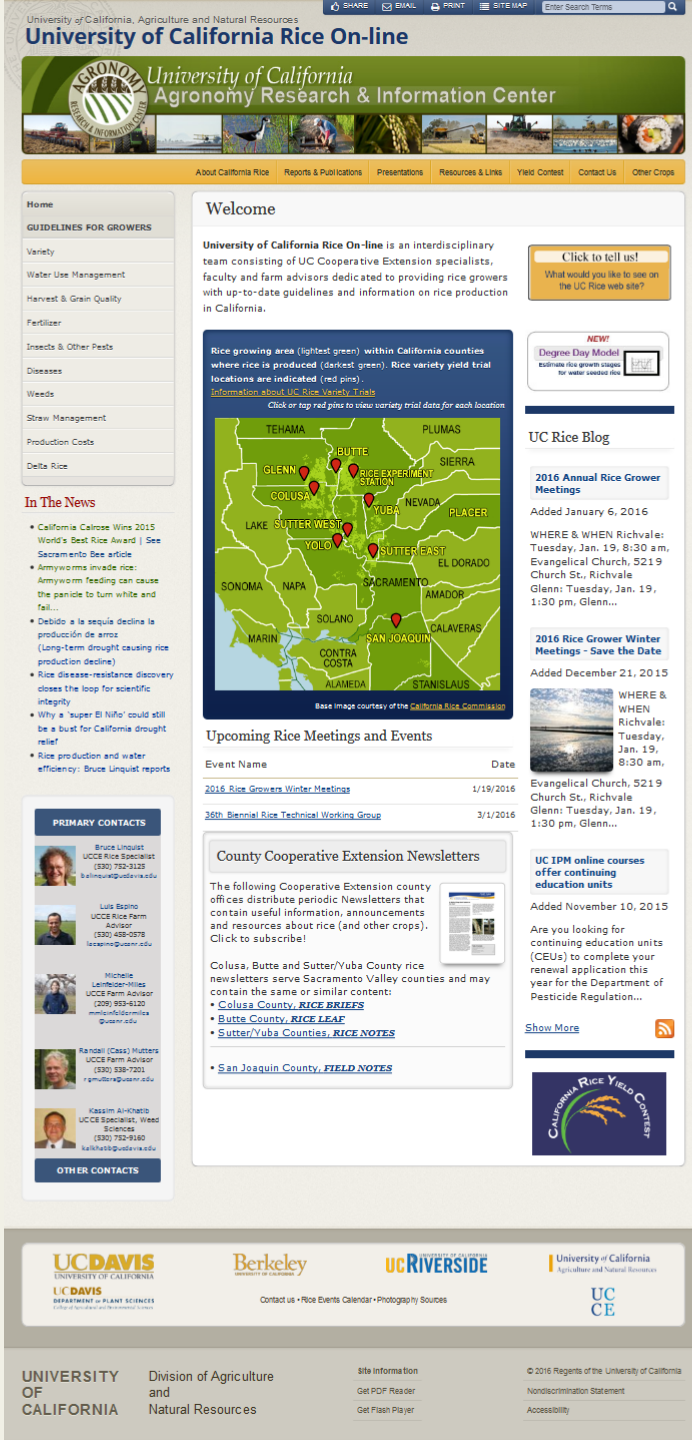
2018 review and fertility management update for California rice systems

