Introducing the Malusim app

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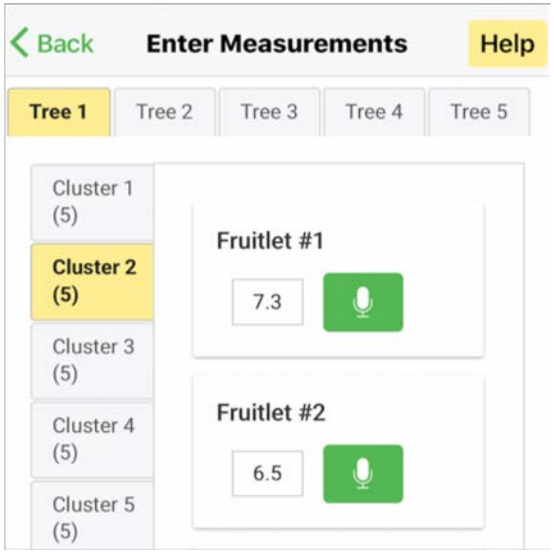
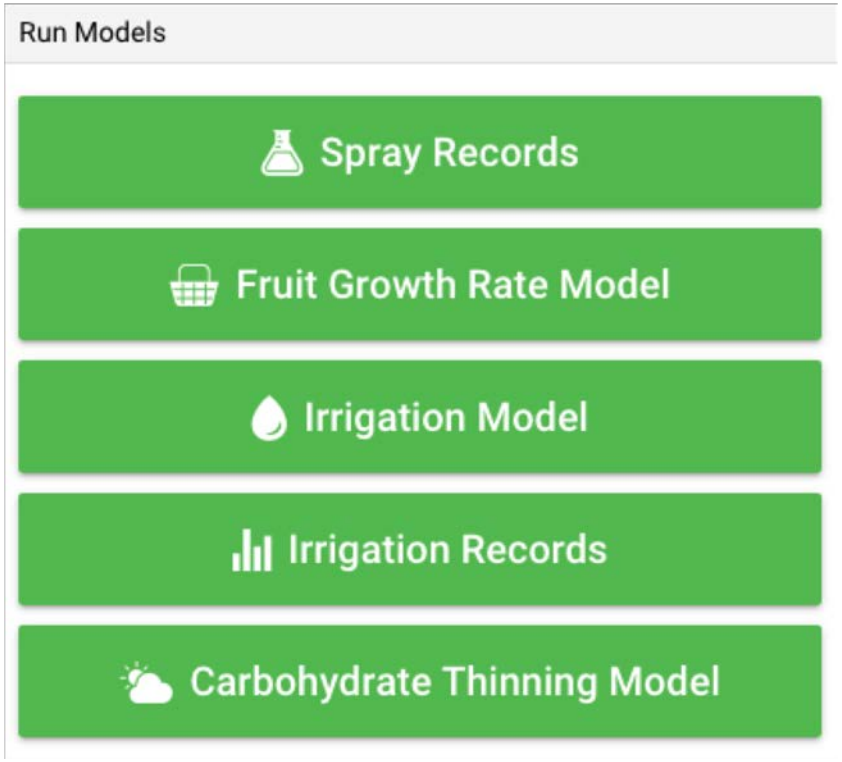


Introducing the Malusim app

- Fruit growth rate model
- Carbohydrate thinning model
- Malusim on web, iPhone (Apple iOS), and Android (Google Play)
- Irrigation model/records
- Live demo

