



# How to know when PFD will strike again?

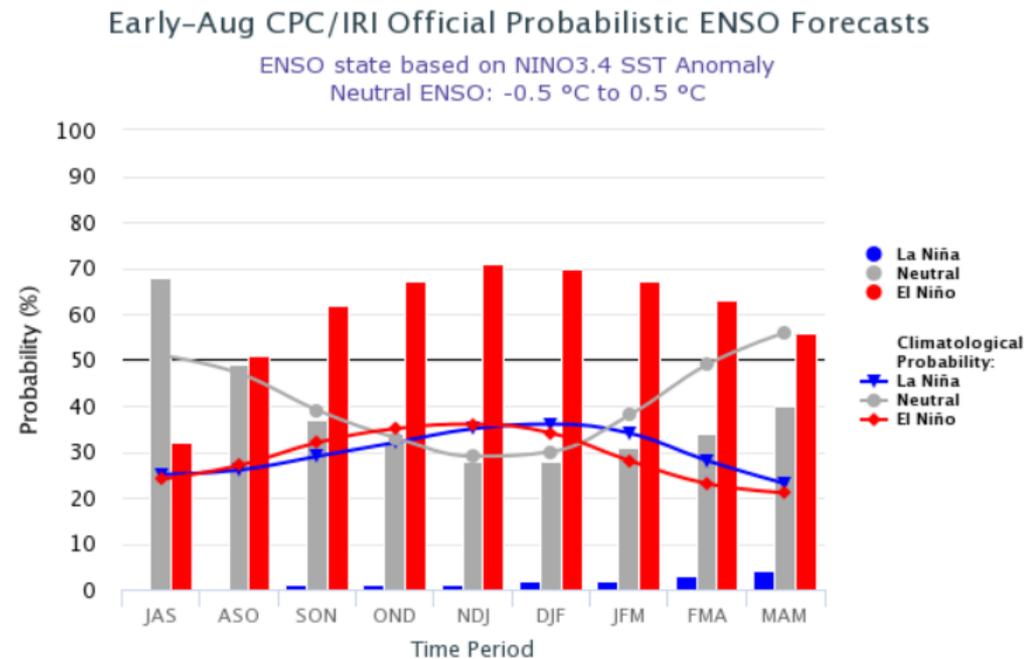
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**and Extension Specialist**  
**University of Florida, IFAS**  
**Citrus Research and Education Center**



# Climate forecast for winter 2018-2019

- Consensus forecast of probability of El Niño weather pattern
  - over three month intervals
- Increased rainfall and moderate temperatures
  - PFD becomes more likely

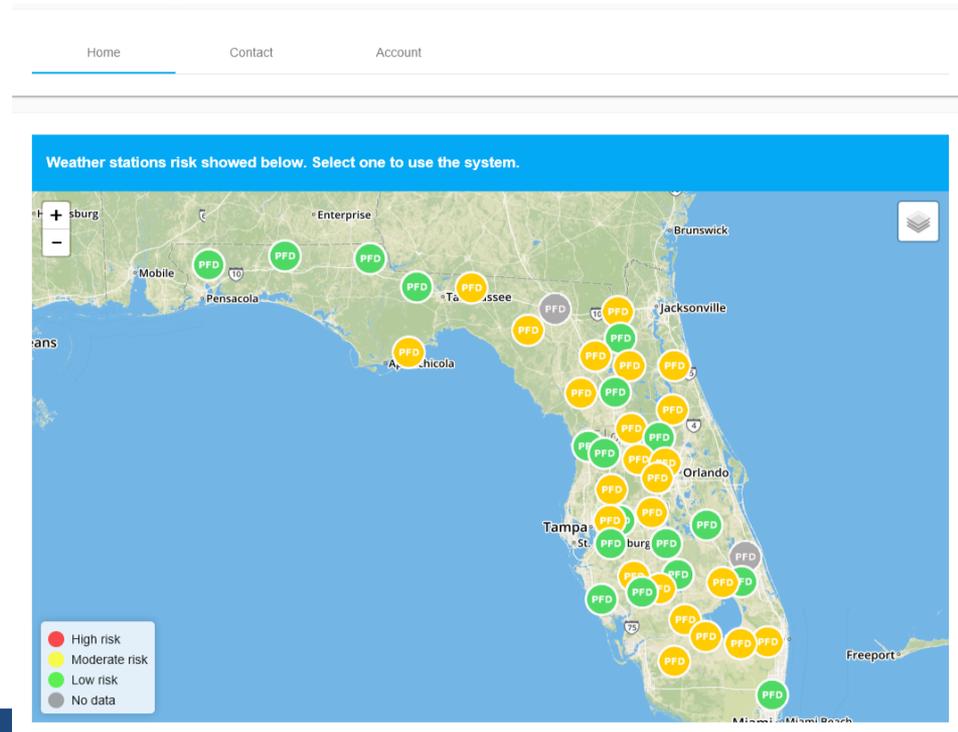


# Development of new PFD advisory system

- Project in collaboration with Natalia Peres and Clyde Fraisse
- To simplify PFD predictions from PFD-FAD
  - Less data collection required
  - Automatically pulls in weather data
- Based off of the FAWN system
  - Some stations with leaf wetness probes
  - Mostly calculated from available models

# Homepage of new PFD advisory system

- Hosted on Agroclimate.org
  - Under tools/crop diseases
  - Similar to Strawberry Advisory System (SAS)
  - Each circle represents a FAWN weather station

