DURUM	2015-2017	WWW DURAKING	878	7169	352	6	548	294	0.2	-	-	-	-	-	-	12.42	1.05	43	-0.77	0.27	0.01	-	-	-	Released
ImpV	DURUM	DURUM	2015-2017	UC 13210 5	1770	7150	352	7	529	294	0.22	-	-	-	-	-	-	12.7	1.05	41	-0.49	0.27	0.11	-	-	-	
ImpV	DURUM	DURUM	2015-2017	WWW CROWN	1166	7140	352	8	518	294	0.22	-	-	-	-	-	-	13.35	1.05	23	0.16	0.27	0.64	-	-	-	Released
ImpV	DURUM	DURUM	2015-2017	ASC 101	1855	7136	353	9	515	296	0.22	6805	315	4	-	-	-	12.18	1.02	51	-1	0.14	0	11.75	0.12	25	
ImpV	DURUM	DURUM	2015-2017	APB 571189	1811	7090	352	10	469	294	0.25	-	-	-	-	-	-	11.92	1.05	53	-1.27	0.27	0	-	-	-	
ImpV	DURUM	DURUM	2015-2017	WB ORITA	1215	7057	253	11	436	170	0.05	6360	315	14	7705	286	4	13.5	1.02	15	0.31	0.1	0	13.08	0.12	10	Released
ImpV	DURUM	DURUM	2015-2017	UC MIWOK	1690	7046	253	12	424	170	0.05	6376	315	13	7773	286	3	13.23	1.02	27	0.04	0.1	0.74	12.83	0.12	16	Released
ImpV	DURUM	DURUM	2015-2017	UC 14215 14	1798	7002	352	13	381	294	0.37	-	-	-	-	-	-	12.79	1.05	40	-0.4	0.27	0.21	-	-	-	
ImpV	DURUM	DURUM	2015-2017	APB 571217	1810	6962	281	14	341	208	0.25	-	-	-	7553	286	5	13.21	1.02	28	0.02	0.13	0.91	-	-	-	
ImpV	DURUM	DURUM	2015-2017	APB 540165	1827	6958	281	15	337	209	0.25	6877	315	1	7012	286	14	13.06	1.02	35	-0.13	0.1	0.31	12.59	0.12	20	
ImpV	DURUM	DURUM	2015-2017	APB 450311	1851	6911	353	16	290	296	0.54	6579	315	9	-	-	-	13.48	1.02	16	0.29	0.14	0.06	13.04	0.12	12	
ImpV	DURUM	DURUM	2015-2017	LCS 13SD0056	1833	6871	353	17	249	296	0.58	-	-	-	7175	286	11	12.19	1.03	50	-1	0.16	0	-	-	-	
ImpV	DURUM	DURUM	2015-2017	UC 15210 24	1826	6868	353	18	247	296	0.58	-	-	-	7173	286	12	13.08	1.03	34	-0.11	0.16	0.61	-	-	-	
ImpV	DURUM	DURUM	2015-2017	UC 14215 42	1799	6865	352	19	244	294	0.58	-	-	-	-	-	-	13.11	1.05	33	-0.08	0.27	0.8	-	-	-	
ImpV	DURUM	DURUM	2015-2017	APB TIBURON	1640	6855	253	20	234	170	0.34	6699	315	7	7239	286	7	13.37	1.02	21	0.18	0.1	0.11	13.02	0.12	13	Released
ImpV	DURUM	DURUM	2015-2017	SY VOLANTE	1431	6841	253	21	220	170	0.37	6700	315	6	6716	286	22	12.26	1.02	48	-0.93	0.1	0	11.71	0.12	26	Released
ImpV	DURUM	DURUM	2015-2017	APB 471400	1853	6839	353	22	217	296	0.63	6507	315	11	-	-	-	12.36	1.02	45	-0.83	0.14	0	11.92	0.12	23	
ImpV	DURUM	DURUM	2015-2017	LCS KIKO	1697	6834	253	23	212	170	0.38	6766	315	5	7205	286	10	12.2	1.02	49	-0.98	0.1	0	11.42	0.12	27	Released
ImpV	DURUM	DURUM	2015-2017	ALBERTO	1813	6816	253	24	195	170	0.44	6543	315	10	7221	286	9	13.39	1.02	20	0.21	0.1	0.06	12.99	0.12	14	Released
ImpV	DURUM	DURUM	2015-2017	ASC 103	1857	6809	353	25	188	296	0.69	6478	315	12	-	-	-	11.8	1.02	54	-1.39	0.14	0	11.36	0.12	28	
ImpV	DURUM	DURUM	2015-2017	APB 571353	1812	6802	281	26	181	208	0.58	-	-	-	6885	286	18	12.8	1.02	39	-0.39	0.13	0.01	-	-	-	
ImpV	DURUM	DURUM	2015-2017	UC DESERT KING	1375	6767	253	27	146	170	0.58	6309	315	17	7376	286	6	13.14	1.02	31	-0.05	0.1	0.69	12.51	0.12	21	Released
ImpV	DURUM	DURUM	2015-2017	UC 14215 11	1797	6720	352	28	99	294	0.86	-	-	-	-	-	-	13.35	1.05	22	0.16	0.27	0.64	-	-	-	
ImpV	DURUM	DURUM	2015-2017	APB 540505	1822	6715	353	29	94	296	0.86	-	-	-	7019	286	13	13.3	1.03	25	0.11	0.16	0.6	-	-	-	
ImpV	DURUM	DURUM	2015-2017	ASC 102	1856	6689	353	30	68	296	0.92	6358	315	15	-	-	-	13.19	1.02	29	0	0.14	0.99	12.76	0.12	17	
ImpV	DURUM	DURUM	2015-2017	WB MOHAVE	1654	6651	253	31	29	170	0.95	6324	315	16	7239	286	8	13.84	1.02	8	0.65	0.1	0	13.5	0.12	6	Released
ImpV	DURUM	DURUM	2015-2017	WWW TOPPER	1211	6639	352	32	18	294	0.98	-	-	-	-	-	-	12.83	1.05	38	-0.36	0.27	0.26	-	-	-	Released
ImpV	DURUM	DURUM	2015-2017	WB MEAD	1607	6618	253	33	-4	170	0.98	5787	315	22	6921	286	17	13.71	1.02	9	0.53	0.1	0	13.19	0.12	9	Released
ImpV	DURUM	DURUM	2015-2017	AS SARAGOLLA	1583	6617	253	34	-4	170	0.98	6812	315	3	6214	286	27	12.39	1.02	44	-0.8	0.1	0	11.78	0.12	24	Released
ImpV	DURUM	DURUM	2015-2017	WWW Q MAX	1473	6584	352	35	-38	294	0.95	-	-	-	-	-	-	13.61	1.05	12	0.42	0.27	0.18	-	-	-	Released
ImpV	DURUM	DURUM	2015-2017	UC 15210 11	1824	6576	353	36	-46	296	0.95	-	-	-	6880	286	19	13.4	1.03	19	0.21	0.16	0.27	-	-	-	
ImpV	DURUM	DURUM	2015-2017	SY FORTISSIMO	1429	6537	253	37	-84	170	0.76	5978	315	20	6760	286	21	13.15	1.02	30	-0.03	0.1	0.76	12.72	0.12	18	Released
ImpV	DURUM	DURUM	2015-2017	APB KRONOS	951	6524	253	38	-97	170	0.71	6108	315	19	6925	286	16	13.51	1.02	14	0.33	0.1	0	13.08	0.12	11	Released
ImpV	DURUM	DURUM	2015-2017	UC 15210 12	1825	6523	353	39	-98	296	0.86	-	-	-	6828	286	20	13.56	1.03	13	0.38	0.16	0.03	-	-	-	
ImpV	DURUM	DURUM	2015-2017	WWW D2517BELL025	1776	6453	352	40	-168	294	0.71	-	-	-	-	-	-	14.27	1.05	4	1.08	0.27	0	-	-	-	
ImpV	DURUM	DURUM	2015-2017	LCS ALIRON	1721	6404	352	41	-217	294	0.63	-	-	-	-	-	-	12.3	1.05	46	-0.89	0.27	0	-	-	-	
ImpV	DURUM	DURUM	2015-2017	APB WESTMORE HP	1484	6368	253	42	-253	170	0.28	6613	315	8	6334	286	26	14.18	1.02	5	0.99	0.1	0	13.94	0.12	3	Released
ImpV	DURUM	DURUM	2015-2017	APB 410077	1823	6310	353	43	-311	296	0.5	-	-	-	6615	286	23	13.42	1.03	18	0.23	0.16	0.21	-	-	-	
ImpV	DURUM	DURUM	2015-2017	APB HELIOS	1440	6310	281	44	-311	208	0.28	-	-	-	6938	286	15	13.47	1.02	17	0.29	0.13	0.06	-	-	-	Released
ImpV	DURUM	DURUM	2015-2017	AS MAESTRALE	1582	6189	272	45	-432	196	0.1	6116	315	18	4708	521	28	13.13	1.02	32	-0.05	0.11	0.69	12.65	0.12	19	Released
ImpV	DURUM	DURUM	2015-2017	UC 16051 25	1850	6149	353	46	-472	296	0.25	5818	315	21	-	-	-	13.26	1.02	26	0.08	0.14	0.66	12.83	0.12	15	
ImpV	DURUM	DURUM	2015-2017	WB HAVASU	1479	6063	253	47	-558	170	0.01	5647	315	23	6390	286	25	13.71	1.02	10	0.52	0.1	0	13.4	0.12	7	Released
ImpV	DURUM	DURUM	2015-2017	UC DESERT KING HP	1627	6055	253	48	-566	170	0.01	5639	315	24	6411	286	24	14.48	1.02	3	1.29	0.1	0	14.13	0.12	2	Released
ImpV	DURUM	DURUM	2015-2017	WWW PLATINUM	1210	5947	352	49	-674	294	0.09	-	-	-	-	-	-	12.94	1.05	36	-0.25	0.27	0.45	-	-	-	Released
ImpV	DURUM	DURUM	2015-2017	UC 16051 12	1849	5860	353	50	-761	296	0.05	5529	315	25	-	-	-	13.98	1.02	7	0.79	0.14	0	13.55	0.12	5	
ImpV	DURUM	DURUM	2015-2017	AS COLOMBO	1800	5723	281	51	-898	208	0	4630	315	28	-	-	-	14.02	1.02	6	0.83	0.12	0	13.88	0.12	4	Released
ImpV	DURUM	DURUM	2015-2017	ASC 100	1854	5722	353	52	-899	296	0.02	5391	315	26	-	-	-	13.7	1.02	11	0.51	0.14	0	13.26	0.12	8	
ImpV	DURUM	DURUM	2015-2017	UC 16051 1	1848	5643	353	53	-978	296	0.01	5311	315	27	-	-	-	15.64	1.02	1	2.45	0.14	0	15.2	0.12	1	
ImpV	DURUM	TURG	2015-2017	KAMUT	1786	3333	352	54	-3288	294	0	-	-	-	-	-	-	15.13	1.05	2	1.94	0.27	0	-	-	-	

Triticale performance tables

Table 25. Sacramento Valley region, triticale yield 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	Status
SacV	TRITICALE	TRITICALE	2015-2017	NS 10T50020	3178	7460	495	1	1885	211	0	6649	1274	2	
SacV	TRITICALE	TRITICALE	2015-2017	NS TRICAL 158EP	3169	6706	477	2	1132	163	0	6111	1268	5	
SacV	TRITICALE	TRITICALE	2015-2017	NS CAMELOT	3168	6600	477	3	1025	163	0	5952	1268	7	Released
SacV	TRITICALE	TRITICALE	2015-2017	WB PACHECO	3164	6483	477	4	908	163	0	6294	1268	3	Released
SacV	TRITICALE	TRITICALE	2015-2017	AGS 133	3182	6481	533	5	907	281	0	6149	1268	4	
SacV	TRITICALE	TRITICALE	2015-2017	NS TRICAL 115T	3170	6450	477	6	875	164	0	5978	1269	6	
SacV	TRITICALE	TRITICALE	2015-2017	NS TRICAL 105	3097	5891	477	7	316	163	0.08	5781	1268	8	Released
SacV	TRITICALE	TRITICALE	2015-2017	NS 12T01486	3180	5821	541	8	246	295	0.53	5449	1270	9	
SacV	TRITICALE	TRITICALE	2015-2017	APB 660049	3172	5625	550	9	50	299	0.92	-	-	-	
SacV	TRITICALE	TRITICALE	2015-2017	APB 9919	3173	5604	550	10	29	299	0.92	-	-	-	
SacV	TRITICALE	TRITICALE	2015-2017	AGS 230	3181	5530	533	11	-45	281	0.92	5197	1268	10	
SacV	TRITICALE	TRITICALE	2015-2017	BAG TYNDAL	3171	5453	550	12	-121	299	0.83	-	-	-	Released
SacV	TRITICALE	TRITICALE	2015-2017	PRL 011TS 429	3177	5348	525	13	-227	270	0.53	-	-	-	
SacV	TRITICALE	TRITICALE	2015-2017	NS 10T70126	3179	4663	521	14	-912	261	0	7158	1329	1	
SacV	TRITICALE	TRITICALE	2015-2017	BAG NU WHEAT	3174	3959	550	15	-1616	299	0	-	-	-	
SacV	TRITICALE	TRITICALE	2015-2017	BAG BG 198 14	3175	3544	550	16	-2031	299	0	-	-	-	
SacV	TRITICALE	TRITICALE	2015-2017	BAG BG 225 14	3176	3153	550	17	-2421	299	0	-	-	-	

Table 26. North Central San Joaquin Valley region, triticale yield 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	Status
NCenSJV	TRITICALE	TRITICALE	2015-2017	NS 10T50020	3178	7257	853	1	1477	142	0	6124	1262	1	
NCenSJV	TRITICALE	TRITICALE	2015-2017	NS TRICAL 115T	3170	6628	850	2	848	119	0	5690	1262	2	
NCenSJV	TRITICALE	TRITICALE	2015-2017	NS 12T01486	3180	6610	859	3	830	172	0	5593	1262	3	
NCenSJV	TRITICALE	TRITICALE	2015-2017	AGS 133	3182	6606	859	4	826	172	0	5589	1262	5	
NCenSJV	TRITICALE	TRITICALE	2015-2017	NS TRICAL 105	3097	6517	850	5	737	119	0	5531	1262	6	Released
NCenSJV	TRITICALE	TRITICALE	2015-2017	NS TRICAL 158EP	3169	6477	850	6	697	119	0	5592	1262	4	
NCenSJV	TRITICALE	TRITICALE	2015-2017	WB PACHECO	3164	6384	850	7	604	119	0	5165	1262	9	Released
NCenSJV	TRITICALE	TRITICALE	2015-2017	AGS 230	3181	6307	859	8	527	172	0	5290	1262	7	
NCenSJV	TRITICALE	TRITICALE	2015-2017	NS CAMELOT	3168	6152	850	9	372	119	0	5190	1262	8	Released
NCenSJV	TRITICALE	TRITICALE	2015-2017	PRL 011TS 429	3177	6104	876	10	324	238	0.19	-	-	-	
NCenSJV	TRITICALE	TRITICALE	2015-2017	APB 9919	3173	5611	877	11	-169	231	0.47	-	-	-	
NCenSJV	TRITICALE	TRITICALE	2015-2017	BAG TYNDAL	3171	5375	877	12	-405	231	0.09	-	-	-	Released
NCenSJV	TRITICALE	TRITICALE	2015-2017	APB 660049	3172	5242	877	13	-538	231	0.03	-	-	-	
NCenSJV	TRITICALE	TRITICALE	2015-2017	BAG BG 198 14	3175	4634	877	14	-1146	231	0	-	-	-	
NCenSJV	TRITICALE	TRITICALE	2015-2017	BAG NU WHEAT	3174	4581	877	15	-1199	231	0	-	-	-	
NCenSJV	TRITICALE	TRITICALE	2015-2017	BAG BG 225 14	3176	4095	877	16	-1685	231	0	-	-	-	
NCenSJV	TRITICALE	TRITICALE	2015-2017	NS 10T70126	3179	3679	896	17	-2101	295	0	-	-	-	

Table 27. South San Joaquin Valley region, triticale yield 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	Status
SoSJV	TRITICALE	TRITICALE	2015-2017	NS 10T50020	3178	5958	1378	1	1053	212	0	7332	3337	1	
SoSJV	TRITICALE	TRITICALE	2015-2017	NS 12T01486	3180	5901	1392	2	995	285	0	7074	3337	2	
SoSJV	TRITICALE	TRITICALE	2015-2017	WB PACHECO	3164	5660	1374	3	755	184	0	7069	3337	3	Released
SoSJV	TRITICALE	TRITICALE	2015-2017	BAG TYNDAL	3171	5628	1441	4	723	433	0.28	-	-	-	Released
SoSJV	TRITICALE	TRITICALE	2015-2017	NS TRICAL 115T	3170	5253	1375	5	348	190	0.23	6418	3337	4	
SoSJV	TRITICALE	TRITICALE	2015-2017	BAG NU WHEAT	3174	5173	1424	6	268	383	0.69	-	-	-	
SoSJV	TRITICALE	TRITICALE	2015-2017	AGS 230	3181	5167	1392	7	262	285	0.56	6341	3337	6	
SoSJV	TRITICALE	TRITICALE	2015-2017	NS TRICAL 105	3097	5148	1375	8	242	190	0.38	6013	3337	8	Released
SoSJV	TRITICALE	TRITICALE	2015-2017	NS CAMELOT	3168	5083	1374	9	178	184	0.56	5904	3337	9	Released
SoSJV	TRITICALE	TRITICALE	2015-2017	APB 660049	3172	4991	1424	10	85	383	0.87	-	-	-	
SoSJV	TRITICALE	TRITICALE	2015-2017	NS TRICAL 158EP	3169	4990	1376	11	85	196	0.87	6415	3337	5	
SoSJV	TRITICALE	TRITICALE	2015-2017	BAG BG 225 14	3176	4841	1424	12	-64	383	0.87	-	-	-	
SoSJV	TRITICALE	TRITICALE	2015-2017	AGS 133	3182	4840	1392	13	-65	285	0.87	6013	3337	7	
SoSJV	TRITICALE	TRITICALE	2015-2017	BAG BG 198 14	3175	4766	1473	14	-140	520	0.87	-	-	-	
SoSJV	TRITICALE	TRITICALE	2015-2017	PRL 011TS 429	3177	4466	1392	15	-439	287	0.29	-	-	-	
SoSJV	TRITICALE	TRITICALE	2015-2017	APB 9919	3173	4259	1441	16	-646	433	0.29	-	-	-	
SoSJV	TRITICALE	TRITICALE	2015-2017	NS 10T70126	3179	1268	1562	17	-3638	725	0	-	-	-	

Table 28. Imperial Valley region, triticale yield 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	Status
ImpV	TRITICALE	TRITICALE	2015-2017	WB PACHECO	3164	7262	246	1	1197	95	0	7075	219	1	Released
ImpV	TRITICALE	TRITICALE	2015-2017	NS 10T50020	3178	6952	256	2	887	120	0	6407	219	3	
ImpV	TRITICALE	TRITICALE	2015-2017	NS TRICAL 105	3097	6806	246	3	741	95	0	6446	219	2	Released
ImpV	TRITICALE	TRITICALE	2015-2017	AGS 230	3181	6745	284	4	679	166	0	6324	219	4	
ImpV	TRITICALE	TRITICALE	2015-2017	NS 12T01486	3180	6718	284	5	653	166	0	6297	219	5	
ImpV	TRITICALE	TRITICALE	2015-2017	NS TRICAL 115T	3170	6489	246	6	424	95	0	5929	219	6	
ImpV	TRITICALE	TRITICALE	2015-2017	NS TRICAL 158EP	3169	6351	246	7	285	95	0.01	5928	219	7	
ImpV	TRITICALE	TRITICALE	2015-2017	PRL 011TS 429	3177	6320	284	8	255	169	0.15	-	-	-	
ImpV	TRITICALE	TRITICALE	2015-2017	APB 660049	3172	6314	285	9	248	162	0.15	-	-	-	
ImpV	TRITICALE	TRITICALE	2015-2017	NS CAMELOT	3168	6227	246	10	162	95	0.12	5704	219	8	Released
ImpV	TRITICALE	TRITICALE	2015-2017	BAG NU WHEAT	3174	6154	285	11	89	162	0.62	-	-	-	
ImpV	TRITICALE	TRITICALE	2015-2017	AGS 133	3182	6102	284	12	37	166	0.83	5681	219	9	
ImpV	TRITICALE	TRITICALE	2015-2017	BAG TYNDAL	3171	5702	285	13	-363	162	0.04	-	-	-	Released
ImpV	TRITICALE	TRITICALE	2015-2017	APB 9919	3173	5667	285	14	-398	162	0.03	-	-	-	
ImpV	TRITICALE	TRITICALE	2015-2017	BAG BG 198 14	3175	4346	285	15	-1719	162	0	-	-	-	
ImpV	TRITICALE	TRITICALE	2015-2017	BAG BG 225 14	3176	2891	285	16	-3174	162	0	-	-	-	

Table 29. Rainfed region, triticale yield 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	Status
Rainfed	TRITICALE	TRITICALE	2015-2017	NS 10T50020	3178	5965	881	1	1805	196	0	6241	1246	2	
Rainfed	TRITICALE	TRITICALE	2015-2017	NS CAMELOT	3168	5294	874	2	1135	160	0	5506	1240	3	Released
Rainfed	TRITICALE	TRITICALE	2015-2017	NS TRICAL 158EP	3169	5264	874	3	1104	160	0	5162	1240	6	
Rainfed	TRITICALE	TRITICALE	2015-2017	WB PACHECO	3164	5134	874	4	974	160	0	5308	1240	4	Released
Rainfed	TRITICALE	TRITICALE	2015-2017	NS TRICAL 115T	3170	5039	874	5	880	160	0	5191	1240	5	
Rainfed	TRITICALE	TRITICALE	2015-2017	NS 12T01486	3180	4819	886	6	659	218	0.01	5102	1240	8	
Rainfed	TRITICALE	TRITICALE	2015-2017	AGS 133	3182	4802	886	7	642	218	0.01	5086	1240	9	
Rainfed	TRITICALE	TRITICALE	2015-2017	NS 10T70126	3179	4627	906	8	468	279	0.12	6435	1281	1	
Rainfed	TRITICALE	TRITICALE	2015-2017	NS TRICAL 105	3097	4558	874	9	399	160	0.02	5121	1240	7	Released
Rainfed	TRITICALE	TRITICALE	2015-2017	AGS 230	3181	4351	886	10	192	218	0.43	4635	1240	10	
Rainfed	TRITICALE	TRITICALE	2015-2017	PRL 011TS 429	3177	4246	907	11	87	282	0.76	-	-	-	
Rainfed	TRITICALE	TRITICALE	2015-2017	BAG TYNDAL	3171	3976	953	12	-184	376	0.66	-	-	-	Released
Rainfed	TRITICALE	TRITICALE	2015-2017	APB 9919	3173	3546	953	13	-613	376	0.13	-	-	-	
Rainfed	TRITICALE	TRITICALE	2015-2017	APB 660049	3172	3470	953	14	-690	376	0.1	-	-	-	
Rainfed	TRITICALE	TRITICALE	2015-2017	BAG NU WHEAT	3174	2567	953	15	-1592	376	0	-	-	-	
Rainfed	TRITICALE	TRITICALE	2015-2017	BAG BG 198 14	3175	1546	953	16	-2614	376	0	-	-	-	
Rainfed	TRITICALE	TRITICALE	2015-2017	BAG BG 225 14	3176	1509	953	17	-2651	376	0	-	-	-	

Barley performance tables

Table 30. Sacramento Valley region, barley yield 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	Status
SacV	BARLEY	6RSF	2015-2017	UC UYP 210A	1351	5214	663	1	824	207	0	-	-	-	
SacV	BARLEY		2015-2017	UC UYP 210B	1383	5080	663	2	691	207	0	-	-	-	
SacV	BARLEY		2015-2017	UC UOP 102	1405	5079	663	3	689	207	0	-	-	-	
SacV	BARLEY	6RSF	2015-2017	ISHI	1047	5066	653	4	676	178	0	7168	487	1	Released
SacV	BARLEY		2015-2017	UC UOP 96	1400	5027	665	5	637	214	0.01	-	-	-	
SacV	BARLEY		2015-2017	UC 08YP 111 1231 LATE	1385	4938	663	6	548	207	0.03	-	-	-	
SacV	BARLEY	6RSF	2015-2017	UC B398	1256	4916	671	7	526	230	0.05	-	-	-	
SacV	BARLEY		2015-2017	UC UOP 97	1401	4877	665	8	487	214	0.05	-	-	-	
SacV	BARLEY		2015-2017	UC UOP 98	1402	4866	663	9	476	207	0.05	-	-	-	
SacV	BARLEY	2RSM	2015-2017	UC UOP 95	1399	4777	663	10	387	207	0.13	-	-	-	
SacV	BARLEY		2015-2017	UC UYP 3B	1379	4740	663	11	350	207	0.18	-	-	-	
SacV	BARLEY	2RSM	2015-2017	LCS Odyssey	1415	4697	709	12	308	327	0.51	6017	476	2	
SacV	BARLEY	2RSM	2015-2017	LCS Genie	1414	4645	709	13	255	327	0.53	5964	476	4	
SacV	BARLEY	6RSF	2015-2017	UC A237	1261	4626	665	14	237	214	0.46	-	-	-	
SacV	BARLEY		2015-2017	UC UOP 99	1403	4601	667	15	211	221	0.51	-	-	-	
SacV	BARLEY	6RSF	2015-2017	UC B369	1255	4588	668	16	199	221	0.51	-	-	-	
SacV	BARLEY		2015-2017	UC UOP 100	1404	4581	663	17	191	207	0.51	-	-	-	
SacV	BARLEY	6RSN	2015-2017	UC 1266	1266	4577	665	18	187	214	0.51	-	-	-	
SacV	BARLEY	6RSF	2015-2017	UC 1280	1280	4569	665	19	179	214	0.51	-	-	-	
SacV	BARLEY	6RSF	2015-2017	UC 933	933	4536	652	20	146	175	0.51	5857	476	5	Released
SacV	BARLEY	6RSF	2015-2017	UC 969	969	4506	653	21	116	178	0.59	5977	487	3	Released
SacV	BARLEY	2RSM	2015-2017	UC UOP 111	1408	4417	665	22	27	214	0.92	-	-	-	
SacV	BARLEY		2015-2017	UC UOP 105	1406	4416	663	23	26	207	0.92	-	-	-	
SacV	BARLEY	6RSN	2015-2017	TAMALPAIS	1134	4383	654	24	-7	182	0.97	5699	487	6	Released
SacV	BARLEY	6RSN	2015-2017	UC 1263	1263	4266	665	25	-124	214	0.63	-	-	-	
SacV	BARLEY	6RSN	2015-2017	UC 1317	1317	4224	667	26	-166	221	0.54	-	-	-	
SacV	BARLEY	6RSN	2015-2017	UC 1321	1321	4169	756	27	-220	412	0.64	-	-	-	
SacV	BARLEY	2RSM	2015-2017	UC MP179	1410	4112	652	28	-277	175	0.21	5622	476	7	
SacV	BARLEY	6RSN	2015-2017	UC 1319	1319	3962	756	29	-428	412	0.49	-	-	-	
SacV	BARLEY	6RSN	2015-2017	UC 1318	1318	3961	663	30	-429	207	0.08	-	-	-	
SacV	BARLEY	6RSF	2015-2017	UC 603	603	3905	652	31	-484	175	0.02	4886	476	10	Released
SacV	BARLEY	6RSF-H	2015-2017	SCHALLER	1413	3836	675	32	-554	239	0.05	-	-	-	Released
SacV	BARLEY		2015-2017	UC UOP 110	1407	3819	756	33	-570	412	0.3	-	-	-	
SacV	BARLEY	6RSF	2015-2017	UC71 183 1	162	3790	665	34	-600	214	0.02	-	-	-	
SacV	BARLEY	2RSM	2015-2017	UC BUTTA 12 96	1360	3617	651	35	-772	172	0	5108	468	9	
SacV	BARLEY	2RSM	2015-2017	UC Tahoe	1409	3557	653	36	-833	178	0	4806	487	11	Released
SacV	BARLEY	2RSM	2015-2017	UC 1390	1390	3531	654	37	-859	182	0	3644	487	12	
SacV	BARLEY	6RSF	2015-2017	MAX	816	3413	653	38	-976	179	0	5219	476	8	
SacV	BARLEY	2RSM	2015-2017	OSU FULL PINT	1411	3317	667	39	-1073	221	0	-	-	-	Released