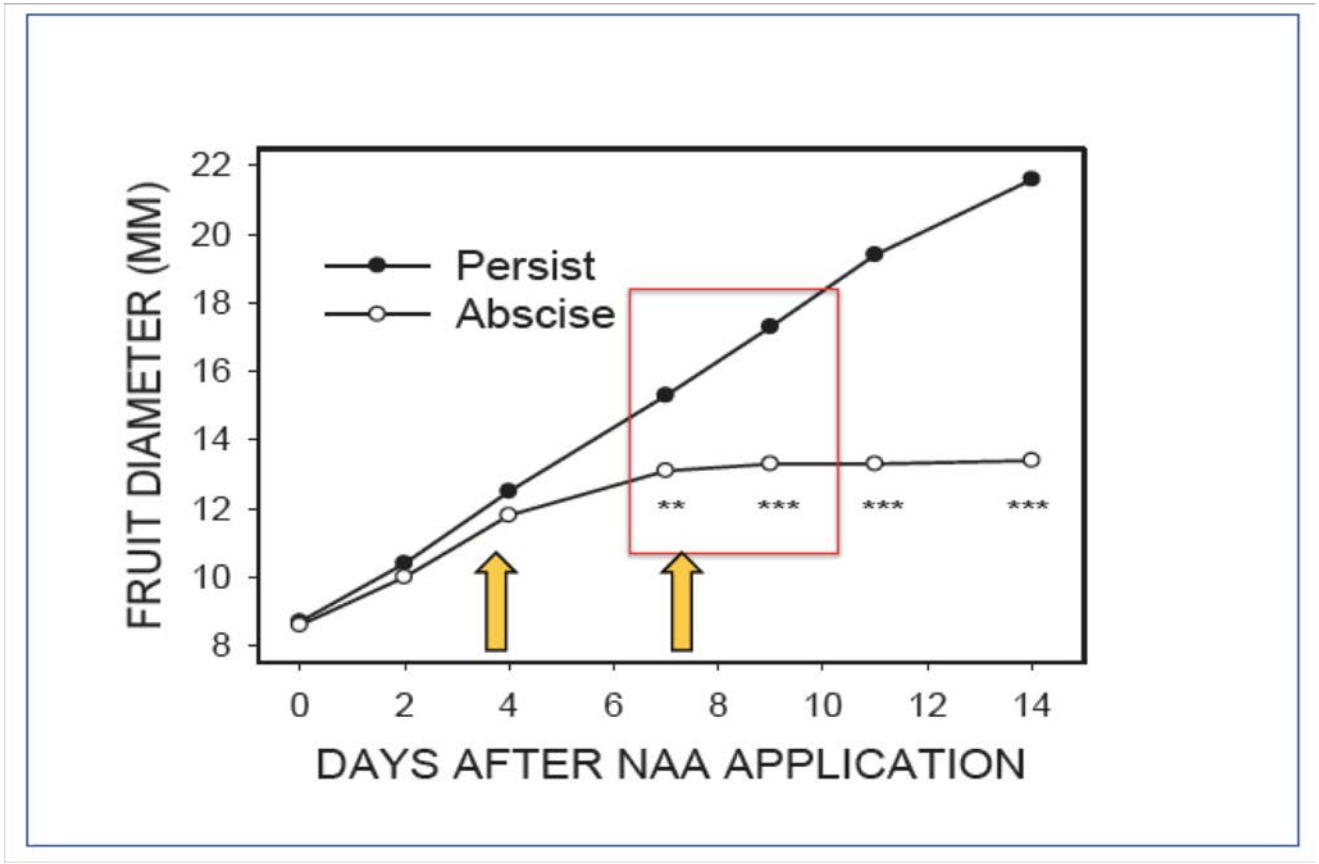


Fruit growth rate model

- Assumes faster growing fruitlets will persist, slower growing fruitlets will fall off
- Two or more consecutive measurements of fruitlets to quantify growth rate
- Measurements start at app. 6 to 7 mm. fruitlet diameter, then every 4 to 7 days depending on temperature and chemical thinner applications, determines growth rate
- Average growth rate calculated: if fruit is above average growth rate it will persist; if below will fall off
- Based on number of flowers, a target crop load (number of fruit) and % fruit set determined
- At time of measurement, can determine if another chemical thinner application needs to be made...

Table 1. Fruitset prediction hypothesis.

Fruitlet Fate	Prediction
Persist	A fruit is predicted to persist if the growth rate over the measurement period was at least 50% or greater of the fastest growing fruit.
Abscise	A fruit is predicted to abscise if the growth rate of the fruit slowed to 50% or less of the growth rate of the fastest growing fruit.



Phil Schwallier and Amy-Irish Brown, Predicting Fruitset Model, apples.msu.edu, 2014

Table 4. Predicting Percent Fruitset Summary Sheet Example.

Predicted number of fast growing fruit

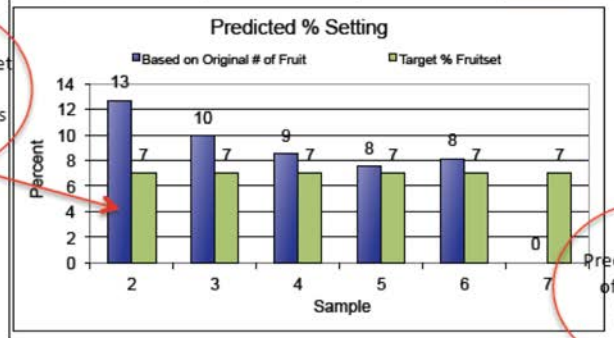
Target number of fruit and target percent.

Number of fruit originally marked and measured.

