IPM: Cereal Rust Problems – Resistance, Susceptibility, and Management

Hay Days Workshop
March 1, 2019, Morgan Hill at Tilton Ranch

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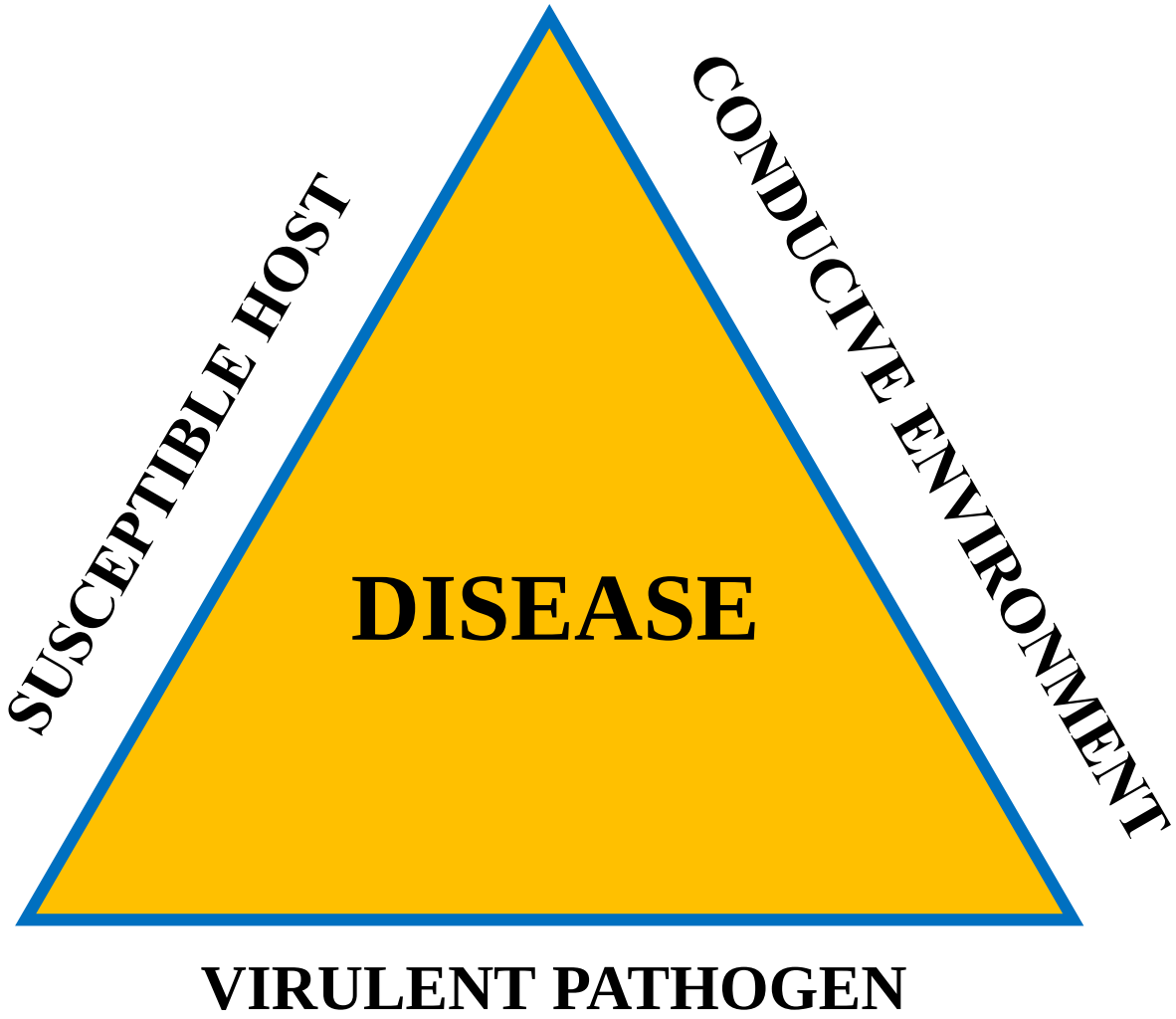
Presentation Outline

- Plant Disease
- Rust pathogens, disease cycle
- Rust management strategies
- Variety selection tool
- Conclusion