Table 31. North Central San Joaquin Valley region, barley yield 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	Status
NCenSJV	BARLEY	6RSF	2015-2017	UC B369	1255	6715	594	1	1526	351	0	-	-	-	
NCenSJV	BARLEY		2015-2017	UC 08YP 111 1231 LATE	1385	6643	594	2	1453	351	0	-	-	-	
NCenSJV	BARLEY	6RSF	2015-2017	UC A237	1261	6163	594	3	973	351	0.03	-	-	-	
NCenSJV	BARLEY		2015-2017	UC UOP 102	1405	6146	594	4	957	351	0.03	-	-	-	
NCenSJV	BARLEY	6RSF	2015-2017	UC B398	1256	6087	622	5	897	393	0.08	-	-	-	
NCenSJV	BARLEY	6RSF	2015-2017	ISHI	1047	6013	543	6	823	268	0.02	5351	291	1	Released
NCenSJV	BARLEY	6RSF	2015-2017	UC UYP 210A	1351	5863	594	7	674	351	0.18	-	-	-	
NCenSJV	BARLEY		2015-2017	UC UOP 98	1402	5819	594	8	629	351	0.22	-	-	-	
NCenSJV	BARLEY		2015-2017	UC UYP 210B	1383	5522	594	9	332	351	0.75	-	-	-	
NCenSJV	BARLEY		2015-2017	UC UOP 105	1406	5470	594	10	281	351	0.77	-	-	-	
NCenSJV	BARLEY		2015-2017	UC UOP 100	1404	5464	594	11	274	351	0.77	-	-	-	
NCenSJV	BARLEY	2RSM	2015-2017	LCS Odyssey	1415	5450	667	12	260	470	0.81	5078	319	2	
NCenSJV	BARLEY	6RSN	2015-2017	UC 1263	1263	5436	594	13	246	351	0.79	-	-	-	
NCenSJV	BARLEY		2015-2017	UC UOP 97	1401	5373	594	14	184	351	0.81	-	-	-	
NCenSJV	BARLEY	6RSF	2015-2017	UC 933	933	5227	543	15	37	268	0.94	4554	291	6	Released
NCenSJV	BARLEY	6RSN	2015-2017	TAMALPAIS	1134	5142	543	16	-48	268	0.94	4589	291	5	Released
NCenSJV	BARLEY	2RSM	2015-2017	LCS Genie	1414	5140	627	17	-50	414	0.94	4727	291	4	
NCenSJV	BARLEY	6RSN	2015-2017	UC 1321	1321	5130	927	18	-59	781	0.94	-	-	-	
NCenSJV	BARLEY	2RSM	2015-2017	UC MP179	1410	5128	543	19	-62	268	0.94	4519	291	7	
NCenSJV	BARLEY	6RSN	2015-2017	UC 1319	1319	5110	927	20	-79	781	0.94	-	-	-	
NCenSJV	BARLEY	2RSM	2015-2017	UC UOP 111	1408	5097	594	21	-92	351	0.94	-	-	-	
NCenSJV	BARLEY	6RSF	2015-2017	UC 1280	1280	5071	594	22	-118	351	0.9	-	-	-	
NCenSJV	BARLEY		2015-2017	UC UOP 96	1400	5064	594	23	-126	351	0.9	-	-	-	
NCenSJV	BARLEY	6RSF	2015-2017	UC 969	969	5023	543	24	-167	268	0.81	5035	291	3	Released
NCenSJV	BARLEY	6RSN	2015-2017	UC 1317	1317	5015	594	25	-174	351	0.81	-	-	-	
NCenSJV	BARLEY	6RSN	2015-2017	UC 1318	1318	4997	594	26	-193	351	0.81	-	-	-	
NCenSJV	BARLEY		2015-2017	UC UOP 99	1403	4988	594	27	-201	351	0.81	-	-	-	
NCenSJV	BARLEY	6RSF	2015-2017	UC 603	603	4978	543	28	-212	268	0.77	4448	291	8	Released
NCenSJV	BARLEY	6RSF	2015-2017	MAX	816	4915	543	29	-275	268	0.71	4173	291	10	
NCenSJV	BARLEY		2015-2017	UC UYP 3B	1379	4906	594	30	-284	351	0.77	-	-	-	
NCenSJV	BARLEY	2RSM	2015-2017	UC UOP 95	1399	4784	594	31	-405	351	0.61	-	-	-	
NCenSJV	BARLEY	6RSN	2015-2017	UC 1266	1266	4781	594	32	-409	351	0.61	-	-	-	
NCenSJV	BARLEY	2RSM	2015-2017	OSU FULL PINT	1411	4685	594	33	-505	351	0.42	-	-	-	Released
NCenSJV	BARLEY		2015-2017	UC UOP 110	1407	4610	927	34	-579	781	0.78	-	-	-	
NCenSJV	BARLEY	2RSM	2015-2017	UC Tahoe	1409	4578	543	35	-612	268	0.08	4089	291	12	Released
NCenSJV	BARLEY	2RSM	2015-2017	UC BUTTA 12 96	1360	4522	543	36	-668	268	0.06	4163	291	11	
NCenSJV	BARLEY	6RSF	2015-2017	UC71 183 1	162	3881	594	37	-1308	351	0	-	-	-	
NCenSJV	BARLEY	2RSM	2015-2017	UC 1390	1390	3878	561	38	-1311	305	0	4259	291	9	
NCenSJV	BARLEY	6RSF-H	2015-2017	SCHALLER	1413	3581	622	39	-1608	393	0	-	-	-	Released

Table 32. South San Joaquin Valley region, barley yield 2015 to 2017.

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

Table 33. Rainfed trials, barley yield 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	Status
Rainfed	BARLEY		2015-2017	UC UOP 98	1402	4468	669	1	787	236	0.02	-	-	-	
Rainfed	BARLEY		2015-2017	UC UYP 210B	1383	4250	669	2	569	236	0.1	-	-	-	
Rainfed	BARLEY	2RSM	2015-2017	LCS Genie	1414	4226	699	3	544	316	0.24	5170	978	2	
Rainfed	BARLEY		2015-2017	UC UOP 100	1404	4196	669	4	514	236	0.15	-	-	-	
Rainfed	BARLEY	6RSF	2015-2017	UC B398	1256	4152	672	5	471	243	0.19	-	-	-	
Rainfed	BARLEY	6RSF	2015-2017	UC 1280	1280	4152	669	6	471	236	0.18	-	-	-	
Rainfed	BARLEY	2RSM	2015-2017	LCS Odyssey	1415	4076	699	7	394	316	0.49	5020	978	3	
Rainfed	BARLEY	6RSF	2015-2017	ISHI	1047	4026	654	8	344	196	0.24	5495	981	1	Released
Rainfed	BARLEY		2015-2017	UC UOP 105	1406	3991	669	9	310	236	0.49	-	-	-	
Rainfed	BARLEY		2015-2017	UC UYP 3B	1379	3961	669	10	280	236	0.51	-	-	-	
Rainfed	BARLEY		2015-2017	UC 08YP 111 1231 LATE	1385	3927	669	11	246	236	0.58	-	-	-	
Rainfed	BARLEY	6RSN	2015-2017	UC 1266	1266	3881	671	12	199	242	0.68	-	-	-	
Rainfed	BARLEY	2RSM	2015-2017	UC UOP 95	1399	3858	669	13	177	236	0.68	-	-	-	
Rainfed	BARLEY		2015-2017	UC UOP 96	1400	3854	671	14	172	242	0.68	-	-	-	
Rainfed	BARLEY		2015-2017	UC UOP 102	1405	3853	669	15	171	236	0.68	-	-	-	
Rainfed	BARLEY	6RSF	2015-2017	UC A237	1261	3842	671	16	160	242	0.68	-	-	-	
Rainfed	BARLEY	6RSF	2015-2017	UC 969	969	3829	654	17	147	196	0.68	4504	981	6	Released
Rainfed	BARLEY		2015-2017	UC UOP 99	1403	3780	671	18	98	242	0.86	-	-	-	
Rainfed	BARLEY	6RSF	2015-2017	UC 933	933	3749	653	19	68	193	0.88	4738	978	5	Released
Rainfed	BARLEY		2015-2017	UC UOP 97	1401	3691	669	20	10	236	0.99	-	-	-	
Rainfed	BARLEY	6RSF	2015-2017	UC B369	1255	3689	672	21	7	243	0.99	-	-	-	
Rainfed	BARLEY	2RSM	2015-2017	UC UOP 111	1408	3680	671	22	-2	242	0.99	-	-	-	
Rainfed	BARLEY	2RSM	2015-2017	UC MP179	1410	3662	653	23	-19	193	0.99	4748	978	4	
Rainfed	BARLEY	6RSN	2015-2017	TAMALPAIS	1134	3642	653	24	-39	192	0.96	4372	981	8	Released
Rainfed	BARLEY	6RSN	2015-2017	UC 1321	1321	3616	950	25	-66	700	0.99	-	-	-	
Rainfed	BARLEY	6RSN	2015-2017	UC 1263	1263	3611	671	26	-70	242	0.91	-	-	-	
Rainfed	BARLEY	6RSN	2015-2017	UC 1318	1318	3524	669	27	-157	236	0.68	-	-	-	
Rainfed	BARLEY	6RSF	2015-2017	UC UYP 210A	1351	3484	669	28	-197	236	0.68	-	-	-	
Rainfed	BARLEY	2RSM	2015-2017	UC 1390	1390	3465	654	29	-217	196	0.55	3883	981	12	
Rainfed	BARLEY	6RSN	2015-2017	UC 1317	1317	3371	671	30	-310	242	0.49	-	-	-	
Rainfed	BARLEY	6RSN	2015-2017	UC 1319	1319	3361	950	31	-321	700	0.84	-	-	-	
Rainfed	BARLEY	6RSF	2015-2017	UC 603	603	3344	652	32	-337	190	0.24	4046	978	11	Released
Rainfed	BARLEY	2RSM	2015-2017	UC BUTTA 12 96	1360	3278	651	33	-403	187	0.15	4410	975	7	
Rainfed	BARLEY	6RSF-H	2015-2017	SCHALLER	1413	3184	675	34	-497	250	0.18	-	-	-	Released
Rainfed	BARLEY	2RSM	2015-2017	UC Tahoe	1409	3178	653	35	-504	192	0.07	4235	981	9	Released
Rainfed	BARLEY		2015-2017	UC UOP 110	1407	3016	950	36	-666	700	0.63	-	-	-	
Rainfed	BARLEY	2RSM	2015-2017	OSU FULL PINT	1411	2957	674	37	-725	249	0.04	-	-	-	Released
Rainfed	BARLEY	6RSF	2015-2017	MAX	816	2934	654	38	-747	196	0.01	4142	978	10	
Rainfed	BARLEY	6RSF	2015-2017	UC71 183 1	162	2818	681	39	-863	266	0.02	-	-	-	

Intermountain region performance tables

Table 34. Intermountain Region, winter wheat yield and protein 2015 to 2017.

Region/Group	CropGroup	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	2016 Yield (lb/acre)	2016 St.Err.Yield (lb/acre)	2016 Yield Rank	3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St.Err.Diff. from overall mean.y	3-yr P-Value	2017 Protein (%)	2017 St.Err.Protein (%)	2017 Protein Rank	Status
InterMnt	WINTERWHEAT	SWW	2015-2017	ORI2101841	29083	8298	1377	1	1120	347	0.02	-	-	-	9954	540	1	10.71	1.01	79	-0.53	0.29	0.28	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	LWW14-74143	29138	8219	1384	2	1041	376	0.07	9262	402	3	-	-	-	10.35	1.01	89	-0.89	0.29	0.03	9.39	0.28	42	
InterMnt	WINTERWHEAT	SWW	2015-2017	OR2090473	29068	8148	1504	3	970	691	0.45	-	-	-	-	-	-	10.57	1.12	83	-0.67	0.57	0.54	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	WB 1783	29146	8097	1378	4	919	353	0.1	9147	382	4	-	-	-	10.9	1.01	67	-0.34	0.29	0.54	9.94	0.28	27	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	WB EXP 1030 CL+	29119	8053	1504	5	875	691	0.51	-	-	-	-	-	-	12.43	1.12	6	1.19	0.57	0.2	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	LOR 092	29044	7873	1368	6	695	313	0.19	8658	382	16	-	-	-	10.38	1	88	-0.86	0.26	0.02	9.74	0.28	34	Released
InterMnt	WINTERWHEAT		2015-2017	SY 04PN062 18	29095	7861	1358	7	683	268	0.1	8894	382	5	9476	540	6	10.87	0.99	70	-0.37	0.22	0.39	9.91	0.28	28	
InterMnt	WINTERWHEAT	SWW	2015-2017	03 299302A	29002	7823	1504	8	645	691	0.61	-	-	-	-	-	-	9.79	1.12	92	-1.45	0.57	0.1	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	LOR 833	29046	7818	1504	9	640	691	0.61	-	-	-	-	-	-	10.63	1.12	81	-0.61	0.57	0.58	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	SY 09PN046816	29143	7802	1378	10	624	353	0.37	8853	382	7	-	-	-	11.28	1.01	33	0.04	0.29	0.95	10.32	0.28	12	
InterMnt	WINTERWHEAT		2015-2017	ARS06134 57C	29009	7801	1392	11	623	404	0.42	-	-	-	9394	540	9	11.11	1.02	49	-0.14	0.33	0.89	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	ROSALYN	29090	7769	1355	12	591	249	0.15	8751	382	14	9383	540	10	10.69	0.99	80	-0.55	0.21	0.07	9.74	0.28	35	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	LWW14-73161	29137	7762	1378	13	584	353	0.41	8812	382	9	-	-	-	11.06	1.01	54	-0.18	0.29	0.83	10.1	0.28	20	
InterMnt	WINTERWHEAT	SWW	2015-2017	IDN 06 18107A	29034	7734	1377	14	556	347	0.42	-	-	-	9365	540	13	11.4	1.01	77	0.16	0.29	0.83	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	WA 8234	29145	7731	1378	15	553	353	0.42	8782	382	12	-	-	-	10.82	1.01	75	-0.42	0.29	0.43	9.86	0.28	32	Released
InterMnt	WINTERWHEAT		2015-2017	IDN 07 280178	29035	7724	1358	16	546	268	0.24	8578	382	19	9579	540	3	11.25	0.99	37	0.01	0.22	0.98	10.35	0.28	9	
InterMnt	WINTERWHEAT	SWW	2015-2017	BOBTAIL	29011	7721	1355	17	543	249	0.19	8473	382	23	9623	540	2	11.18	0.99	41	-0.06	0.21	0.92	10.32	0.28	11	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	MARY	29059	7718	1352	18	540	234	0.16	8783	382	11	9375	540	11	11.42	0.98	26	0.18	0.19	0.64	10.6	0.28	4	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	KELDIN	29039	7700	1377	19	522	347	0.42	-	-	-	9098	540	23	11.33	1.01	29	0.09	0.29	0.92	-	-	-	Released
InterMnt	WINTERWHEAT		2015-2017	SY 04PN0666 7	29096	7698	1358	20	520	268	0.29	9398	382	2	8424	540	33	11.23	0.99	38	-0.02	0.22	0.96	10.01	0.28	24	
InterMnt	WINTERWHEAT	SWW	2015-2017	TUBBS 06	29105	7685	1355	21	507	249	0.24	8660	382	15	9540	540	4	10.62	0.99	82	-0.62	0.21	0.03	9.5	0.28	39	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	WB 1604	29116	7668	1377	22	490	347	0.45	-	-	-	9147	540	21	11.17	1.01	43	-0.07	0.29	0.83	-	-	-	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	IDN 02 29001A	29030	7649	1355	23	471	249	0.3	8763	382	13	9222	540	17	11.44	0.99	23	0.2	0.21	0.61	10.53	0.28	7	
InterMnt	WINTERWHEAT		2015-2017	ORILD113092	29087	7599	1392	24	421	404	0.6	-	-	-	9192	540	18	11.09	1.02	51	-0.15	0.33	0.87	-	-	-	
InterMnt	WINTERWHEAT		2015-2017	LWW14 73163	29058	7596	1358	25	418	268	0.42	8891	382	6	8863	540	28	11.01	0.99	60	-0.23	0.22	0.6	9.98	0.28	25	
InterMnt	WINTERWHEAT		2015-2017	OR2121086	29075	7581	1358	26	403	268	0.42	8413	382	26	9465	540	7	10.48	0.99	86	-0.76	0.22	0.02	9.75	0.28	33	
InterMnt	WINTERWHEAT	SWW	2015-2017	LWW14-72916	29136	7576	1378	27	398	353	0.58	8626	382	17	-	-	-	11.16	1.01	45	-0.08	0.29	0.92	10.2	0.28	18	
InterMnt	WINTERWHEAT	SWW	2015-2017	LADD	29040	7568	1504	28	390	691	0.8	-	-	-	-	-	-	10.1	1.12	90	-1.14	0.57	0.22	-	-	-	Released
InterMnt	WINTERWHEAT		2015-2017	HUFFMAN	29027	7565	1392	29	387	404	0.61	-	-	-	9158	540	19	11.06	1.02	55	-0.18	0.33	0.83	-	-	-	Released
InterMnt	WINTERWHEAT		2015-2017	SY 04PN0662	29098	7563	1392	30	385	404	0.61	-	-	-	9156	540	20	11.59	1.02	19	0.35	0.33	0.59	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	OR2110526	29074	7562	1377	31	384	347	0.58	-	-	-	9434	540	8	11.1	1.01	50	-0.14	0.29	0.84	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	SY OVATION	29102	7556	1378	32	378	353	0.58	8606	382	18	-	-	-	10.91	1.01	66	-0.33	0.29	0.54	9.95	0.28	26	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	SY 96-2 EXP	29101	7553	1504	33	375	691	0.8	-	-	-	-	-	-	10.57	1.12	84	-0.67	0.57	0.54	-	-	-	
InterMnt	WINTERWHEAT		2015-2017	WA 8232	29113	7548	1358	34	370	268	0.46	9525	382	1	7905	540	41	10.92	0.99	65	-0.32	0.22	0.43	9.49	0.28	40	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	WB TRIFECTA	29123	7543	1504	35	365	691	0.8	-	-	-	-	-	-	10.87	1.12	71	-0.37	0.57	0.83	-	-	-	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	LCS BIANCOR	29042	7538	1355	36	360	249	0.45	8471	382	24	9361	540	14	10.93	0.99	64	-0.31	0.21	0.43	10.33	0.28	10	Released
InterMnt	WINTERWHEAT		2015-2017	LWW14 71195	29057	7519	1358	37	341	268	0.51	8378	382	27	9368	540	12	11.37	0.99	28	0.13	0.22	0.83	10.6	0.28	5	
InterMnt	WINTERWHEAT	SWW	2015-2017	OR2130485	29140	7508	1378	38	330	353	0.61	8558	382	20	-	-	-	10.83	1.01	73	-0.41	0.29	0.43	9.87	0.28	30	
InterMnt	WINTERWHEAT		2015-2017	EXPBZ6W09 489	29023	7485	1392	39	307	404	0.66	-	-	-	9078	540	25	11.22	1.02	40	-0.02	0.33	0.96	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	SY 09PN100 63	29141	7484	1378	40	306	353	0.63	8534	382	21	-	-	-	10.83	1.01	74	-0.41	0.29	0.43	9.87	0.28	31	
InterMnt	WINTERWHEAT	SWW	2015-2017	LOR 913	29047	7483	1504	41	305	691	0.85	-	-	-	-	-	-	10.94	1.12	62	-0.3	0.57	0.83	-	-	-	
InterMnt	WINTERWHEAT		2015-2017	JASPER	29037	7454	1358	42	776	268	0.6	8274	382	29	9354	540	15	11.13	0.99	47	-0.11	0.22	0.84	10.03	0.28	23	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	OR2121285	29139	7448	1378	43	270	353	0.66	8499	382	22	-	-	-	11.18	1.01	42	-0.06	0.29	0.94	10.22	0.28	17	
InterMnt	WINTERWHEAT	SWW	2015-2017	LEGION	29043	7443	1368	44	265	313	0.63	8806	382	10	-	-	-	10.88	1	69	-0.37	0.26	0.43	9.6	0.28	37	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	IDN 01 10704A	29028	7413	1504	45	235	691	0.9	-	-	-	-	-	-	10.07	1.12	91	-1.17	0.57	0.21	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	PUMA WA 8134	29088	7398	1504	46	220	691	0.91	-	-	-	-	-	-	10.55	1.12	85	-0.69	0.57	0.54	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	TUBBS	29104	7395	1355	47	217	249	0.63	8324	382	28	9092	540	24	10.86	0.99	72	-0.38	0.21	0.28	9.88	0.28	29	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	ORI2101840 2 GENE	29082	7350	1392	48	172	404	0.85	-	-	-	8943	540	27	11.32	1.02	30	0.08	0.33	0.93	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	LWW 11 431	29051	7313	1504	49	135	691	0.97	-	-	-	-	-	-	10.94	1.12	63	-0.3	0.57	0.83	-	-	-	
InterMnt	WINTERWHEAT		2015-2017	LWW12 7105	29055	7269	1392	50	91	404	0.96	-	-	-	8862	540	29	11.03	1.02	57	-0.21	0.33	0.83	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	LCS ARTDECO	29041	7255	1355	51	77	249	0.91	8005	382	35	9233	540	16	10.96	0.99	61	-0.28	0.21	0.44	10.1	0.28	21	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	WB 1529	29115	7242	1355	52	64	249	0.94	7859	382	39	9113	540	22	11.43	0.99	25	0.19	0.21	0.65	10.94	0.28	3	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	OR2080641	29065	7233	1504	53	55	691	1	-	-	-	-	-	-	11.13	1.12	48	-0.11	0.57	0.94	-	-	-	
InterMnt	WINTERWHEAT		2015-2017	WA 8206	29112	7219	1358	54	41	268	1	8845	382	8	8045	540	40	11.31	0.99	31	0.07	0.22	0.92	10.22	0.28	16	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	STEPHENS	29093	7195	1355	55	17	249	1	7968	382	37	9033	540	26	11.46	0.99	22	0.22	0.21	0.58	10.54	0.28	6	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	IDN 06 033038	29033	7193	1504	56	15	691	1	-	-	-	-	-	-	12	1.12	14	0.76	0.57	0.46	-	-	-	
InterMnt	WINTERWHEAT		2015-2017	SY 04PN005 25	29094	7190	1358	57	12	268	1	7701	382	40	9503	540	5	10.72	0.99	78	-0.52	0.22	0.13	9.47	0.28	41	
InterMnt	WINTERWHEAT	SWW	2015-2017	IDO1108	29036	7177	1355	58	-1	249	1	8452	382	25	8411	540	35	11.04	0.99	56	-0.21	0.21	0.61	9.6	0.28	38	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	IDN 09-08357A	29135	7173	1378	59	-5	353	1	8223	382	30	-	-	-	11.26	1.01	36	0.02	0.29	0.96	10.3	0.28	13	
InterMnt	WINTERWHEAT	SWW	2015-2017	SY 09PN008872	29142	7150	1378	60	-28	353	1	8200	382	31	-	-	-	11.02	1.01	59	-0.23	0.29	0.73	10.05	0.28	22	
InterMnt	WINTERWHEAT	SWW	2015-2017	SKILES	29092	7148	1504	61	-30	691	1	-	-	-	-	-	-	10.43	1.12	87	-0.81	0.57	0.43	-	-	-	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	YS 221	29129	7133	1504	62	-45	691	1	-	-	-	-	-	-	10.73	1.12	77	-0.51	0.57	0.65	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	DAS 004	29018	7128	1504	63	-50	691	1	-	-	-	-	-	-	11.44	1.12	24	0.2	0.57	0.92	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	DAS 003	29017	7098	1504	64	-80	691	1	-	-	-	-	-	-	12.08	1.12	11	0.84	0.57	0.43	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	SY 107	29099	7065	1355	65	-113	249	0.85	8188	382	32	8816	540	30	11.14	0.99	46	-0.11	0.21	0.83	10.17	0.28	19	
InterMnt	WINTERWHEAT	SWW	2015-2017	LCS DRIVE	29052	7041	1368	66	-136	313	0.85	7980	382	36	-	-	-	11.02	1	58	-0.22	0.26	0.66	10.28	0.28	14	Released
InterMnt	WINTERWHEAT		2015-2017	EXPBZ6W09 471	29022	6961	1392	67	-217	404	0.8	-	-	-	8553	540	31	11.63	1.02	18	0.39	0.33	0.54	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	LOR 3314	29045	6952	1368	68	-226	313	0.68	8091	382	34	-	-	-	11.28	1	34	0.04	0.26	0.95	10.23	0.28	15	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	LOR 978	29048	6923	1504	69	-255	691	0.89	-	-	-	-	-	-	12.11	1.12	9	0.87	0.57	0.43	-	-	-	
InterMnt	WINTERWHEAT		2015-2017	OR2121252	29076	6856	1358	70	-322	268	0.53	7874	382	38	8492	540	32	11.22	0.99	39	-0.02	0.22	0.96	10.39	0.28	8	
InterMnt	WINTERWHEAT		2015-2017	LWW14 71032	29056	6830	1392	71	-348	404	0.63	-	-	-	8423	540	34	11.56	1.02	21	0.32	0.33	0.63	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	KASEBERG	29038	6821	1355	72	-357	249	0.45	8143	382	33	8116	540	39	10.75	0.99	76	-0.49	0.21	0.12	9.62	0.28	36	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	LWW10 1018	29054	6808	1392	73	-370	404	0.61	-	-	-	8401	540	36	11.27	1.02	35	0.03	0.33	0.96	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	YS 9568 A	29134	6723	1504	74	-455	691	0.72	-	-	-	-	-	-	11.07	1.12	53	-0.17	0.57	0.92	-	-	-	
InterMnt	WINTERWHEAT		2015-2017	ORLD112334	29086	6687	1392	75	-491	404	0.53	-	-	-	8280	540	37	11.3	1.02	32	0.06	0.33	0.94	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	ORCF 102	29079	6663	1504	76	-515	691	0.67	-	-	-	-	-	-	11.68	1.12	17	0.44	0.57	0.73	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	BRUNEAU	29014	6653	1504	77	-525	691	0.66	-	-	-	-	-	-	11.08	1.12	52	-0.16	0.57	0.92	-	-	-	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	LWW 10 1073	29050	6613	1504	78	-565	691	0.65	-	-	-	-	-	-	12.13	1.12	8	0.89	0.57	0.43	-	-	-	
InterMnt	WINTERWHEAT	HRW	2015-2017	WINCAL 09196	29126	6528	1392	79	-650	404	0.42	-	-	-	8121	540	38	12.06	1.02	12	0.82	0.33	0.11	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	WA 8169	29111	6483	1504	80	-695	691	0.6	-	-	-	-	-	-	12	1.12	13	0.76	0.57	0.46	-	-	-	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	WB EXP 1028 CL+	29118	6433	1504	81	-745	691	0.58	-	-	-	-	-	-	13	1.12	3	1.76	0.57	0.03	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	SY 71-4 EXP	29100	6423	1504	82	-755	691	0.58	-	-	-	-	-	-	10.88	1.12	68	-0.36	0.57	0.83	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	ORCF 101	29077	6313	1504	83	-865	691	0.51	-	-	-	-	-	-	12.52	1.12	5	1.28	0.57	0.15	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	GOETZE	29026	6253	1504	84	-925	691	0.48	-	-	-	-	-	-	11.16	1.12	44	-0.08	0.57	0.95	-	-	-	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	SY ASSURE	29144	6197	1378	85	-981	353	0.07	7247	382	41	-	-	-	12.13	1.01	7	0.89	0.29	0.03	11.17	0.28	2	Released
InterMnt	WINTERWHEAT	SWW	2015-2017	OR2101043	29073	6128	1377	86	-1049	347	0.04	-	-	-	7796	540	42	11.72	1.01	16	0.48	0.29	0.39	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	YS 261	29130	6023	1504	87	-1155	691	0.41	-	-	-	-	-	-	12.56	1.12	4	1.32	0.57	0.13	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	OR2080637	29064	5988	1504	88	-1190	691	0.39	-	-	-	-	-	-	11.57	1.12	20	0.33	0.57	0.83	-	-	-	
InterMnt	WINTERWHEAT	SWW	2015-2017	YAMHILL	29128	5067	1362	89	-2111	285	0	6252	507	42	6474	540	44	12.1	0.99	10	0.86	0.24	0.01	11.17	0.35	1	Released
InterMnt	WINTERWHEAT		2015-2017	20060126 35C	29003	4915	1392	90	-2263	404	0	-	-	-	6508	540	43	11.73	1.02	15	0.49	0.33	0.43	-	-	-	
InterMnt	WINTERWHEAT		2015-2017	WINCORA	29127	4544	1392	91	-2634	404	0	-	-	-	6137	540	45	13.58	1.02	1	2.34	0.33	0	-	-	-	Released
InterMnt	WINTERWHEAT		2015-2017	VERDANT	29107	4279	1404	92	-2899	441	0	-	-	-	5863	571	46	13.38	1.03	2	2.14	0.37	0	-	-	-	Released