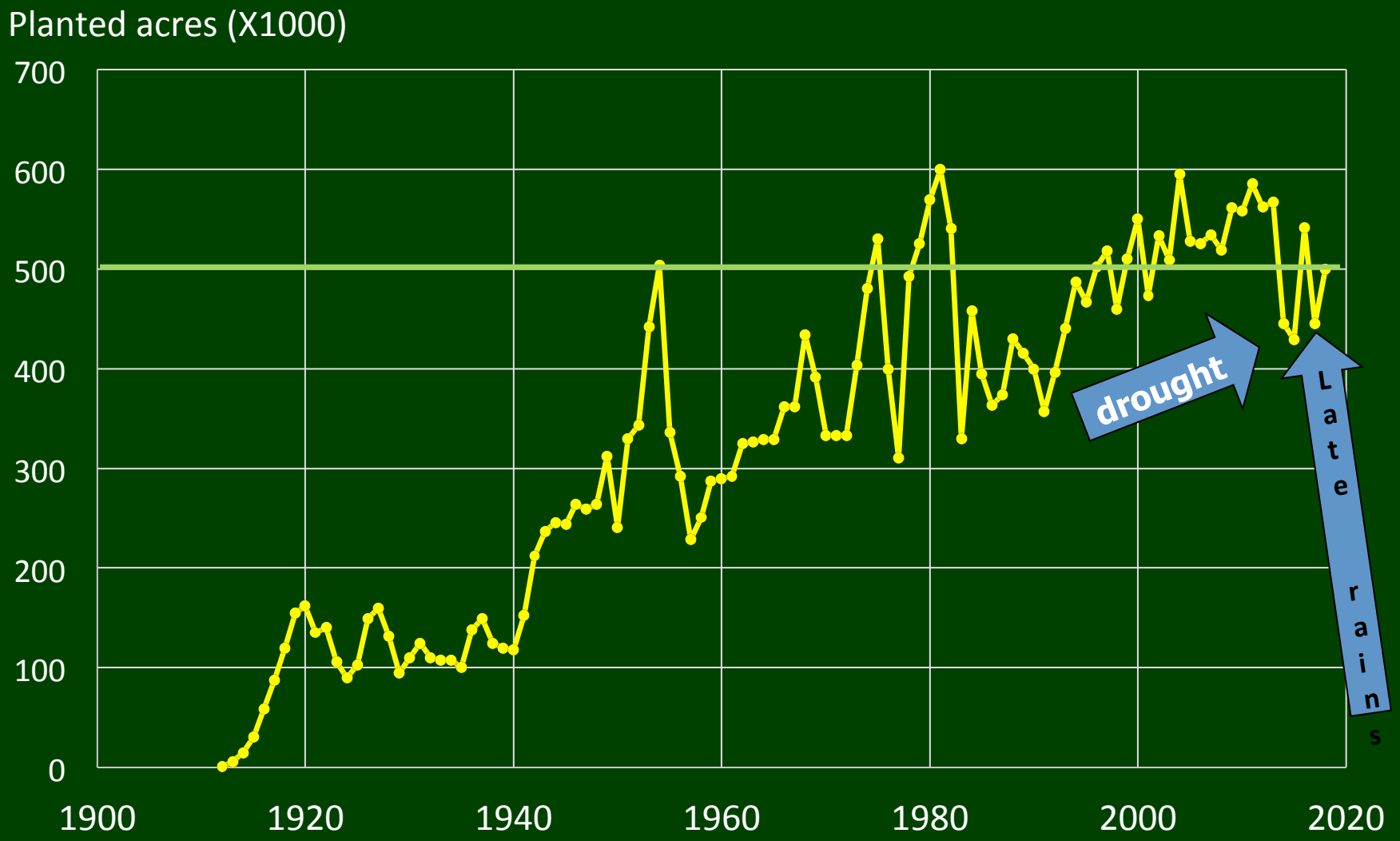
Bruce Linquist

January 17, 18 and 22, 2018

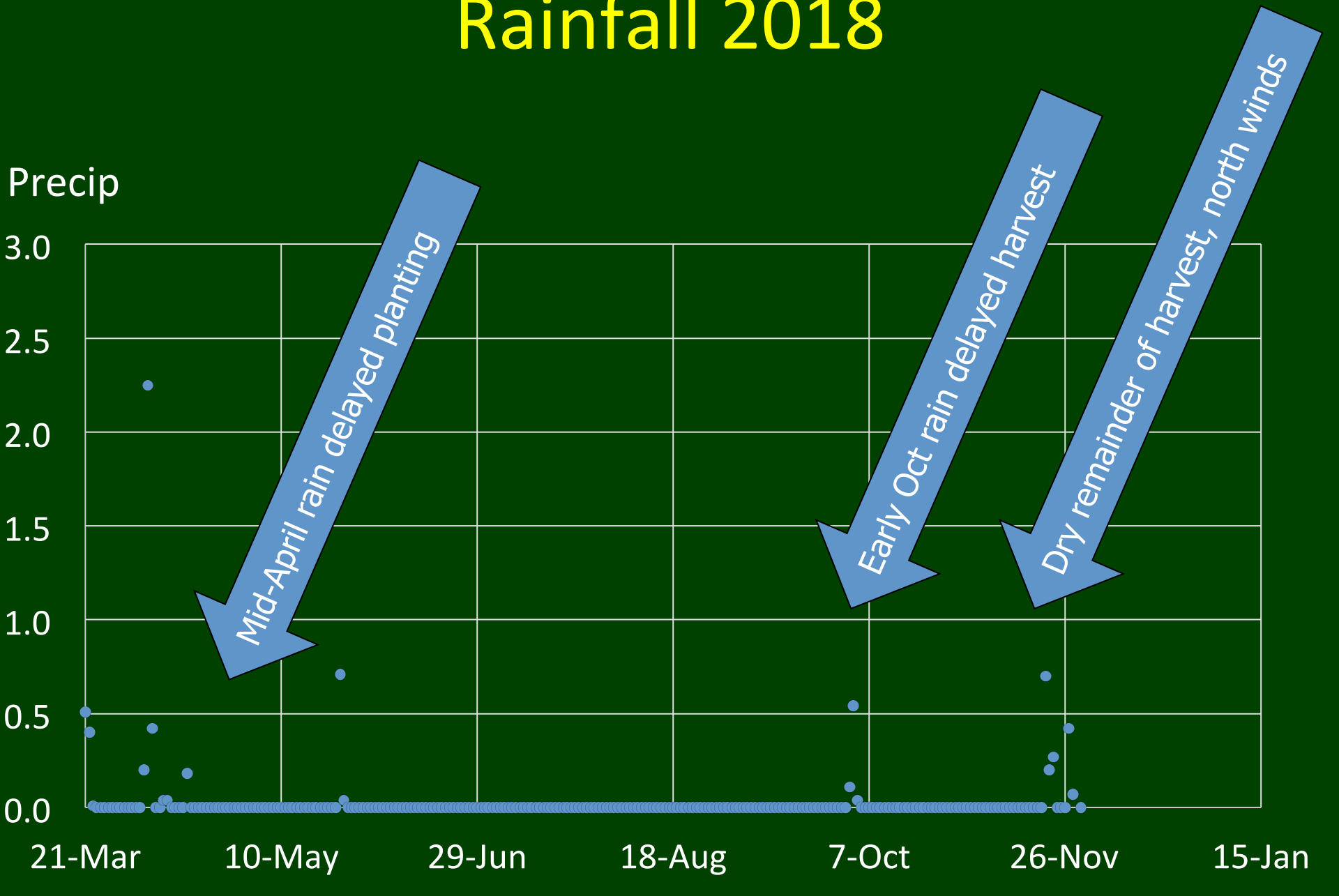
UCDAVIS
DEPARTMENT OF PLANT SCIENCES
College of Agricultural and Environmental Sciences



Planted acres

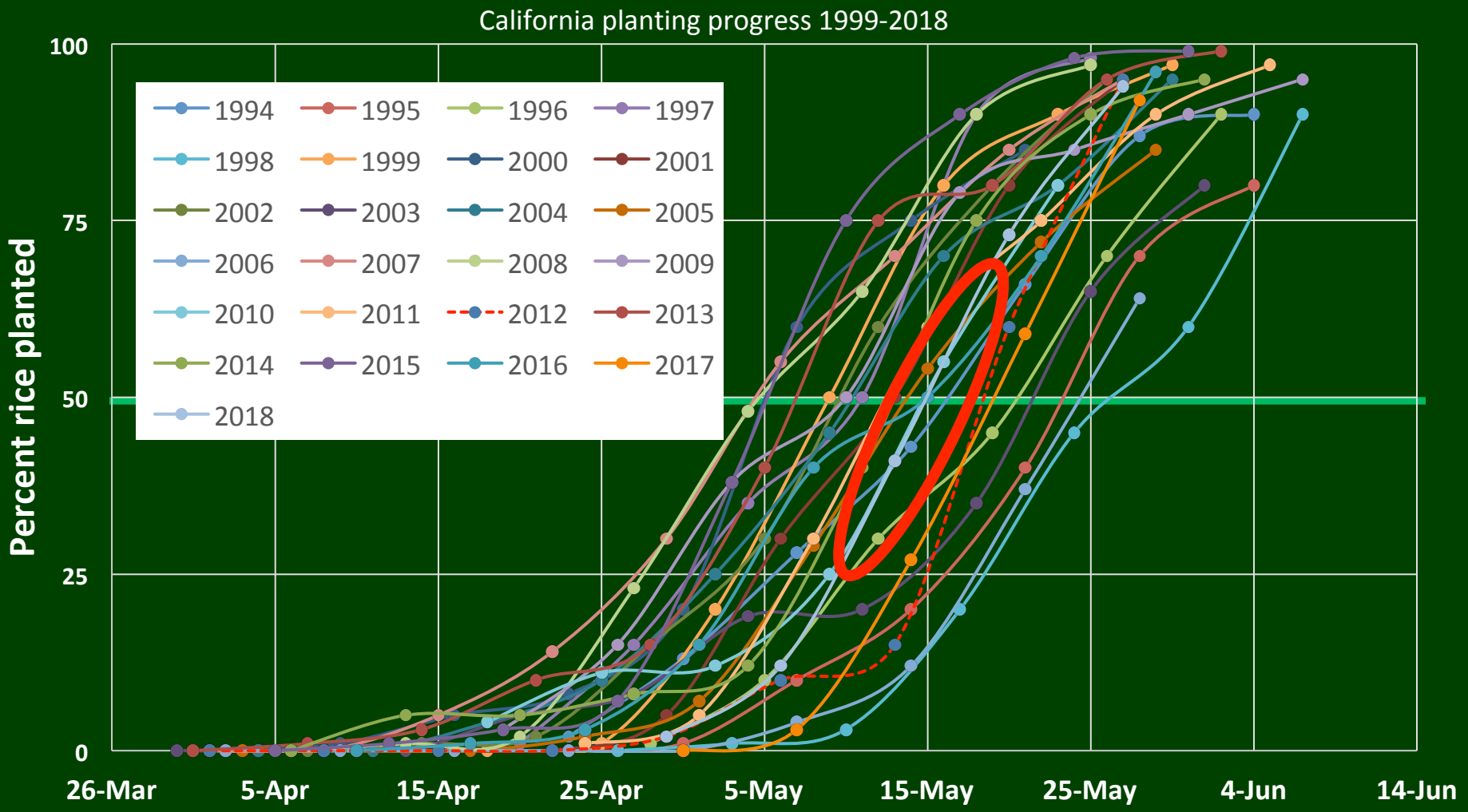


Rainfall 2018



Planting Progress:

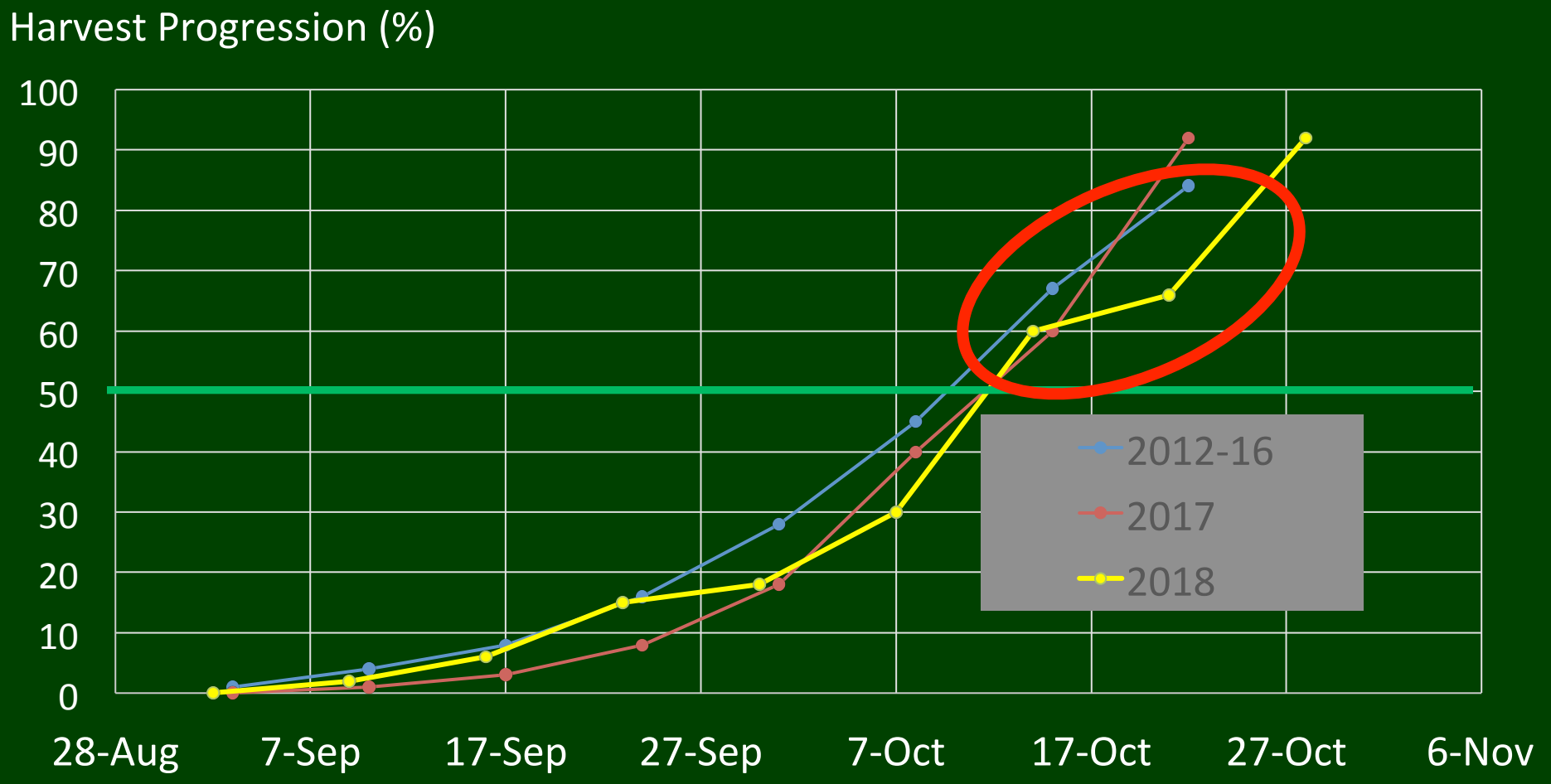
2018 50% on May 15



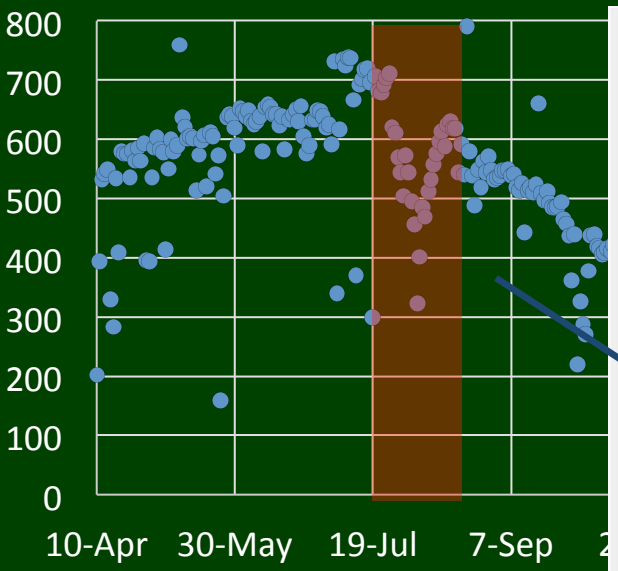
Harvest progression

2018 50% harvested Oct 11

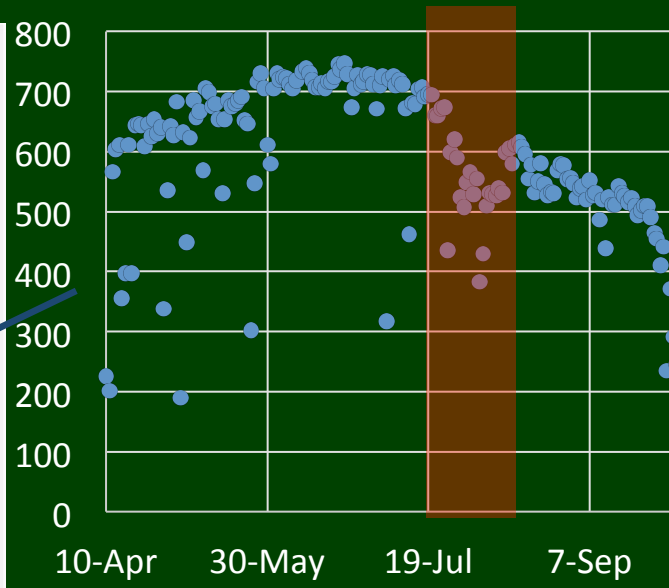
Season length was normal

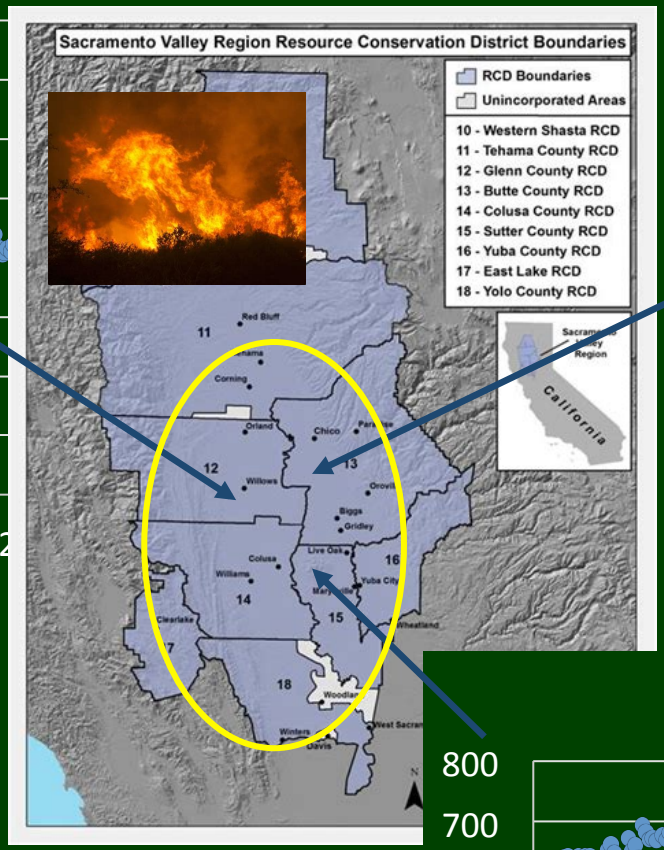


Williams



Biggs



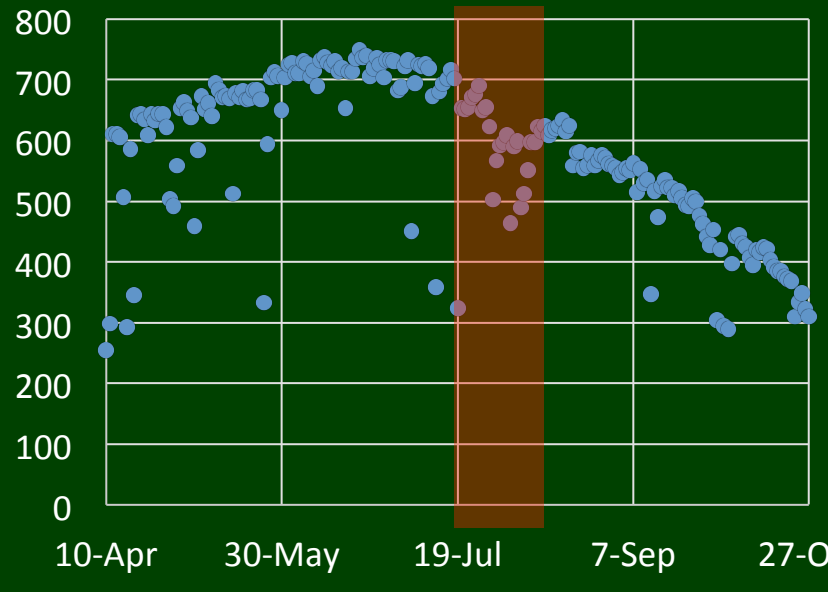


Solar Radiation (Ly/day)

Wildfires

Redding wildfire:
end July/beginning Aug
during booting

Verona

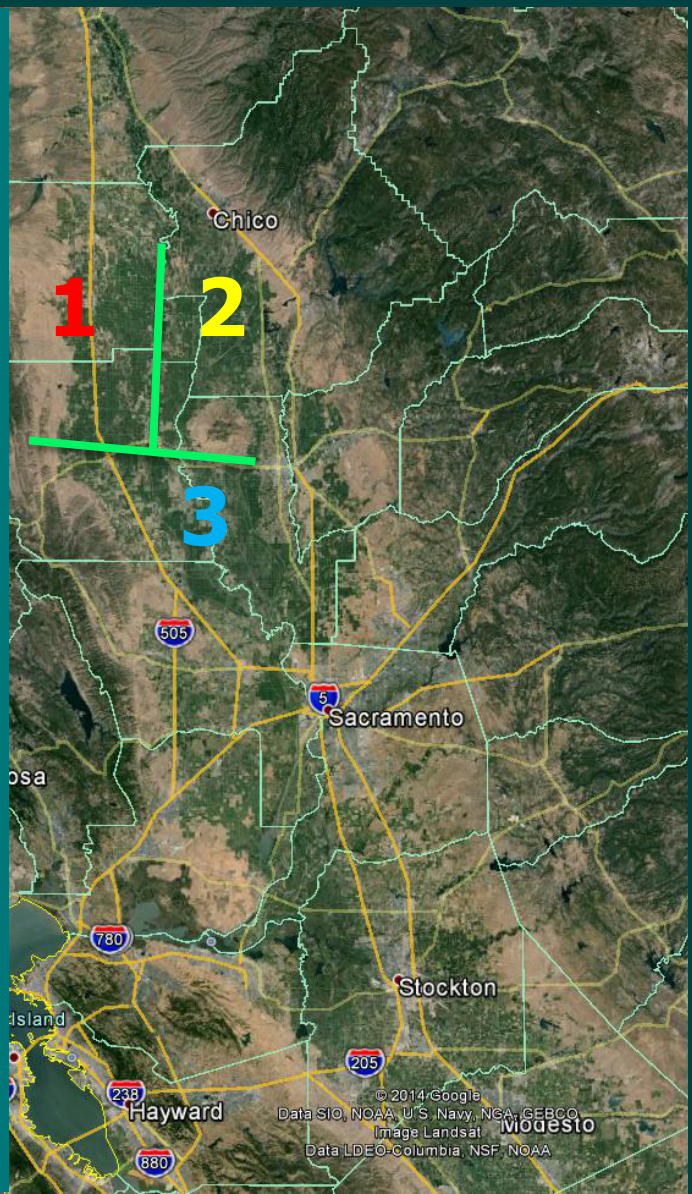


2018 Season Summary

- Wet spring
  - Late planting
- Increased kernel smut
- Smoke a problem in some areas?
- Lower yields on the northwest side of valley
- Good harvest weather
- Good grain quality
- State wide yields up from 2017 but not as high as 2015 and 2016 yields???

Yield Contest

- 21 test fields (30+ entrants)
  - Region 1: 4
  - Region 2: 6
  - Region 3: 11
- Top Yields
  - 11 entrants yields greater than 110 cwt
  - 7 entrants yields greater than 115 cwt
  - 3 entrants yields greater than 120 cwt
  - 2 entrants yields greater than 130 cwt