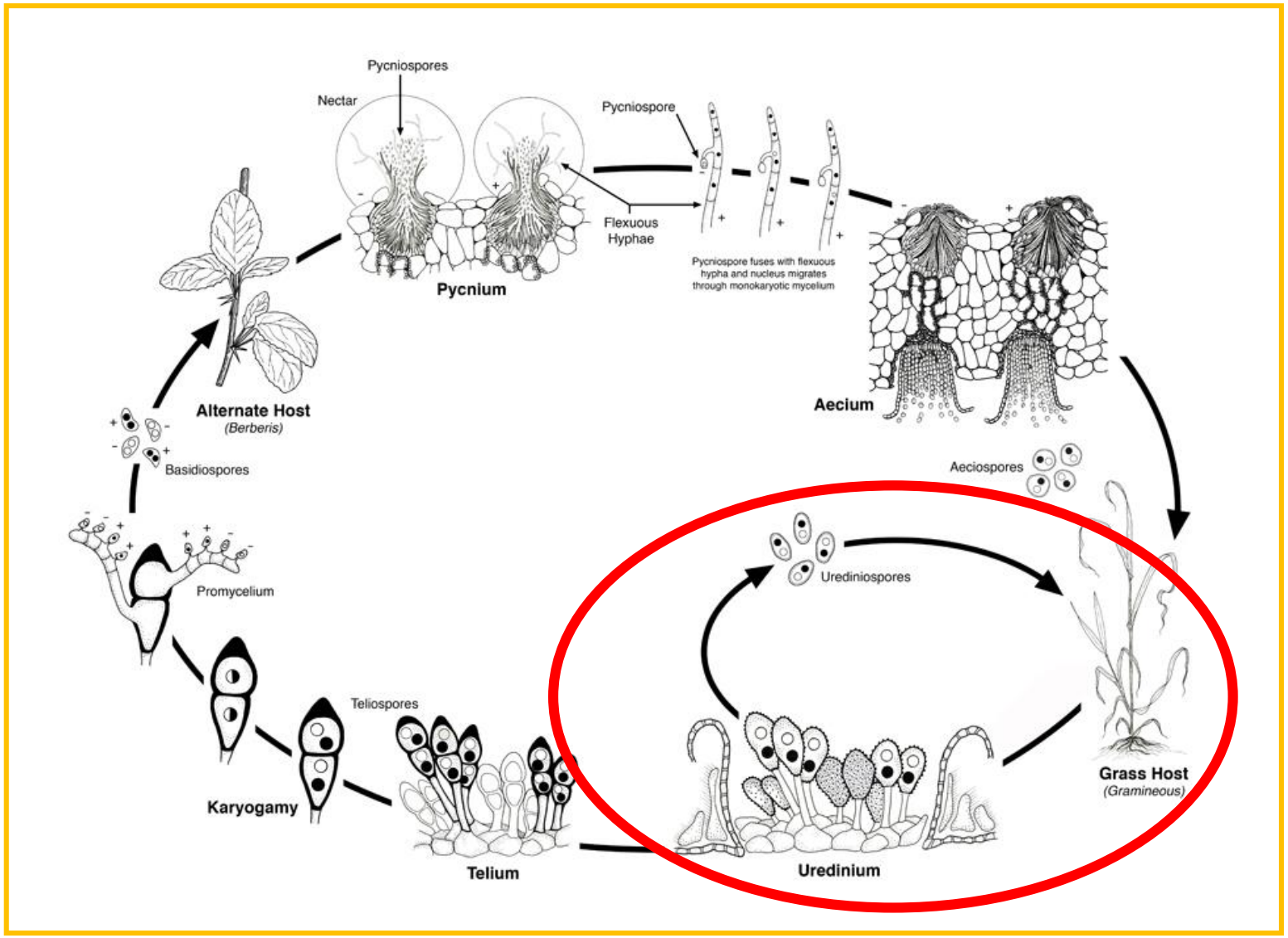
Plant Disease

- Diminished capacity to function normally;
  - **Biotic** and abiotic causes



Rust Diseases

- Caused by pathogens
  - *Puccinia spp.*
- Obligate parasites
- Host species specific
- Stem, crown, leaf, stripe
  - All different pathogens
- Alternate hosts usually not important