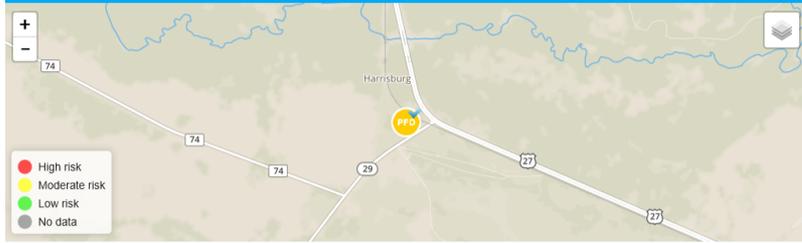


# Criteria to select

- Palmdale station selected
  - Map zooms in automatically
- Need to indicate bloom intensity
  - Will I recoup costs if application made?
- Flowering stage
- Last fungicide application

Home Contact Account

Weather stations risk showed below. Select one to use the system.



Recommendation Disease Simulation Daily summary Weather

**Palmdale - Recommendation**

Flowering intensity:

- Sufficient bloom present on the trees to justify the cost of application
- Insufficient bloom present to justify the cost of application

Sufficient bloom

Flowering stage:

-  Pinhead bloom, few popcorn, no open flowers
-  Pinhead, button bloom, few open flowers
-  Many open flowers, some pinhead or button bloom remaining
-  All flowers open, no pinhead or button bloom remaining

Many open flowers, some pinhead or button bloom remaining

When was your last fungicide application:

- None
- Last 7 days
- More than 7 days

None

[View recommendation](#) EDIS: Postbloom Fruit Drop

# If there is an infection event

- Conditions could allow for infection event
- Still need sufficient bloom
- Fungicide applications minimum 7 days apart

When was your last fungicide application:

None 

Last 7 days

More than 7 days

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[View recommendation](#) EDIS: Postbloom Fruit Drop  [Link to current FPG](#)

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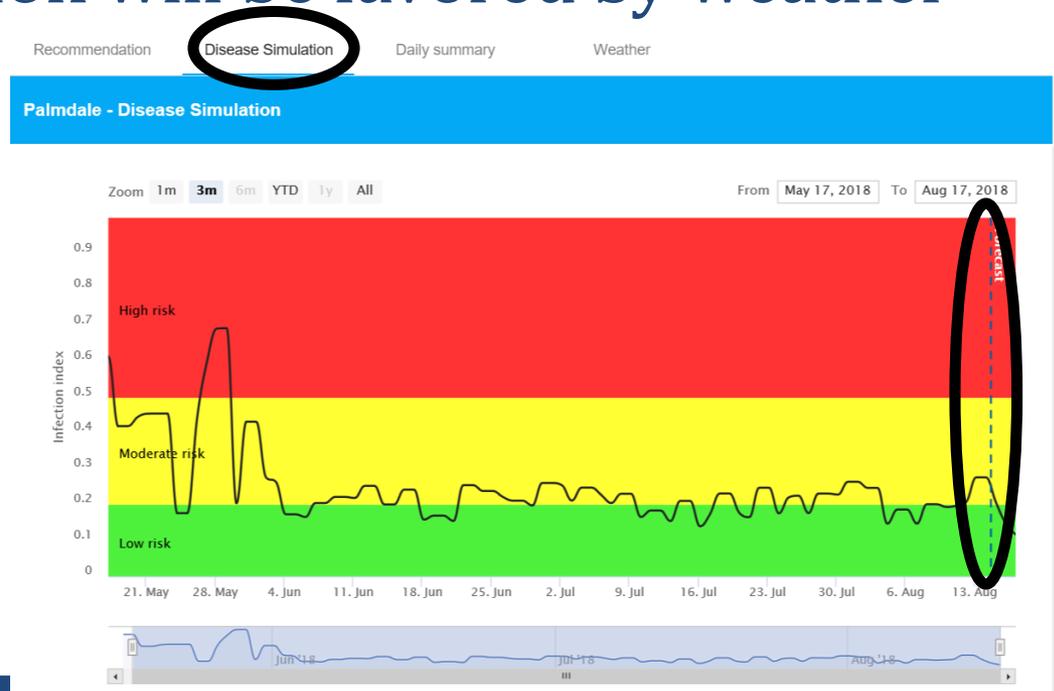
**Spray fungicide! We recommend the following products:**

-  Abound  
Rate: 12-15.5 fl oz/acre
-  Headline SC  
Rate: 12-15 lbs/acre
-  Quadris Top  
Rate: 15.4 fl oz/acre
-  Gem 500 SC  
Rate: 1.9-3.8 fl oz/acre