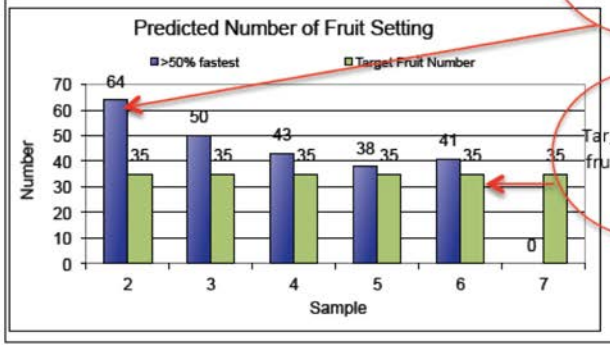
Predicted % fruitset of the original measured fruitlets.

Summary Sheet			Farm: TestData Farm		Block: Test Block					
Target Fruit Number			35		Target % Fruitset					7%
Sampling			Diameter (mm)		Diameter Growth (mm)		Number of Fruit			Predicted % Setting
Number	Date	Days between sample dates	Mean of 20 largest fruitlets	Mean of all fruitlets	Mean of up to 20 fastest growing fruitlets	50% fastest growing fruitlets	>50% fastest	<50% fastest	Measured	Based on Original # of Fruit
1	5/1	0	10.05	7.04					505	
2	5/4	3	13.21	7.55	3.54	1.77	64	419	483	12.7
3	5/7	3	15.98	8.27	3.32	1.66	50	368	418	9.9
4	5/10	3	17.56	8.89	1.88	0.94	43	329	372	8.5
5	5/13	3	19.88	10.60	2.72	1.36	38	173	211	7.5
6	5/16	3	21.31	12.13	1.68	0.84	41	112	153	8.1
7	5/19	3	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	0	0	0	0.0

Predicted % fruitset of the original measured fruitlets (blue bar).



Predicted number of fruit setting (blue bar).



Target number of fruit (green bar).

Phil Schwallier and Amy-Irish Brown, Predicting Fruitset Model, apples.msu.edu, 2014

Carbohydrate thinning model

- Apple trees produce (photosynthesis) or use (respiration) carbohydrates beginning at green tip
- Carbohydrate production or use depends mostly on sunlight and temperature
- More sunlight = more carbohydrate produced
- Higher temperature (particularly at night) = more carbohydrate used
- Can calculate a daily balance per a fairly complicated model/simulation developed by Cornell scientist Lakso et al
- Cumulative daily balance can determine trees carbohydrate balance, and thus degree to which it may be *easy* or *hard* to thin with chemical thinner = carbohydrate thinning model

Cornell University

Search Cornell

New York State Integrated Pest Management Program

NEWA Network for Environment and Weather Applications

Website status:
Forecast data beyond day 5 are incorrect.
3/23/2019 10:55:22 AM

Weather Data | Pest Forecasts | Station Pages | Crop Management | Crop Pages | Weather Stations | Help

- Apple Carbohydrate Thinning
- Apple Irrigation
- Apple Evapotranspiration
- Apple Frost Risk
- Growing Degree Days
- Degree Day Calculator
- Turf Evapotranspiration Map
- Soil Temperature Map
- Other Crop Tools
- Apple Pollen Tube Growth

Weather Data Quick Links

Past 12 months shown. Current month highlighted.

Daily Summary
Apr | May | Jun | Jul | Aug | Sep
Oct | Nov | Dec | Jan | Feb | Mar

Hourly Data
Apr | May | Jun | Jul | Aug | Sep
Oct | Nov | Dec | Jan | Feb | Mar

Growing Degree Days (Base 50F)
Apr | May | Jun | Jul | Aug | Sep
Oct | Nov | Dec | Jan | Feb | Mar

Growing Degree Days (Base 50F BE)
Apr | May | Jun | Jul | Aug | Sep
Oct | Nov | Dec | Jan | Feb | Mar

Growing Degree Days (Base 86/50F)
Apr | May | Jun | Jul | Aug | Sep
Oct | Nov | Dec | Jan | Feb | Mar

National Weather Service Forecast

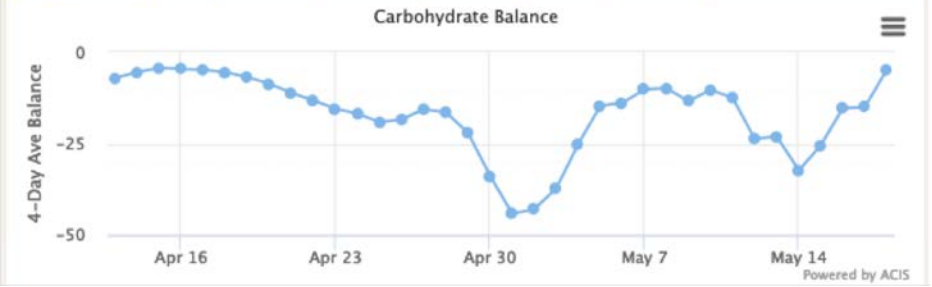
Belchertow ion Page

These Stati nost accurate when you use your own biofix date esults displayed will use NEWA's default biofix dates on the forecast page, where prompted, for more ac ns. After getting the Station Page forecast results, use get query results for prior years, dates, and locations.