Table 35. Intermountain Region, spring wheat yield and protein 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St. Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St. Err. Diff. from overall mean.x	P-Value	2017 Yield (lb/acre)	2017 St. Err. Yield (lb/acre)	2017 Yield Rank	3-yr Protein (%)	3-yr St. Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean.y	St. Err. Diff. from overall mean.y	3-yr P-Value	2017 Protein (%)	2017 St. Err. Protein (%)	2017 Protein Rank	Status
InterMnt	SPRINGWHEAT	HRS	2015-2017	XA 9301 EXP	29156	7535	1051	1	1544	321	0	8398	230	1	12.15	0.8	65	-0.49	0.63	0.62	11.63	0.22	33	
InterMnt	SPRINGWHEAT	SWS	2015-2017	WB 6341	19091	7253	1018	2	1262	192	0	7799	230	3	10.45	0.62	96	-2.19	0.38	0	10.15	0.22	49	
InterMnt	SPRINGWHEAT	SWS	2015-2017	YS 602	19108	7178	1050	3	1187	320	0	-	-	-	11.02	0.8	90	-1.62	0.63	0.07	-	-	-	
InterMnt	SPRINGWHEAT	SWS	2015-2017	WB 6430	19092	7103	1018	4	1113	192	0	7524	230	8	10.77	0.62	94	-1.87	0.38	0	10.3	0.22	47	
InterMnt	SPRINGWHEAT	HRS	2015-2017	LCS IRON 11 SB 0096	19045	6808	1050	5	817	320	0.05	-	-	-	12.82	0.8	44	0.18	0.63	0.86	-	-	-	
InterMnt	SPRINGWHEAT	HWS	2015-2017	DAYN	19022	6781	1067	6	790	371	0.13	-	-	-	12.29	0.88	63	-0.35	0.73	0.79	-	-	-	
InterMnt	SPRINGWHEAT	SWS	2015-2017	UI STONE	19078	6756	1018	7	766	192	0	7781	230	4	10.81	0.62	93	-1.83	0.38	0	10.13	0.22	50	
InterMnt	SPRINGWHEAT	HWS	2015-2017	WB HARTLINE	19100	6646	1050	8	656	320	0.14	-	-	-	12.97	0.8	41	0.33	0.63	0.77	-	-	-	
InterMnt	SPRINGWHEAT	SWS	2015-2017	ALTURAS	19015	6615	1033	9	625	261	0.08	-	-	-	11.36	0.71	89	-1.28	0.51	0.08	-	-	-	
InterMnt	SPRINGWHEAT	HWS	2015-2017	WA 8189	19082	6613	1014	10	623	174	0	-	-	-	12.68	0.6	48	0.04	0.34	0.96	-	-	-	
InterMnt	SPRINGWHEAT	HWS	2015-2017	LCS STAR	19046	6603	1018	11	613	192	0.01	7774	230	5	12.53	0.62	55	-0.11	0.38	0.86	11.45	0.22	36	
InterMnt	SPRINGWHEAT	HRS	2015-2017	12SB0146	19005	6574	1067	12	584	371	0.27	-	-	-	11.99	0.88	73	-0.65	0.73	0.57	-	-	-	
InterMnt	SPRINGWHEAT	HRS	2015-2017	IDO862E	19038	6541	1067	13	550	371	0.31	-	-	-	13.07	0.88	38	0.43	0.73	0.74	-	-	-	
InterMnt	SPRINGWHEAT	HWS	2015-2017	UC 12013 22	19071	6531	1067	14	540	371	0.31	-	-	-	12.41	0.88	60	-0.23	0.73	0.86	-	-	-	
InterMnt	SPRINGWHEAT	SWS	2015-2017	TEKOA WA 8189	29150	6512	1051	15	521	321	0.26	7375	230	10	11.02	0.8	91	-1.62	0.63	0.07	10.5	0.22	46	
InterMnt	SPRINGWHEAT	HWS	2015-2017	IDO1203S A	19033	6508	1025	16	518	227	0.09	7238	230	14	12.78	0.66	45	0.14	0.44	0.86	12.35	0.22	24	
InterMnt	SPRINGWHEAT	SWS	2015-2017	RYAN WA 8214	29148	6496	1051	17	506	321	0.27	7359	230	11	11.45	0.8	88	-1.19	0.63	0.19	10.93	0.22	45	
InterMnt	SPRINGWHEAT	HWS	2015-2017	WB 7566	29167	6453	1026	18	462	231	0.15	7315	174	12	12.6	0.67	51	-0.04	0.45	0.96	12.08	0.16	26	Released
InterMnt	SPRINGWHEAT	SWS	2015-2017	IDO851	19035	6451	1067	19	460	371	0.42	-	-	-	11.01	0.88	92	-1.63	0.73	0.12	-	-	-	
InterMnt	SPRINGWHEAT	HRS	2015-2017	SY BASALT 04WA0240R	19062	6439	1025	20	449	227	0.15	7015	230	20	12.41	0.66	59	-0.23	0.44	0.77	11.7	0.22	32	
InterMnt	SPRINGWHEAT	SWS	2015-2017	12SW052	19009	6413	1029	21	423	242	0.22	-	-	-	12	0.68	72	-0.65	0.47	0.38	-	-	-	
InterMnt	SPRINGWHEAT	HWS	2015-2017	LCS ATOMO	19044	6413	1018	22	423	192	0.11	6728	230	31	12.43	0.62	58	-0.21	0.38	0.75	12.45	0.22	22	
InterMnt	SPRINGWHEAT	HRS	2015-2017	SY 04W40292R	19058	6407	1067	23	417	371	0.46	-	-	-	13.48	0.88	18	0.84	0.73	0.48	-	-	-	
InterMnt	SPRINGWHEAT	SWS	2015-2017	WB 6121	19090	6384	1022	24	394	212	0.18	7196	230	16	11.93	0.64	76	-0.71	0.42	0.27	11.18	0.22	40	
InterMnt	SPRINGWHEAT	HWS	2015-2017	IDO1202S	19032	6344	1018	25	354	192	0.18	7909	230	2	13.38	0.62	22	0.74	0.38	0.18	12.88	0.22	15	
InterMnt	SPRINGWHEAT	SWS	2015-2017	12SW079	19011	6337	1067	26	347	371	0.57	-	-	-	12.92	0.88	43	0.28	0.73	0.83	-	-	-	
InterMnt	SPRINGWHEAT	HRS	2015-2017	IDO862T	19039	6324	1067	27	334	371	0.57	-	-	-	13.16	0.88	33	0.52	0.73	0.65	-	-	-	
InterMnt	SPRINGWHEAT	HWS	2015-2017	SY SELWAY 04PN3001 2	19065	6322	1025	28	331	227	0.31	7212	230	15	13.36	0.66	24	0.72	0.44	0.29	12.95	0.22	13	
InterMnt	SPRINGWHEAT	HRS	2015-2017	WB 9518	19096	6316	1018	29	326	192	0.24	6388	230	42	14.03	0.62	6	1.39	0.38	0	14.05	0.22	2	
InterMnt	SPRINGWHEAT	HWS	2015-2017	UI PLATINUM	19077	6294	1018	30	303	192	0.27	6760	230	29	12.11	0.62	71	-0.53	0.38	0.38	11.85	0.22	31	
InterMnt	SPRINGWHEAT	SWS	2015-2017	MELBA	19050	6291	1025	31	300	227	0.37	7193	230	17	10.35	0.66	97	-2.29	0.44	0	9.73	0.22	52	
InterMnt	SPRINGWHEAT	SWS	2015-2017	12SW068	19010	6281	1029	32	291	242	0.44	-	-	-	11.5	0.68	86	-1.14	0.47	0.09	-	-	-	
InterMnt	SPRINGWHEAT	SWS	2015-2017	WB 1035 CL	29151	6275	1051	33	285	321	0.57	7138	230	19	11.62	0.8	82	-1.02	0.63	0.29	11.1	0.22	41	
InterMnt	SPRINGWHEAT	HRS	2015-2017	WB 9200	19094	6257	1025	34	267	227	0.45	6733	230	30	13.63	0.66	12	0.99	0.44	0.12	13.17	0.22	9	
InterMnt	SPRINGWHEAT	HWS	2015-2017	UC 12013/34	19075	6247	1067	35	257	371	0.67	-	-	-	13.8	0.88	11	1.16	0.73	0.3	-	-	-	
InterMnt	SPRINGWHEAT	HRS	2015-2017	SY 04PN3051 9	19057	6238	1050	36	248	320	0.63	-	-	-	14.07	0.8	5	1.43	0.63	0.12	-	-	-	
InterMnt	SPRINGWHEAT	HRS	2015-2017	11SB0096	19003	6237	1067	37	247	371	0.67	-	-	-	12.58	0.88	52	-0.06	0.73	0.96	-	-	-	
InterMnt	SPRINGWHEAT	HRS	2015-2017	12SB0224	19008	6225	1029	38	235	242	0.56	7551	230	7	12.13	0.68	66	-0.51	0.47	0.52	11.48	0.22	35	
InterMnt	SPRINGWHEAT	HWS	2015-2017	YS 601	19107	6214	1067	39	224	371	0.68	-	-	-	12.71	0.88	47	0.07	0.73	0.96	-	-	-	
InterMnt	SPRINGWHEAT	HRS	2015-2017	12SB0197	19006	6198	1029	40	208	242	0.57	7273	230	13	12.12	0.68	70	-0.52	0.47	0.51	11.53	0.22	34	
InterMnt	SPRINGWHEAT	HRS	2015-2017	HRS 3504	19030	6198	1033	41	207	261	0.62	-	-	-	13.08	0.71	37	0.44	0.51	0.59	-	-	-	
InterMnt	SPRINGWHEAT	SWS	2015-2017	IM 12001	19049	6184	1067	42	194	371	0.71	-	-	-	12.58	0.88	53	-0.06	0.73	0.96	-	-	-	
InterMnt	SPRINGWHEAT	HRS	2015-2017	WB 9229	19095	6165	1020	43	175	202	0.57	6654	230	33	13.29	0.63	27	0.65	0.39	0.29	12.65	0.22	21	
InterMnt	SPRINGWHEAT	HRS	2015-2017	YS 802	19110	6164	1067	44	174	371	0.73	-	-	-	13.63	0.88	13	0.99	0.73	0.38	-	-	-	
InterMnt	SPRINGWHEAT	HWS	2015-2017	WB 7417	19093	6158	1025	45	168	227	0.65	6983	230	22	13.92	0.66	10	1.28	0.44	0.04	13.78	0.22	5	
InterMnt	SPRINGWHEAT	HRS	2015-2017	YS 604	29162	6150	1051	46	160	321	0.72	7013	230	21	10.57	0.8	95	-2.07	0.63	0.01	10.05	0.22	51	
InterMnt	SPRINGWHEAT	HRS	2015-2017	SY 06PN3015 08	19059	6147	1050	47	157	320	0.72	-	-	-	12.62	0.8	50	-0.02	0.63	0.99	-	-	-	
InterMnt	SPRINGWHEAT	SWS	2015-2017	JEFFERSON	19041	6137	1028	48	146	241	0.68	7184	230	18	13.3	0.68	25	0.66	0.47	0.38	12.8	0.22	16	
InterMnt	SPRINGWHEAT	HRS	2015-2017	12SB0199	19007	6124	1025	49	134	227	0.68	6905	230	24	12.28	0.66	64	-0.36	0.44	0.61	11.93	0.22	28	
InterMnt	SPRINGWHEAT	SWS	2015-2017	YS 603	29161	6070	1051	50	80	321	0.86	6933	230	23	11.55	0.8	85	-1.09	0.63	0.27	11.03	0.22	44	
InterMnt	SPRINGWHEAT	SWS	2015-2017	WHIT	19105	6064	1029	51	74	242	0.83	-	-	-	11.55	0.68	84	-1.09	0.47	0.12	-	-	-	
InterMnt	SPRINGWHEAT	HWS	2015-2017	BULLSEYE	19019	6039	1029	52	48	242	0.88	-	-	-	13.62	0.68	14	0.98	0.47	0.16	-	-	-	
InterMnt	SPRINGWHEAT	HRS	2015-2017	XA 9860 EXP	29158	6022	1051	53	31	321	0.95	6885	230	25	12.92	0.8	42	0.28	0.63	0.8	12.4	0.22	23	
InterMnt	SPRINGWHEAT	HWS	2015-2017	12SB0131	19004	5991	1067	54	0	371	1	-	-	-	12.35	0.88	62	-0.29	0.73	0.83	-	-	-	
InterMnt	SPRINGWHEAT	HRS	2015-2017	XA 9861 EXP	29159	5973	1051	55	-18	321	0.97	6836	230	26	12.4	0.8	61	-0.24	0.63	0.83	11.88	0.22	30	
InterMnt	SPRINGWHEAT	HRS	2015-2017	WB PATRON	29147	5963	1051	56	-27	321	0.95	6826	230	27	13.45	0.8	20	0.81	0.63	0.41	12.93	0.22	14	Released
InterMnt	SPRINGWHEAT	SWS	2015-2017	SY 04PN3024 2	19056	5918	1050	57	-72	320	0.87	-	-	-	11.57	0.8	83	-1.07	0.63	0.27	-	-	-	
InterMnt	SPRINGWHEAT	SWS	2015-2017	SY COHO 04WA0292R	19064	5909	1025	58	-81	227	0.79	6647	230	34	13.51	0.66	15	0.87	0.44	0.18	13.03	0.22	11	
InterMnt	SPRINGWHEAT	HRS	2015-2017	WA 8217	19084	5897	1067	59	-93	371	0.86	-	-	-	13.36	0.88	23	0.72	0.73	0.54	-	-	-	
InterMnt	SPRINGWHEAT	HRS	2015-2017	WB 9411	29153	5865	1051	60	-126	321	0.78	6728	230	32	13.25	0.8	31	0.61	0.63	0.54	12.73	0.22	20	
InterMnt	SPRINGWHEAT	HRS	2015-2017	SY 3001 2	19060	5857	1067	61	-133	371	0.79	-	-	-	13	0.88	39	0.36	0.73	0.78	-	-	-	
InterMnt	SPRINGWHEAT	HRS	2015-2017	SY STEELHEAD	19066	5822	1018	62	-168	192	0.57	6795	230	28	14	0.62	8	1.36	0.38	0	13.92	0.22	4	
InterMnt	SPRINGWHEAT	HRS	2015-2017	WB 9879 CLP	19099	5816	1050	63	-174	320	0.7	-	-	-	13.4	0.8	21	0.76	0.63	0.46	-	-	-	
InterMnt	SPRINGWHEAT	SWS	2015-2017	ALPOWA	19014	5783	1025	64	-208	227	0.57	7463	230	9	11.47	0.66	87	-1.17	0.44	0.07	11.05	0.22	42	
InterMnt	SPRINGWHEAT	HRS	2015-2017	UI WINCHESTER	19079	5781	1067	65	-210	371	0.69	-	-	-	13.45	0.88	19	0.81	0.73	0.51	-	-	-	
InterMnt	SPRINGWHEAT	SWS	2015-2017	WB 9668	19097	5773	1051	66	-218	321	0.67	6636	230	35	14.47	0.8	2	1.83	0.63	0.04	13.95	0.22	3	
InterMnt	SPRINGWHEAT	HRS	2015-2017	HRS 3530	19031	5767	1067	67	-223	371	0.68	-	-	-	13.14	0.88	34	0.5	0.73	0.66	-	-	-	
InterMnt	SPRINGWHEAT	HWS	2015-2017	XA 7320 CLEXP	29155	5765	1051	68	-225	321	0.67	6628	230	36	12.57	0.8	54	-0.07	0.63	0.96	12.05	0.22	27	
InterMnt	SPRINGWHEAT	HRS	2015-2017	UC 12014/35	19076	5754	1067	69	-236	371	0.68	-	-	-	12.47	0.88	56	-0.17	0.73	0.9	-	-	-	
InterMnt	SPRINGWHEAT	HWS	2015-2017	CLEAR WHITE 515	19021	5754	1067	70	-236	371	0.68	-	-	-	13.22	0.88	32	0.58	0.73	0.61	-	-	-	
InterMnt	SPRINGWHEAT	SWS	2015-2017	WA 8214	19083	5723	1033	71	-267	261	0.53	-	-	-	11.86	0.71	78	-0.78	0.51	0.33	-	-	-	
InterMnt	SPRINGWHEAT	HRS	2015-2017	WB 9662	29154	5689	1051	72	-301	321	0.57	6552	230	37	13.97	0.8	9	1.33	0.63	0.15	13.45	0.22	8	
InterMnt	SPRINGWHEAT	HRS	2015-2017	APB 8238	29168	5666	1051	73	-324	321	0.53	6529	230	38	12.45	0.8	57	-0.19	0.63	0.86	11.93	0.22	29	
InterMnt	SPRINGWHEAT	HWS	2015-2017	LIC PATWIN 515HP	29164	5630	1051	74	-361	321	0.46	6493	230	39	13.5	0.8	16	0.86	0.63	0.38	12.98	0.22	12	Released
InterMnt	SPRINGWHEAT	HRS	2015-2017	XA 9660 EXP	29157	5624	1051	75	-366	321	0.46	6487	230	40	13.27	0.8	28.5	0.63	0.63	0.54	12.75	0.22	18	
InterMnt	SPRINGWHEAT	SWS	2015-2017	WB 1035 CL+	19089	5569	1050	76	-421	320	0.37	-	-	-	12.12	0.8	68	-0.52	0.63	0.61	-	-	-	
InterMnt	SPRINGWHEAT	SWS	2015-2017	14SWW1030	19012	5546	1050	77	-444	320	0.34	-	-	-	11.97	0.8	74	-0.67	0.63	0.52	-	-	-	
InterMnt	SPRINGWHEAT	HRS	2015-2017	IDSB0087 B	19002	5543	1029	78	-447	242	0.18	-	-	-	12.98	0.68	40	0.34	0.47	0.65	-	-	-	
InterMnt	SPRINGWHEAT	HRS	2015-2017	YECORA ROJO	19106	5532	1025	79	-458	227	0.15	5886	230	47	14.2	0.66	4	1.56	0.44	0.01	13.78	0.22	6	Released
InterMnt	SPRINGWHEAT	HRS	2015-2017	YS 802 1	19111	5526	1050	80	-464	320	0.31	-	-	-	14.02	0.8	7	1.38	0.63	0.12	-	-	-	
InterMnt	SPRINGWHEAT	HRS	2015-2017	HRS 3419	19029	5484	1029	81	-506	242	0.13	-	-	-	12.74	0.68	46	0.1	0.47	0.91	-	-	-	
InterMnt	SPRINGWHEAT	HRS	2015-2017	ALLIM	19016	5474	1025	82	-516	227	0.09	6461	230	41	13.48	0.66	17	0.84	0.44	0.19	13.13	0.22	10	
InterMnt	SPRINGWHEAT	SWS	2015-2017	WB 9350	29152	5449	1051	83	-541	321	0.24	6312	230	43	13.25	0.8	30	0.61	0.63	0.54	12.73	0.22	19	
InterMnt	SPRINGWHEAT	SWS	2015-2017	SY SALITESE SY 04PN3024 2	29149	5368	1051	84	-622	321	0.16	6231	230	44	11.77	0.8	81	-0.87	0.63	0.38	11.25	0.22	39	
InterMnt	SPRINGWHEAT	SWS	2015-2017	SEAHAWK	19054	5334	1017	85	-656	187	0	7607	230	6	11.91	0.61	77	-0.73	0.37	0.18	10.17	0.22	48	
InterMnt	SPRINGWHEAT	HRS	2015-2017	HRS 3361	19028	5264	1033	86	-726	261	0.03	-	-	-	13.14	0.71	35	0.5	0.51	0.54	-	-	-	
InterMnt	SPRINGWHEAT	HRS	2015-2017	KELSE	19042	5185	1051	87	-806	321	0.06	6047	230	45	14.27	0.8	3	1.63	0.63	0.07	13.75	0.22	7	
InterMnt	SPRINGWHEAT	HRS	2015-2017	HRS 3100	19027	5084	1050	88	-907	320	0.03	-	-	-	13.1	0.8	36	0.46	0.63	0.65	-	-	-	
InterMnt	SPRINGWHEAT	SWS	2015-2017	BAG NEW DIRKWIN HP	29166	5057	1051	89	-933	321	0.02	5920	230	46	12.65	0.8	49	0.01	0.63	0.99	12.13	0.22	25	Released
InterMnt	SPRINGWHEAT	HRS	2015-2017	GLEE	19025	5014	1051	90	-977	321	0.02	5876	230	48	13.27	0.8	28.5	0.63	0.63	0.54	12.75	0.22	17	
InterMnt	SPRINGWHEAT	SWS	2015-2017	14SWW1059	19013	4998	1050	91	-992	320	0.01	-	-	-	11.82	0.8	79	-0.82	0.63	0.41	-	-	-	
InterMnt	SPRINGWHEAT	SWS	2015-2017	YS 801	19109	4941	1067	92	-1050	371	0.03	-	-	-	13.29	0.88	26	0.65	0.73	0.57	-	-	-	
InterMnt	SPRINGWHEAT	SWS	2015-2017	LOUISE	19048	4894	1025	93	-1096	227	0	5415	230	51	12.12	0.66	69	-0.52	0.44	0.48	11.03	0.22	43	
InterMnt	SPRINGWHEAT	SWS	2015-2017	YS 605	29163	4827	1051	94	-1164	321	0	5690	230	49	11.8	0.8	80	0.84	0.63	0.39	11.28	0.22	38	
InterMnt	SPRINGWHEAT	HRS	2015-2017	ANZA	19052	4666	1066	95	-1324	368	0	-	-	-	11.95	0.88	75	-0.69	0.72	0.54	-	-	-	
InterMnt	SPRINGWHEAT	SWS	2015-2017	DIVA	19023	4318	1018	96	-1672	192	0	5473	230	50	12.13	0.62	67	-0.51	0.38	0.38	11.4	0.22	37	
InterMnt	SPRINGWHEAT	HRS	2015-2017	YECORA ROJO 515	29160	4224	1051	97	-1766	321	0	5087	230	52	15.2	0.8	1	2.56	0.63	0	14.68	0.22	1	

Table 36. Intermountain Region, spring barley yield 2015 to 2017.

Region/Group	Crop Group	Crop Type	Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean	St.Err.Diff. from overall mean	P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank	Status
InterMnt	BARLEY	6RSF	2015-2017	UC 1337	9081	7702	921	1	2808	300	0	-	-	-	
InterMnt	BARLEY	6RSF	2015-2017	UC 1341	9082	6868	898	2	1974	227	0	-	-	-	
InterMnt	BARLEY		2015-2017	UC 1278	9080	6629	921	3	1735	300	0	-	-	-	
InterMnt	BARLEY		2015-2017	FRANCIN	9148	6038	922	4	1144	301	0	7731	237	2	
InterMnt	BARLEY	6RSF	2015-2017	UC 1365	9083	5892	898	5	998	227	0	-	-	-	
InterMnt	BARLEY	6RSF	2015-2017	MILLENNIUM	9063	5883	939	6	989	357	0.02	-	-	-	
InterMnt	BARLEY		2015-2017	UTSB10902 91	9135	5696	896	7	802	213	0	8061	237	1	
InterMnt	BARLEY		2015-2017	EXPLORER	9147	5643	922	8	749	301	0.05	7336	237	4	
InterMnt	BARLEY	6RSF	2015-2017	UC 10B	9088	5587	939	9	693	357	0.13	-	-	-	
InterMnt	BARLEY	2RSM	2015-2017	UC BUTTA 12 96	9049	5575	896	10	681	213	0.01	6940	237	9	
InterMnt	BARLEY		2015-2017	UTSB10905 72	9136	5552	896	11	658	213	0.01	6845	237	12	
InterMnt	BARLEY		2015-2017	11WA 107 20	9020	5514	921	12	620	300	0.11	-	-	-	
InterMnt	BARLEY	2RSM	2015-2017	2ND28065	9044	5485	921	13	591	300	0.13	-	-	-	
InterMnt	BARLEY		2015-2017	BZ512 220	9143	5385	922	14	491	301	0.22	7078	237	7	
InterMnt	BARLEY	2RSM	2015-2017	MERIT 57	9062	5367	939	15	473	357	0.36	-	-	-	
InterMnt	BARLEY		2015-2017	08ARS028 20	9001	5341	896	16	447	213	0.1	7651	237	3	
InterMnt	BARLEY		2015-2017	OSU FULL PINT	9059	5341	890	17	447	189	0.06	7232	237	5	
InterMnt	BARLEY		2015-2017	SYNERGY	9154	5219	922	18	325	301	0.48	6912	237	10	
InterMnt	BARLEY		2015-2017	10ARS191 3	9140	5171	922	19	277	301	0.58	6864	237	11	
InterMnt	BARLEY	2RSM	2015-2017	CONRAD	9057	5100	939	20	206	357	0.81	-	-	-	
InterMnt	BARLEY	2RSM	2015-2017	2B10 4378	9035	5096	896	21	202	213	0.57	7207	237	6	
InterMnt	BARLEY		2015-2017	08ARS116 91	9003	5081	896	22	187	213	0.61	6741	237	13	
InterMnt	BARLEY	6RSM	2015-2017	CELEBRATION	9055	5063	971	23	169	432	0.92	-	-	-	
InterMnt	BARLEY		2015-2017	BZ509 601	9053	5036	921	24	142	300	0.88	-	-	-	
InterMnt	BARLEY		2015-2017	BZ512 282	9144	4998	922	25	104	301	0.92	6691	237	16	
InterMnt	BARLEY		2015-2017	MT124555	9070	4996	921	26	102	300	0.92	-	-	-	
InterMnt	BARLEY	2RSM	2015-2017	LCS Genie	9149	4990	922	27	96	301	0.92	6684	237	17	
InterMnt	BARLEY	6RSF	2015-2017	STEPTOE	9077	4988	888	28	93	180	0.85	6237	237	24	
InterMnt	BARLEY		2015-2017	CDC BOW	9145	4978	922	29	84	301	0.92	6671	237	18	
InterMnt	BARLEY	6RSF	2015-2017	UC 1393	9084	4965	898	30	71	227	0.92	-	-	-	
InterMnt	BARLEY		2015-2017	MT090182	9065	4952	921	31	58	300	0.94	-	-	-	
InterMnt	BARLEY		2015-2017	08ARS112 75	9002	4946	896	32	52	213	0.92	6729	237	15	
InterMnt	BARLEY	2RSF	2015-2017	MT100120	9067	4943	921	33	49	300	0.94	-	-	-	
InterMnt	BARLEY	6RSF	2015-2017	UC 960	9087	4907	939	34	13	357	0.97	-	-	-	
InterMnt	BARLEY	2RSF	2015-2017	BARONESSE	9048	4888	888	35	-6	180	0.97	6234	237	26	
InterMnt	BARLEY	6RSM	2015-2017	STELLAR ND	9076	4877	939	36	-17	357	0.97	-	-	-	
InterMnt	BARLEY	6RSF	2015-2017	UC 1339	9096	4867	939	37	-27	357	0.97	-	-	-	
InterMnt	BARLEY		2015-2017	MT090190	9066	4845	896	38	-50	213	0.92	6577	237	20	
InterMnt	BARLEY	2RSM	2015-2017	UC 1410	9086	4845	896	39	-50	213	0.92	6994	237	8	
InterMnt	BARLEY	6RSF	2015-2017	UC TL20	9129	4843	939	40	-51	357	0.94	-	-	-	
InterMnt	BARLEY	6RSM	2015-2017	LEGACY	9061	4837	939	41	-57	357	0.94	-	-	-	
InterMnt	BARLEY	2RSF	2015-2017	MT100126	9068	4807	921	42	-87	300	0.92	-	-	-	
InterMnt	BARLEY	6RSF	2015-2017	UC 1395	9124	4797	939	43	-97	357	0.92	-	-	-	
InterMnt	BARLEY	2RSM	2015-2017	PINCLE	9073	4750	939	44	-144	357	0.92	-	-	-	
InterMnt	BARLEY	2RSM	2015-2017	UC Tahoe	9085	4720	922	45	-174	301	0.81	6413	237	22	Released
InterMnt	BARLEY		2015-2017	11WA 107 58	9022	4715	896	46	-179	213	0.61	6465	237	21	
InterMnt	BARLEY	2RSM	2015-2017	2B11 4949	9038	4712	896	47	-182	213	0.61	6732	237	14	
InterMnt	BARLEY		2015-2017	11WA 107 43	9021	4653	896	48	-241	213	0.45	6642	237	19	
InterMnt	BARLEY	6RSM	2015-2017	TRADITION	9079	4643	939	49	-251	357	0.72	-	-	-	
InterMnt	BARLEY	2RSM	2015-2017	HARRINGTON	9060	4590	890	50	-304	189	0.22	6113	267	27	
InterMnt	BARLEY	2RSM	2015-2017	AC METCALFE	9047	4575	888	51	-319	180	0.18	5964	237	33	
InterMnt	BARLEY		2015-2017	2ND32529	9141	4555	922	52	-339	301	0.45	6249	237	23	
InterMnt	BARLEY		2015-2017	2ND33760	9142	4543	922	53	-351	301	0.45	6236	237	25	
InterMnt	BARLEY	2RSM	2015-2017	UC 1390	9018	4509	896	54	-386	213	0.17	5702	237	37	
InterMnt	BARLEY	6RSF H	2015-2017	UC 1332	9093	4463	939	55	-431	357	0.43	-	-	-	
InterMnt	BARLEY		2015-2017	MT124677	9153	4400	922	56	-494	301	0.22	6093	237	28	
InterMnt	BARLEY		2015-2017	CDC FRASER	9146	4398	922	57	-496	301	0.22	6091	237	30	
InterMnt	BARLEY	2RSM	2015-2017	2B10 4162	9034	4385	896	58	-509	213	0.06	6091	237	29	
InterMnt	BARLEY		2015-2017	MT124112	9150	4378	922	59	-516	301	0.2	6071	237	31	
InterMnt	BARLEY	6RSM	2015-2017	QUEST	9074	4330	939	60	-564	357	0.23	-	-	-	
InterMnt	BARLEY	2RSM	2015-2017	CDC COPELAND	9054	4253	888	61	-641	180	0	5914	237	35	
InterMnt	BARLEY		2015-2017	MT124134	9152	4225	922	62	-669	301	0.08	5918	237	34	
InterMnt	BARLEY	2RSF-H	2015-2017	2AB09 X06F084-51	9032	4195	921	63	-699	300	0.06	-	-	-	
InterMnt	BARLEY		2015-2017	MT124128	9151	4110	922	64	-784	301	0.04	5803	237	36	
InterMnt	BARLEY		2015-2017	2B12 5582	9041	4057	896	65	-838	213	0	6057	237	32	
InterMnt	BARLEY		2015-2017	12WA 120 14	9023	4047	900	66	-848	227	0	5664	267	38	
InterMnt	BARLEY	2RSM	2015-2017	2B11 5166	9039	4028	896	67	-866	213	0	5373	237	40	
InterMnt	BARLEY	2RSF	2015-2017	10WA 106 18	9013	3978	896	68	-916	213	0	5412	237	39	
InterMnt	BARLEY	2RSF	2015-2017	10WA 117 24	9017	3970	921	69	-924	300	0.01	-	-	-	
InterMnt	BARLEY	2RSF	2015-2017	10WA 117 17	9016	3937	896	70	-958	213	0	5355	237	41	
InterMnt	BARLEY		2015-2017	2ND30837	9046	3635	921	71	-1259	300	0	-	-	-	
InterMnt	BARLEY	2RSM	2015-2017	CONLON	9056	3623	971	72	-1271	432	0.01	-	-	-	
InterMnt	BARLEY	2RSF H	2015-2017	2AB09 X06F058HL-31	9031	3357	896	73	-1537	213	0	5082	237	42	

Disease & agronomic summaries

The statewide occurrence of diseases during the 2016-17 season is presented in Figure 17. The 90th percentile disease incidence ratings for all seasons between 2013 and 2017 and for individual locations in the 2016-17 season are presented in Tables 37 and 38. Stripe rust and leaf rust were not notably more severe in the 2016-17 season than previous seasons. Septoria and powdery mildew were observed in 2016-17 after not being recorded for a number of seasons. The incidence of stripe rust, septoria, and powdery mildew were highest at the Kern location. Stripe rust samples sent for race analysis identified race PSTv-37, which is virulent to Yr6, Yr7, Yr8, Yr9, Yr17, Yr27, Yr43, Yr44, YrTr1 and YrExp2, but avirulent to Yr1, Yr5, Yr10, Yr15, Yr24, Yr32, YrSP and Yr76, the most predominant race in recent years and this year.