Yield Contest

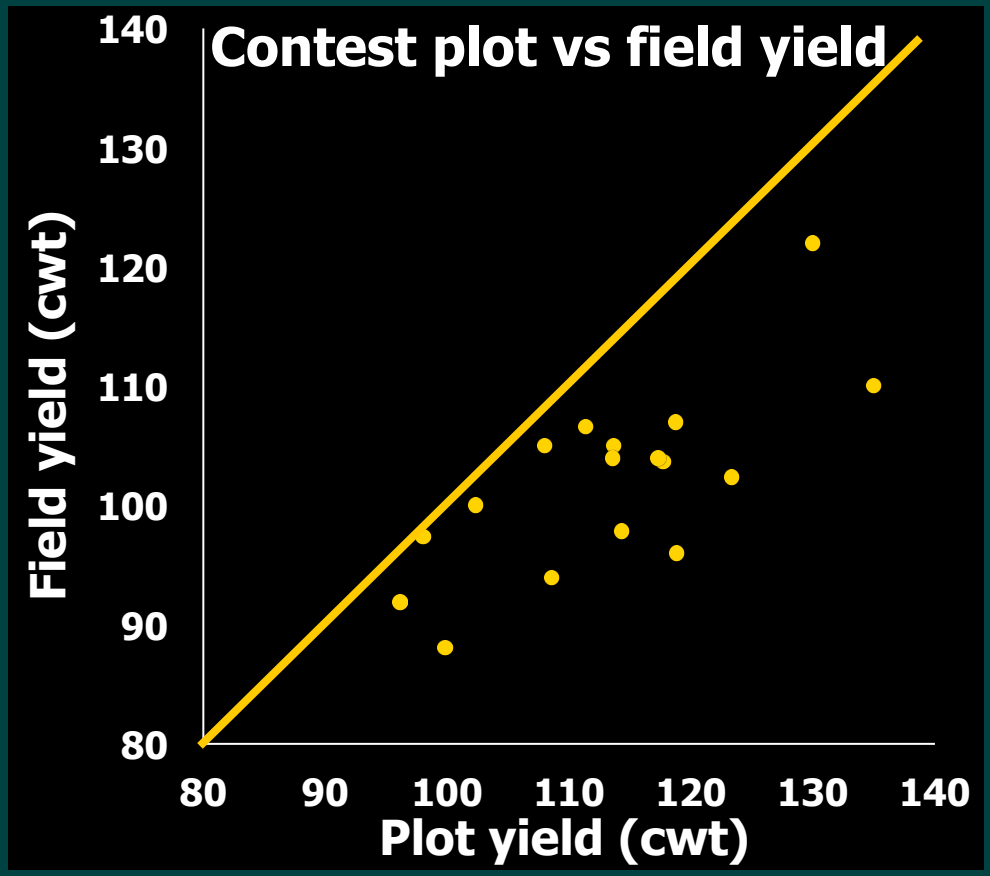
- 2015-2017:
  - Yields ranged from 99 to 127 cwt
- 2018: Yields from 92 to 135 cwt
  - NW: 102.3 (227 bu) M-401
  - NE: 118.8 (264 bu) M-105
  - S: 135.0 (300 bu) M-209

General info

- Yield results by region
  - Region 1 (NW): 91.9 – 102.3 cwt
  - Region 2 (NE): 99.8 to 118.8 cwt
  - Region 3 (S): 103.6 to 135.0 cwt
- Varieties entered
  - M-105 (2)
  - M-206 (11)
  - M-209 (7)
  - M-401 (1)
- Seed rates
  - 150 to 200 lb/ac (average – 170 lb/ac)
- Previous year
  - Fallow (6)
  - Alternate crop (5)
  - Rice (9)

Yields and quality

- Yields in full field were on average 9% lower than contest plot
- Head and totals
  - Head: 65-71
  - Total: 70-75



Fertilizer

- N rates
  - 122 to 187 lb N/ac
- Starter timing
  - 8 applied late (20-30 DAP)
  - 9 applied pre-plant
- Top-dress
  - 10 applied
  - of those getting more than 115 cwt 4 applied/ 3 did not
  - Top-dress ranged from 16 to 42 lb N/ac
- 20/21 applied P

Herbicide programs

- Winners and fields above 115 cwt
  - (3) League MVP/Superwham/Grandstand*
  - (2) Butte/Regiment*
  - (2) Bolero/Grandstand
  - (1) Clomazone/Granite/Stam-Grandstand

Yield components of some yield contest entrants

Grower	Yield (cwt)	Variety	Tiller density (tiller/ft2)	Productive tillers (%)	Total spiklets/ panicle	Blanks (%)	1000 grain wt (g)
K. Gallagher	131.3	M-209	70	97	83	11.1	26.7
Doherty (1)	135.0	M-209	73	100	73	12.5	26.7
J. Gallagher	117.8	M-206	65	97	71	4.8	27.6
Doherty (2)	123.3	M-206	91	98	57	4.9	28.7



Rice Yield Contest

University of California, Agriculture and Natural Resources

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Home
GUIDELINES FOR GROWERS
Variety
Water Use Management
Harvest & Grain Quality
Fertilizer
Insects & Other Pests
Diseases
Weeds
Straw Management
Production Costs
Delta Rice

In The News

- California Calrose Wins 2015 World's Best Rice Award | See Sacramento Bee article
- Armyworms invade rice: Armyworm feeding can cause the panicle to turn white and fail...
- Debido a la sequía declina la producción de arroz (Long-term drought causing rice production decline)
- Rice disease-resistance discovery closes the loop for scientific integrity
- Why a 'super El Niño' could still be a bust for California drought relief

UCCE Rice Yield Contest

Purpose

The purpose of the California Rice Yield Contest is to provide an opportunity for rice producers and UC scientists to share information about intensive rice production in California and to recognize individuals who have achieved the highest yields in the state. Please read the rules carefully.

Organization

The California Rice Yield Contest is run and operated by the University of California Cooperative Extension. If you have any questions please call Bruce Linquist (530 752-3125), Randal Mutters (530 538-7201) or Luis Espino (530 458-0578). Entry form, Rules and Harvest forms can all be viewed and downloaded here.

Rice Yield Contest 2015

- Rice Yield Contest Rules 2015
- Yield Contest Entry form 2015
- Yield Contest Harvest form 2015

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Weeds
Straw Management
Production

Welcome

University of California Rice On-line is an inte... team consisting of UC Cooperative Exte... specialists, faculty and farm advisors dedicate... ing rice growers with up-to-date guidelines an... ion on rice production in California.

Click to tell us!
What would you like to see on the UC Rice web site?

Rice ... (lightest green) within California counties ... produced (darkest green). Rice variety yield trial ... are indicated (red pins).
...formation about UC Rice Variety Trials
Click or tap red pins to view variety trial data for each location

Base image courtesy of the California Rice Commission

NEW!
Degree Day Model
estimate rice growth stages for water seeded rice

In The News

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- Why a 'super El Niño' could still be a bust for California drought relief
- Rice production and water efficiency: Bruce Linquist reports

UC Rice Blog

2016 Annual Rice Grower Meetings
Added January 6, 2016
WHERE & WHEN Richvale: Tuesday, Jan. 19, 8:30 am, Evangelical Church, 5219 Church St., Richvale Glenn: Tuesday, Jan. 19, 1:30 pm, Glenn...

2016 Rice Grower Winter Meetings - Save the Date
Added December 21, 2015

WHERE & WHEN Richvale: Tuesday, Jan. 19, 8:30 am, Evangelical Church, 5219 Church St., Richvale Glenn: Tuesday, Jan. 19, 1:30 pm, Glenn...

UC IPM online courses offer continuing education units
Added November 10, 2015
Are you looking for continuing education units (CEUs) to complete your renewal application this year for the Department of Pesticide Regulation...

Show More

Upcoming Rice Meetings and Events

Event Name	Date
2016 Rice Growers Winter Meetings	1/19/2016
36th Biennial Rice Technical Working Group	3/1/2016

County Cooperative Extension Newsletters

The following Cooperative Extension county offices distribute periodic Newsletters that contain useful information, announcements and resources about rice (and other crops). Click to subscribe!