USDA ARS

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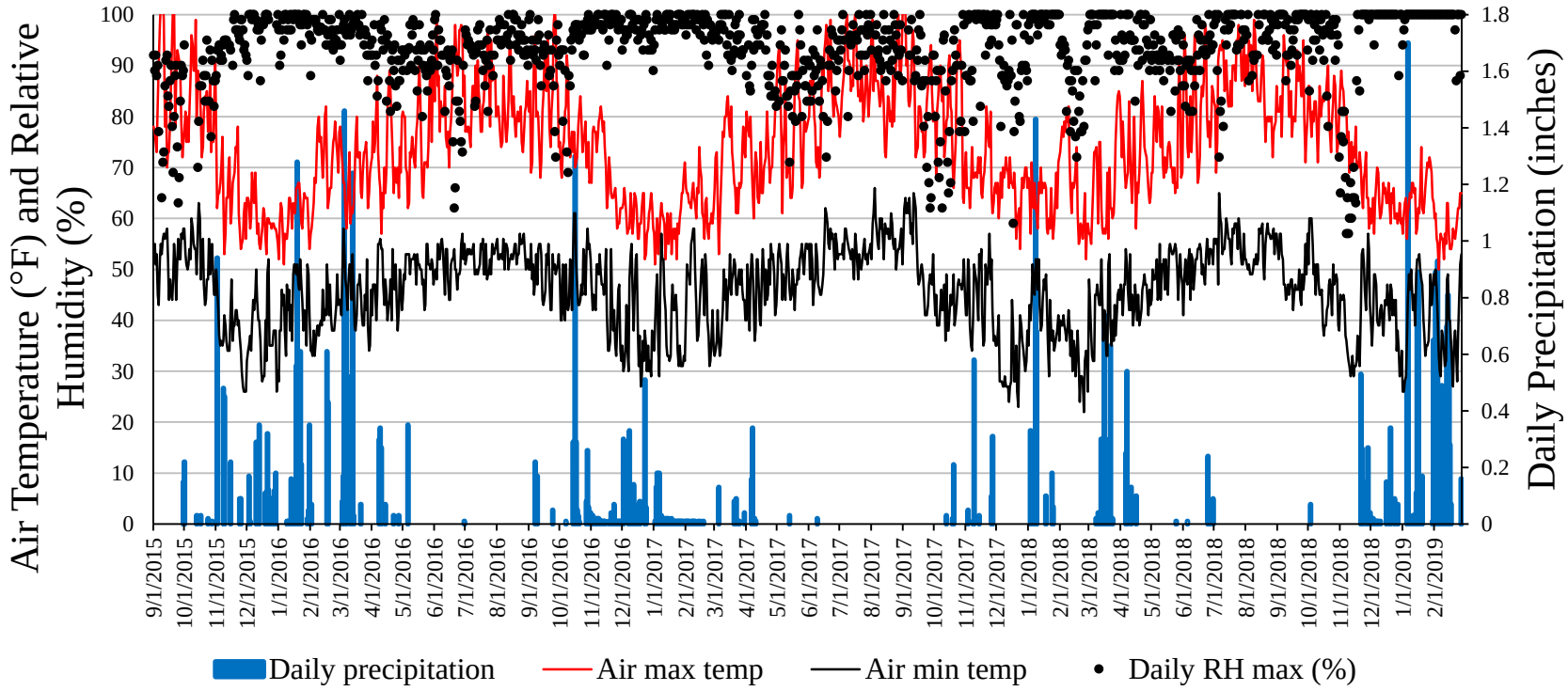
Favorable Environments

- Leaf Rusts
  - 60-86 °F
  - Frequent dew or high RH%
- Stem Rusts
  - 60-86 °F
  - Frequent dew or high RH%
- Strip Rust
  - 50-64 °F
  - Frequent dew or high RH%

Temperature, Relative Humidity, and Precipitation at Gilroy
CIMIS, 9/1/15 to Present