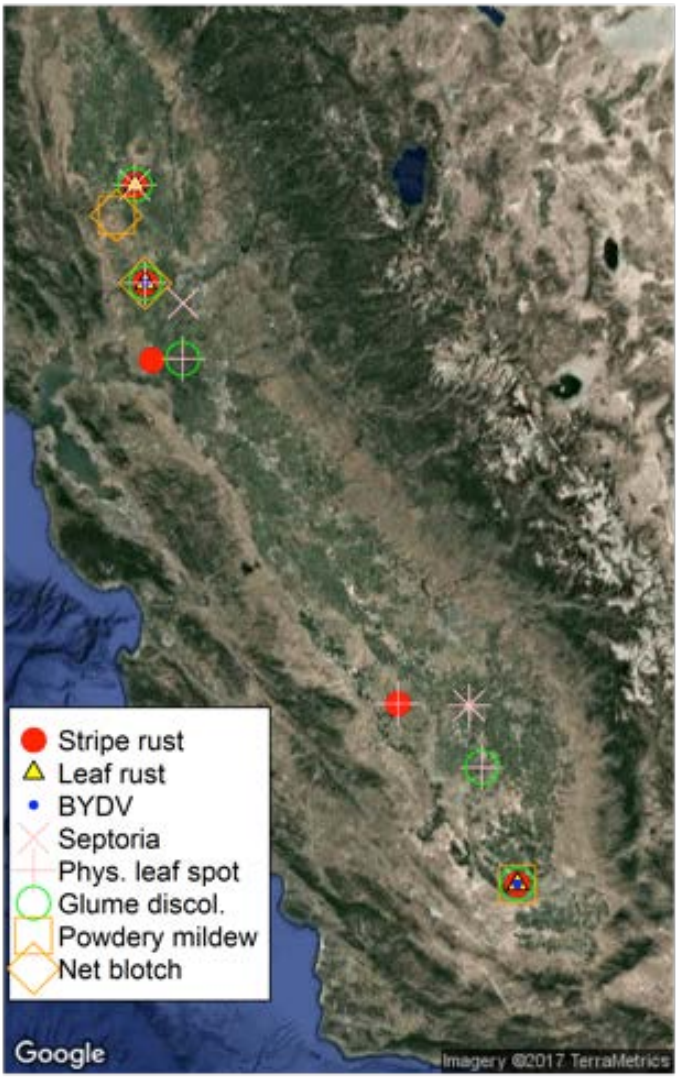

Figure 17. Locations where diseases and other symptoms were observed in the 2016-17 season.

Disease and agronomic observations for common wheat are presented in Table 39 and Table 40. In the common wheat trials, Yecora Rojo (112) was included as known stripe rust-susceptible check, and it displayed a stripe rust score of 5.2, which was the highest of all varieties. The varieties UC Anza, WWW FV 2808, and SY Redwing, showed incidences of stripe rust over 3. These varieties are considered susceptible to moderately susceptible based on multi-year analyses. SY Blanca Grande 515, APB 501089, XA 9302, SY Ultra, XA 9301, SY Blanca Royale had incidences of in the 90th percentile of observations at 2.8. All common wheat varieties were considered resistant to leaf rust and septoria (or had no data) in the multi-year summary. Several varieties had ratings of 2 or greater in the 2016-17 season for both of these diseases, including WB Joaquin Oro, SY Vaca, and UC Lassik, which had ratings greater than 3. Multiple varieties are considered susceptible or moderately susceptible to BYDV in the multi-year data. Notably, SY Cal Rojo, previously rated as moderately resistant, had a rating of 3 in 2016-17.

In the 2016-17 season, a disease-like symptom characterized by darkening of the glumes was observed at a number of test locations, as well as grower fields (Figure 18). The symptoms may be a condition referred to as pseudo-black chaff/false black chaff/melanism. This is a physiological condition associated with the presence of the stem rust resistance gene Sr2 that results in the deposition of melanoid pigments that discolor the glumes in the wheat head and, in

severe cases, in the stem below the head. Entries with ratings of 3 or greater were SY Blanca Grande 515, WB 9112, SY Summit 515, WB 7566, APB 501089, SY 314, WB Joaquin Oro, SY Ultra, APB 410117 and SY Cal Rojo. There does not appear to be a quantitative relationship between the glume discoloration symptoms and wheat yield. More information is available in the Discussion section of this report and on the UC Small Grains Blog (http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=24722).

A leaf-spotting symptom, termed "physiological leaf spot" was also observed in multiple locations, with some varieties also showing greater incidence than others (Figure 19). APB 410117 and SY Blanca Grande 515 had ratings of 4 or greater. No clear correlation with reduced performance was observed for this trait and no consistent pathogens were recovered from plants demonstrating this symptomology. Given the abnormally high rainfall experienced during the 2016-17 season, chloride deficiency was suggested as a possible explanation for the symptom. More information and images are available on the UC Small Grains Blog (http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=23757) and in the Discussion section of this report.

Figure 18. Glume darkening caused by possible false black chaff at 2016-17 UC trial site.

Figure 19. Leaf spotting symptoms at Davis durum wheat variety trial (leaf view).

Disease and agronomic observations for durum wheat are presented in Tables 42 and 43. In the durum wheat trials, over half the entries had stripe rust ratings exceeding 3, and several varieties had ratings exceeding 4. The varieties with 4 or greater were APB Kronos, WB Orita, WB Havasu, AS Maestrale, AS Saragolla, UC Miwok, APB 471400, ASC 101, ASC 102, ASC 103, and WB Mohave. All the commercial varieties with ratings greater than 4 had been tested for multiple years and are already considered susceptible to stripe rust. All entries were rated as 2 or

less for leaf rust, with the varieties all considered resistant based on multi-year data. The experimental varieties APB 540165 and APB 471400 had septoria ratings exceeding 3, and commercial variety WB Havasu was rated as 2.8 and WB Tiburon as 2.6. APB 471400 was a new entry in the 2016-17 season. Both APB 540165 and WB Tiburon were previously considered susceptible in multi-year summaries, whereas WB Havasu was previously considered resistant. Multiple varieties of durum wheat are rated as susceptible to BYDV based on multi-year data. BYDV ratings in durum wheat were low in the 2016-17 season.

In the 2016-17 season, powdery mildew, false black chaff and physiological leaf spot were observed in the durum wheat. Some varieties exhibited moderately heavy incidence of powdery mildew, notably in the Southern San Joaquin Valley. Varieties with ratings of 4 or greater were SY Volante, UC Desert King HP, UC 16051 12, WB Orita, and APB 450311, and WB Havasu and UC 16051 25 were rated as 5. The yield of these was notably poor relative to other varieties in the Southern San Joaquin Valley. In contrast to common wheat, false black chaff was rated as 2 or less for all durum wheat entries, and the physiological leaf spot was rated as 6 or great for the LCS Kiko, SY Fortissimo and APB Westmore HP. It is notable that in the GGE plots (see below) these varieties yielded poorly in the Sacramento Valley but not at other locations.

For the common wheat, the multi-year lodging risk was only rated to be high in Yecora Rojo, WB Triple IV, LCS Star, UC 15080 49, and UC Clear White. For the durum wheat ASC 101, ASC 102, UC 15210 12, LCS 13SD0056, APB Westmore HP, WB Havasu, APB Kronos, and AS Maestrale exhibited high lodging risk. Shatter was rated as low among both species across all varieties.

Disease and agronomic observations for triticale are presented in Tables 44 and 45. Around half of the varieties are considered susceptible to leaf rust and BYDV, although the 2016-17 data did not have entries with stripe rust or leaf rust ratings over 3. The highest ratings were 2.6 and 2.7, respectively, both for the variety AGS 230. WB Pacheo and NS Camelot had septoria ratings of 2.8 in the 2016-17 season. The highest BYDV rating was 2.4 for NS Trical 105. In the multi-year data for triticale, all the varieties were considered resistant to leaf rust and septoria. The triticale varieties exhibited false black chaff and physiological leaf spot. The false black chaff ratings were all less than 3 and both NS 12T01486 and WB Pacheo showed leaf spotting of 3 or greater.

Disease and agronomic observations for barley are presented in Tables 46 and 47. Based on the multi-year data for barley, most varieties were resistant or moderately resistant to stripe rust, leaf rust, and BYDV. In the 2016-17 season all varieties were rated as 1 or 2 for both rusts. The varieties UC 933 and UC 969 had BYDV ratings of 2.8, and UC Butta 12 96 is considered moderately susceptible but rated only 1 in the 2016-17 season. Four varieties, UC Butta 12 96, UC 603, Tamalpais, and Max had powdery mildew ratings of 3. Net blotch was observed in the 2016-17 season, with LCS Odyssey and UC Butta 12 96 rating as 3.6 and Max as 3.8. Most varieties have a high to moderately high lodging risk.

Table 37. The 90th percentile for disease incidence across all test locations within individual seasons between 2013 and 2017.

Species	Year	Stripe Rust	Leaf Rust	Septoria	BYDV
BARLEY	2013				1.0
	2014				1.3
	2015		1.8		2.5
	2016	2.0	2.0		3.0
	2017		2.0		2.0
COMMON	2013	4.0	1.0		3.0
	2014	1.0	1.0		4.0
	2015	5.0	1.0		4.0
	2016	3.0	1.0		4.0
	2017	1.0	1.0	1.0	2.0
DURUM	2013	4.0	1.0		2.0
	2014	1.0	1.0		2.4
	2015	4.0	1.0		3.0
	2016	3.0	1.0		2.0
	2017	4.0	1.0	2.0	1.0
TRITICALE	2013	1.0	1.0		1.0
	2014	1.0	1.0		2.0
	2015	4.0			4.0
	2016	1.0	1.0		2.0
	2017	1.0	1.0	1.0	1.0

Table 38. The 90th percentile for disease incidence at individual test locations in the 2016-17 season.

Species	Location	Stripe Rust	Leaf Rust	Septoria	BYDV	False Black Chaff	Physiological Leaf Spot	Net Blotch	Powdery Mildew
BARLEY	DAVIS		2.0		1.0			2.0	3.0
	FRESNO	1.0							
	SOLANO_RF							3.0	
	TULARE_RF				2.3			2.0	
COMMON	COLUSA	1.0	1.0	3.0	1.0	1.0	2.0		
	DAVIS	1.0	1.0	1.0	1.0	1.0	2.0		
	DAVIS_LOW_N								
	DELTA			1.0	1.0	3.0	2.1		
	FRESNO	1.0		1.0			2.0		
	IMPERIAL								
	KERN	4.0	1.0	1.0	3.0	3.0	3.0		
	KINGS		1.0		1.0	3.6	2.0		
	SOLANO_RF	1.0		1.0	1.0	1.0	3.0		
	TULARE_RF			1.0	1.0		2.0		
DURUM	DAVIS	1.0		1.0	1.0		3.0		
	FRESNO			1.0	1.0		2.0		
	IMPERIAL								
	KERN	5.0		2.0	1.0		3.0		4.0
	KINGS		1.0		1.0	2.0	1.0		
TRITICALE	COLUSA	1.0	1.0	3.0	1.0		2.0		
	DAVIS	1.0	1.0	1.0	1.0	1.0	3.0		
	DAVIS_LOW_N								
	DELTA			1.0	1.0	1.0	1.0		
	FRESNO	1.0		1.0			2.0		
	IMPERIAL								
	KERN	1.0	1.0	1.0	2.5	2.0	4.0		
	KINGS		1.0		1.0	1.0	2.0		
	SOLANO_RF	1.0		1.0	1.0	1.0	3.0		
	TULARE_RF			1.0	1.0		1.5		

Table 39. Common wheat disease and disease-like observations in the 2016-17 season.

Crop Group	Species	Type	UC Number	Name	Leaf rust, late, 90th percentile (1-8)	Stripe rust, late, 90th percentile (1-8)	Septoria, 90th percentile (1-8)	Barley Yellow Dwarf, 90th percentile (1-8)	False Black Chafe, 90th percentile (1-8)	Physiological Leaf Spot, 90th percentile (1-8)
WHEAT	COMMON	HRS	1731	WB PATRON	1	1	1	3.2	1	2.6
WHEAT	COMMON	HRS	20	UC ANZA	2	4.6	1.4	1.8	1	3
WHEAT	COMMON	HWS	1657	SY BLANCA GRANDE 515	1	2.8	2.8	1	3	4.6
WHEAT	COMMON	HRS	1730	WB 9229	1.7	2	1.4	2.2	2.6	3.3
WHEAT	COMMON	HRS	1835	SY 13W00886	2.4	1	2.4	1.4	2	3
WHEAT	COMMON	HRS	112	YECORA ROJO	1	5.2	2.4	1.4	2	2.6
WHEAT	COMMON	HRS	1847	XA 9503	2.4	1.6	2.2	2	1.6	2
WHEAT	COMMON	HRS	1819	APB 500709	1.7	2.2	2	2.4	1	2.3
WHEAT	COMMON	HRS	1828	APB 501089	1	2.8	1	1.8	3.6	3
WHEAT	COMMON	HWS	1743	UC PATWIN 515HP	1	1.6	1.4	1.4	1.6	2
WHEAT	COMMON	HRS	1845	XA 9501	2.7	1.6	1	1.4	1	2
WHEAT	COMMON	HRS	1830	LCS 12SB0197	1.7	1	1.4	2.8	1	2
WHEAT	COMMON	HWS	1831	LCS 12SB0224	1	1.6	1.4	2.4	1	3.6
WHEAT	COMMON	HRS	1841	APB 510453	2	2.2	2	2	1.6	3.6
WHEAT	COMMON	HRS	1748	WB 9112	1	1.6	1.4	2.4	3	2.3
WHEAT	COMMON	HRS	1478	SY CAL ROJO	1	1.6	2	3	4.2	3
WHEAT	COMMON	HRS	1521	SY REDWING	1	3.2	2.4	1	2.2	3
WHEAT	COMMON	HWS	1680	UC PATWIN 515	1	1	2	2	2	2
WHEAT	COMMON	HWS	1723	LCS ATOMO	1	2.2	1.4	2	2	2.3
WHEAT	COMMON	HRS	1660	SY 314	1	1	2.2	1.4	3.6	3
WHEAT	COMMON	HRS	1817	UC 15014 4	1	2	1.4	1.8	1.7	2
WHEAT	COMMON	HWS	1839	UC 16010 32	1	1	1.4	2	2.6	2.3
WHEAT	COMMON	HRS	1658	SY SUMMIT 515	1	1	2	2	3	2.3
WHEAT	COMMON	HRS	1728	WB JOAQUIN ORO	1	2.2	3	2.4	3.6	3.6
WHEAT	COMMON	HRS	1838	UC 16010 20	1	1.6	1.4	3	1	3
WHEAT	COMMON	SRS	1766	SY VACA	1	1	3.2	2.4	2.2	3.3
WHEAT	COMMON	HWS	1815	UC 15010 27	1	1	2.4	1.8	2	3
WHEAT	COMMON	HRS	1846	XA 9502	1	2.2	1.4	1.8	1	2
WHEAT	COMMON	HWS	1802	WB 7566	1.7	1	2.4	1.4	3	3
WHEAT	COMMON	HRS	1844	XA 9302	1	2.8	2.4	2	1	3.6
WHEAT	COMMON	HWS	1837	UC 15080 49	1	2.2	2.8	2.4	1.6	3.6
WHEAT	COMMON	HRS	1590	SY ULTRA	1	2.8	2.2	2	3.6	3
WHEAT	COMMON	HWS	1688	LCS STAR	1.7	1	1.4	1.4	1	2.6
WHEAT	COMMON	HRS	1840	APB 410117	1	1.6	2	2.4	3.6	4
WHEAT	COMMON	HRS	1842	WB 9350	1.7	1.6	2.2	2	1.6	3
WHEAT	COMMON	HRS	1745	UC YUROK	2.4	1	1.8	2	1	2.3
WHEAT	COMMON	HWS	1522	SY BLANCA ROYALE	1.7	2.8	2	2	1	3.3
WHEAT	COMMON	HRS	1751	WB 9904	1	1	1	2	1	2.3
WHEAT	COMMON	HRS	1843	XA 9301	1	2.8	2.4	2	2	2.3
WHEAT	COMMON	HRS	1495	UC LASSIK	1	1.6	3.2	2	1	3
WHEAT	COMMON	SWS	1667	BAG NEW DIRKWIN	1	1	1	2	1	1.9
WHEAT	COMMON	HRS	1608	WWW FV 2808	1	4.2	2.4	2.8	1	2.3
WHEAT	COMMON	HRS	1836	UC 14657 170	1.7	1.6	1	1.4	2.2	2.3
WHEAT	COMMON	HRS	1834	SY 13W00850	2.4	1	2.6	1.4	1	2
WHEAT	COMMON	SRS	1778	ASSL TAM 204	1	1.6	1.4	1	1.6	2.3

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

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

Table 40. A summary of common wheat disease and agronomic observations taken between 2013 and 2017.

Crop Group	Crop Type	Name	UC Number	2013-2017 S. Rust rating	2013-2017 L. Rust rating	2013-2017 BYDV rating	2013-2017 Septoria rating	Test Wt (lb/bu)	1000 Kernel Wt (g)	Days to heading (from Jan. 1, Davis)	Days to maturity (from Jan. 1, Davis)	Plant Ht (in)	Lodging risk	Shatter risk	2013-2017 plots observed (n)	Status
COMMON	HRS	UC ANZA	20	S	R	MR	R	61	34.2	98	136	34	Med. Low	Low	153	Released
COMMON	HRS	YECORA ROJO	112	MS	R	MR	R	60.7	42	93	135	28	High	Low	78	Released
COMMON	HRS	WWW MIKA	1340	S	-	S	-	58	33.4	100	138	39	Med. Low	Low	96	Released
COMMON	HWS	UC CLEAR WHITE	1361	MS	-	MS	-	61.2	40.4	84	130	37	Low	Low	33	Released
COMMON	HWS	UC PATWIN	1419	R	-	MS	-	59	33.9	100	136	34	Low	Low	95	Released
COMMON	HRS	WB JOAQUIN	1424	S	-	MS	-	59.5	37.1	91	130	37	Med. Low	Low	96	Released
COMMON	HRS	SY CAL ROJO	1478	R	R	MR	R	59.9	39.2	92	132	30	Low	Low	185	Released
COMMON	HRS	UC LASSIK	1495	R	R	MR	R	61	34.5	96	136	33	Med. High	Low	184	Released
COMMON	HRS	SY REDWING	1521	MS	R	MR	R	59.5	38.9	93	135	30	Low	Low	185	Released
COMMON	HWS	SY BLANCA ROYALE	1522	R	R	MR	R	61.1	37.7	92	133	31	Med. Low	Low	186	Released
COMMON	HRS	WB PR 1404	1526	R	-	S	-	59.3	39.8	102	141	37	Med. Low	Low	97	Released
COMMON	HRS	WB TRIPLE IV	1550	S	R	MS	-	60	39.4	83	127	38	High	Low	136	Released
COMMON	HRS	SY ULTRA	1590	MS	R	MR	R	61.8	38.5	93	135	31	Med. Low	Low	184	Released
COMMON	HRS	WWW FV 2808	1608	S	R	MS	R	60.5	35.6	98	137	38	Med. High	Low	184	Released
COMMON	HRS	WB ROCKLAND	1650	R	R	MS	-	61.6	38.2	92	132	32	Low	Low	134	Released
COMMON	HWS	SY BLANCA GRANDE 515	1657	R	R	R	R	63.3	40.9	88	131	34	Med. High	Low	184	Released
COMMON	HRS	SY SUMMIT 515	1658	R	R	MR	R	61.6	38.9	93	134	32	Low	Low	184	Released
COMMON	HRS	SY 314	1660	R	R	MR	R	59.6	38.3	95	134	32	Med. Low	Low	185	Released
COMMON	SWS	BAG NEW DIRKWIN	1667	R	R	MS	R	56.3	35	110	145	38	Med. High	Low	181	Released
COMMON	HWS	UC PATWIN 515	1680	R	R	R	R	60	35	94	134	30	Low	Low	187	Released
COMMON	HWS	LCS STAR	1688	R	R	MR	R	60.9	35.9	93	134	35	High	Low	182	Released
COMMON	HWS	LCS ATOMO	1723	MR	R	MS	R	61.8	38.1	90	133	32	Med. Low	Low	186	Released
COMMON	HRS	WB JOAQUIN ORO	1728	R	R	MS	R	62.2	42	84	128	34	Med. Low	Low	185	Released
COMMON	HWS	WB PERLA	1729	R	-	MS	-	61.4	39.9	89	130	35	Med. Low	Low	99	Released
COMMON	HRS	WB 9229	1730	R	R	MS	R	62.1	37.2	93	135	32	Med. Low	Low	184	Released
COMMON	HRS	WB PATRON	1731	R	R	MS	R	60.5	41.3	92	134	35	Med. High	Low	185	Released
COMMON	HWS	UC PATWIN 515HP	1743	R	R	R	R	59.8	34.1	90	129	29	Med. Low	Low	119	Released
COMMON	HRS	UC YUROK	1745	R	R	MS	R	62.2	37.2	96	136	35	Med. High	Low	184	Released
COMMON	HRS	WB 9112	1748	R	R	MS	R	61.9	36.1	89	130	34	Med. Low	Low	185	Released
COMMON	HWS	WB 7618	1749	R	R	MS	-	61.4	36.8	92	133	34	Low	Low	138	Released
COMMON	HRS	WB 9904	1751	R	R	MS	R	60.6	44.8	95	137	36	Med. Low	Low	185	Released
COMMON	SRS	SY VACA	1766	R	R	MR	R	56	33.5	111	149	38	Med. Low	Low	153	Released
COMMON	SRS	ASSL TAM 204	1778	MR	R	MR	R	58.3	30.8	105	143	37	Med. Low	Low	150	Released
COMMON	SWS	BAG NEW DIRKWIN HP	1779	R	-	MR	-	57.6	37.8	111	143	38	Med. Low	Low	66	Released
COMMON	HWS	SY DAYN	1795	R	R	MS	-	62.4	40.6	86	138	41	Med. Low	Low	30	Released
COMMON	HWS	WB 7566	1802	R	R	R	R	62	43.4	91	136	31	Med. Low	Low	119	Released
COMMON	HRS	WB 9350	1842	R	R	R	R	61.8	42.8	92	145	25	Med. Low	-	48	Released
COMMON	HWS	WB 7390	1750	R	R	MS	-	62.8	42.4	91	132	37	Med. Low	Low	139	
COMMON	HRS	UC 13010 23	1767	R	-	MS	-	62.2	39.5	97	135	37	Med. Low	Low	66	
COMMON	HRS	LCS 11SB0096	1772	R	-	MR	-	62	41.6	94	134	38	Low	Low	63	
COMMON	HRS	LCS 11SB0097	1773	R	-	MS	-	61.8	40.8	95	135	39	Low	Low	63	
COMMON	HRS	UC 14010 17	1789	R	-	S	-	61.7	41.8	86	134	36	Low	Low	30	
COMMON	HRS	UC 14010 20	1790	R	-	MS	-	61.9	41.6	87	132	38	Med. Low	Low	30	
COMMON	HWS	UC 14010 22	1791	R	-	MR	-	62.6	40.7	85	134	36	Med. Low	Low	31	
COMMON	HRS	UC 14010 29	1792	R	-	MS	-	62.2	39.4	87	131	37	Med. Low	Low	30	
COMMON	HWS	UC 14014 42	1793	R	-	MS	-	61.3	39.8	86	125	38	Med. Low	Low	31	
COMMON	HRS	SY 034	1794	MS	-	MS	-	62.7	39.6	89	135	34	Low	Low	31	
COMMON	HRS	WB DA907005	1803	R	-	MS	-	62.8	37.5	87	137	34	Low	Low	31	
COMMON	HRS	LCS 10SB0087 B	1804	R	-	MR	-	61.2	42	90	142	36	Med. Low	Low	31	
COMMON	HWS	LCS UI PLATINUM	1805	S	-	MR	-	62.7	44.3	82	132	37	Med. Low	Low	30	
COMMON	HRS	APB 500553	1806	S	-	R	-	62.3	42.3	86	135	38	Med. Low	Low	31	
COMMON	HRS	APB 501189	1807	S	R	MR	-	61.8	39.3	81	127	36	Med. High	Low	71	
COMMON	HRS	APB 430429	1808	S	-	MS	-	60.6	38.2	83	135	38	Med. High	Low	31	
COMMON	HWS	APB 717	1809	S	R	R	-	56.4	33.7	85	136	38	Med. High	Medium	28	
COMMON	HRS	UC 15010 5	1814	R	R	R	-	60.4	38.5	88	127	33	Med. Low	Low	40	
COMMON	HWS	UC 15010 27	1815	R	R	R	R	61.3	43	87	133	29	Low	Low	88	
COMMON	HWS	UC 15013 15	1816	R	R	R	-	64.1	39.8	84	130	32	Med. Low	Low	40	
COMMON	HRS	UC 15014 4	1817	R	R	R	R	62.8	41.2	85	131	29	Med. Low	Low	88	
COMMON	HRS	UC 15014 35	1818	R	R	R	-	63.6	34.9	85	126	37	Med. Low	Medium	39	
COMMON	HRS	APB 500709	1819	R	R	R	R	61.8	38.5	85	132	29	Med. Low	Low	88	
COMMON		APB 501129	1820	MR	R	MR	-	60.4	38.5	86	130	31	Med. Low	Low	40	
COMMON		APB 8238	1821	R	R	MR	-	61.3	38.8	85	128	34	Med. Low	Low	39	
COMMON	HRS	APB 501089	1828	R	R	R	R	61	39.6	84	129	28	Low	Low	88	
COMMON		APB 8155	1829	R	R	MR	-	62.2	39	83	128	36	Med. Low	Low	40	
COMMON	HRS	LCS 12SB0197	1830	R	R	R	R	60.2	40.3	87	137	33	Low	Low	88	
COMMON	HWS	LCS 12SB0224	1831	R	R	MR	R	61.1	39.9	88	134	32	Med. Low	Low	88	
COMMON	HRS	SY 13W00850	1834	R	R	R	R	62.2	46.2	92	152	30	Med. Low	-	48	
COMMON	HRS	SY 13W00886	1835	R	R	R	R	62.5	46.8	92	149	29	Med. Low	-	48	
COMMON	HRS	UC 14657 170	1836	R	R	R	R	58.5	40.4	92	152	28	Med. Low	-	48	
COMMON	HWS	UC 15080 49	1837	R	R	R	R	57.5	37.9	88	149	27	High	-	48	
COMMON	HRS	UC 16010 20	1838	R	R	R	R	62.9	43.1	92	149	32	Med. Low	-	48	
COMMON	HWS	UC 16010 32	1839	R	R	R	R	61.3	42.4	92	145	31	Med. Low	-	48	
COMMON	HRS	APB 410117	1840	R	R	R	R	61.4	46.7	92	149	30	Med. Low	-	48	
COMMON	HRS	APB 510453	1841	R	R	R	R	62.1	45.7	92	152	29	Med. Low	-	48	
COMMON	HRS	XA 9301	1843	R	R	R	R	62.3	47.3	88	152	30	Med. Low	-	48	
COMMON	HRS	XA 9302	1844	R	R	R	R	63.6	43.3	88	142	28	Med. Low	-	48	
COMMON	HRS	XA 9501	1845	R	R	R	R	62	46	92	145	27	Med. Low	-	48	
COMMON	HRS	XA 9502	1846	R	R	R	R	62.8	44.5	92	149	27	Med. Low	-	48	
COMMON	HRS	XA 9503	1847	R	R	R	R	62.3	41.4	92	149	26	Med. Low	-	48	

Table 41. Durum wheat disease and disease-like observations in the 2016-17 season.