Colusa, Butte and Sutter/Yuba County rice newsletters serve Sacramento Valley counties and may contain the same or similar content:

- Colusa County, ***RICE BRIEFS***
- ... County, ***RICE LEAF***
- ... Counties, ***RICE NOTES***
- San Joaquin County...

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OTHER CONTACTS

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UC CE

UNIVERSITY OF CALIFORNIA Division of Agriculture and Natural Resources

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California variety usage

- Questions are for growers or PCAs
- Grower
  - Base questions on primary region and practice (conventional vs organic)
- PCA
  - Base questions on one grower you work with
  - Use growers primary region and practice
  - Preferably not a grower in the room

Variety selection

Grain yield (lb/acre @14% moisture) summary (2014-2018)

Location	Year	M105	M205	M206	M209
Butte (1)	2014	9070	9140	9610	9140
	2015	9350	7780	9370	8580
	2016	10060	9640	10400	10220
	2017	8910	9670	9330	9350
	2018	8350	8540	8270	7990
	Mean	**9148**	**8954**	**9396**	**9056**
Butte (2)	2016	10090	9110	9600	9010
	2017	8930	8550	9650	8480
	2018	9990	9200	10270	9580
	Mean	**9670**	**8953**	**9840**	**9023**
Colusa	2014	9100	9370	9280	9600
	2015	10500	10050	9850	10490
	2016	10390	9730	9960	9600
	2017	7390	8040	7530	7850
	2018	8470	8540	8960	9120
	Mean	**9170**	**9146**	**9116**	**9332**
Glenn	2014	7370	8910	8270	8610
	2015	9550	9420	9620	9700
	2016	7340	8490	7860	8520
	2017	7520	8500	7140	8200
	2018	9520	9840	9300	9990
	Mean	**8260**	**9032**	**8438**	**9004**
Yuba	2014	8590	9120	8950	8800
	2015	9970	9650	9940	10240
	2016	9110	8430	9090	8760
	2017	8370	8020	8770	9060
	2018	9450	7090	9350	8400
	Mean	**9098**	**8462**	**9220**	**9052**
Loc/Years Mean		**9069**	**8909**	**9202**	**9093**

Kernel smut

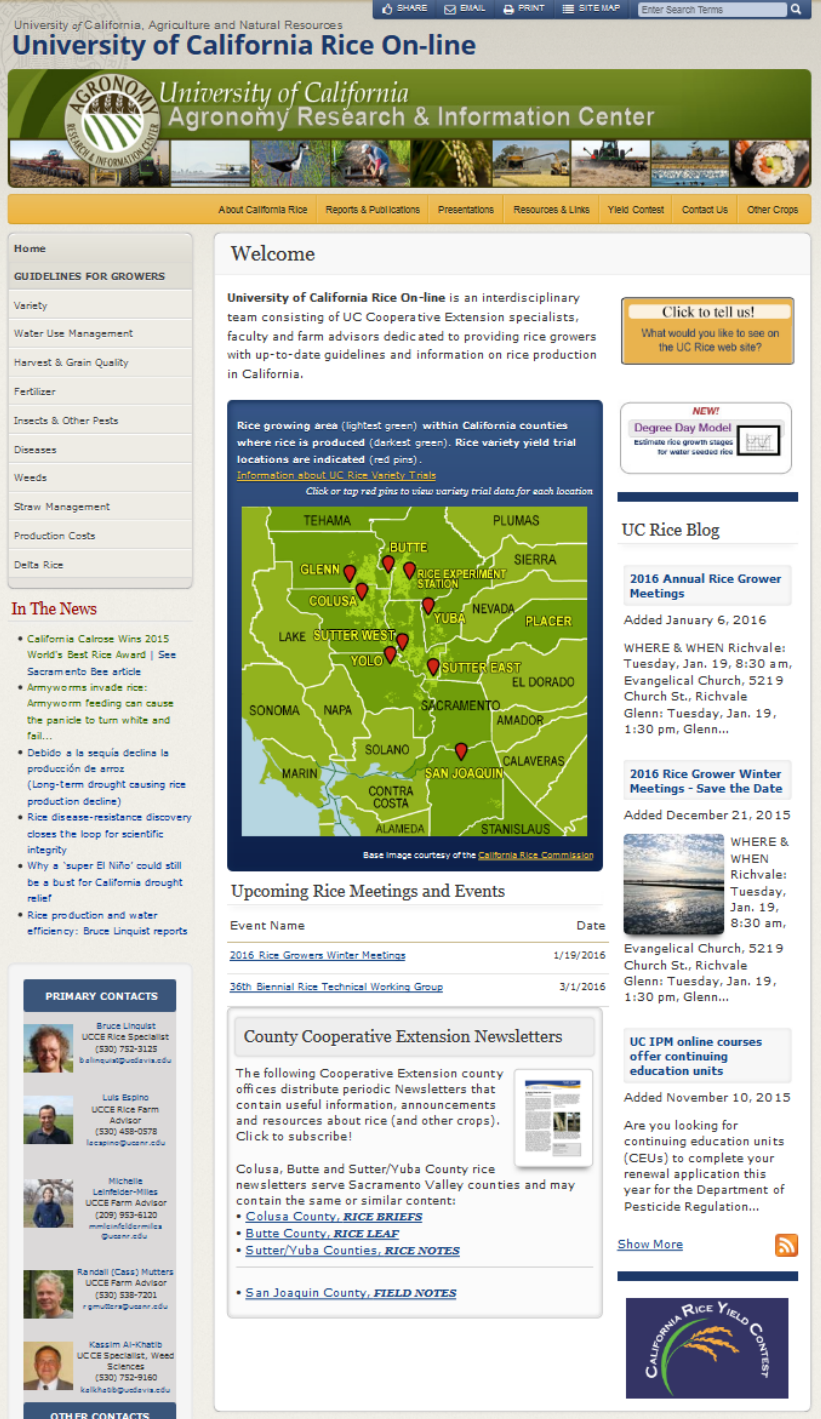
Grain yield (lb/acre @14% moisture) summary (2014-2018)

Location	Year	M105	M205	M206	M209
Yolo	2014	10150	9780	9770	9960
	2015	7210	7870	7490	7700
	2016	10420	9590	10980	9580
	2017	8550	8390	8890	9130
	2018	10010	9760	10090	9790
	Mean	**9268**	**9078**	**9444**	**9232**
Sutter	2014	10380	9170	9710	9310
	2015	10350	9790	9900	10490
	2016	11630	9780	11110	10710
	2017	9380	8100	9240	8790
	2018	9540	9270	9250	9090
	Mean	**10256**	**9222**	**9842**	**9678**
South Yolo	2017	8590	7280	7530	7280
	2018	8210	6940	7640	7580
	Mean	**8400**	**7110**	**7585**	**7430**
Loc/Years Mean		**9308**	**8470**	**8957**	**8780**

Cold sites

http://rice.ucanr.edu/

or Google “UC rice”

