UC Small Grain Variety Testing Program and Interactive Web Tool

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The overall objective of this research is to provide productivity information for new and existing small grain cultivars to growers in various regions of California as well as to public and private breeding programs. Publically released small grain varieties and advanced breeding lines are evaluated for yield, agronomic characteristics, disease & pest reactions, and grain quality in representative environments throughout California. This work is accomplished in cooperation with a large network of UC agronomists and breeders as well as other public- and private-industry agronomists and breeders. The resulting information is used to identify where and under which conditions small grain varieties are best adapted, and to justify the release of advanced breeding lines from both public and private breeding programs.

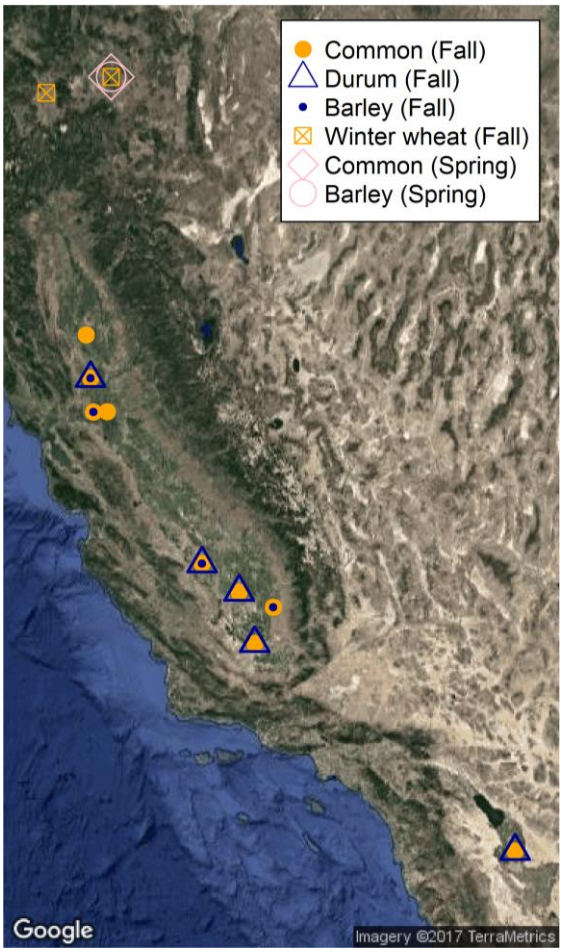

Figure 1. 2016-17 UC Small Grain Variety Testing Program trial locations.

Commercially available and advanced breeding lines of common wheat, durum wheat, triticale, and barley are grown annually in statewide multi-environment trials (Figure 1). Trials are established in fields of cooperating growers and at University of California Research and Extension Centers. Randomized complete block designs with four replications are used for all tests. Comprehensive agronomic data is recorded for each variety at the plot level, including in-season observations of time to heading and maturity, plant height, and propensity for lodging or shattering. Observations of diseases including stripe rust, leaf rust, septoria, and barley yellow dwarf virus, are also made across multiple trial locations.

Results of these multi-year, multi-location trials are summarized on the Small Grains Variety portion of the UC Agronomy Research and Information Center website (http://smallgrains.ucanr.edu/Variety/). Updates on these trials and other research and extension items of relevance to California small grain growers are provided on the UC Small Grains Blog (http://ucanr.edu/blogs/smallgrains/).

In addition, we are excited to share our recently developed and released variety selection webtool (http://smallgrainselection.plantsciences.ucdavis.edu/). This interactive decision support tool is designed to pinpoint small grain varieties that have performed well in particular regions and environments of California using data from our multi-year, multi-location field trials. The main

features of the tool are: 1) 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 UC trial data; 2) a custom table that is returned based on these selections; and 3) a second series of selection options that modify/narrow the table based on user choices (Figure 2).