UC IPM; OSU Ext; CA CWR CIMIS

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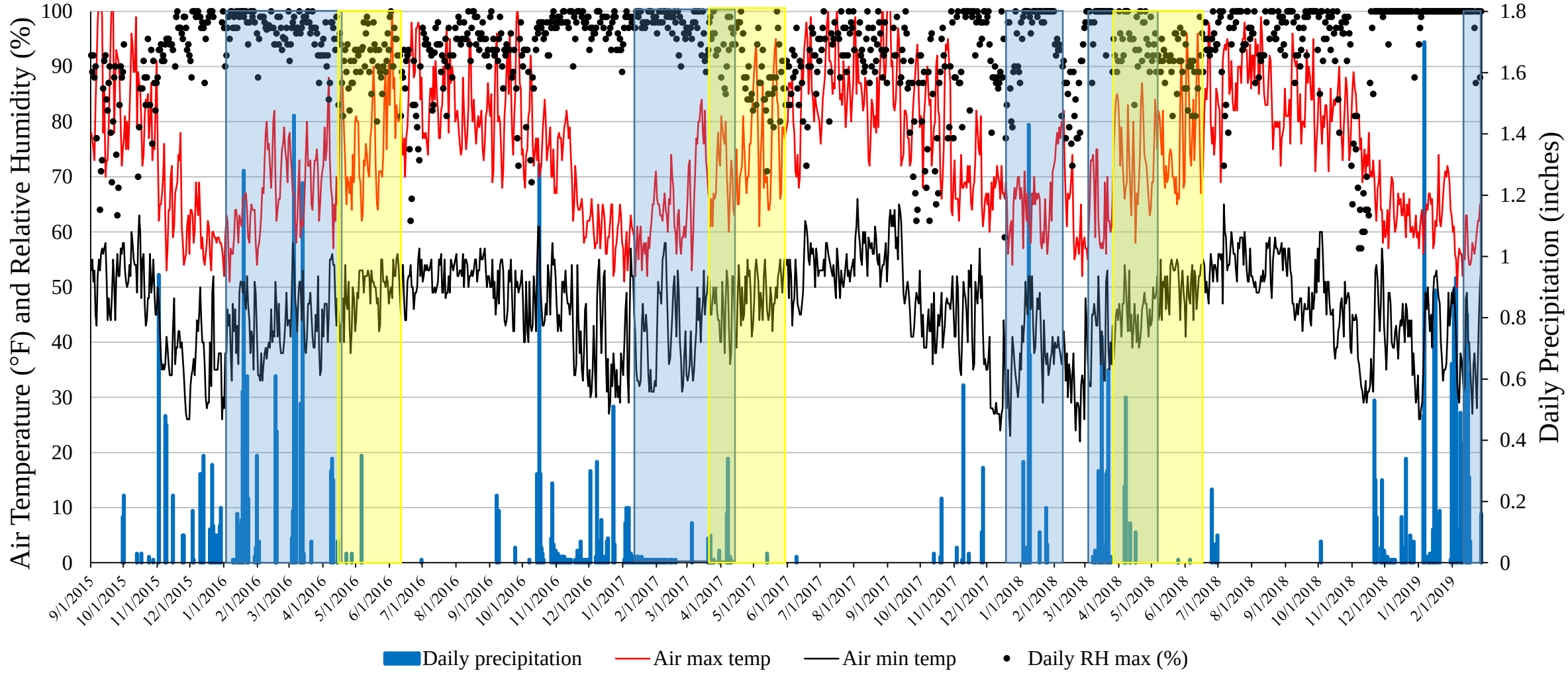
Temperature, Relative Humidity, and Precipitation at Gilroy CIMIS, 9/1/15 to Present



CA DWR CIMIS

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Management of Rust

- Establishing/maintaining healthy plants
- Planting of resistant varieties
- Planting blends of species
- Disease favorable environment forecasting
- Well-timed application of fungicides
  - Strobulurins or triazoles to protect the flag leaf

[UC IPM Small Grains Webpage]

[Barley resistance table]
[Oat resistance table]
[Wheat resistance table]

Fig. 1. Leaf rust.

Fig. 2. Stripe rust

Fig. 3. Stem rust.

Consult a PCA and always follow all pesticide label instructions.
Images: OSU Ext.