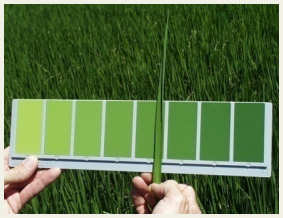


Fertility program for water-seeded rice

Preplant aqua-N application

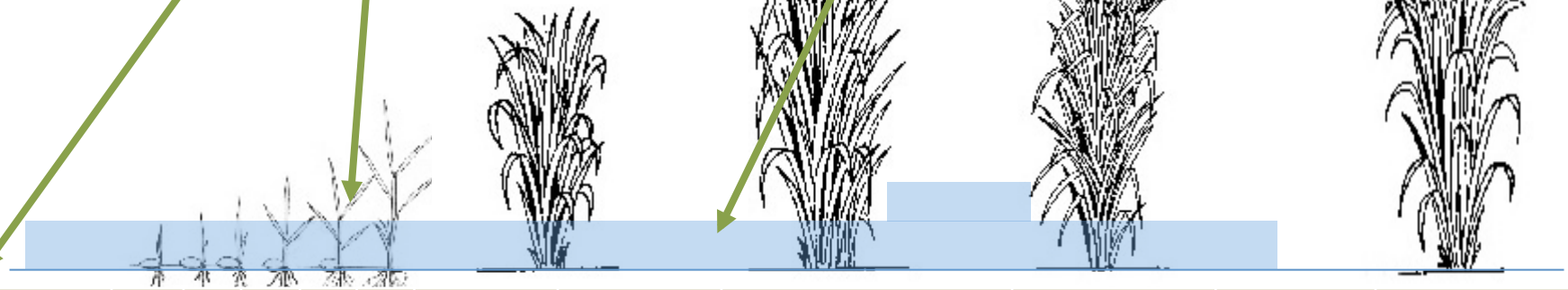
Starter blend (NPK w/ lowest amount of N possible)

Access need for topdress N application at PI



<u>During first month</u>

- Time constraint
- To control scum
- Post herbicide

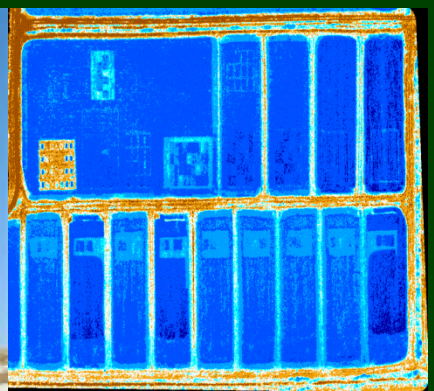


Stage	Plant	Leaf 1	2	3	4	5	Tillering begins	Maximum tillering	Panicle initiation*	Heading	R7	Maturity

Tools to access need for top-dress

Even when applying all N upfront a top-dress may be necessary.

- Leaf Color Chart
- SPAD meter
- Green Seeker (NDVI-Normalized Difference Vegetation Index)
- Drones with camera such as an NDVI camera



Methodology

- Site years
  - 3 in 2016
  - 3 in 2017
  - 4 in 2018
- Preplant N rates
  - -ranged from 0 to excessive
- Each N rate receives top-dress N at PI
  - 30 lb/ac in 2018
- NDVI (and NDRE in 2018) taken at PI before top-dress
  - GreenSeeker and drone

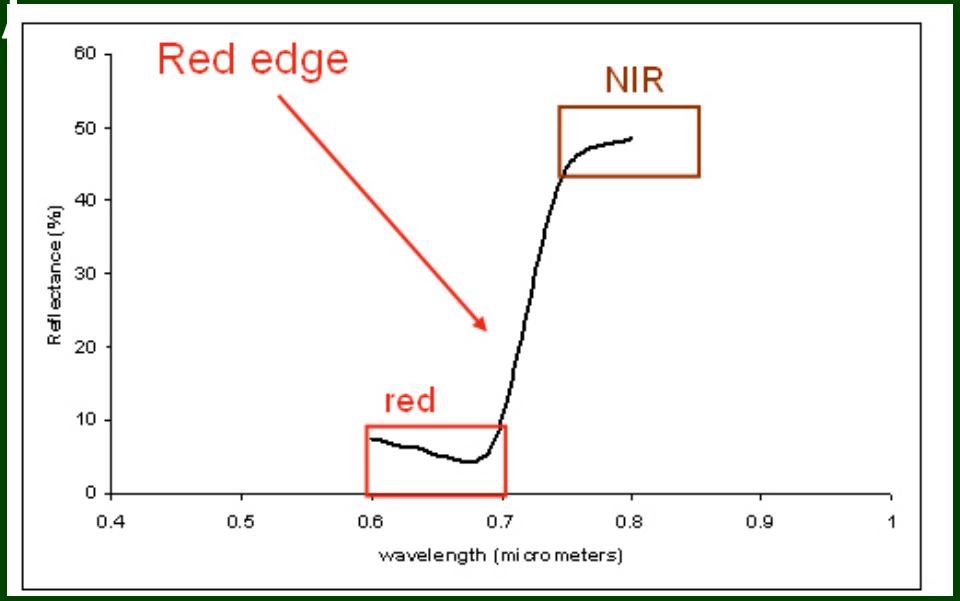
NDVI vs NDRE

- Normalized Difference Vegetation Index (NDVI)

$$\mathrm{NDVI} = \frac{(\mathrm{NIR} - \mathrm{Red})}{(\mathrm{NIR} + \mathrm{Red})}$$

- Normalized Difference Red Edge (NDRE)

$$\mathrm{NDRE} = \frac{(\mathrm{NIR} - \mathrm{RE})}{(\mathrm{NIR} + \mathrm{RE})}$$