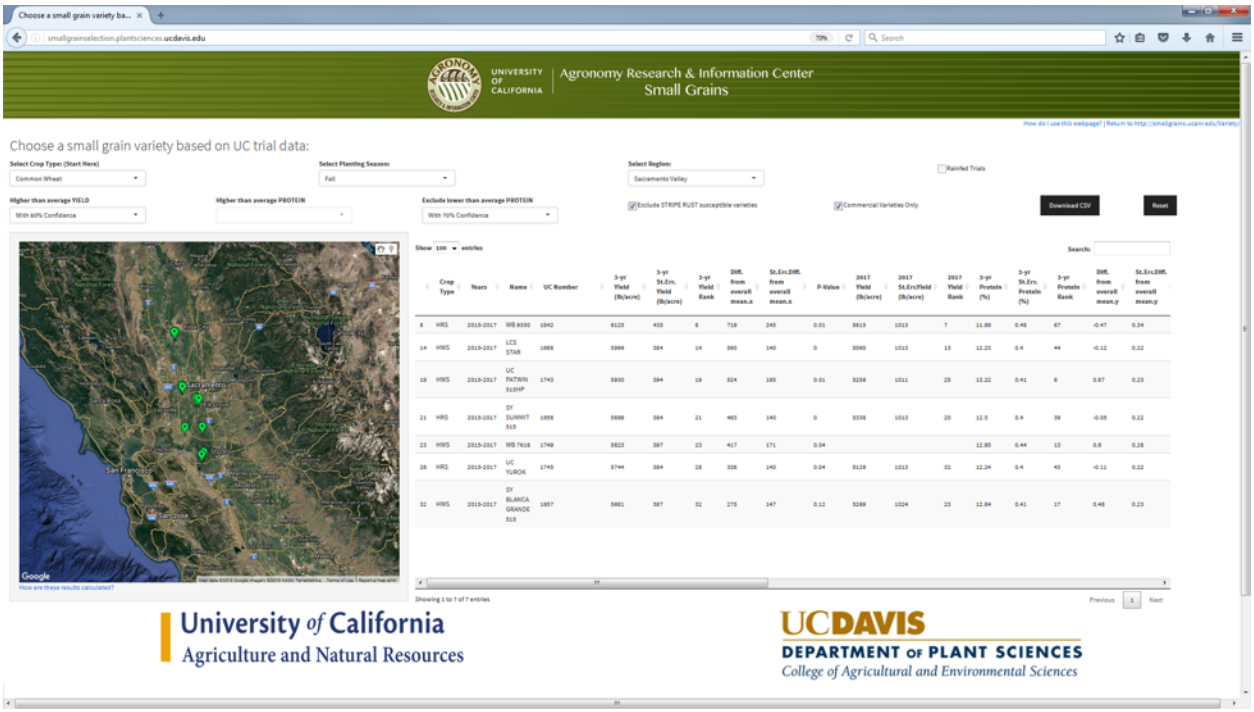

Figure 2. Screenshot of interactive decision support tool for small grain variety selection with selections for the Imperial Valley. This tool is available on the Small Grains portion of the UC Agronomy Research and Information Center (AgRIC) website: smallgrains.ucanr.edu/Variety/.

Using this tool and the most recent 3-years of data collected at our trials in the Sacramento Valley, we are able to identify which commercially available varieties have performed better than average in terms of yield. In addition, because there is often a yield-protein tradeoff in small grain crops, we can also filter results to only those varieties with average or above-average grain protein content. There is an additional filter for varieties that have shown susceptibility to stripe rust within our trial network.

If we apply all of these filters to commercially-available, fall-planted common wheat in the Sacramento Valley, **WB 9350, LCS STAR, UC PATWIN 515HP, SY SUMMIT 515, WB 7618, and UC YUROK** are the varieties that remain. Similar summaries are available for durum wheat, triticale, and barley. You can navigate to the tool at http://smallgrains.ucanr.edu/Variety/. We encourage you to check it out for yourself and let us know if you have questions or suggestions!

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			YIELD								
Crop Type	**Years**	**Name**	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	3-yr P-Value	2017 Yield (lb/acre)	2017 St.Err.Yield (lb/acre)	2017 Yield Rank
HRS	2015-2017	WB 9350	6125	435	8	719	245	0.01	5815	1013	7
HWS	2015-2017	LCS STAR	5996	384	14	590	140	0	5560	1013	13
HWS	2015-2017	UC PATWIN 515HP	5930	394	19	524	165	0.01	5256	1011	25
HRS	2015-2017	SY SUMMIT 515	5869	384	21	463	140	0	5338	1013	20
HWS	2015-2017	WB 7618	5823	397	23	417	171	0.04	NA	NA	NA
HRS	2015-2017	UC YUROK	5744	384	28	338	140	0.04	5126	1013	32

			PROTEIN								
			3-yr Protein (%)	3-yr St.Err. Protein (%)	3-yr Protein Rank	Diff. from overall mean	St.Err. Diff. from overall mean	3-yr P-Value	2017 Protein (%)	2017 St.Err.Protein (%)	2017 Protein Rank
HRS	2015-2017	WB 9350	11.89	0.48	67	-0.47	0.34	0.46	11.21	0.71	34
HWS	2015-2017	LCS STAR	12.23	0.4	44	-0.12	0.22	0.8	11.3	0.71	29
HWS	2015-2017	UC PATWIN 515HP	13.22	0.41	6	0.87	0.23	0	12.53	0.71	2
HRS	2015-2017	SY SUMMIT 515	12.3	0.4	39	-0.05	0.22	0.92	11.83	0.71	13
HWS	2015-2017	WB 7618	12.95	0.44	13	0.6	0.28	0.15	NA	NA	NA
HRS	2015-2017	UC YUROK	12.24	0.4	43	-0.11	0.22	0.8	12	0.71	11

			DISEASE AND AGRONOMIC TRAITS											
			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 rated for disease or traits (n)
HRS	2015-2017	WB 9350	R	R	R	R	61.8	42.8	92	145	25	Med. Low	NA	48
HWS	2015-2017	LCS STAR	R	R	MR	R	60.9	35.9	93	134	35	High	Low	182
HWS	2015-2017	UC PATWIN 515HP	R	R	R	R	59.8	34.1	90	129	29	Med. Low	Low	119
HRS	2015-2017	SY SUMMIT 515	R	R	MR	R	61.6	38.9	93	134	32	Low	Low	184
HWS	2015-2017	WB 7618	R	R	MS	NA	61.4	36.8	92	133	34	Low	Low	138
HRS	2015-2017	UC YUROK	R	R	MS	R	62.2	37.2	96	136	35	Med. High	Low	184

Table 1. Summary output from UC Small Grain Variety Selection tool (http://smallgrainselection.plantsciences.ucdavis.edu/; http://smallgrains.ucanr.edu/Variety/) with the following filters in place: Common Wheat; Fall Planted; Sacramento Valley; Higher than average Yield with 95% confidence; average or above average protein with 70% confidence; stripe rust resistance; Commercial varieties.

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