Crop Group	Species	UC Number	Name	Leaf rust, late, 90th percentile (1-8)	Stripe rust, late, 90th percentile (1-8)	Septoria, 90th percentile (1-8)	Powdery Mildew, 90th percentile (1-8)	Barley Yellow Dwarf, 90th percentile (1-8)	False Black Chafe, 90th percentile (1-8)	Physiological Leaf Spot, 90th percentile (1-8)
DURUM	DURUM	1856	ASC 102	1	4.6	1.8	1	1.7	1	2
DURUM	**DURUM**	**1851**	**APB 450311**	**1**	**2.8**	**1.8**	**4**	**1.7**	**1**	**3.6**
DURUM	DURUM	1849	UC 16051 12	1	2.8	1	4	1	1	1
DURUM	**DURUM**	**1431**	**SY VOLANTE**	**1**	**3.7**	**1**	**4**	**1**	**1**	**2.8**
DURUM	DURUM	1484	APB WESTMORE HP	1	2.8	1	3	1	1	7
DURUM	**DURUM**	**1654**	**WB MOHAVE**	**1**	**5.7**	**1.8**	**1**	**1.7**	**1**	**2**
DURUM	DURUM	1852	APB 470442	1	2.8	1	3	1.7	2	1.8
DURUM	**DURUM**	**1690**	**UC MIWOK**	**1**	**4.6**	**2**	**3**	**1**	**1**	**2.8**
DURUM	DURUM	1583	AS SARAGOLLA	1	4.6	1	1	2	1	1.8
DURUM	**DURUM**	**1582**	**AS MAESTRALE**	**1**	**4.6**	**1**	**3**	**1**	**1**	**1**
DURUM	DURUM	1827	APB 540165	1	3.7	3.4	3	1	2	2.8
DURUM	**DURUM**	**1429**	**SY FORTISSIMO**	**1**	**3.7**	**1.8**	**3**	**1**	**2**	**6.8**
DURUM	DURUM	1813	APB 335	1	2.8	2	3	1.7	2	2.8
DURUM	**DURUM**	**1215**	**WB ORITA**	**1**	**4.6**	**2.6**	**4**	**1**	**1**	**1.8**
DURUM	DURUM	1850	UC 16051 25	1	2.8	1.8	5	1.7	1	1.8
DURUM	**DURUM**	**1800**	**AS COLOMBO**	**1**	**3.7**	**1.8**	**1**	**1**	**1**	**1**
DURUM	DURUM	1375	UC DESERT KING	1	2.8	1	3	1	1	1
DURUM	**DURUM**	**1848**	**UC 16051 1**	**1**	**1**	**1.8**	**2**	**1**	**1**	**1.8**
DURUM	DURUM	1627	UC DESERT KING HP	1	1.9	1	4	1	1	1
DURUM	**DURUM**	**951**	**APB KRONOS**	**1**	**4.6**	**2**	**2**	**1**	**1**	**2.6**
DURUM	DURUM	1479	WB HAVASU	1	4.6	2.8	5	1	2	2.8
DURUM	**DURUM**	**1697**	**LCS KIKO**	**1**	**2.9**	**1**	**1**	**1**	**1**	**6.6**
DURUM	DURUM	1857	ASC 103	1	5.5	1.8	1	1	2	1
DURUM	**DURUM**	**1855**	**ASC 101**	**1**	**4.6**	**1**	**2**	**1**	**1**	**1.8**
DURUM	DURUM	1854	ASC 100	1	3.7	1	1	1.7	1	1
DURUM	**DURUM**	**1607**	**WB MEAD**	**1**	**2.8**	**1.8**	**2**	**1.7**	**1**	**1.8**
DURUM	DURUM	1853	APB 471400	1	4.6	3.4	3	1	1	2.8
DURUM	**DURUM**	**1640**	**APB TIBURON**	**2**	**2.8**	**2.6**	**3**	**2**	**2**	**3.6**

Rating scale, area of flag leaf affected (BYDV percentage of plants showing symp

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

Table 42. A summary of durum wheat disease and agronomic observations taken between 2013 and 2017.

Crop Group	Crop Type	Name	UC Number	2013-2017 S. Rust rating	2013-2017 L. Rust rating	2013-2017 BYDV rating	2013-2017 Septoria rating	Test Wt (lb/bu)	1000 Kernel Wt (g)	Days to heading (from Jan. 1)	Days to maturity (from Jan. 1)	Plant Ht (in)	Lodging risk	Shatter risk	2013-2017 plots observed (n)	Status
DURUM	DURUM	WWW DURAKING	878	R	-	S	-	62	46	161	197	33	Med. Low	Low	54	Released
DURUM	DURUM	WWW CROWN	1166	R	-	R	-	59.9	49.9	158	197	36	Med. Low	Low	54	Released
DURUM	DURUM	WWW PLATINUM	1210	R	-	S	-	61.5	46.3	157	196	33	Med. Low	Low	54	Released
DURUM	DURUM	UC DESERT KING	1375	R	R	R	R	61.9	48.8	159	202	34	Med. Low	Low	94	Released
DURUM	DURUM	SY FORTISSIMO	1429	R	R	R	R	61.3	46.5	157	197	33	Med. Low	Low	94	Released
DURUM	DURUM	WWW Q MAX	1473	R	-	S	-	59.9	49.2	160	197	37	Med. Low	Low	54	Released
DURUM	DURUM	APB WESTMORE HP	1484	R	R	R	R	61.5	42.7	150	193	34	High	Low	93	Released
DURUM	DURUM	UC DESERT KING HP	1627	R	R	R	R	59.8	45	159	196	33	Med. Low	Low	94	Released
DURUM	DURUM	APB TIBURON	1640	R	R	R	S	61.7	58.9	152	196	34	Med. Low	Low	94	Released
DURUM	DURUM	LCS ALIRON	1721	R	-	R	-	63.3	56.3	160	198	35	Med. High	Low	54	
DURUM	DURUM	UC 13210 5	1770	R	-	S	-	62.6	56.4	156	197	34	Med. Low	Low	37	
DURUM	DURUM	UC 13210 21	1771	R	-	R	-	63	48.8	156	195	34	Med. Low	Low	38	
DURUM	DURUM	UC 14215/9	1796	R	R	S	-	63.4	57.6	148	195	33	Med. Low	Low	39	
DURUM	DURUM	UC 14215 11	1797	R	-	S	-	63.1	51.6	149	204	33	Med. Low	Low	19	
DURUM	DURUM	UC 14215 14	1798	R	-	R	-	62.4	53.9	146	202	35	Med. High	Low	19	
DURUM	DURUM	APB 335	1813	R	R	R	R	61.5	54.5	146	198	28	Med. Low	Low	59	
DURUM	DURUM	APB 410077	1823	R	R	R	-	62.8	62	142	196	34	Med. Low	Low	20	
DURUM	DURUM	UC 15210 11	1824	R	R	R	-	60.3	53	158	197	34	Med. High	Low	20	
DURUM	DURUM	UC 15210 12	1825	R	R	R	-	63	57.6	148	193	34	High	Low	20	
DURUM	DURUM	APB 540165	1827	R	R	R	S	61.4	63.1	143	199	31	Med. Low	Low	40	
DURUM	DURUM	LCS 12E4006	1832	R	R	R	-	63.8	57	158	196	33	Med. High	Low	20	
DURUM	DURUM	LCS 13SD0056	1833	R	R	R	-	63.3	53.1	152	194	33	High	Low	19	
DURUM	DURUM	UC 16051 1	1848	R	R	R	R	57.7	-	165	215	32	Med. High	-	20	
DURUM	DURUM	UC 16051 12	1849	R	R	R	R	60.2	-	165	218	35	Med. Low	-	20	
DURUM	DURUM	UC 16051 25	1850	R	R	R	R	59.5	-	165	215	34	Med. Low	-	20	
DURUM	DURUM	APB 470442	1852	R	R	R	R	62	-	158	211	32	Med. Low	-	20	
DURUM	DURUM	APB KRONOS	951	S	R	S	R	60.8	53.3	149	196	34	High	Low	98	Released
DURUM	DURUM	WWW TOPPER	1211	S	-	R	-	62.5	42.6	159	198	37	Med. Low	Low	54	Released
DURUM	DURUM	WB ORITA	1215	S	R	R	R	60.4	52	158	198	34	Med. Low	Low	82	Released
DURUM	DURUM	SY VOLANTE	1431	S	R	R	R	62.5	54.4	158	196	32	Med. Low	Low	89	Released
DURUM	DURUM	APB HELIOS	1440	S	R	R	-	62.3	51.2	140	192	35	Med. Low	Low	39	Released
DURUM	DURUM	WB HAVASU	1479	S	R	R	R	62.7	52.5	148	194	36	High	Low	82	Released
DURUM	DURUM	AS MAESTRALE	1582	S	R	S	R	62.7	47.9	155	195	37	High	Low	88	Released
DURUM	DURUM	AS SARAGOLLA	1583	S	R	R	R	62.8	49.5	156	196	34	Med. High	Low	94	Released
DURUM	DURUM	WB MEAD	1607	S	R	S	R	60.7	45.5	162	204	35	Med. Low	Low	82	Released
DURUM	DURUM	WB MOHAVE	1654	S	R	R	R	61.9	49.3	151	196	34	Med. Low	Low	82	Released
DURUM	DURUM	UC MIWOK	1690	S	R	S	R	62.4	56.4	157	198	34	Med. High	Low	94	Released
DURUM	DURUM	LCS KIKO	1697	S	R	R	R	61.7	55	155	196	35	Med. High	Low	94	Released
DURUM	DURUM	AS COLOMBO	1800	S	R	R	R	61.2	48.6	173	164	34	Low	Low	39	Released
DURUM	DURUM	WWW D2517BEL1025	1776	S	-	R	-	63	49.6	154	193	37	Med. High	Low	38	
DURUM	TURG	KAMUT	1786	S	-	S	-	57.4	60.8	169	202	50	High	Low	35	
DURUM	DURUM	UC 14215 42	1799	S	-	R	-	62.4	52	152	205	32	Med. High	Low	19	
DURUM	DURUM	WWW D3085	1801	S	-	R	-	62	43	147	200	36	Med. Low	Low	19	
DURUM	DURUM	APB 571217	1810	S	R	R	-	63.8	54.3	149	198	32	Med. Low	Medium	39	
DURUM	DURUM	APB 571353	1812	S	R	R	-	62.8	49.1	149	195	31	Med. Low	Low	32	
DURUM	DURUM	APB 540505	1822	S	R	R	-	64.1	55	146	193	33	Med. Low	Low	20	
DURUM	DURUM	UC 15210 24	1826	S	R	R	-	63.5	61.4	151	194	36	Med. High	Low	20	
DURUM	DURUM	APB 450311	1851	S	R	R	R	61	-	151	211	26	Med. Low	-	20	
DURUM	DURUM	APB 471400	1853	S	R	R	R	62.8	-	151	208	29	Med. Low	-	20	
DURUM	DURUM	ASC 100	1854	S	R	R	R	61.3	-	168	118	34	Low	-	20	
DURUM	DURUM	ASC 101	1855	S	R	R	R	61.8	-	158	215	31	High	-	20	
DURUM	DURUM	ASC 102	1856	S	R	R	R	62.5	-	151	211	30	High	-	20	
DURUM	DURUM	ASC 103	1857	S	R	R	R	61.6	-	158	215	31	Med. Low	-	20	

Table 43. Triticale disease and disease-like observations in the 2016-17 season.

Crop Group	Species	Type	UC Number	Name	Leaf rust, late, 90th percentile (1-8)	Stripe rust, late, 90th percentile (1-8)	Septoria, 90th percentile (1-8)	Barley Yellow Dwarf, 90th percentile (1-8)	False Black Chafe, 90th percentile (1-8)	Physiological Leaf Spot, 90th percentile (1-8)
WHEAT	TRITICALE	TRITICALE	3178	NS 10T50020	1	2.2	1.4	1	1.6	3
WHEAT	TRITICALE	TRITICALE	3180	NS 12T01486	1	1	2.4	2.2	1.6	3
WHEAT	TRITICALE	TRITICALE	3164	WB PACHECO	1	1	2.8	1.4	1	3.9
WHEAT	TRITICALE	TRITICALE	3097	NS TRICAL 105	1.7	1	2.2	2.4	2.2	2.3
WHEAT	TRITICALE	TRITICALE	3182	AGS 133	1	2	1.4	1.8	2.2	2.3
WHEAT	TRITICALE	TRITICALE	3168	NS CAMELOT	1	1	2.8	1.4	1.6	2
WHEAT	TRITICALE	TRITICALE	3169	NS TRICAL 158EP	1	1	1.4	1.4	1	2.3
WHEAT	TRITICALE	TRITICALE	3181	AGS 230	2.7	2.6	2.6	1.4	1	2.6
WHEAT	TRITICALE	TRITICALE	3170	NS TRICAL 115T	1	1.6	1.8	1	1	4

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

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

Table 44. A summary of triticale disease and agronomic observations taken between 2013 and 2017.

Crop Group	Crop Type	Name	UC Number	2013-2017 S. Rust rating	2013-2017 L. Rust rating	2013-2017 BYDV rating	2013-2017 Septoria rating	Test Wt (lb/bu)	1000 Kernel Wt (g)	Days to heading (from Jan. 1)	Days to maturity (from Jan. 1)	Plant Ht (in)	Lodging risk	Shatter risk	2013-2017 plots observed (n)	Status
TRITICALE	TRITICALE	NS TRICAL 105	3097	R	R	S	R	58.5	45.6	149	197	40	Med. High	Low	185	Released
TRITICALE	TRITICALE	WB PACHECO	3164	R	R	R	R	59.5	45.5	148	196	38	Med. Low	Low	155	Released
TRITICALE	TRITICALE	NS CAMELOT	3168	R	R	R	R	56.4	40.7	148	196	38	Med. Low	Low	187	Released
TRITICALE	TRITICALE	BAG TYNDAL	3171	S	-	S	R	58.3	50	139	185	50	Med. Low	Low	32	Released
TRITICALE	TRITICALE	NS TRICAL 158EP	3169	R	R	R	R	57.9	36.4	152	198	35	Low	Low	183	
TRITICALE	TRITICALE	NS TRICAL 115T	3170	R	R	S	R	58.2	38.3	152	197	35	Low	Low	184	
TRITICALE	TRITICALE	APB 660049	3172	S	-	S	-	54.4	39.1	146	199	47	Med. Low	Low	31	
TRITICALE	TRITICALE	APB 9919	3173	R	-	S	-	55.1	39.9	150	201	43	Med. Low	Low	30	
TRITICALE	TRITICALE	BAG NU WHEAT	3174	S	-	S	-	60.3	37.5	151	196	39	Med. High	Low	31	
TRITICALE	TRITICALE	BAG BG 198-14	3175	R	-	S	-	55.9	39.4	135	191	49	Med. High	Low	29	
TRITICALE	TRITICALE	BAG BG 225-14	3176	R	-	S	-	56.1	47.3	137	185	52	Med. High	Medium	31	
TRITICALE	TRITICALE	PRL 011TS 429	3177	R	R	R	-	57.2	37.8	142	192	44	High	Low	40	
TRITICALE	TRITICALE	NS 10T50020	3178	R	-	R	-	56.4	39.7	142	194	32	Med. Low	Low	82	
TRITICALE	TRITICALE	NS 10T70126	3179	R	R	R	-	52.3	31.4	169	218	47	Med. High	Low	27	
TRITICALE	TRITICALE	NS 12T01486	3180	R	R	R	R	57.2	-	144	211	34	Med. Low	-	48	
TRITICALE	TRITICALE	AGS 230	3181	S	R	R	R	59.9	-	147	215	34	Low	-	48	
TRITICALE	TRITICALE	AGS 133	3182	R	R	R	R	58.9	-	151	218	31	Low	-	48	

Table 45. Barley wheat disease and disease-like observations in the 2016-17 season.

Crop Group	Species	Type	UC Number	Name	Leaf rust, late, 90th percentile (1-8)	Stripe rust, late, 90th percentile (1-8)	Net Blotch, 90th percentile (1-8)	Powdery Mildew, 90th percentile (1-8)	Barley Yellow Dwarf, 90th percentile (1-8)
BARLEY	BARLEY	6RSF	1047	ISHI	1	1	2	1	1
BARLEY	BARLEY	6RSF	933	UC 933	2	1	2.8	1	2.8
BARLEY	BARLEY	2RSM	1410	UC MP179	1	1	1.8	1	1
BARLEY	BARLEY	6RSN	1134	TAMALPAIS	2	2	2.8	3	1.9
BARLEY	BARLEY	2RSM	1415	LCS Odyssey	1	1	3.6	1	1
BARLEY	BARLEY	2RSM	1409	UC Tahoe	1	1	1.8	1	1
BARLEY	BARLEY	2RSM	1390	UC 1390	1	1	2.6	1	1
BARLEY	BARLEY	2RSM	1360	UC BUTTA 12 96	1	1	3.6	3	1
BARLEY	BARLEY	6RSF	603	UC 603	2	1	2	3	1
BARLEY	BARLEY	6RSF	969	UC 969	1	1	2.8	1	2.8
BARLEY	BARLEY	6RSF	816	MAX	2	2	3.8	3	1.9
BARLEY	BARLEY	2RSM	1414	LCS Genie	1	1	2.8	1	1.9

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

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

Table 46. A summary of barley disease and agronomic observations taken between 2013 and 2017.

Crop Group	Crop Type	Name	UC Number	2013-2017 S. Rust rating	2013-2017 L. Rust rating	2013-2017 BYDV rating	2013-2017 Septoria rating	Test Wt (lb/bu)	1000 Kernel Wt (g)	Days to heading (from Jan. 1, Davis)	Days to maturity (from Jan. 1, Davis)	Plant Ht (in)	Lodging risk	Shatter risk	2013-2017 plots observed (n)	Status
BARLEY	6RSF	UC 603	603	S	MS	R	-	50.1	38.9	88	127	31	Med. Low	Medium	52	Released
BARLEY	6RSF	UC 933	933	S	MS	MR	-	49.4	42.2	85	127	31	Med. High	Medium	51	Released
BARLEY	6RSF	UC 969	969	S	MR	MR	-	52.3	43.1	81	127	34	Med. High	Medium	46	Released
BARLEY	6RSF	ISHI	1047	R	R	MR	-	49.6	44	89	132	31	High	Low	50	Released
BARLEY	6RSN	TAMALPAIS	1134	MR	R	R	-	54.3	40.1	85	133	31	Med. Low	Low	50	Released
BARLEY	2RSM	UC Tahoe	1409	R	R	R	-	53.7	44.1	94	127	30	High	Low	43	Released
BARLEY	2RSM	OSU FULL PINT	1411	R	R	S	-	52.2	42.1	89	128	30	Med. High	Low	27	Released
BARLEY	6RSF-H	SCHALLER	1413	R	MR	R	-	48	39.9	94	131	38	High	Low	24	Released
BARLEY	6RSF	UC71 183 1	162	R	R	MR	-	44	36.7	98	134	40	Med. Low	Low	24	
BARLEY	6RSF	MAX	816	MS	MR	R	-	50.6	39.1	97	133	29	Med. High	Low	50	
BARLEY	6RSF	UC B369	1255	R	R	R	-	48.2	43.3	89	128	34	High	Low	37	
BARLEY	6RSF	UC B398	1256	R	R	R	-	48.7	43	92	130	34	High	Low	37	
BARLEY	6RSF	UC A237	1261	R	R	R	-	49	43.4	91	130	34	High	Low	36	
BARLEY	6RSN	UC 1263	1263	R	R	R	-	54.4	41	89	133	34	Med. High	Low	32	
BARLEY	6RSN	UC 1266	1266	R	R	R	-	54.1	39.3	89	131	33	Med. High	Low	32	
BARLEY	6RSF	UC 1280	1280	R	R	R	-	50.9	42.9	86	130	36	High	Low	37	
BARLEY	6RSN	UC 1317	1317	R	R	MS	-	52.5	38.6	94	130	33	Med. High	Low	35	
BARLEY	6RSN	UC 1318	1318	R	R	R	-	53.5	42.1	90	132	34	High	Low	37	
BARLEY	6RSN	UC 1319	1319	-	R	R	-	53.6	40	103	134	32	Med. High	Low	13	
BARLEY	6RSN	UC 1321	1321	-	R	R	-	54.2	40.9	102	134	33	Med. High	Low	13	
BARLEY	6RSF	UC UYP 210A	1351	R	R	R	-	48.5	41.1	91	130	34	Med. High	Low	36	
BARLEY	2RSM	UC BUTTA 12 96	1360	R	R	MS	-	51.5	46.3	93	125	33	High	Low	47	
BARLEY		UC UYP 3B	1379	R	R	MR	-	50.3	45.3	88	133	32	High	Low	33	
BARLEY		UC UYP 210B	1383	R	R	R	-	49.2	43.2	88	134	34	High	Low	33	
BARLEY		UC 08YP 111 1231 LATE	1385	R	R	MR	-	49.5	49.2	91	130	35	Med. High	Low	33	
BARLEY	2RSM	UC 1390	1390	R	R	R	-	53.9	54.4	78	125	35	High	Low	40	
BARLEY	2RSM	UC UOP 95	1399	R	R	MR	-	50.1	47.8	87	129	33	High	Low	29	
BARLEY		UC UOP 96	1400	R	R	MR	-	50.9	49.3	86	131	34	High	Low	28	
BARLEY		UC UOP 97	1401	R	R	R	-	50.5	46.4	88	131	35	Med. High	Low	28	
BARLEY		UC UOP 98	1402	R	MR	MR	-	49.9	42.3	84	131	34	High	Low	29	
BARLEY		UC UOP 99	1403	R	R	R	-	49.9	44.7	86	135	34	High	Low	27	
BARLEY		UC UOP 100	1404	R	R	MR	-	49.1	42.3	92	134	33	High	Low	29	
BARLEY		UC UOP 102	1405	R	R	R	-	49.4	45.8	88	129	34	Med. High	Low	29	
BARLEY		UC UOP 105	1406	R	MR	MR	-	50.7	47.3	87	130	34	High	Low	29	
BARLEY		UC UOP 110	1407	-	R	R	-	51.4	47.1	95	137	33	Med. High	Low	5	
BARLEY	2RSM	UC UOP 111	1408	R	R	MS	-	58.5	44.1	90	132	33	Med. High	Low	28	
BARLEY	2RSM	UC MP179	1410	R	R	R	-	51.8	42.5	98	126	29	High	Low	43	
BARLEY	2RSM	LCS Genie	1414	-	R	R	-	52	48.5	-	-	29	Low	-	15	
BARLEY	2RSM	LCS Odyssey	1415	-	R	R	-	52.9	50.2	-	-	27	Low	-	14	

Genotype-by-environment analyses

Summaries of the GGE analyses of yield data from the 2016-17 season are provided in Figures 20 to 27. For all species there are large changes in variety ranking between test locations in some cases, indicating potentially important genotype-by-environment effects. Individual locations within sub-regions show over-lap with other sub-region axes in many cases, indicating different sub-regions in the 2016-17 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.

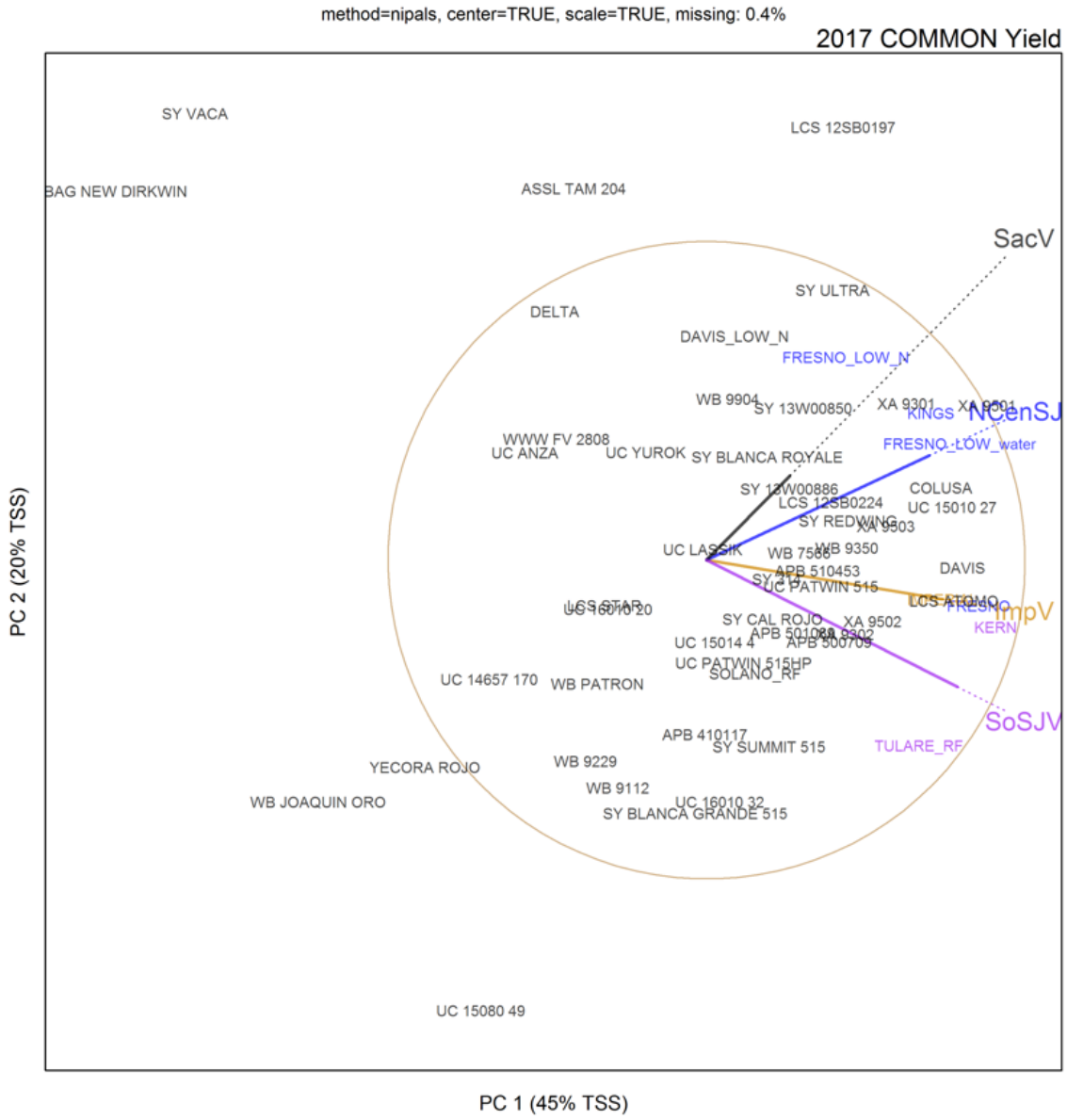

Figure 20: GGE biplot of common wheat yield data from the 2016-17 regional variety trials.

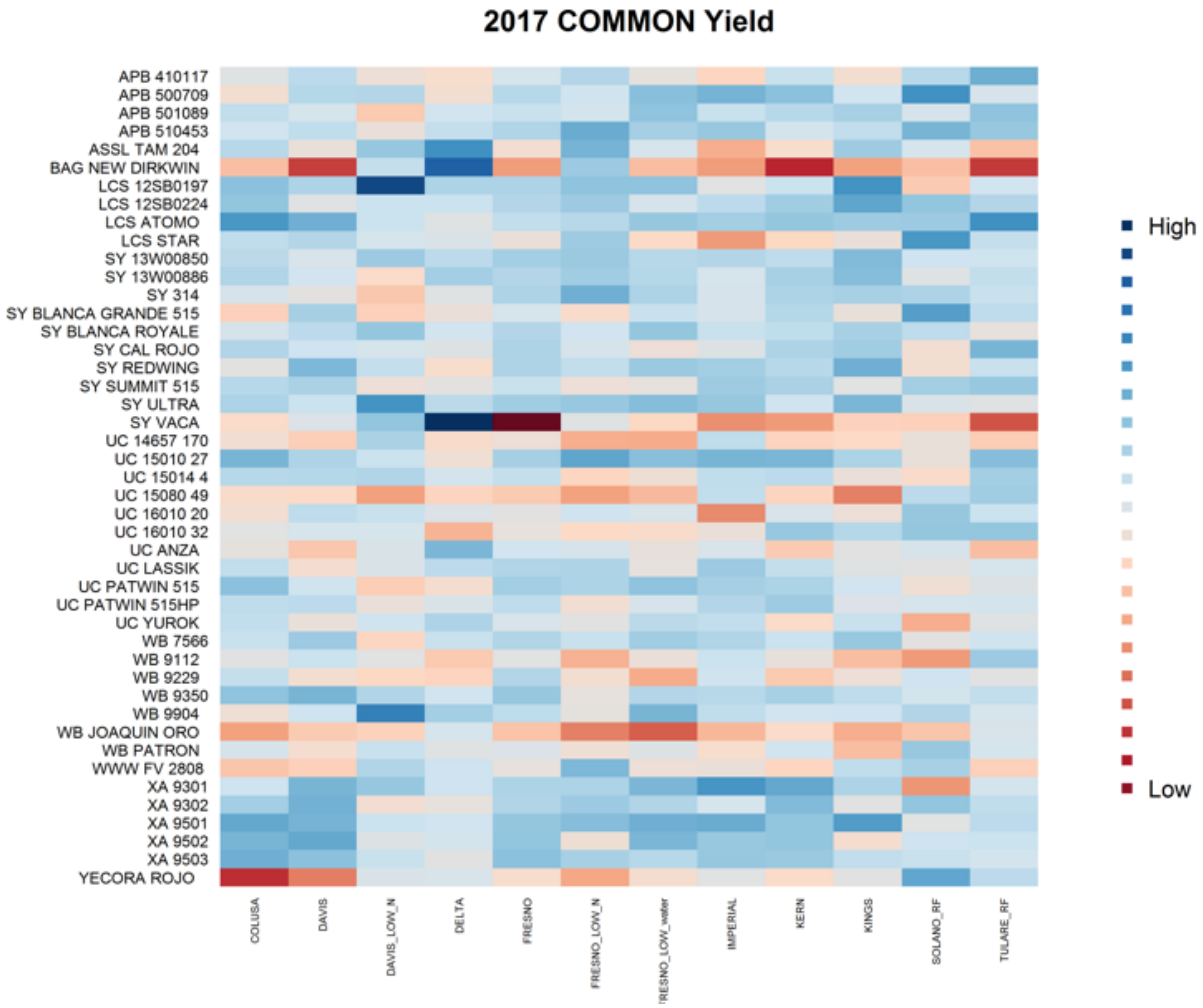

Figure 21: GGE heatmap of common wheat yield data from the 2016-17 regional variety trials.