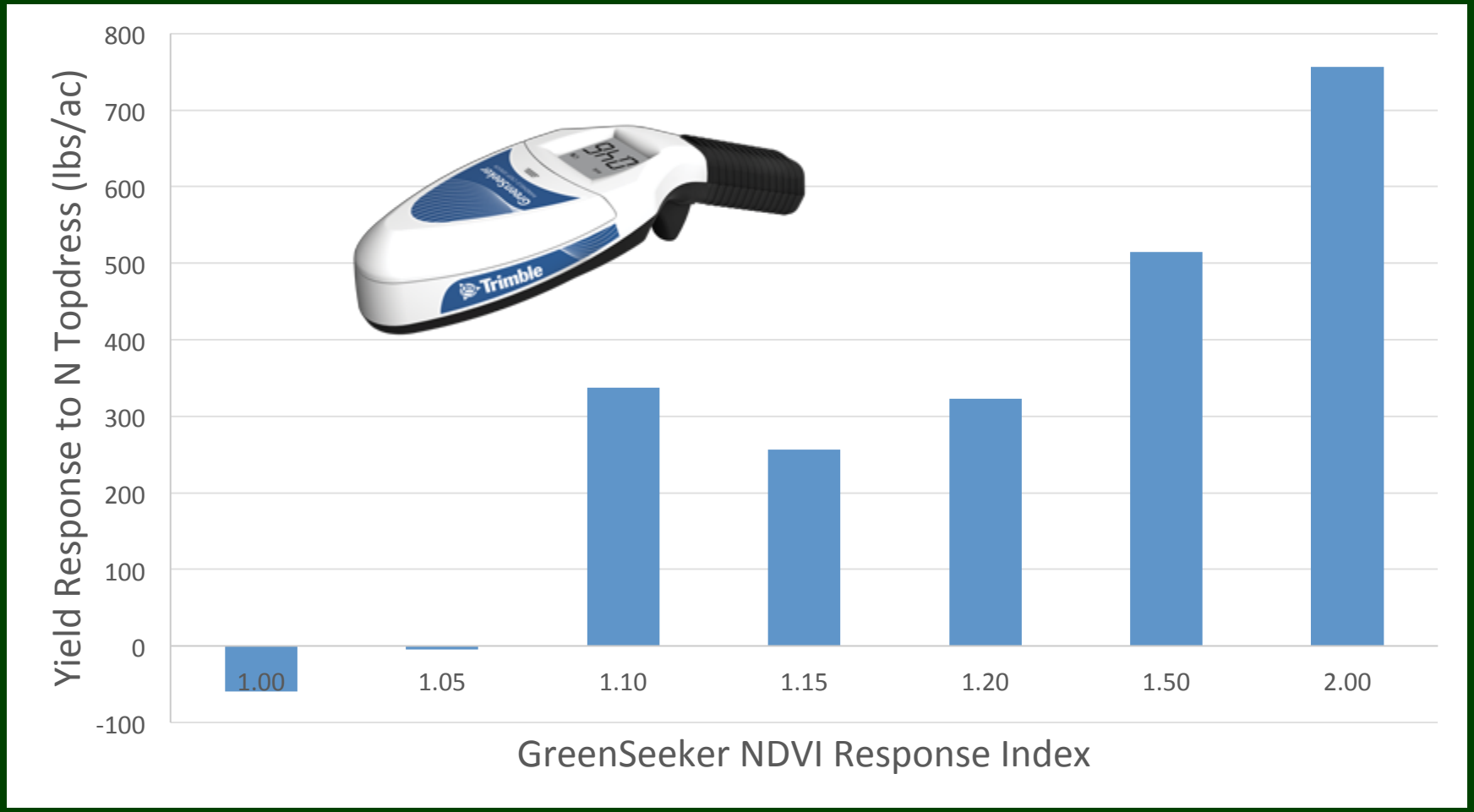
Response index

- Ratio of High N strip to test area
  - = NDVI High N / NDVI test
  - For example:

72 / 65 **=1.1**

- Response index to apply: >1.1

Grain yield response in relation to Response Index

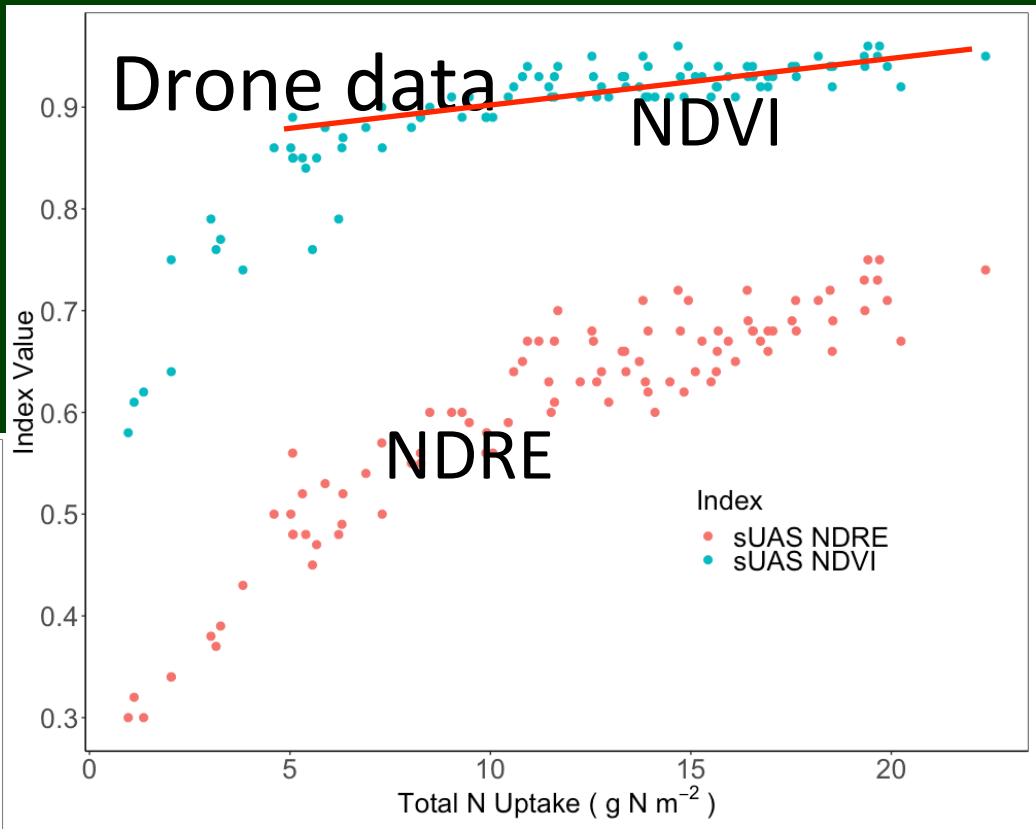


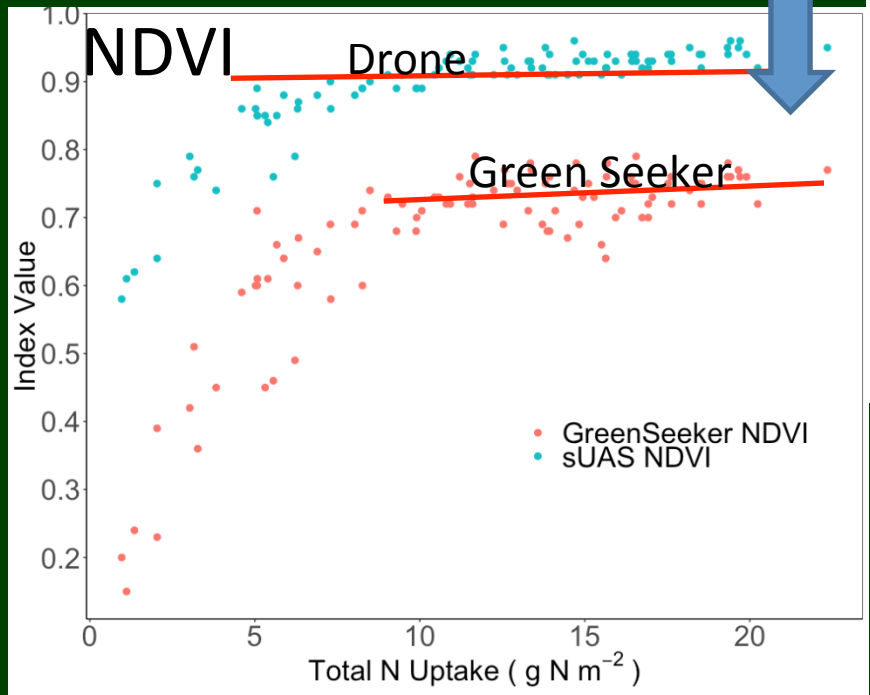
GreenSeeker vs remotely sensed data from a drone

- GreenSeeker has a active sensor
  - Only NDVI
  - Own light source
  - Clouds, haze, time of day does not matter
- Sensors from drones are passive
  - Can have various sensors (NDVI, NDRE)
  - Require sunlight
  - Readings at mid-day
  - Readings can not be taken if clouds are moving in front of sun
- Drones cover a much bigger area

NDVI vs NDRE

- NDVI saturates more than NDRE
- GreenSeeker NDVI better than drone NDVI





Thank you