  Fungicide recommendations

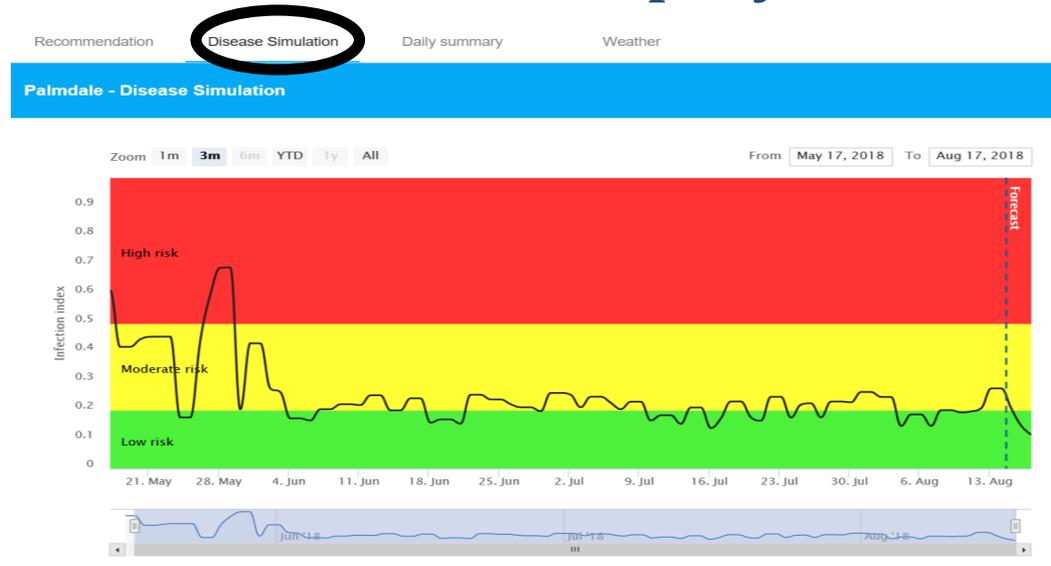
# Disease simulation tab

- Graphical representation of infection risk
  - Can select time frame
- Forecasted risk (from NOAA weather data) for three days from actual date
  - Help plan if infection will be favored by weather in near term



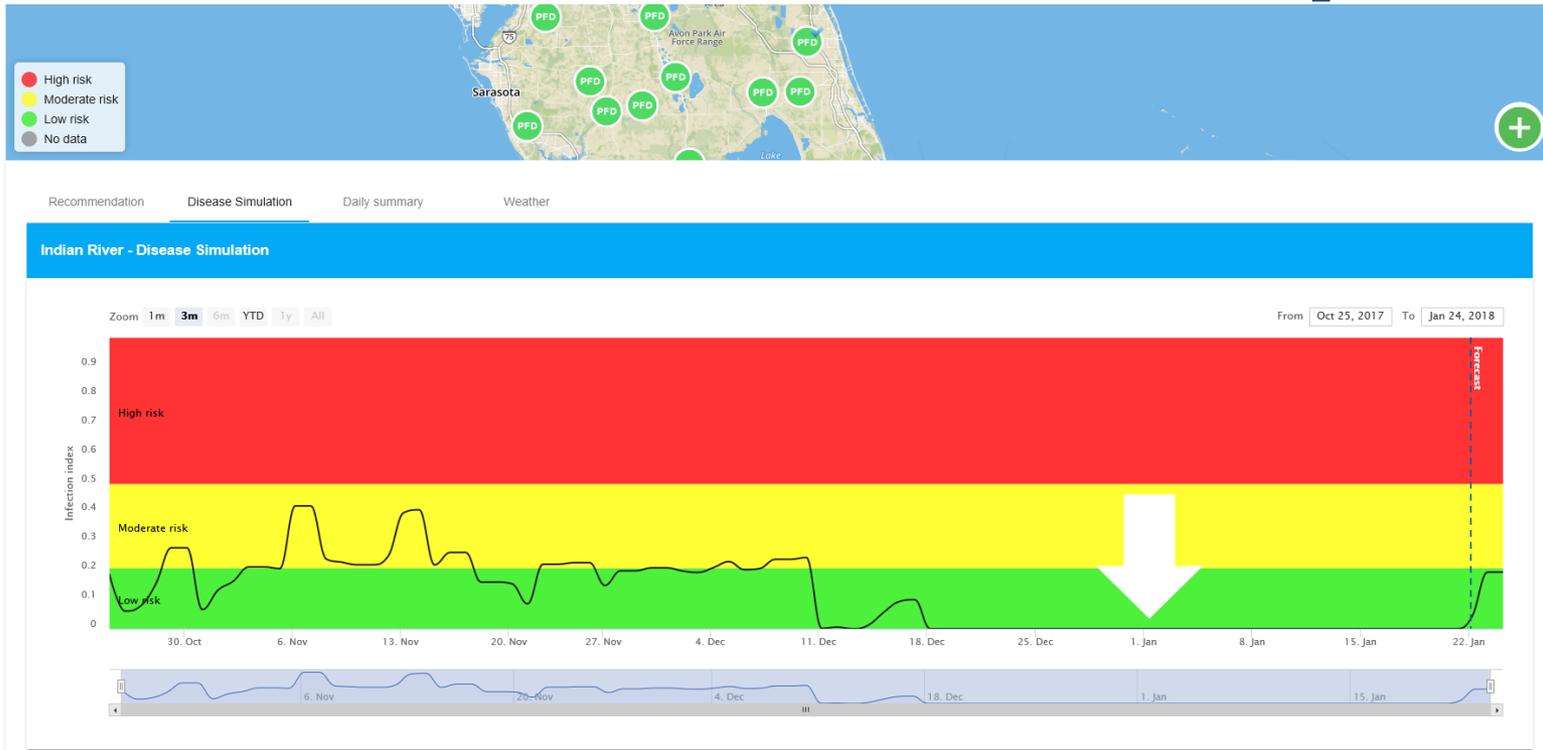
# Infection risk levels

- High risk (red area)
  - Index above 0.51; Spray as soon as possible
- Moderate risk (yellow area)
  - Index between 0.21 -0.5; Spray recommended
- Low risk (green area)
  - Index between 0-0.2; No spray recommended