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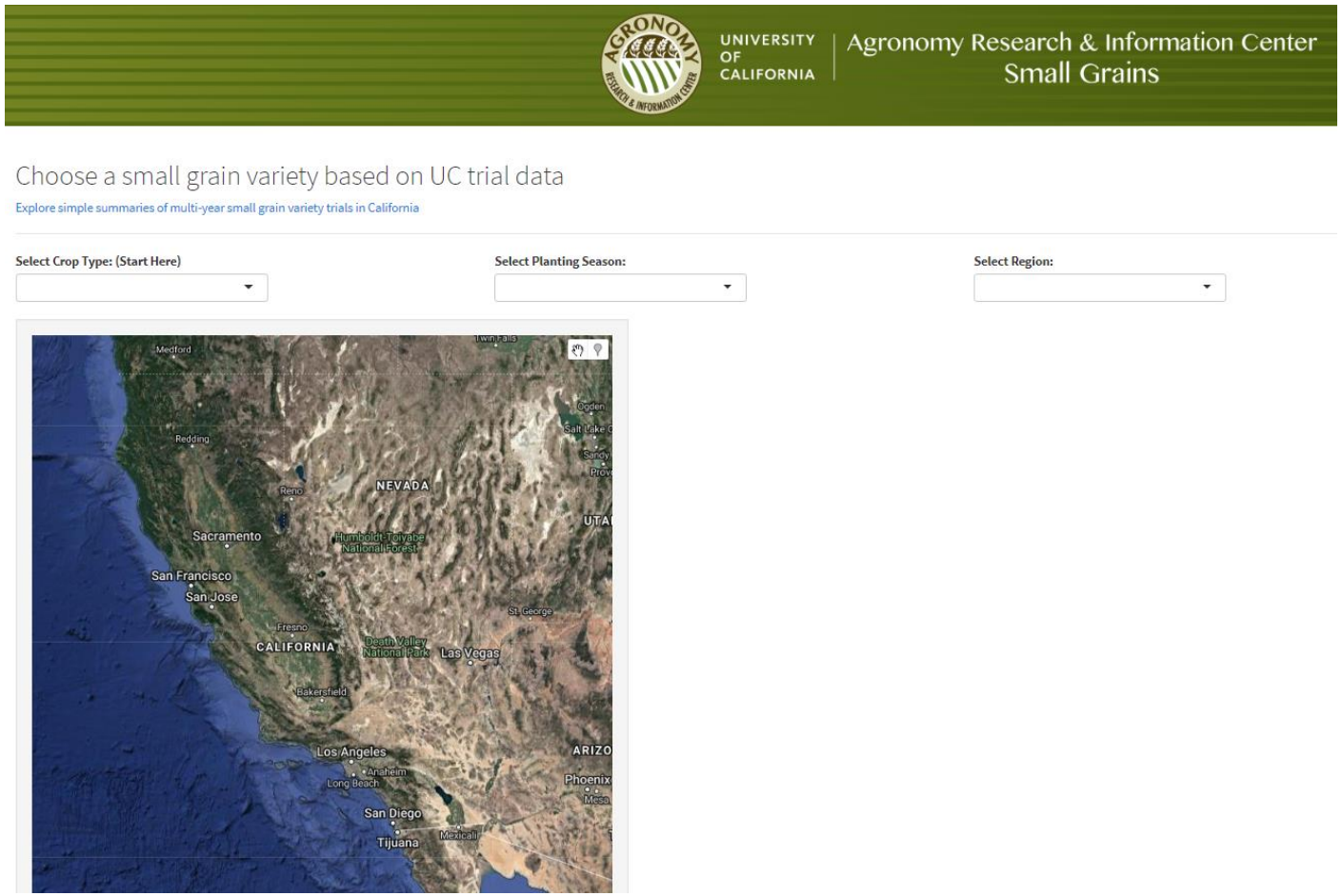
UC Small Grain Variety Selection Tool



[Small Grain Selection Web Tool]

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Choose a small grain variety based on UC trial data

Explore simple summaries of multi-year small grain variety trials in California

Select Crop Type: (Start Here)