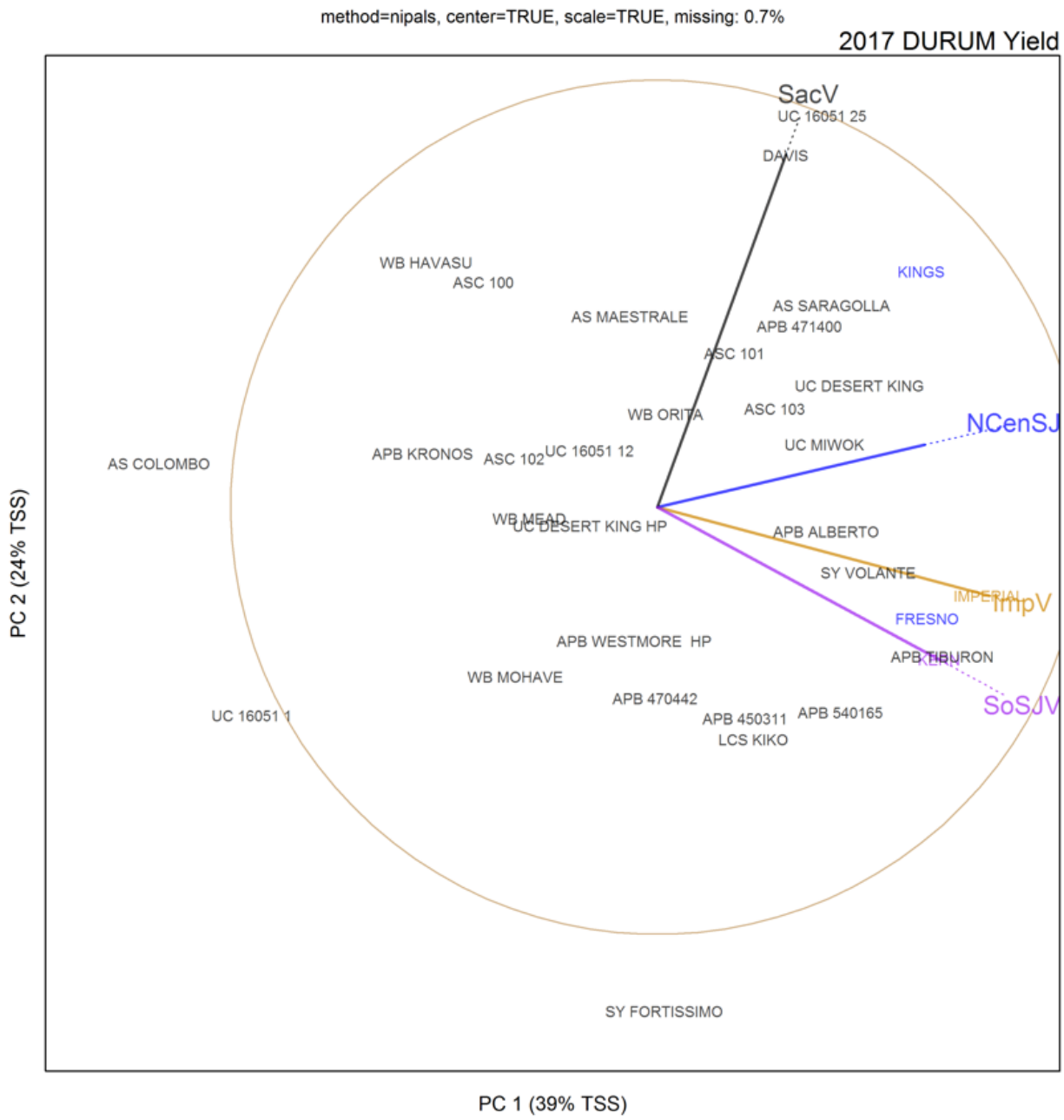

Figure 22: GGE biplot of durum wheat yield data from the 2016-17 regional variety trials.

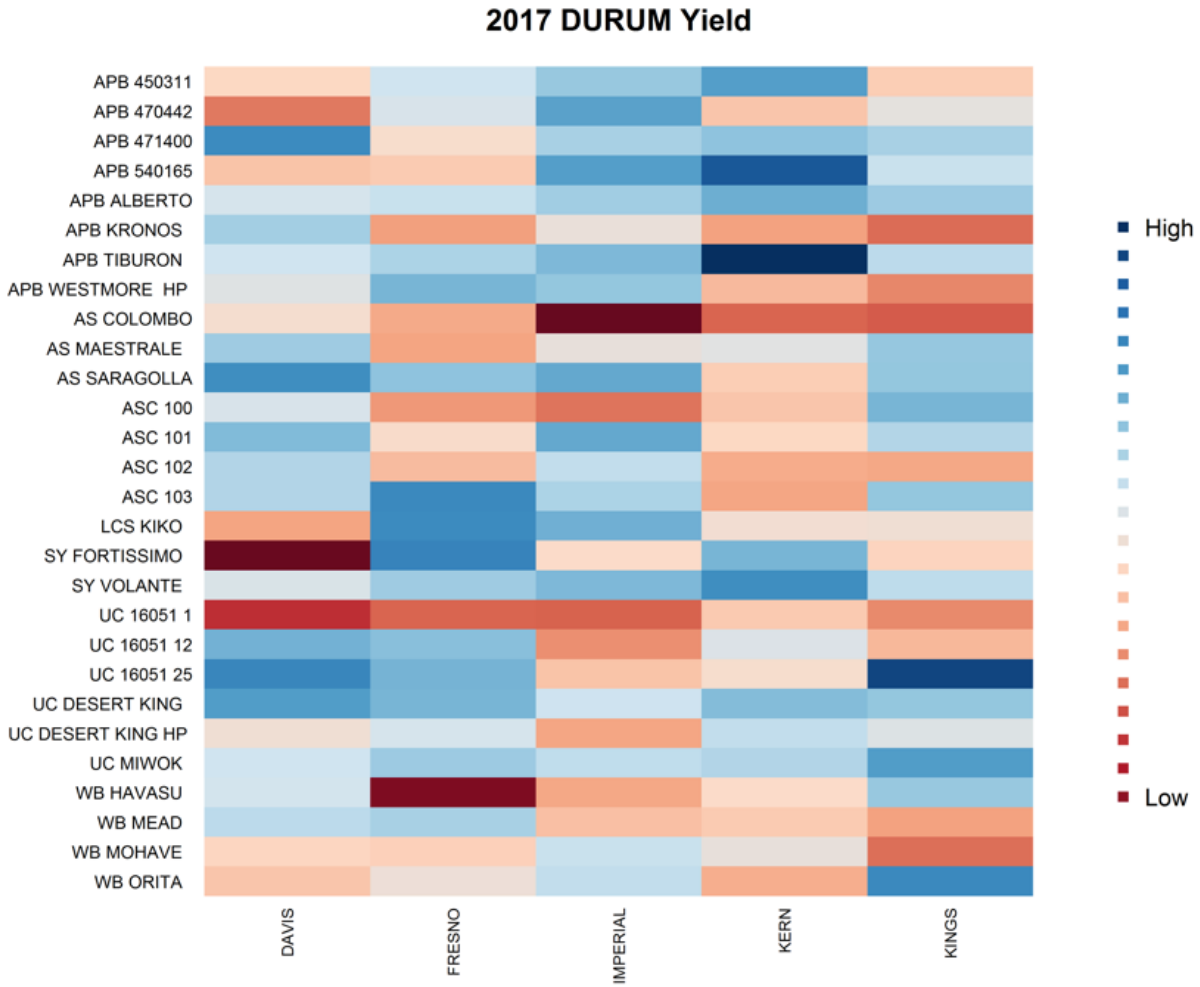

Figure 23: GGE heatmap of durum wheat yield data from the 2016-17 regional variety trials.

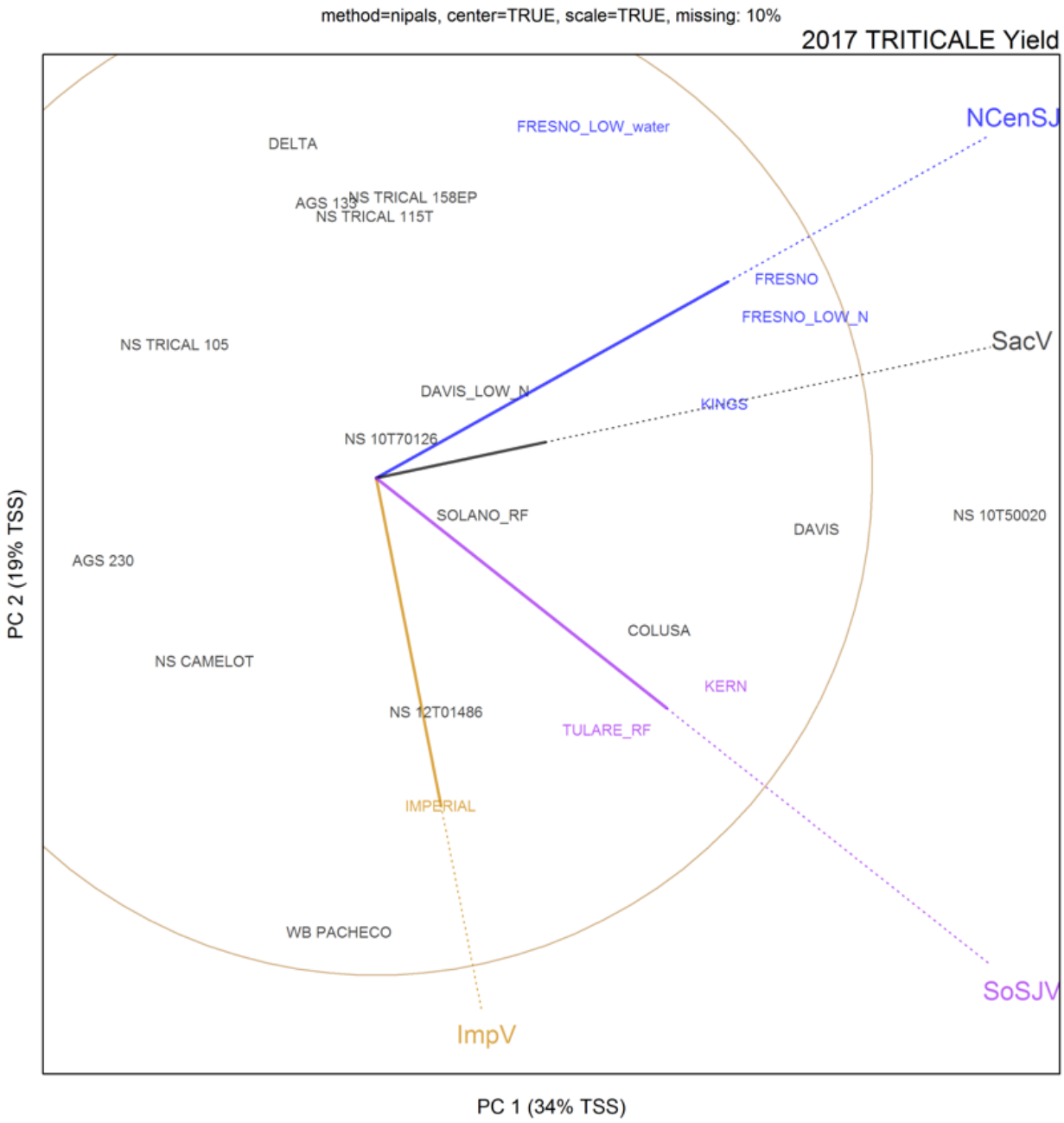

Figure 24: GGE biplot of triticale yield data from the 2016-17 regional variety trials.

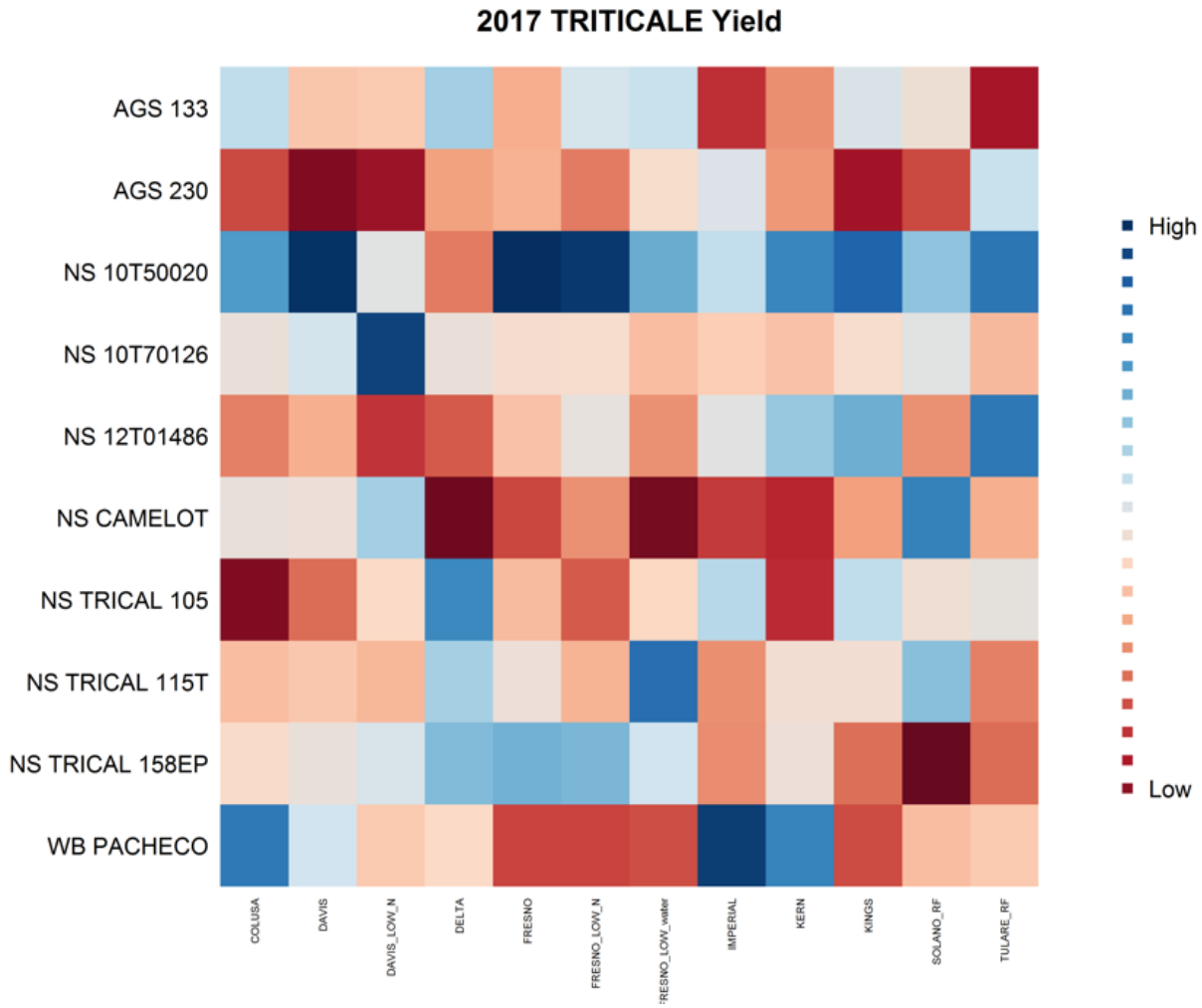

Figure 25: GGE heatmap of triticale yield data from the 2016-17 regional variety trials.

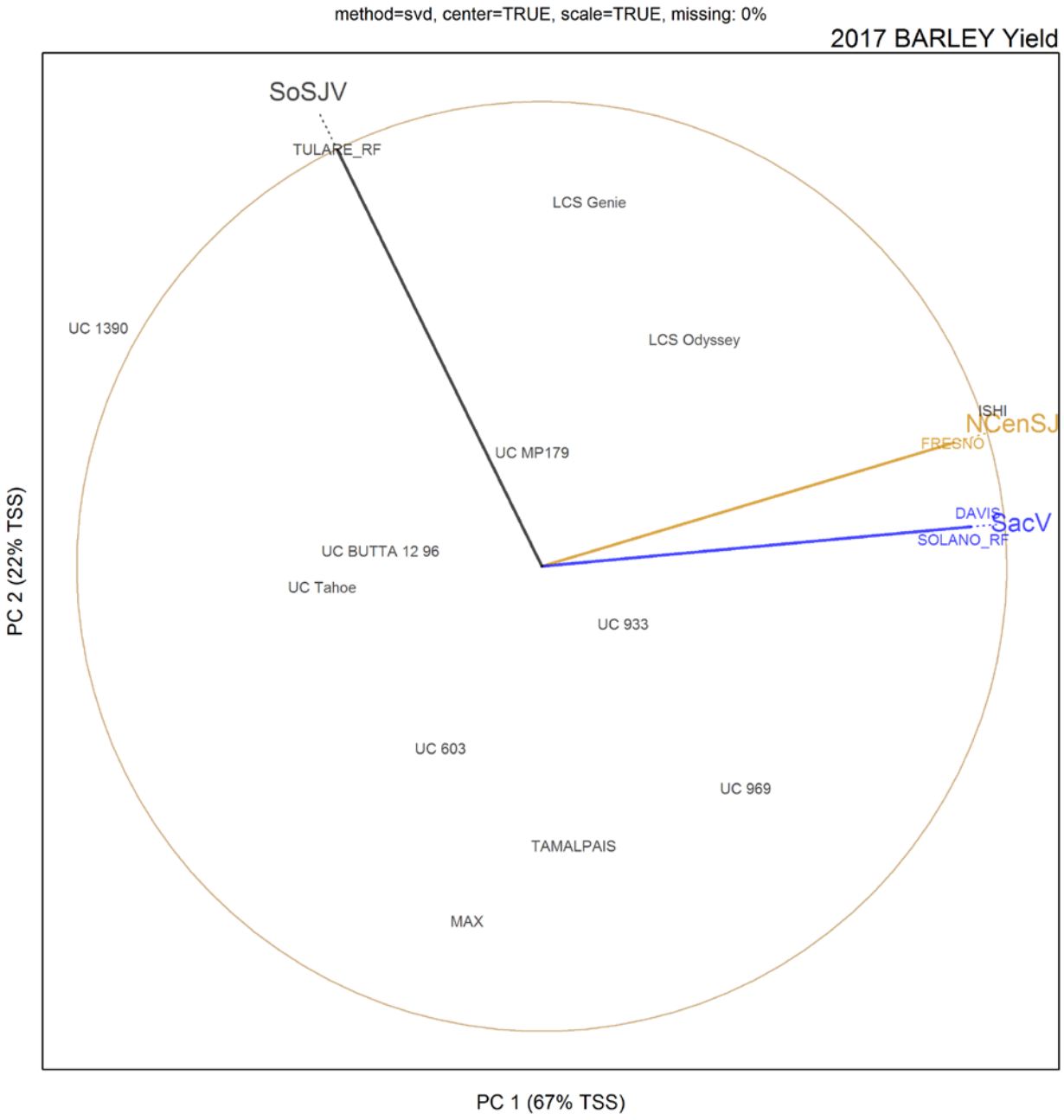

Figure 26: GGE biplot of barley yield data from the 2016-17 regional variety trials.

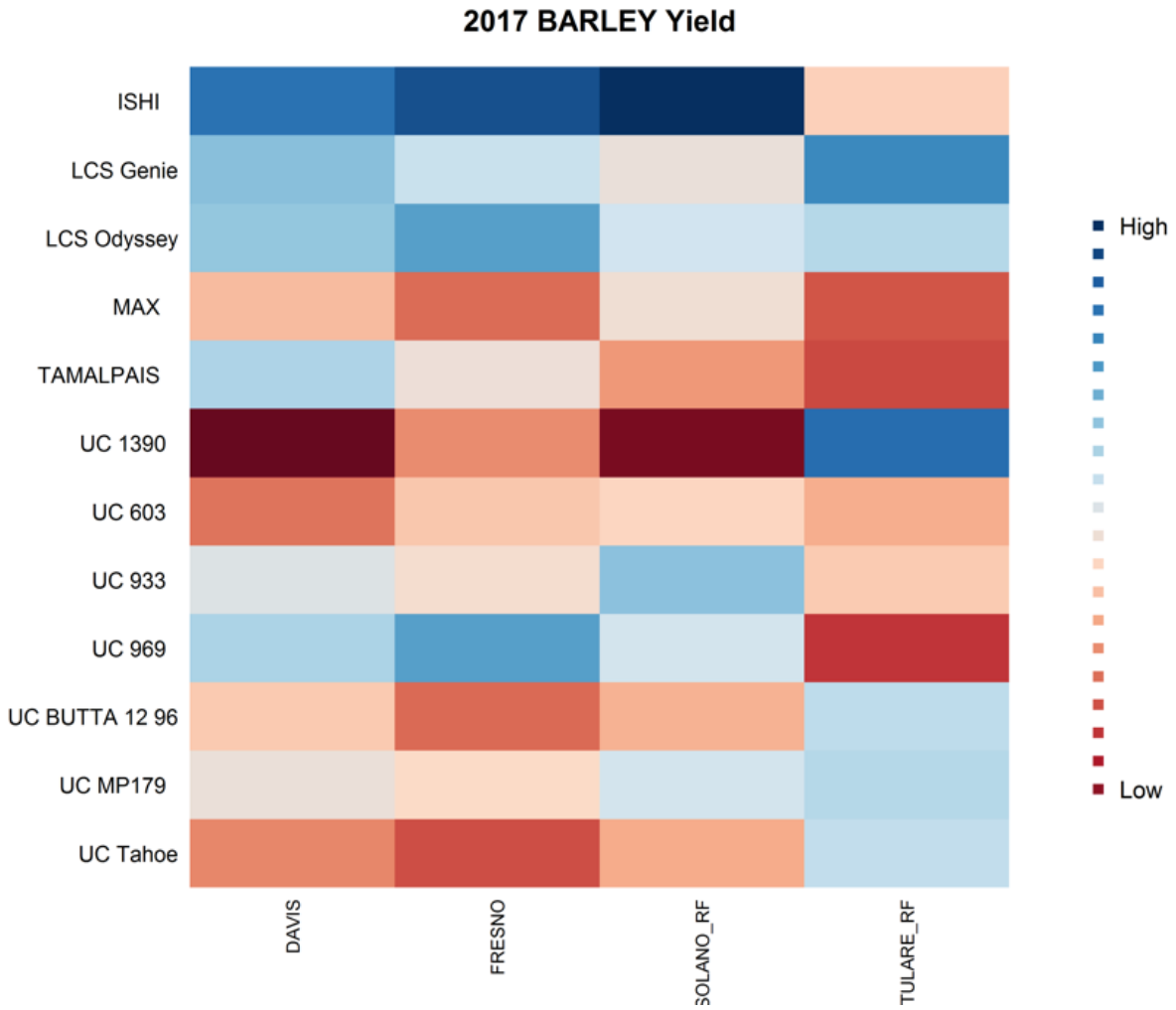

Figure 27: GGE heatmap of barley yield data from the 2016-17 regional variety trials.

3.2 Collaborative trials

Crop productivity

The absolute yield, range of yields between varieties, and trial error for the common wheat varieties grown in the collaborative trials at Davis and Fresno were comparable to the same varieties in the region trails between 2014-15 and 2016-17 (Figure 28). The absolute yield, range of yields between varieties, and trial error for the durum wheat varieties grown in the collaborative trial Fresno were comparable to the same varieties in the region trails between 2014-15 and 2016-17, whereas the yields at the collaborative trial in the Imperial Valley were marginally lower than yields in the regional trials (Figure 29).

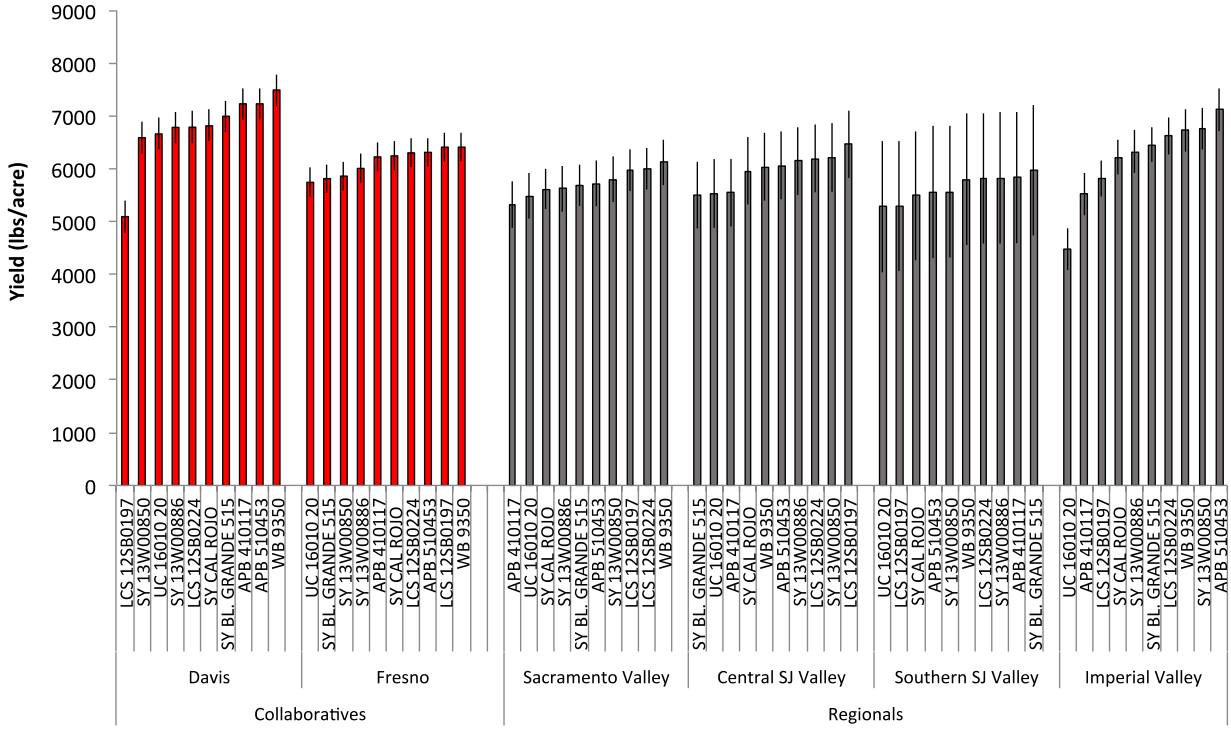

Figure 28: The yield performance of varieties in the common wheat collaborative trials relative to the same varieties in the region trials between 2013 and 2017.