# Problem with station

- Problem with leaf wetness estimates
  - Should see an increase in infection index overnight from dew
- Please let us know ASAP if there is a problem



# Daily summary of data

- Gives leaf wetness, temperature, PFD index and risk level
  - Weather variables daily average
  - PFD index max. daily value

Recommendation Disease Simulation **Daily summary** Weather

**Loaded data!**

Select a range of dates:

Begin date: 2017-12-23 End date: 2018-01-23 [Export data](#)

Date	LWD	Temp (F)	Temp (C)	PFD Index	PFD description
2018-01-23	15.00	67.0	19.4	0.198	Low risk
2018-01-22	15.00	56.8	13.8	0.134	Low risk
2018-01-21	14.00	57.8	14.3	0.133	Low risk
2018-01-20	15.75	50.0	10.0	0.072	Low risk
2018-01-19	0.00			0.000	Low risk
2018-01-18	13.00	52.0	11.1	0.078	Low risk
2018-01-17	13.00	52.0	11.1	0.078	Low risk
2018-01-16	13.00	49.4	9.6	0.055	Low risk
2018-01-15	13.00	49.4	9.6	0.055	Low risk
2018-01-14	17.25	64.8	18.2	0.214	Moderate risk

32 total

# Weather data

- Can look at the weather data for every 15 min.
  - Temperature, relative humidity, rainfall, leaf wetness
- Find out when drying periods occur
  - After 4 hours of drying, PFD index resets to zero

Recommendation Disease Simulation Daily summary **Weather**

Loaded data!

Select a range of dates:

Begin date: 2018-01-21 End date: 2018-01-23 [Export data](#)

Date time	Temp (F)	RH (%)	Rain (inch)	Wet	LWD	Mean temp. (F)	PFD Index
2018-01-23 11:15	75.74	88.10	0.00	NO	15.75	67.31	0.209
2018-01-23 11:00	75.04	90.40	0.00	YES	15.75	67.31	0.209
2018-01-23 10:45	74.52	92.30	0.00	YES	15.50	67.19	0.205
2018-01-23 10:30	73.63	94.50	0.00	YES	15.25	67.07	0.202
2018-01-23 10:15	72.99	95.80	0.00	YES	15.00	66.96	0.198
2018-01-23 10:00	72.57	96.90	0.00	YES	14.75	66.85	0.195
2018-01-23 09:45	71.89	98.80	0.00	YES	14.50	66.76	0.191
2018-01-23 09:30	71.24	100.00	0.00	YES	14.25	66.67	0.188
2018-01-23 09:15	70.54	100.00	0.00	YES	14.00	66.58	0.184
2018-01-23 09:00	69.57	100.00	0.00	YES	13.75	66.51	0.181

238 total

1 2 3 4 5

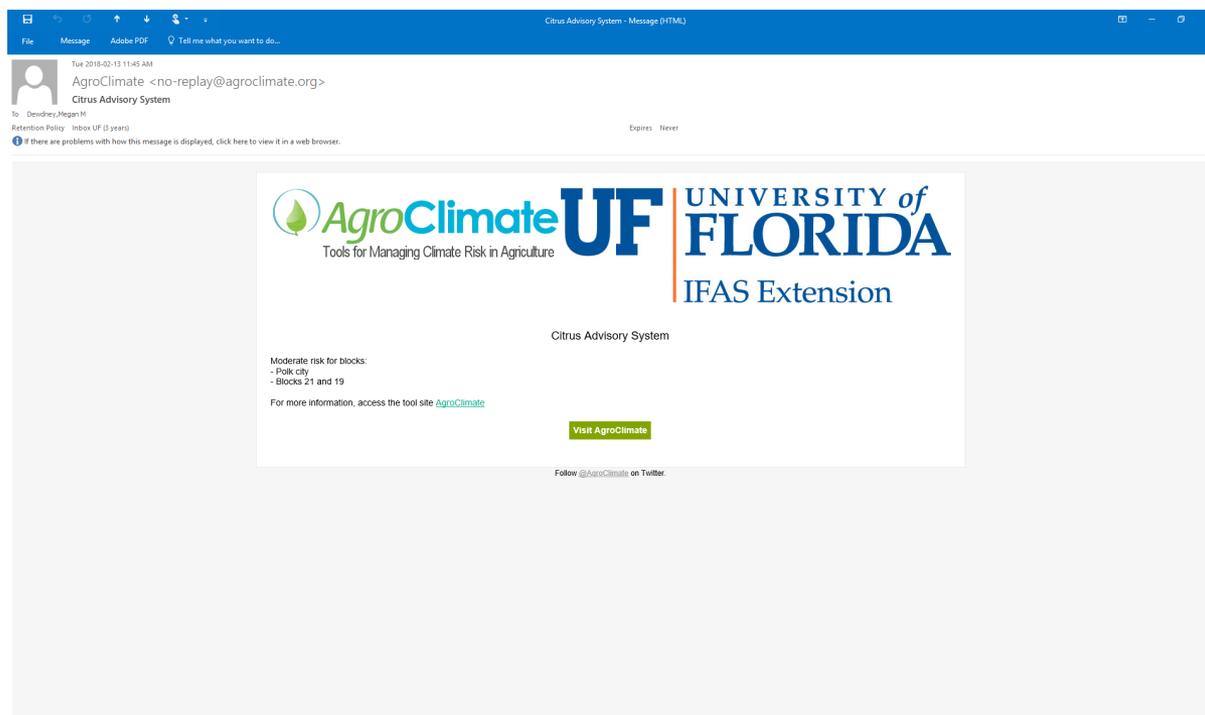
# With an account

- Can mark specific blocks of interest
  - Map and satellite views
  - Use map to find block and satellite to mark
- Specific risk assessment for location