Select Planting

- Common Wheat
- Durum Wheat
- Triticale
- Barley

Choose a small grain variety based on UC trial data

Explore simple summaries of multi-year small grain variety trials in California

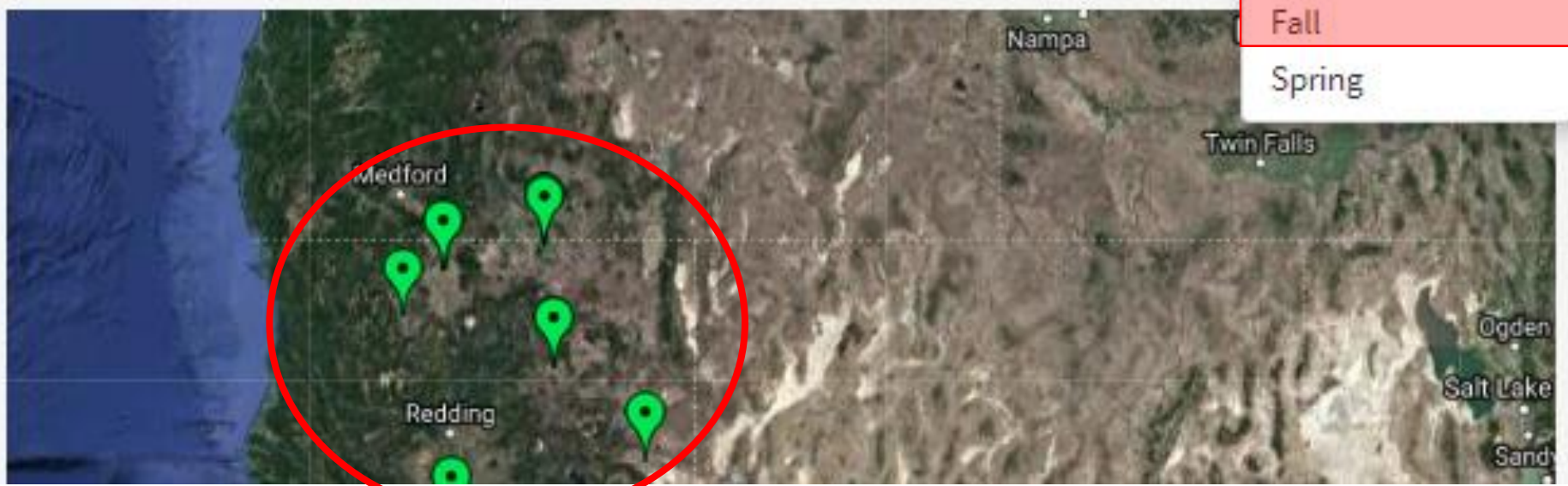
Select Crop Type: (Start Here)

Common Wheat

Select Planting Season:

Fall

Spring



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Small Grains

How do I use this webpage? | Return to http

Select Region:

Rainfed Trials

wer than average PROTEIN

Exclude STRIPE RUST susceptible varieties

Commercial Varieties Only

Download CSV

entries

Search:

Years	Name	UC Number	3-yr Yield (lb/acre)	3-yr St.Err. Yield (lb/acre)	3-yr Yield Rank	Diff. from overall mean.x	St.Err.Diff. from overall mean.x	P-Value	2018 Yield (lb/acre)	2018 St.Err.Yield (lb/acre)	2018 Yield Rank	3-yr Protein (%)	3-yr St.Er Prot (%)

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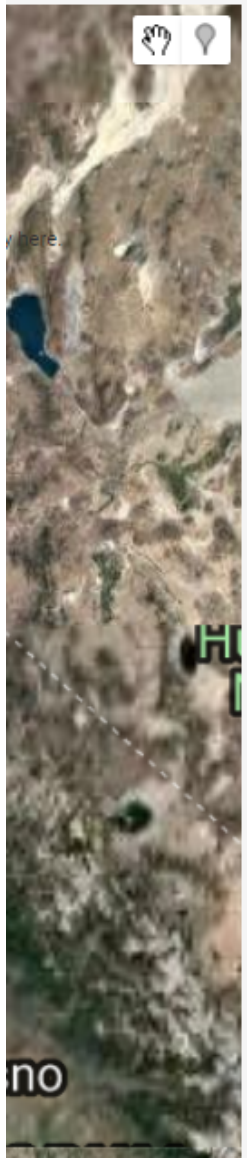

Show 100 entries

Search:

n	2014-2018 S. Rust rating	2014-2018 L. Rust rating	2014-2018 BYDV rating	2014-2018 Septoria rating	Test Wt (lb/bu)	1000 Kernel Wt (g)	Days to heading (from Jan. 1, Davis)	Days to maturity (from Jan. 1, Davis)	Plant Ht (in)	Lodging risk	Shatter risk	2014-2018 plots rated for disease or traits (n)
	MS	R	MS	R	62	38.4	89	137	32	Med. Low	Low	210
	R	R	R	R	61.4	39.1	94	148	27	Med. Low		104
	R	R	R	R	62.2	38.9	91	142	30	Med. High	Low	144
	R	R	R	R	62	37.8	97	149	27	Med. High		104
	R	R	MR	R	61.8	39.1	92	139	32	Med. Low	Low	209