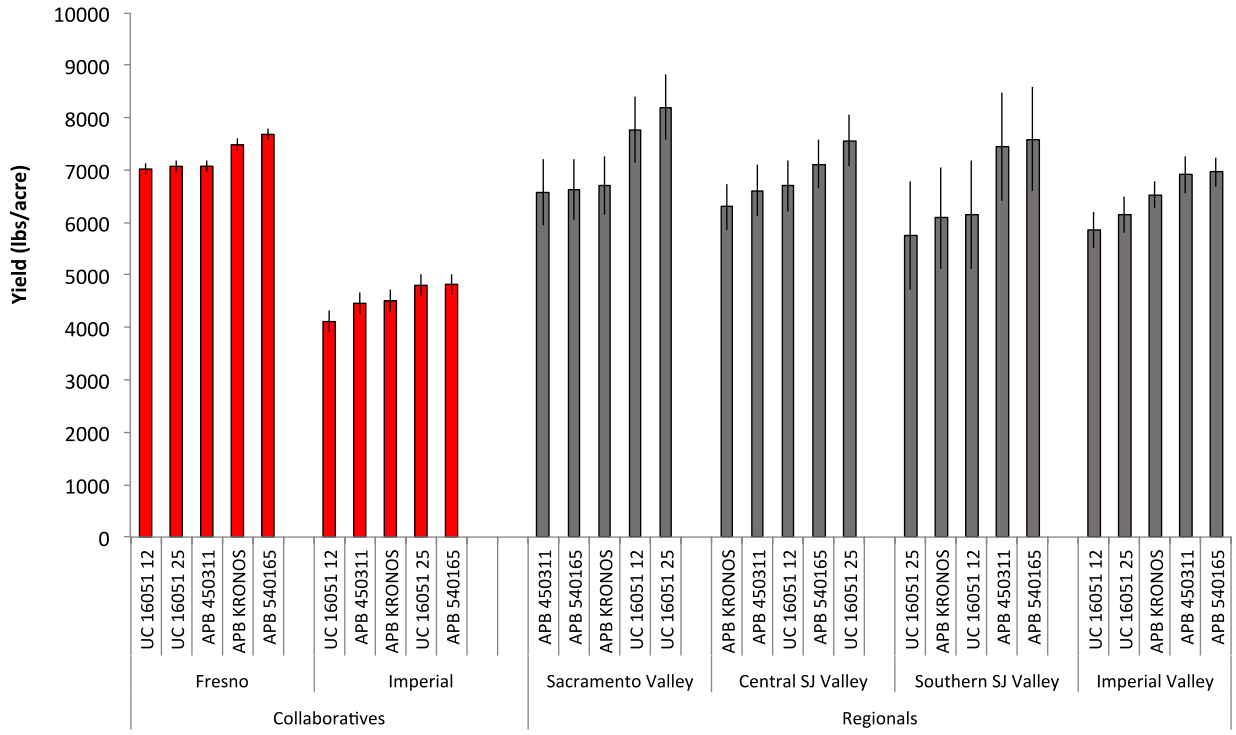

Figure 29: The yield performance of varieties in the durum wheat collaborative trials relative to the same varieties in the region trials between 2013 and 2017.

3.3 Effect of reduced nitrogen & water availability on productivity and quality

Relative to the conventionally managed trial, the low water common wheat trial at Fresno received 5-inch less irrigation overall (Table 5). This is associated with a reduction in median yields of approximately 1250 lbs/acre (Figure 30). The conventionally managed common wheat at Davis and Fresno both received 200 lbs/acre of nitrogen, while the common wheat at Davis and Fresno grown under low nitrogen received no fertilizer (Table 4). The median yields in the low nitrogen fertilization trials were approximately 3500 lbs/acre and 5000 lbs/acre lower than the conventionally managed trials at Davis and West Side, respectively (Figure 30). Reduced irrigation and nitrogen fertilization also caused notable changes in grain and flour quality (Tables 47, 48, and 49). For example, at the Fresno location mean protein content decreased by 3.5% under low nitrogen fertilization.

The ranking of varieties in the conventionally managed and low irrigation common wheat trials at Davis and Fresno were similar (Figure 31). A reduction in nitrogen fertilization resulted in changes in variety rankings that were similar at both the Davis and Fresno locations, although the range of yields was greater at Davis. Varieties that showed the largest changes in their relative rankings tended to be those that exhibited high mean yields under conventional management. For example, XA 9501, XA 9502, and XA 9302 were among the highest-ranking varieties in 2016-17 in the conventionally managed tests at Davis and Fresno, and were top-ranking varieties at other locations as well, with a mean yield of around 8200 lbs/acre, but were among the bottom quarter of varieties in terms of yield in the low nitrogen tests at both Davis and Fresno.

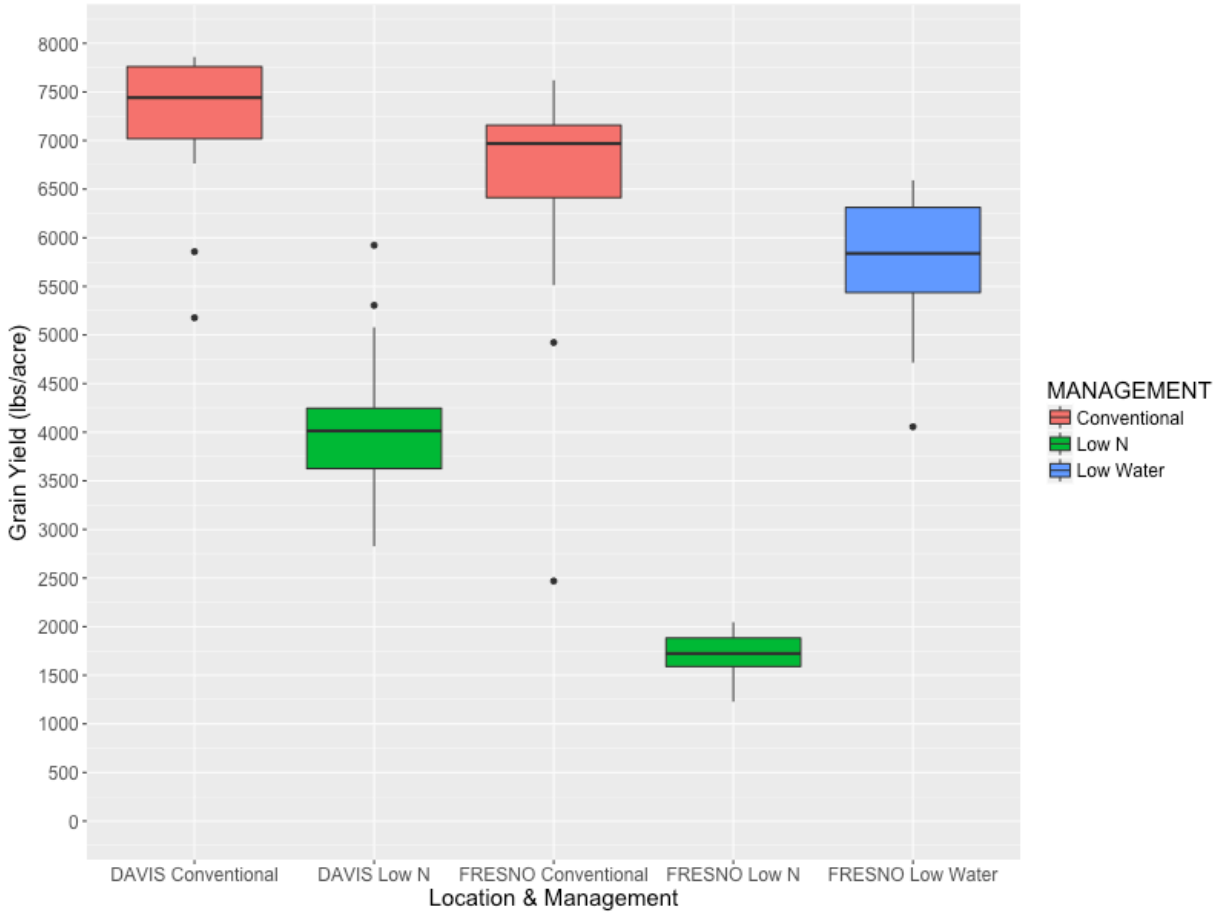

Figure 30: The grain yield of 54 common wheat and triticale varieties grown under either reduced nitrogen or reduced irrigation, compared to common wheat grown under conventional management.

Table 47: The grain quality parameters for the common wheat varieties included in the collaborative trials grown under conventional, low nitrogen and low water management.

UC Number	Name	GRAIN QUALITY													
		Protein			Ash		MOIS %	TEST WEIGHT	TEST WEIGHT	1000 KWt	Weight	Diameter	Hardness	KERNEL SIZE DIST. (200G)	
		AS IS	12% moist.	0% moist.	AS IS	14% moist.		lbs/bu	kg/hl	mg				L	M	S
Fresno - conventional																
1840	APB 410117	11.58	11.19	12.72	1.29	1.24	8.93	63.04	82.87	48.78	47.21	3.08	57.23	93	7	0
1841	APB 510453	12.84	12.33	14.01	1.34	1.29	8.33	63.32	83.22	42.02	44.22	3.09	67.32	89	11	0
1830	LCS 12SB0197	11.84	11.40	12.95	1.36	1.31	8.60	61.95	81.46	48.54	46.41	3.11	59.07	91	9	0
1831	LCS 12SB0224	12.00	11.53	13.10	1.47	1.41	8.43	61.93	81.43	44.64	43.96	3.06	66.70	91	9	0
1834	13W00850	12.74	12.26	13.93	1.34	1.29	8.56	63.60	83.59	43.67	42.35	3.00	70.15	90	10	0
1835	13W00886	11.97	11.55	13.13	1.45	1.40	8.82	62.54	82.22	44.84	44.56	3.06	56.00	94	6	0
1838	16010-20	13.56	13.01	14.78	1.35	1.30	8.27	64.16	84.31	42.55	44.41	3.06	67.97	92	8	0
1842	WB 9350	11.63	11.16	12.69	1.35	1.29	8.32	63.36	83.28	42.55	41.82	3.01	66.52	91	9	0
1478	SY CAL ROJO	11.32	10.98	12.48	1.29	1.25	9.27	62.09	81.64	44.44	42.14	2.91	57.73	88	12	1
1657	SY BLANCA GRANDE 515	13.23	12.69	14.42	1.33	1.28	8.23	63.60	83.60	41.67	41.47	3.00	63.94	89	11	0
	Mean	*12.27*	*11.81*	*13.42*	*1.36*	*1.31*	*8.58*	*62.96*	*82.76*	*44.37*	*43.86*	*3.04*	*63.26*	*91*	*9*	*0*
	Stdev	*0.77*	*0.71*	*0.80*	*0.06*	*0.06*	*0.34*	*0.79*	*1.02*	*2.52*	*1.94*	*0.06*	*5.23*	*2*	*2*	*0*
Fresno - low nitrogen																
1840	APB 410117	8.63	8.37	9.51	1.82	1.76	9.27	62.76	82.51	50.25	47.00	3.23	41.07	98	2	0
1841	APB 510453	8.14	7.88	8.96	1.78	1.72	9.12	63.78	83.83	44.44	40.93	3.10	57.46	94	6	0
1830	LCS 12SB0197	8.51	8.24	9.36	1.74	1.68	9.10	61.92	81.42	43.48	41.14	3.04	43.84	90	10	0
1831	LCS 12SB0224	9.76	9.44	10.73	1.83	1.77	8.98	63.35	83.26	40.00	38.64	3.02	62.29	93	7	0
1834	13W00850	9.73	9.42	10.71	1.82	1.76	9.08	63.60	83.59	43.48	41.77	3.15	65.88	95	5	0
1835	13W00886	8.98	8.70	9.88	1.81	1.75	9.15	63.59	83.57	45.25	43.60	3.13	49.84	96	4	0
1838	16010-20	8.76	8.47	9.62	1.86	1.80	8.95	65.25	85.72	39.53	37.36	2.97	76.02	91	9	0
1842	WB 9350	7.82	7.59	8.63	1.79	1.74	9.37	64.11	84.24	41.84	40.54	3.06	57.68	92	8	0
1478	SY CAL ROJO	9.03	8.76	9.96	1.79	1.74	9.32	63.04	82.87	41.67	40.85	3.02	46.86	94	6	0
1657	SY BLANCA GRANDE 515	9.21	8.90	10.11	1.72	1.66	8.89	65.32	85.81	37.17	36.53	2.96	64.53	89	10	0
	Mean	*8.86*	*8.58*	*9.75*	*1.80*	*1.74*	*9.12*	*63.67*	*83.68*	*42.71*	*40.84*	*3.07*	*56.55*	*93*	*7*	*0*
	Stdev	*0.63*	*0.60*	*0.68*	*0.04*	*0.04*	*0.16*	*1.04*	*1.35*	*3.61*	*3.02*	*0.08*	*11.08*	*3*	*3*	*0*
Fresno - low water																
1840	APB 410117	12.79	12.31	13.99	1.85	1.78	8.52	63.63	83.63	56.82	52.60	3.26	54.99	93	7	0
1841	APB 510453	10.60	10.19	11.58	1.45	1.39	8.45	64.57	84.84	46.08	43.68	3.11	73.79	93	7	0
1830	LCS 12SB0197	12.08	11.68	13.27	1.29	1.25	9.00	63.49	83.45	45.08	44.34	3.01	64.25	90	10	0
1831	LCS 12SB0224	9.85	9.50	10.80	1.55	1.49	8.75	63.99	84.10	43.67	42.38	3.05	72.09	94	6	0
1834	13W00850	9.90	9.54	10.85	1.44	1.39	8.68	65.06	85.48	46.51	44.36	3.08	69.16	95	5	0
1835	13W00886	12.26	11.84	13.46	1.35	1.31	8.86	63.99	84.09	50.51	49.04	3.18	55.71	97	3	0
1838	16010-20	14.06	13.54	15.39	1.50	1.45	8.63	64.61	84.90	45.66	42.93	3.06	72.82	92	8	0
1842	WB 9350	12.31	11.87	13.48	1.34	1.29	8.74	64.27	84.45	48.78	46.66	3.17	69.42	93	7	0
1478	SY CAL ROJO	9.64	9.33	10.60	1.39	1.35	9.10	63.38	83.30	45.66	43.91	2.97	57.99	89	10	1
1657	SY BLANCA GRANDE 515	12.15	11.77	13.38	1.51	1.47	9.15	65.58	86.15	45.05	43.13	3.04	67.55	89	11	0
	Mean	*11.56*	*11.16*	*12.68*	*1.47*	*1.42*	*8.79*	*64.26*	*84.44*	*47.38*	*45.30*	*3.09*	*65.78*	*93*	*7*	*0*
	Stdev	*1.48*	*1.42*	*1.62*	*0.16*	*0.15*	*0.24*	*0.71*	*0.92*	*3.85*	*3.24*	*0.09*	*7.17*	*3*	*2*	*0*
Davis - conventional																
1840	APB 410117	12.87	12.64	14.36	1.38	1.35	10.39	61.74	81.18	50.76	49.27	3.10	58.85	96	4	0
1841	APB 510453	13.45	13.22	15.02	1.43	1.40	10.44	63.54	83.52	45.70	44.58	3.04	69.77	93	7	0
1830	LCS 12SB0197	11.00	10.71	12.17	1.42	1.38	9.62	61.13	80.40	43.86	40.34	2.90	61.78	87	13	0
1831	LCS 12SB0224	13.40	13.18	14.98	1.52	1.49	10.54	61.53	80.92	41.49	39.02	2.92	79.44	89	11	0
1834	13W00850	13.20	12.93	14.69	1.56	1.53	10.13	63.47	83.42	42.74	44.39	3.05	72.23	92	8	0
1835	13W00886	13.26	12.96	14.73	1.60	1.56	9.96	62.98	82.79	47.62	46.84	3.08	58.84	95	5	0
1838	16010-20	13.86	13.52	15.36	1.51	1.47	9.79	62.96	82.76	41.84	43.43	2.99	71.60	91	9	0
1842	WB 9350	12.00	11.72	13.32	1.58	1.54	9.92	62.99	82.80	42.92	42.90	3.02	72.82	87	12	1
1478	SY CAL ROJO	12.70	12.37	14.06	1.62	1.58	9.65	61.06	80.31	42.92	40.33	2.78	63.91	85	15	0
1657	SY BLANCA GRANDE 515	13.26	12.93	14.70	1.54	1.50	9.75	64.59	84.87	42.55	41.93	2.97	65.30	92	8	0
	Mean	*12.90*	*12.62*	*14.34*	*1.52*	*1.48*	*10.02*	*62.60*	*82.30*	*44.24*	*43.30*	*2.99*	*67.45*	*91*	*9*	*0*
	Stdev	*0.84*	*0.84*	*0.95*	*0.08*	*0.08*	*0.34*	*1.18*	*1.52*	*2.95*	*3.14*	*0.10*	*6.79*	*4*	*4*	*0*
Davis - low nitrogen																
1840	APB 410117	9.97	9.76	11.09	1.78	1.74	10.15	62.34	81.96	56.82	54.67	3.27	44.90	97	3	0
1841	APB 510453	9.33	9.14	10.39	1.77	1.74	10.16	63.16	83.02	45.66	45.43	3.14	64.44	93	7	0
1830	LCS 12SB0197	10.78	10.55	11.99	1.52	1.48	10.10	61.58	80.98	50.00	47.65	3.17	55.90	93	7	0
1831	LCS 12SB0224	9.01	8.84	10.04	1.79	1.76	10.27	63.39	83.32	44.25	42.36	3.06	53.58	94	6	0
1834	13W00850	8.10	7.94	9.03	1.62	1.59	10.32	60.69	79.83	49.50	45.81	3.13	38.17	91	8	1
1835	13W00886	9.77	9.59	10.90	1.80	1.76	10.32	62.08	81.63	49.02	48.39	3.17	48.71	97	3	0
1842	WB 9350	10.75	10.49	11.92	1.65	1.61	9.86	62.57	82.26	46.95	45.49	3.12	61.69	90	9	1
1478	SY CAL ROJO	9.71	9.53	10.83	1.75	1.72	10.35	61.61	81.02	47.62	46.21	3.00	48.20	93	7	0
1657	SY BLANCA GRANDE 515	10.87	10.63	12.08	1.91	1.87	9.97	64.16	84.32	40.65	36.80	2.91	74.99	88	12	0
	Mean	*9.81*	*9.61*	*10.92*	*1.73*	*1.70*	*10.17*	*62.40*	*82.04*	*47.83*	*45.87*	*3.11*	*54.51*	*93*	*7*	*0*
	Stdev	*0.92*	*0.89*	*1.01*	*0.12*	*0.12*	*0.17*	*1.06*	*1.37*	*4.47*	*4.77*	*0.11*	*11.21*	*3*	*3*	*0*

Table 48: The flour quality parameters for the common wheat varieties included in the collaborative trials grown under conventional, low nitrogen and low water management.

UC Number	Name	FLOUR ANALYSIS							FARINOGRAPH						
		Wheat FALL NO.	FLOUR YIELD	FLOUR PROTEIN		MOIS	ASH		WET GLUT (14% MB)	WET GLUT (As-is MB)	GLUTEN INDEX	ABS%	Dev Time	Stability	M.T.I.
		SEC		AS IS	14% moist.	%	14% moist.	AS IS					min	min	FU
Fresno - conventional															
1840	APB 410117	377	72.42	9.84	9.76	13.31	0.46	0.47	24.75	24.95	98.40	62.9	5.5	9.6	34
1841	APB 510453	403	68.79	10.96	10.91	13.59	0.41	0.42	30.80	30.95	87.22	65.7	5.7	9.7	20
1830	LCS 12SB0197	389	69.16	9.95	9.90	13.58	0.44	0.44	27.27	27.40	88.56	63.1	4	5.5	44
1831	LCS 12SB0224	430	65.66	10.08	10.03	13.52	0.45	0.45	26.55	26.70	87.08	63.6	6.5	11.2	23
1834	13W00850	465	67.32	11.06	10.98	13.39	0.45	0.46	29.39	29.60	94.31	63.7	7.2	17	17
1835	13W00886	437	67.54	10.41	10.33	13.32	0.43	0.43	26.89	27.10	97.97	61.4	10	22	13
1838	16010-20	475	69.28	11.54	11.51	13.83	0.40	0.40	30.49	30.55	93.79	68.9	10.7	20.2	8
1842	WB 9350	428	68.56	9.78	9.74	13.65	0.37	0.37	23.26	23.35	99.14	64.7	11	25	6
1478	SY CAL ROJO	396	68.99	9.90	9.82	13.28	0.35	0.35	23.95	24.15	98.99	61.2	8	16.2	26
1657	SY BLANCA GRANDE 515	311	67.02	11.28	11.22	13.51	0.36	0.36	29.03	29.20	95.40	65.3	11	19.5	7
	Mean	*411.10*	*68.47*	*10.48*	*10.42*	*13.50*	*0.41*	*0.42*	*27.24*	*27.40*	*94.09*	*64.05*	*7.96*	*15.59*	*19.80*
	Stdev	*47.45*	*1.80*	*0.67*	*0.67*	*0.17*	*0.04*	*0.04*	*2.68*	*2.67*	*4.85*	*2.26*	*2.58*	*6.33*	*12.40*
Fresno - low nitrogen															
1840	APB 410117	443	71.72	7.60	7.53	13.16	0.60	0.61	18.72	18.90	99.74	59.6	1.5	6.5	23
1841	APB 510453	315	68.75	7.01	6.97	13.45	0.57	0.57	16.05	16.15	100.00	61.9	1.5	3.4	54
1830	LCS 12SB0197	302	70.59	7.04	6.98	13.27	0.53	0.53	17.55	17.70	97.73	58.5	1.5	3.7	66
1831	LCS 12SB0224	341	70.98	8.12	8.04	13.15	0.49	0.49	20.84	21.05	95.49	60.7	1.7	4.4	59
1834	13W00850	391	68.66	8.00	7.88	12.73	0.53	0.54	19.02	19.30	100.00	62.4	1.9	4.5	46
1835	13W00886	401	71.00	7.95	7.81	12.49	0.50	0.51	19.36	19.70	99.23	59.8	1.8	7.2	15
1838	16010-20	480	68.90	7.41	7.31	12.76	0.58	0.59	16.22	16.45	100.00	66.6	1.5	3.4	46
1842	WB 9350	397	69.34	6.52	6.46	13.19	0.55	0.56	13.97	14.10	100.00	61.6	1.4	1.3	78
1478	SY CAL ROJO	432	70.13	7.29	7.20	13.00	0.56	0.56	17.05	17.25	99.72	57.7	1.7	5.4	38
1657	SY BLANCA GRANDE 515	262	68.62	7.87	7.80	13.24	0.48	0.49	18.78	18.95	99.73	63.1	2	4.6	44
	Mean	*376.40*	*69.87*	*7.48*	*7.40*	*13.04*	*0.54*	*0.55*	*17.76*	*17.96*	*99.16*	*61.19*	*1.65*	*4.44*	*46.90*
	Stdev	*69.24*	*1.16*	*0.52*	*0.50*	*0.30*	*0.04*	*0.04*	*1.99*	*2.03*	*1.46*	*2.56*	*0.20*	*1.68*	*18.88*
Fresno - low water															
1840	APB 410117	390	72.83	10.94	10.74	12.38	0.42	0.43	31.70	32.30	93.04	64.2	5.7	9.3	32
1841	APB 510453	390	68.23	9.20	9.09	12.98	0.54	0.55	27.03	27.35	96.91	64.9	5	7.1	41
1830	LCS 12SB0197	445	72.88	10.17	10.07	13.13	0.51	0.52	30.64	30.95	91.61	62.8	5.2	7	36
1831	LCS 12SB0224	374	69.19	8.61	8.52	13.10	0.45	0.46	24.79	25.05	99.20	61.7	5.7	11	25
1834	13W00850	433	68.31	8.36	8.29	13.25	0.52	0.52	23.35	23.55	97.18	62.4	1.8	8.7	23
1835	13W00886	425	72.19	10.35	10.25	13.17	0.49	0.49	28.23	28.50	97.58	60.5	6.3	12.7	24
1838	16010-20	475	72.15	12.08	12.02	13.57	0.44	0.44	35.87	36.05	88.49	68.7	7.5	13.8	17
1842	WB 9350	451	73.50	10.72	10.67	13.57	0.44	0.45	28.41	28.55	99.83	65.8	12.2	27	7
1478	SY CAL ROJO	392	71.65	7.97	7.90	13.25	0.43	0.43	22.60	22.80	99.56	59.6	2.2	7.9	20
1657	SY BLANCA GRANDE 515	298	71.01	10.40	10.35	13.60	0.43	0.43	29.07	29.20	97.60	64.5	5.5	12.9	20
	Mean	*407.30*	*71.19*	*9.88*	*9.79*	*13.20*	*0.47*	*0.47*	*28.17*	*28.43*	*96.10*	*63.51*	*5.71*	*11.74*	*24.50*
	Stdev	*50.31*	*1.95*	*1.30*	*1.30*	*0.36*	*0.04*	*0.04*	*4.02*	*4.06*	*3.79*	*2.69*	*2.87*	*5.91*	*9.81*
Davis - conventional															
1840	APB 410117	389	72.1	11.32	11.44	14.88	0.54	0.55	31.22	30.90	88.11	60.7	5.7	7	44
1841	APB 510453	338	69.2	12.13	12.22	14.64	0.46	0.46	33.80	33.55	73.91	64.1	6	9.6	27
1830	LCS 12SB0197	392	73.2	9.92	10.01	14.76	0.51	0.52	25.17	24.95	99.60	61.2	8.7	12.5	27
1831	LCS 12SB0224	415	70.9	11.83	11.90	14.53	0.48	0.48	28.42	28.25	93.27	61.6	7.5	10.3	34
1834	13W00850	411	72.3	11.66	11.71	14.40	0.53	0.53	29.14	29.00	97.58	62.4	7.2	15.4	15
1835	13W00886	356	73.5	11.70	11.73	14.23	0.51	0.51	33.14	33.05	87.60	61.7	8.5	14.3	21
1838	16010-20	412	68.3	12.14	12.30	15.11	0.52	0.53	35.97	35.50	78.89	67.8	7.2	12.8	20
1842	WB 9350	421	71.9	10.57	10.64	14.57	0.50	0.50	27.08	26.90	99.63	62.4	13.2	23.8	18
1478	SY CAL ROJO	384	72.6	11.29	11.37	14.58	0.52	0.52	27.18	27.00	93.19	60.6	7.9	11.7	25
1657	SY BLANCA GRANDE 515	314	71.3	11.75	11.84	14.64	0.51	0.51	31.94	31.70	92.11	66.8	9.9	13.7	5
	Mean	*383.20*	*71.53*	*11.43*	*11.52*	*14.63*	*0.51*	*0.51*	*30.31*	*30.08*	*90.39*	*62.93*	*8.18*	*13.11*	*23.60*
	Stdev	*36.09*	*1.67*	*0.70*	*0.71*	*0.24*	*0.02*	*0.03*	*3.45*	*3.48*	*8.55*	*2.52*	*2.16*	*4.49*	*10.65*
Davis - low nitrogen															
1840	APB 410117	375	70.64	8.69	8.64	13.42	0.48	0.49	23.64	23.80	98.74	60.1	5.4	10.7	23
1841	APB 510453	363	65.53	7.92	7.86	13.37	0.53	0.54	23.97	24.15	90.17	64.2	1.8	2.3	51
1830	LCS 12SB0197	412	69.85	9.01	8.92	13.10	0.42	0.42	24.34	24.60	97.76	61.1	2	7.7	25
1831	LCS 12SB0224	438	67.76	7.60	7.54	13.36	0.47	0.47	19.80	19.95	97.61	58.2	1.7	2.2	54
1834	13W00850	349	68.79	6.65	6.60	13.29	0.45	0.45	14.98	15.10	99.34	57.4	1.2	1.6	68
1835	13W00886	381	70.03	8.18	8.11	13.34	0.49	0.49	18.80	18.95	95.77	60	1.7	5.7	36
1842	WB 9350	456	72.37	9.54	9.49	13.58	0.50	0.50	26.02	26.15	99.64	64.5	2	15.5	23
1478	SY CAL ROJO	448	70.66	8.57	8.48	13.18	0.51	0.52	22.24	22.45	99.56	58.9	2.2	8.9	25
1657	SY BLANCA GRANDE 515	480	68.91	9.42	9.39	13.71	0.50	0.50	24.87	24.95	99.40	63.7	8.7	20.5	13
	Mean	*411.33*	*69.39*	*8.40*	*8.34*	*13.37*	*0.48*	*0.49*	*22.07*	*22.23*	*97.55*	*60.90*	*2.97*	*8.34*	*35.33*
	Stdev	*46.41*	*1.96*	*0.92*	*0.92*	*0.19*	*0.03*	*0.04*	*3.55*	*3.56*	*3.04*	*2.66*	*2.47*	*6.44*	*18.30*

Table 49: The flour quality parameters for the common wheat varieties included in the collaborative trials grown under conventional, low nitrogen and low water management.