# Will send alerts

- SMS alerts for each location
- E-mail notification
- Can choose both



# Conclusions

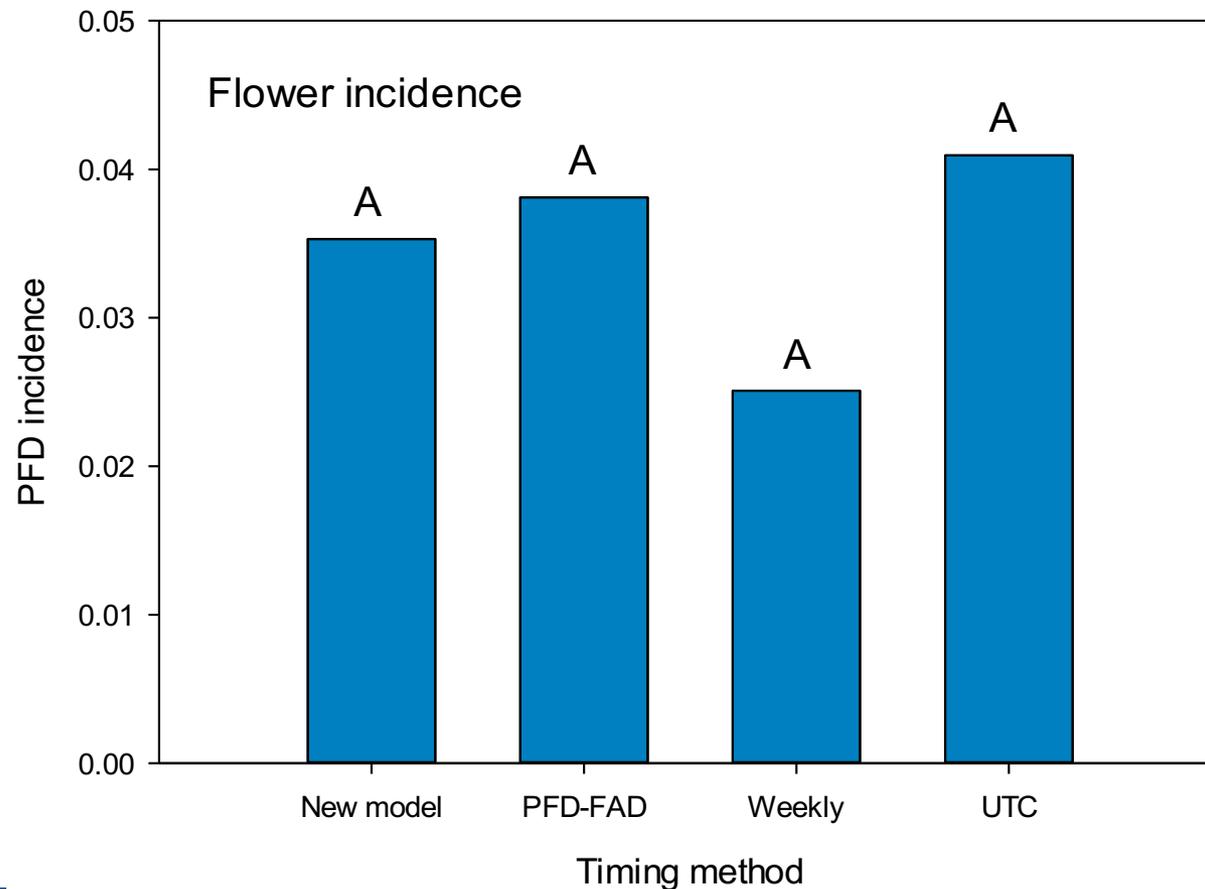
- New model was released in January for the 2018 PFD season
  - Fewer data inputs; easier to use
  - Login system should make block-by-block planning easier
- Working with programmer to detect and fix bugs
  - Expect occasional difficulties with program first year
    - Want your feedback on problems and ways to improve

# How do application timings compare?

- Fort Meade grove in 2017
  - Valencia on Swingle with history of PFD
  - Headline at 15.5 fl. oz./acre
- Four timing treatments:
  - No applications
  - Weekly for three applications
    - March 8<sup>th</sup>, 15<sup>th</sup>, 22<sup>nd</sup>
  - PFD-FAD (fungicide application decision)
    - Two applications recommended on March 15<sup>th</sup>, 24<sup>th</sup>
  - New PFD model
    - No applications recommended