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Crop Type	Years	Name	UC Numbe	3-yr Yield (	3-yr St.Err.	3-yr Yield F	Diff. from	St.Err.Diff.	P-Value	2018 Yield	2018 St.Er	2018 Yield	3-yr Protei	3-yr St.Err.	3-yr Protei	Diff. from	St.Err.Diff.
2	HWS	2016-2018	LCS ATOM	1723	5616	649	1	645	142	0	6182	1086	2	12.16	0.84	54	-0.49	0.39
3	HRS	2016-2018	WB 9350	1842	5473	653	3	502	162	0.02	6155	1086	3	12.3	0.86	52	-0.35	0.42
4	HRS	2016-2018	UC CENTR	1817	5290	648	10	319	140	0.14	5876	1084	12	12.77	0.84	23	0.12	0.39
5	HRS	2016-2018	WB 9433	1847	5240	654	15	269	165	0.34	5836	1089	14	12.4	0.86	49	-0.25	0.43
6	HRS	2016-2018	SY SUMMI	1658	5218	649	18	247	142	0.29	5876	1086	13	12.64	0.83	35	-0.01	0.37
7	HWS	2016-2018	LCS STAR	1688	5158	651	23	187	150	0.48	5261	1099	32	13.16	0.84	10	0.51	0.39
8	HRS	2016-2018	SY REDWII	1521	5152	650	24	181	146	0.48	5772	1091	16	12.66	0.83	32	0.01	0.38
9	HRS	2016-2018	SY ULTRA	1590	5137	658	26	166	179	0.63	NA	NA	NA	12.6	0.89	38	-0.05	0.48
10	HWS	2016-2018	WB 7566	1802	5123	651	29	152	153	0.6	5962	1104	8	12.32	0.85	51	-0.33	0.4
11	HWS	2016-2018	SY BLANCA	1657	5084	650	31	114	148	0.67	5322	1095	29	12.73	0.84	28	0.08	0.39
12	HWS	2016-2018	WB 7618	1749	5075	701	32	104	296	0.88	NA	NA	NA	13.23	1.1	9	0.58	0.81
13	HRS	2016-2018	SY SIENNA	1835	5070	653	34	100	162	0.78	5881	1086	11	12.76	0.86	24	0.11	0.42
14	HWS	2016-2018	UC PATWI	1680	5067	650	35	97	146	0.76	6483	1092	1	12.87	0.84	21	0.22	0.4
15	HWS	2016-2018	SY BLANCA	1522	5030	649	39	59	144	0.85	5302	1089	30	12.99	0.84	18	0.34	0.39
16	HRS	2016-2018	WB ROCKL	1650	5006	701	42	35	296	0.92	NA	NA	NA	13.6	1.1	5	0.96	0.81
17	HRS	2016-2018	WB 9904	1751	4988	649	44	17	144	0.92	5340	1089	27	12.61	0.84	37	-0.04	0.39
18	HRS	2016-2018	UC LASSIK	1495	4985	650	45	14	146	0.92	5970	1091	7	12.16	0.84	55	-0.49	0.39
19	HRS	2016-2018	SY CAL RO	1478	4950	650	46	-21	146	0.92	5502	1089	25	12.11	0.83	60	-0.54	0.37
20	HRS	2016-2018	WB 9112	1748	4932	648	47	-39	138	0.88	5579	1083	21	12.36	0.83	50	-0.29	0.37
21	HRS	2016-2018	UC YUROK	1745	4889	648	50	-82	140	0.78	5810	1084	15	12.12	0.83	59	-0.53	0.37
22	HRS	2016-2018	SY 314	1660	4818	658	52	-153	179	0.64	NA	NA	NA	12.03	0.89	61	-0.61	0.48
23	HRS	2016-2018	WB 9229	1730	4817	650	53	-154	146	0.6	5326	1091	28	13.02	0.84	17	0.37	0.4
24	HWS	2016-2018	UC PATWI	1743	4752	648	55	-219	140	0.36	5098	1084	35	13.64	0.83	4	0.99	0.37

Summary

- Plant disease requires the convergence in the same place at the same time of a susceptible host, enough of a virulent pathogen, and the favorable environmental conditions for disease development (infection, growth, dispersion).
- Small grains rust diseases can largely be controlled by selection of resistance varieties and species coupled with well-timed fungicide applications in high disease pressure years or for susceptible varieties to protect the flag leaf.
- A dynamic, interactive web-tool is available to assist in the selection of small grain varieties for irrigated and dryland systems based on a number of agronomic and disease resistance factors.

Thank You

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Photo credit to the Santa Clara County Office of the Agricultural Commissioner

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