UC Number	Name	REGULAR BREAD TEST							
		BAKING ABS%	MIX TIME	VOL C.C	DOUGH HANDLING	CRUmoist. COLOR	CRUmoist. GRAIN	CRUmoist. TEXTURE	BREAD SYMMETRY
					(1-10)	(1-10)	(1-10)	(1-10)	(1-10)
Fresno - conventional									
1840	APB 410117	62.90	2:37	888	6.5	8	7	6	7
1841	APB 510453	64.70	2:24	945	8	8	9	8	9
1830	LCS 12SB0197	63.10	2:44	880	4	6	7	8	6
1831	LCS 12SB0224	63.60	3:10	810	6.5	6	5	6	4
1834	13W00850	63.70	3:28	880	7	8	7	7	5
1835	13W00886	61.40	3:15	898	8	4	8	7	7
1838	16010-20	67.90	2:48	1000	9	8	8	9	9
1842	WB 9350	64.70	4:20	915	8	8	7	6	7
1478	SY CAL ROJO	61.70	3:06	890	7	8	7	7	6
1657	SY BLANCA GRANDE 515	65.30	2:50	983	9	9	9	10	9
	Mean	*63.90*	*0.13*	*908.90*	*7*	*7*	*7*	*7*	*7*
	Stdev	*1.89*	*0.02*	*55.27*	*1*	*1*	*1*	*1*	*2*
Fresno - low nitrogen									
1840	APB 410117	59.50	3:55	707.5	4	6	4	4	4
1841	APB 510453	62.00	3:26	705	4	6	4	5	4
1830	LCS 12SB0197	58.50	2:50	667.5	2	4	4	4	2
1831	LCS 12SB0224	60.50	4:06	660	3	4	4	4	2
1834	13W00850	63.50	2:54	780	5	2	6	6	4
1835	13W00886	60.50	3:03	770	4	2	6	6	4
1838	16010-20	65.50	3:41	770	4	4	6	7	4
1842	WB 9350	62.50	4:24	682.5	3	3	4	4	3
1478	SY CAL ROJO	58.50	4:17	680	2	3	3	4	4
1657	SY BLANCA GRANDE 515	63.00	3:48	805	6	8	7	7	5
	Mean	*61.40*	*0.15*	*722.75*	*4*	*4*	*5*	*5*	*4*
	Stdev	*2.29*	*0.02*	*53.22*	*1*	*2*	*1*	*1*	*1*
Fresno - low water									
1840	APB 410117	64.00	2:50	977.5	8	8	9	8	8
1841	APB 510453	64.00	3:10	862.5	7	6	7	7	6
1830	LCS 12SB0197	62.00	2:54	877.5	7	6	7	6	7
1831	LCS 12SB0224	61.50	4:24	767.5	6	6	5	4	4
1834	13W00850	61.50	5:03	770	6	6	5	4	4
1835	13W00886	60.50	3:06	860	7	2	6	7	6
1838	16010-20	68.50	2:25	977.5	8	8	8	9	8
1842	WB 9350	66.00	4:12	907.5	7	8	7	7	7
1478	SY CAL ROJO	60.50	3:40	835	6	8	6	7	6
1657	SY BLANCA GRANDE 515	65.50	3:07	907.5	7	8	7	8	7
	Mean	*63.40*	*0.15*	*874.25*	*7*	*7*	*7*	*7*	*6*
	Stdev	*2.66*	*0.03*	*72.79*	*1*	*2*	*1*	*2*	*1*
Davis - conventional									
1840	APB 410117	60.7	2:27	967.5	5.5	8	6	8	8
1841	APB 510453	63.1	2:03	1002.5	8	9	8	9	9
1830	LCS 12SB0197	60.2	3:08	905	6	4	5	5	5
1831	LCS 12SB0224	61.6	2:55	895	4	4	5	6	5
1834	13W00850	62.4	2:53	960	6	8	7	8	8
1835	13W00886	60.7	2:27	962.5	5	1	5	3	6
1838	16010-20	66.8	2:02	1002.5	9	8	9	9	9
1842	WB 9350	62.4	3:56	910	4	6	7	6	5
1478	SY CAL ROJO	60.6	2:26	910	8	7	7	7	5
1657	SY BLANCA GRANDE 515	65.8	2:03	1002.5	8	9	8	9	9
	Mean	*62.43*	*0.11*	*951.75*	*6*	*6*	*7*	*7*	*7*
	Stdev	*2.26*	*0.02*	*43.53*	*2*	*3*	*1*	*2*	*2*
Davis - low nitrogen									
1840	APB 410117	61.00	3:12	747.5	6	8	6	6	4
1841	APB 510453	64.00	3:48	702.5	5	6	5	5	4
1830	LCS 12SB0197	63.00	3:20	857.5	7	6	6	7	5
1831	LCS 12SB0224	59.00	4:30	687.5	5	6	4	4	3
1834	13W00850	59.50	4:47	682.5	5	4	4	4	3
1835	13W00886	61.00	4:34	710	6	2	6	5	3
1842	WB 9350	64.50	4:34	805	6	6	6	6	5
1478	SY CAL ROJO	60.00	4:00	802.5	6	6	6	6	5
1657	SY BLANCA GRANDE 515	63.50	4:09	860	6	8	7	7	6
	Mean	*61.72*	*0.17*	*761.67*	*6*	*6*	*6*	*6*	*4*
	Stdev	*2.06*	*0.02*	*71.18*	*1*	*2*	*1*	*1*	*1*

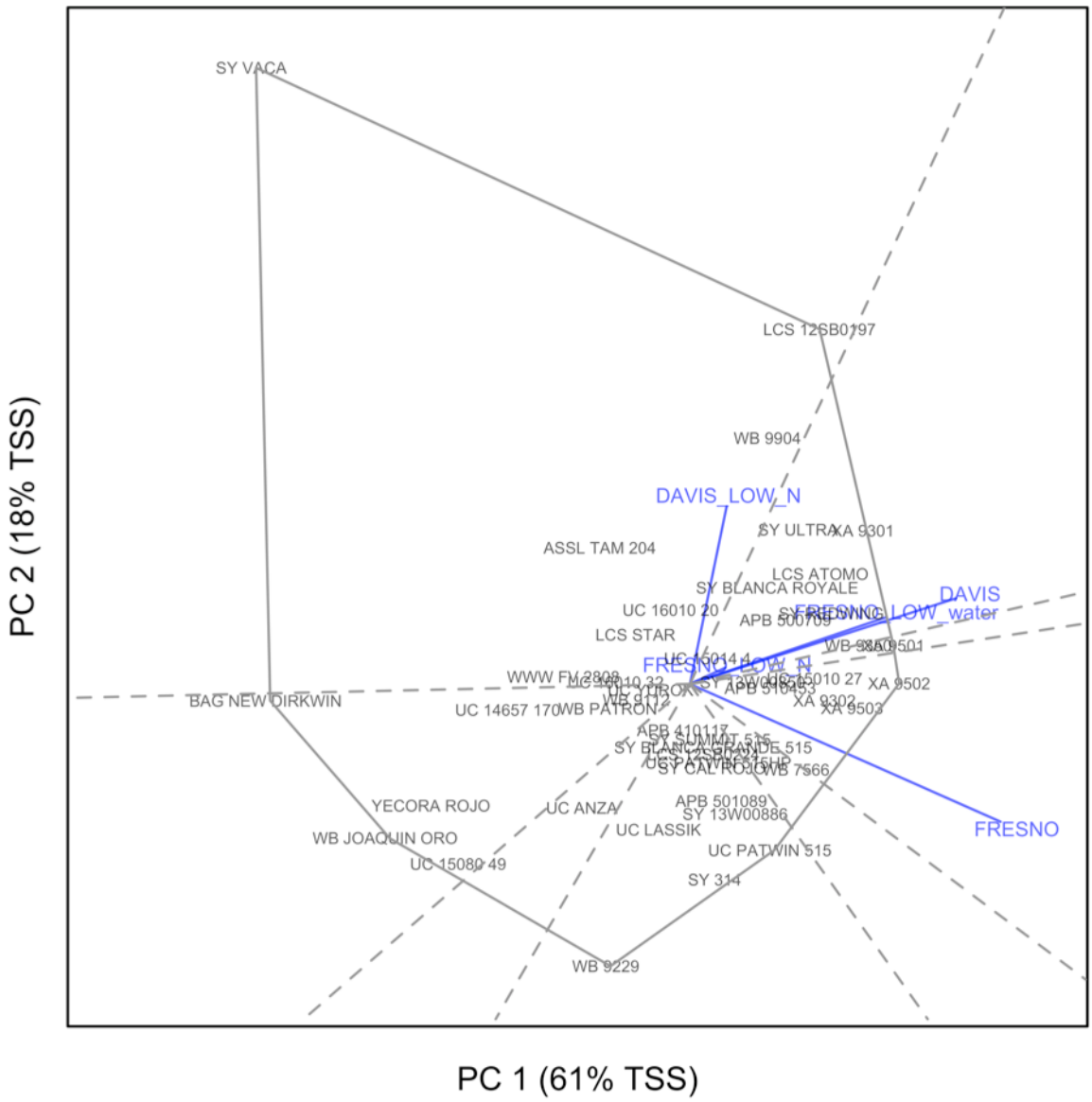

Figure 31: GGE biplot of yield among varieties of common wheat as a function of differing soil nitrogen and water availability.

3.4 Crop model testing

A comparison between the above ground biomass yields from the 2016-17 repeat harvest study and a preliminary APSIM model simulation found a very close correlation (Cal Rojo $R^2 = 0.95$ and Blanca Grande 515 $R^2 = 0.96$) between the yields of the conventionally manage plots and the model results (Figure 32). The model results correlated more closely with the yields of the Blanca Grande 515 than the Cal Rojo, where the model yields were slightly over-estimated. The correlation between the above ground biomass yields from the low nitrogen trial and the model simulation was good, but weaker than for the conventional trial, and the model over-predicted biomass yields for both varieties (Figure 33).

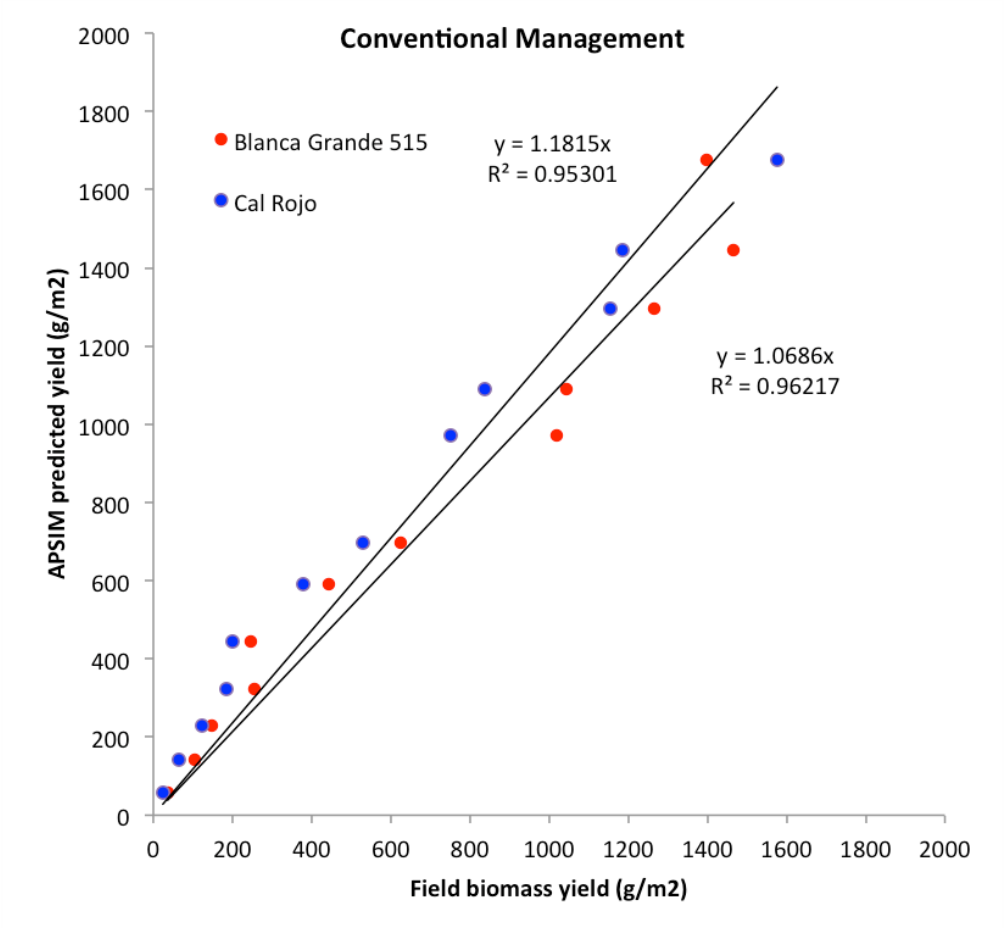

Figure 32: The biomass yields from the conventionally managed repeat harvest study compared with the APSIM model prediction of above ground biomass yield for the same location.

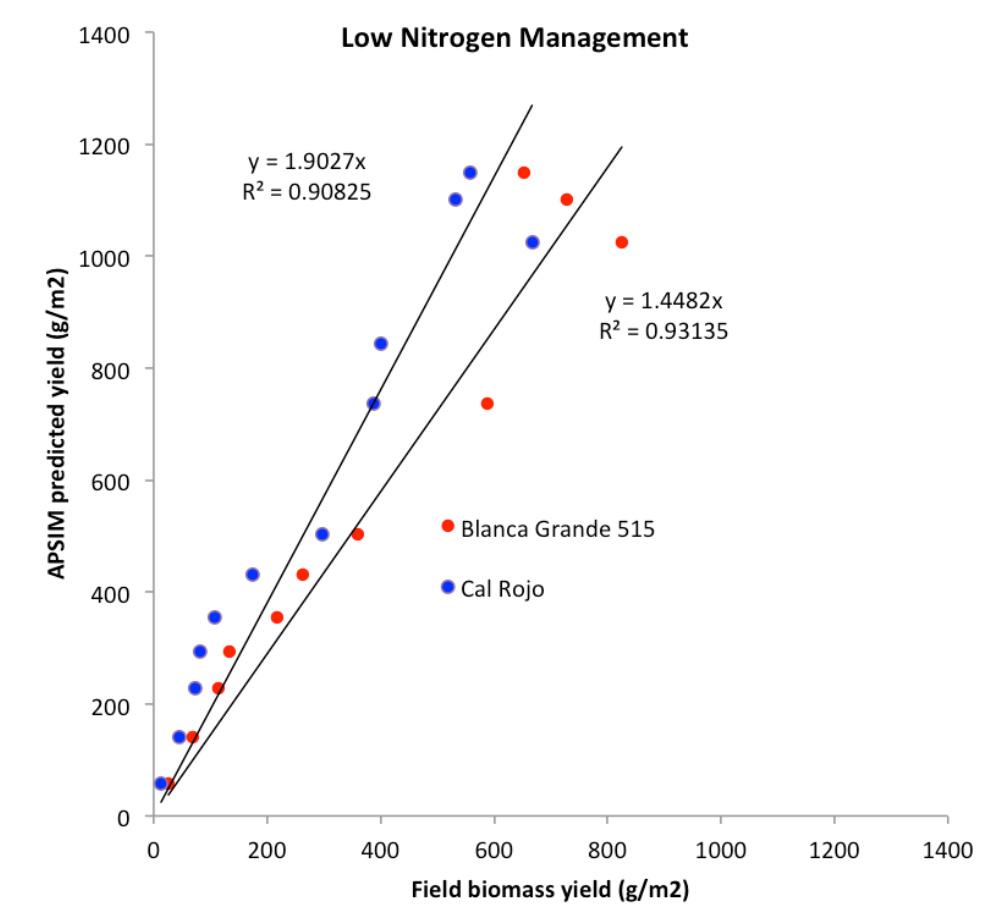

Figure 33: The biomass yields from the conventionally managed repeat harvest study compared with the APSIM model prediction of above ground biomass yield for the same location.

3.5 Canopy spectral reflectance

Figure 34 depicts the workflow for summarizing plot specific reflectance values. These periodic measurements were then analyzed as a variety-specific time-series as depicted in Figure 35.

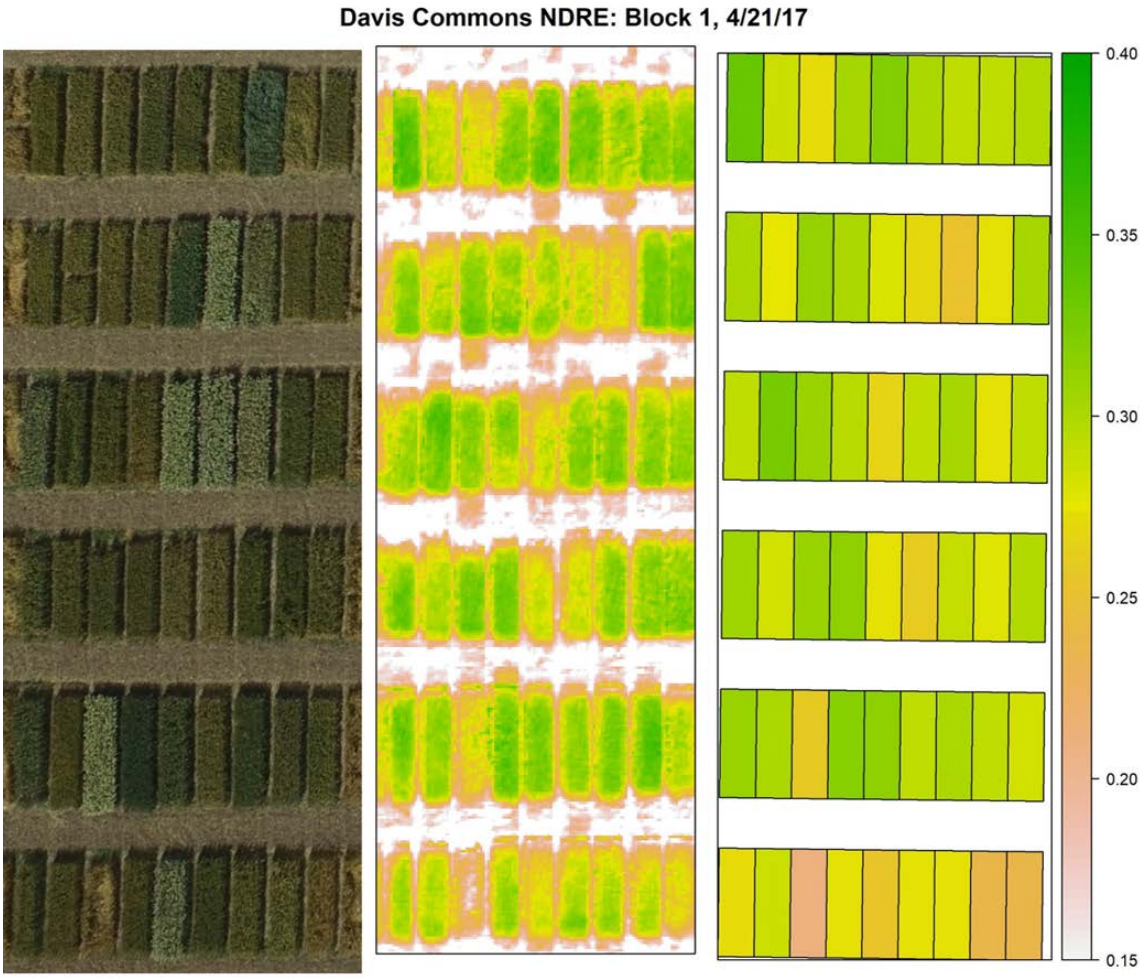

Figure 14. Workflow for a single date/block combination to create time-series data of changes in spectral reflectance at Davis common trial location.

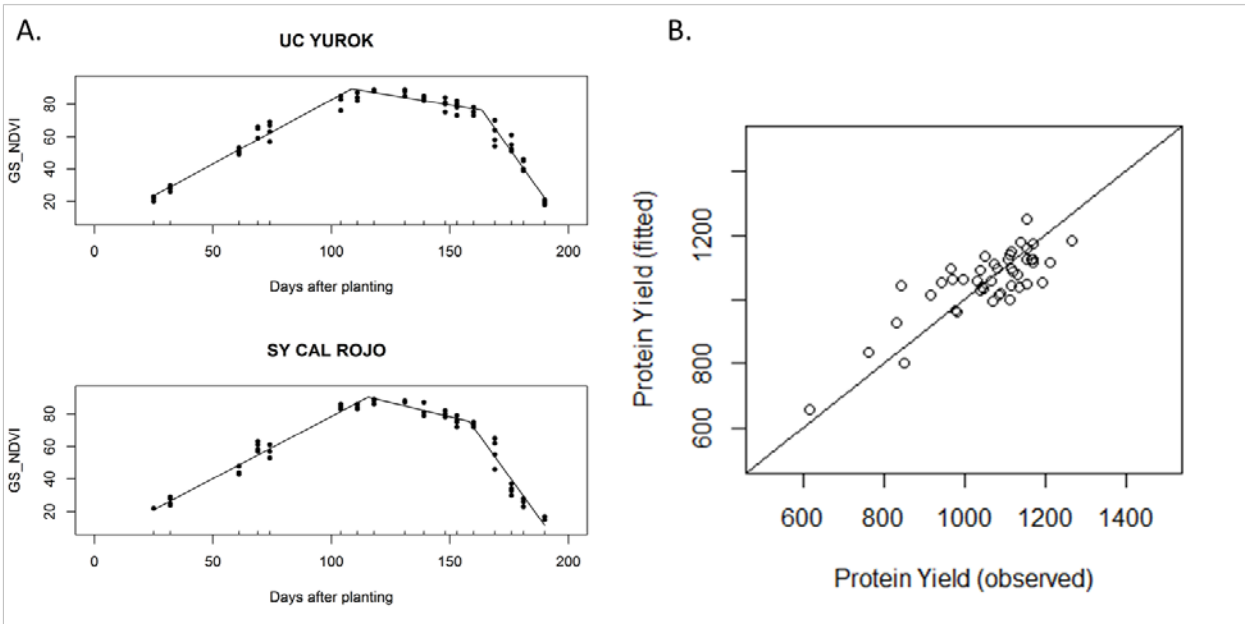

Figure 35. Example of 3-slope, 2-breakpoint model fit to all varieties, with two selected varieties to illustrate (A), and a regression of observed to fitted values of multiple regression model describing protein yield outcomes as a function of variety specific slope and breakpoint values and their interactions.

3.6 Extension products

Web Development

During the reporting period, we successfully released an interactive web-based variety selection tool (http://smallgrainselection.plantsciences.ucdavis.edu/) as part of ongoing improvements and developments from the UC Agronomy Research and Information Center (AgRIC). The tool is designed to help pinpoint small grain varieties that have performed well in particular regions and environments of California using data from multi-year, multi-location field trials. The main features of the tool are: a series of selection menus that interact with a map to give the user real-time feedback on how particular crop selections are represented geographically in the trial data; a custom table that is returned based on these selections; and a second series of selection options that can modified/narrow the table based on user choices. A video demonstrating how to use the tool is also available. In addition, a second tool designed to navigate site-specific and multi-year data interactively in a similar manner is under development and should be finished during the spring of 2018.

This tool and other updates to the Variety section of the Small Grains portion of the AgRIC (http://smallgrains.ucanr.edu/Variety_Results/2017/) have resulted in increased usage and traffic on our websites. Traffic on http://smallgrains.ucanr.edu/ is up 270%, and average session duration increased 450% during Fall 2017 compared to Fall 2016 on the former site. The site was viewed over 11,000 times during 2017.

In addition to the efforts to update the web reporting related to variety selection, we have continued a UC Small Grains Blog, begun during the previous reporting period (http://ucanr.edu/blogs/smallgrains/). The goal for the blog is that it serve as a place for field notes, announcements, and timely discussions of interest to growers, consultants, agronomists and others involved in the California small grain industry. We produced 14 posts in 2016-2017 season, and the blog was viewed over 7000 times during the reporting period. The top posts

were: 2017 University of California Small Grains Survey Results, California small grain disease notes from the field, and Topdress of nitrogen at tillering stage is something to seriously consider over the coming weeks.

Extension events

In collaboration with CCIA and the California Wheat Commission, we hosted our annual Small Grains/Alfalfa-Forages Field Day on 11 May in Davis, with over 200 people in attendance. In addition, in collaboration with the California Grain Foundation and the California Wheat Commission, we hosted the annual Wheat Collaborators Meeting on 25 October in Davis. There were approximately 100 people in attendance. Our group also hosted a 2-day training on the use of sUAS in agricultural research and a field tour of a Fresno County trial. Finally, the Grain Cropping Systems group collectively gave 16 public presentations related to small grains at extension forums during the reporting period (4/1/2017-4/1/2018).

4. DISCUSSION

2016-17 season outcomes

In comparison to previous seasons, the 2016-17 season resulted in higher grain yields for most species. Above average rainfall and temperatures, particularly in northern parts of the state, are likely to have contributed to this. Rust ratings were not notably higher than previous years, although the warm and wet conditions may have resulted in the high incidence of powdery mildew in Southern San Joaquin Valley and presence of septoria, neither of which had been documented in the statewide tests in recent seasons. A number of varieties previously considered resistant to individual disease may be showing break down of resistance (see results for details).

Flooding at the Delta appears to have caused yield suppression and changes to variety ranking relative to other locations. The Delta location experienced early-season flooding. In contrast to all other locations, the top yielding varieties at the Delta location were very late maturing types. The data from this location may therefore be of limited use to overall variety performance estimates. High heat during anthesis may have cause slight yield suppression in the Imperial Valley, at least relative to other locations, in the 2016-17 year, although yield rankings relative to other locations were mostly unchanged.

Darkening of glumes was widely observed in common spring wheat both within the regional trials and by growers and crop consultants around the San Joaquin and Sacramento Valleys. The symptom appeared to have a genetic link because particular wheat varieties consistently displayed symptoms in multiple locations, while others displayed none. There are multiple potential causes for darkened glumes, some pathogenic and some physiological. Cassandra Swett, UC Cooperative Extension Specialist in Vegetable and Field Pathology, worked with a subset of samples collected from UC trials that displayed symptoms and recovered no known pathogens. A second hypothesis proposed by UC Davis diagnosticians and breeders was that the symptoms may be a condition referred to as pseudo-black chaff/false black chaff/melanism. This is a physiological condition associated with the presence of the stem rust resistance gene Sr2 that results in the deposition of melanoid pigments that discolor the glumes in the wheat head and, in severe cases, in the stem below the head. The effect of pseudo black chaff on yield has not been clearly established.

The physiological leaf spot symptoms were also widely observed in California in 2016-17. It manifested more strongly in durum wheat, with some varieties apparently more susceptible than others. A possible correlation with varieties that displayed sever leaf spot symptoms and low relative yields of those entries was observed. Cassandra Swett was not able to positively associate the leaf spot symptoms with a pathogen. Chloride deficiency can result in a leaf spot syndrome that can superficially resemble *Pyrenophora triticirepentis* infection, and spots manifest about a month before flowering, around boot/early heading, appearing on lower leaves and moving up the plant, durum wheat being more susceptible than common wheat [33]. The leaf spot symptoms caused by chloride deficiency close resemble those observed in the 2016-17 in California. There are also significant variety differences in the response to chloride deficiency in both bread and durum wheat [34]. Chloride-deficient leaf spotting also has an environmental component, with high early season rainfall during vegetative phases appearing to be an important causal factor [33-35]. It is therefore hypothesized that the leaf spot symptoms observed in California were the result of chloride deficiency due to high early-season rainfall in many locations.

Nitrogen and water manipulation

The nitrogen and water management treatments applied to the common wheat trials resulted in significant changes in both grain yield and quality that were, in most cases, several times greater than differences between varieties. The treatments also caused significant changes in overall variety rankings. The yield and variety-rank effects were mostly consistent across the two test locations. The results demonstrate the importance of management factors for dictating the ultimate performance and quality of small grains, and the need to develop a quantitative understanding of the effect of nitrogen and water management for applied small grain agronomy in California. Similar studies should therefore be continued in future season. The results also justify the more systematic and detailed quantification of nitrogen and water status of statewide test locations in future seasons to facilitate a better understanding of trial results.

Genotype-by-environment analysis

Analyses found considerable genotype-by-environment interaction among varieties of all the small grain tested in California, some of which resulted in large changes in variety ranking between test locations. If significant changes in variety ranking occur from one location to the next then it can be misleading to extrapolate variety performance based on data from only single location, or even a limited range of locations [36]. If genotype-by-environment interaction results in repeated differences in variety ranking within a production region then the production region can be sub-divided into homogenous sub-regions which will have differing variety recommendations [22, 37]. There is a trade-off however, because sub-dividing a production region makes variety development and recommendations more complex, and requires more test locations thereby reducing resources within a statewide variety testing program [38, 39].

Variety performance patterns for small grains in California detected by our analyses did not always correlate well with current sub-divisions used for analyzing and summarizing small grain performance in the state. The results of the analyses were ambiguous, so it is presently unclear whether the sub-regions are appropriate. Further work is therefore needed to explore genotype-by-environment interaction in small grains in California.

Intermountain trials

The fall-sown winter wheat, and spring-sown spring wheat and barley trials, are conducted in a geographically restricted region of California and represent only one or two test locations. This is potentially problematic because variety trial data from single years and locations may not be a reliable predictor of long-term variety performance [40]. To address the lack of multiple test locations within individual season, data from multiple seasons is therefore used to generate the variety performance estimates presented here. To further increase the reliability of performance estimates for the Intermountain region the results of the trials could also be analyzed with data for the same varieties from other regions of Oregon. This will generate more reliable performance data for these varieties for California grain growers in the Intermountain region.

Crop modeling

APSIM is a computer modeling framework that combines biophysical and management modules that simulate cropping systems [41, 42]. The program is commonly used as a research and management tool for simulating wheat production, although there is little to no published information regarding its use for this in California. The accuracy of the model under Californian conditions is therefore unknown. Preliminary model testing suggests that the APSIM model is able to accurately simulate biomass accumulation of common wheat in California. Further testing of the model under a wider range of conditions is ongoing.

Canopy reflectance

Initial analysis of the 2016-17 canopy reflectance data suggest that these phenotyping and modeling approaches are able to account for a significant portion of the variability in crop productivity. More work is ongoing to relate these measurements to changes in phenological stages and changes in biomass across the season. In addition, during the current season, we are taking similar measurements at a broader range of locations to test the consistency of this approach across multiple site-years. If these phenotyping efforts continue to produce useful information, they may permit the development of more robust and quantitative variety information that can be used both in breeding selection and in site-specific variety selection moving forward.

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