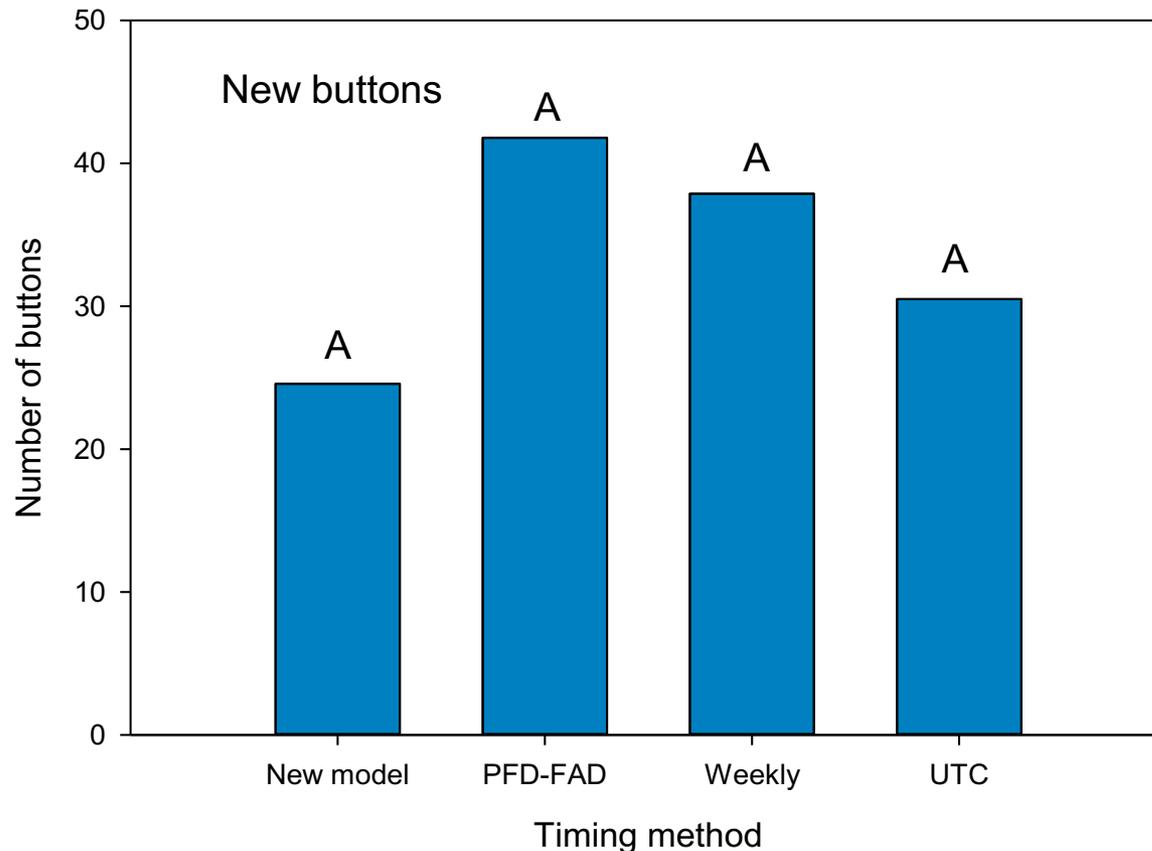
# Flower incidence 2017

○ Data collected March 27<sup>th</sup>



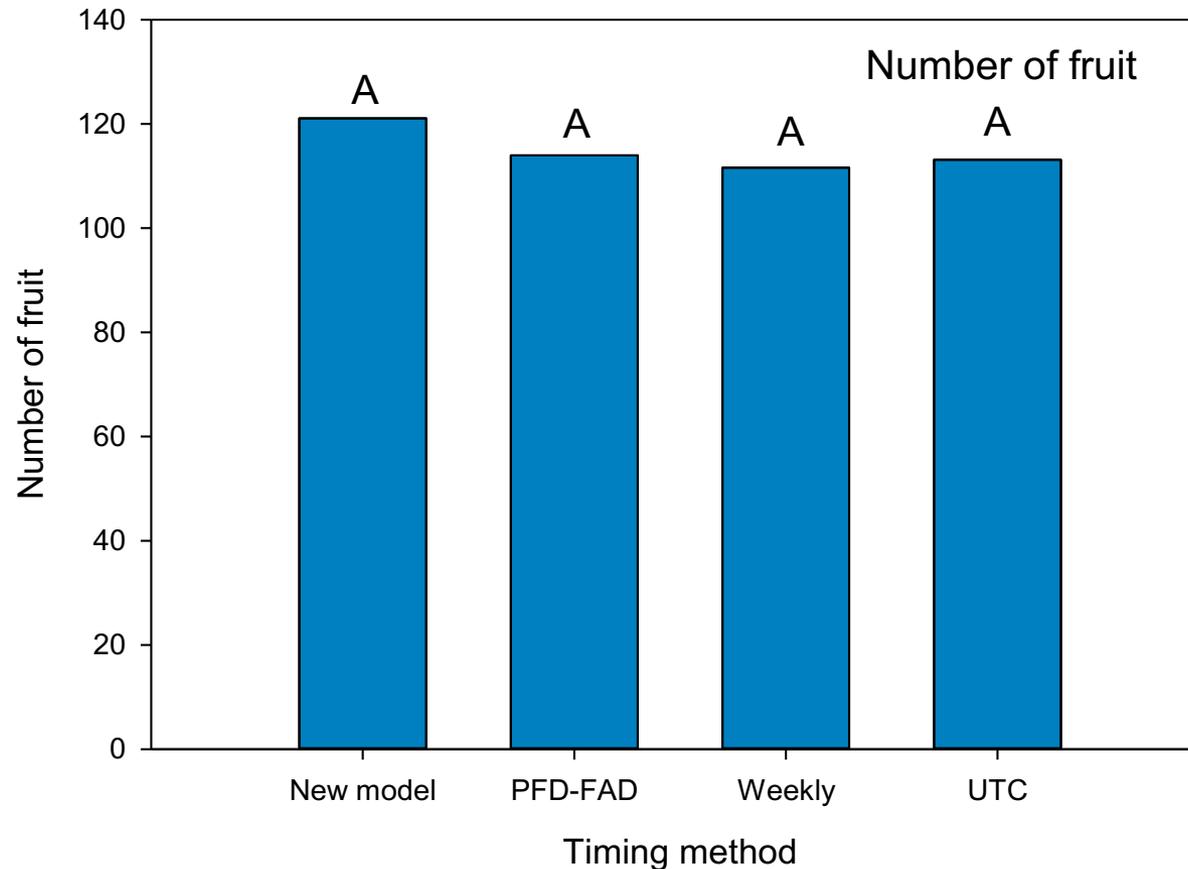
# Post-application buttons 2017

- Button data collected June 8-9<sup>th</sup>



# Number of fruit 2017

- Data collected July 20<sup>th</sup>

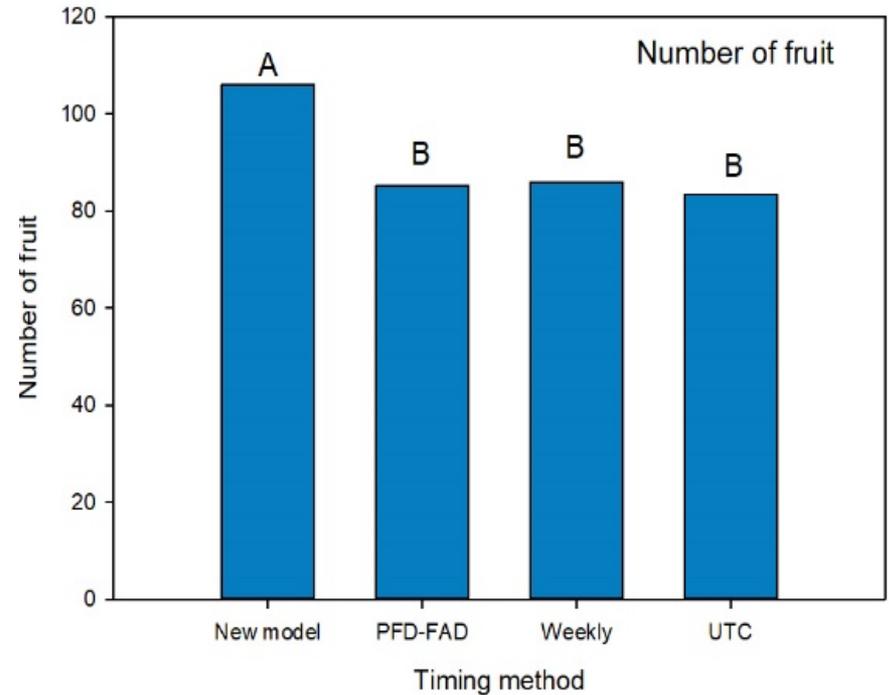
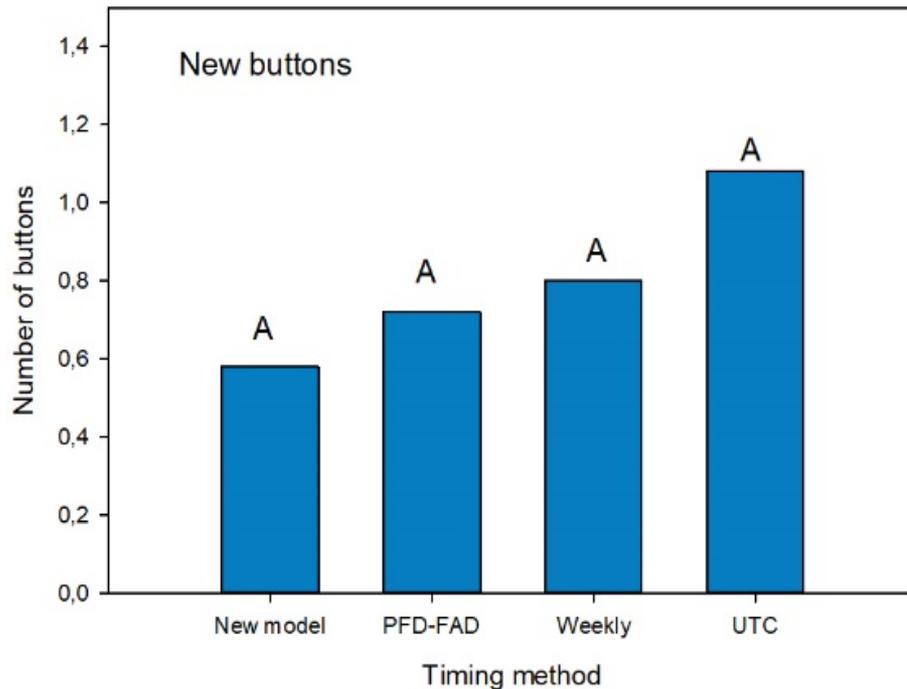


# Application timings 2018?

- Fort Meade same as 2017
- Polk City grove
  - Navel on Swingle with history of PFD
  - Headline at 15.5 fl. oz./acre
- Four timing treatments:
  - No applications
  - Weekly for three applications
    - Feb 26<sup>th</sup>, March 5<sup>th</sup>, 13<sup>th</sup> Fort Meade
    - Feb 25<sup>th</sup>, March 5<sup>th</sup> Polk City
  - PFD-FAD (fungicide application decision)
    - Two apps recommended on Feb 26, March 7<sup>th</sup> Fort Meade
    - Two apps recommended on Feb 25<sup>th</sup>, March 7<sup>th</sup> Polk City
  - New PFD model
    - No applications recommended

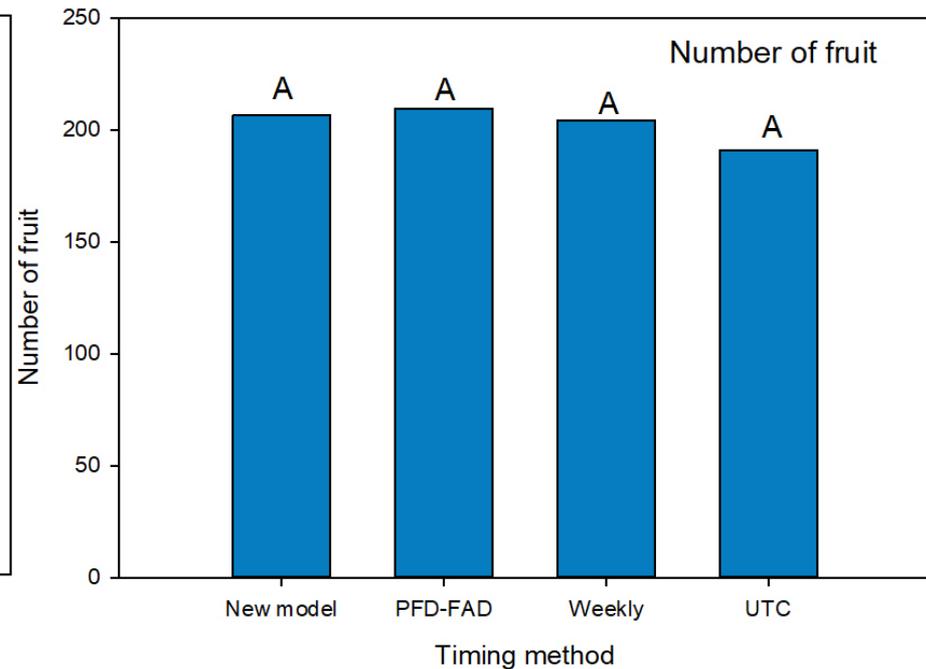
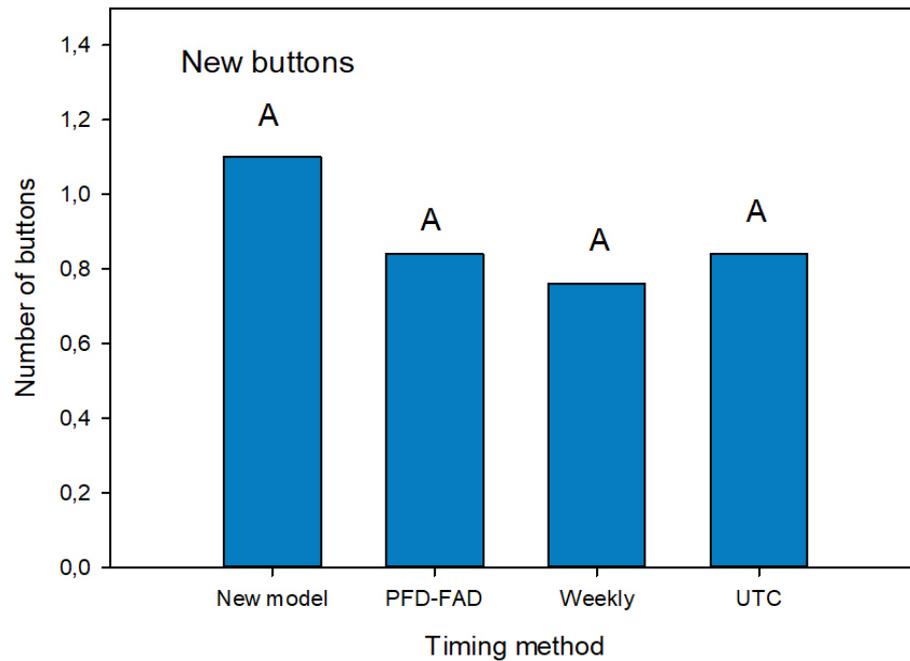
# Polk City location 2018

- Data collected buttons: June 6
- Fruit: July 6



# Fort Meade location 2018

- Data collected buttons: June 6
- Fruit: July 18



# Model performance conclusions

- 2017 season had low PFD incidence
- New model did not recommend a spray
  - There were no disease intensity differences among treatments
  - Means that the ‘no application’ recommendation was correct
  - Cost savings of three applications compared to weekly applications
  - Repeating experiment in 2 locations in 2018
    - Validation is an important part of model design

# Performance conclusions

- 2018 season was again light PFD year in Peace River
  - No applications predicted again correct outcome
    - No differences among treatments despite different number of applications
- In Polk City CAS treatment had significantly more fruit despite no treatments
  - No treatments again correct outcome
- Need a year with disease prediction to see if the positive predictions work as well

# Acknowledgments

- Daniel Perondi
- André Bueno Gama
- Tracey Hobbs
- Etelvina Aguilar
  
- Funding sources:

**Any Questions?**