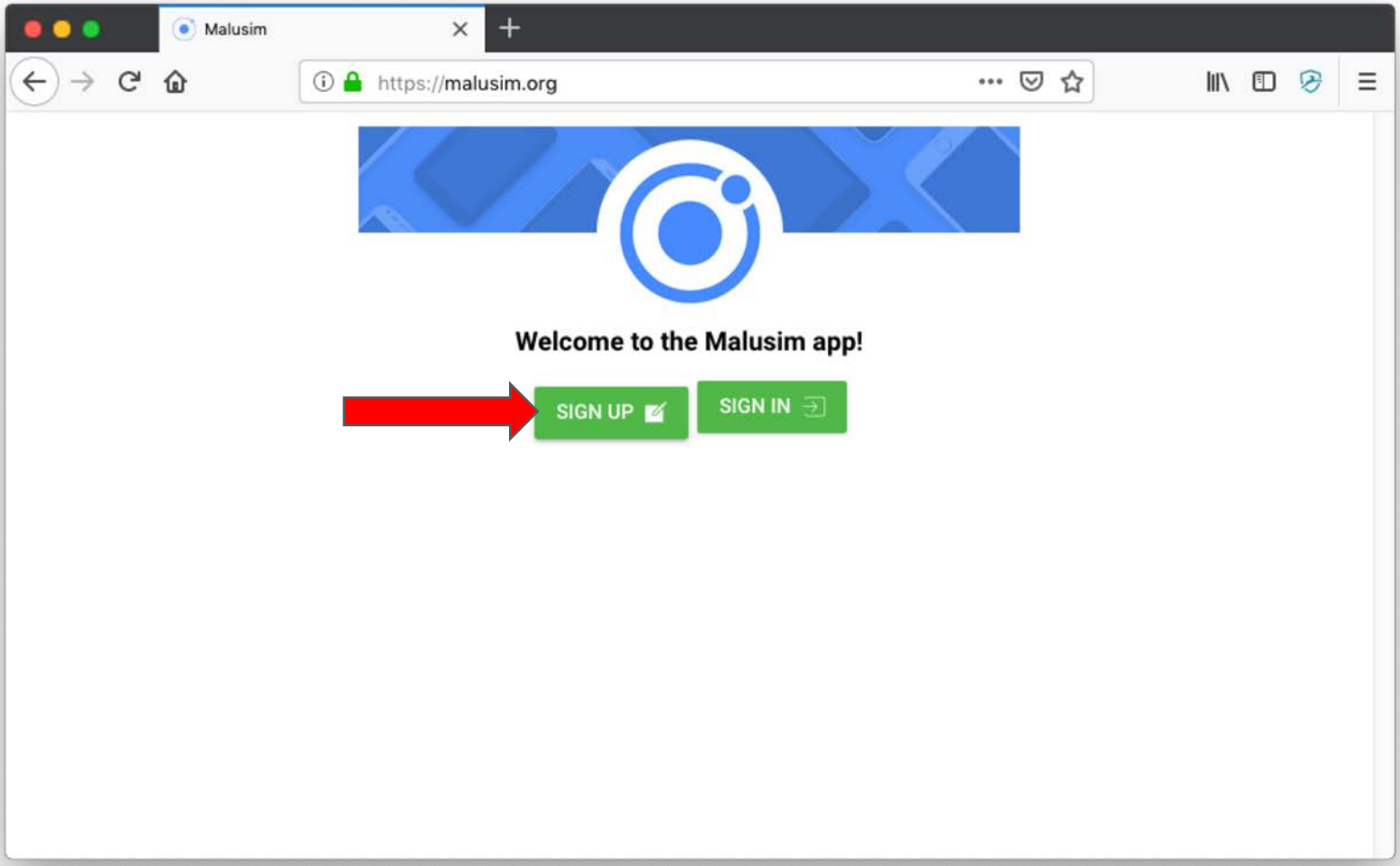
Belchertown-2 Pest Forecasts

Apple Scab	Plum Curculio	Grape Berry Moth
Fire Blight	Obliquebanded Leafroller	Cabbage Maggot
Sooty Blotch/Flyspeck	Apple Maggot	Onion Maggot
Leaf Wetness Events	San Jose Scale	Onion Diseases
Spotted Tentiform Leafminer	Grape Diseases	Potato Diseases
Oriental Fruit Moth	Grapevine Downy Mildew	Tomato Diseases
Codling Moth		

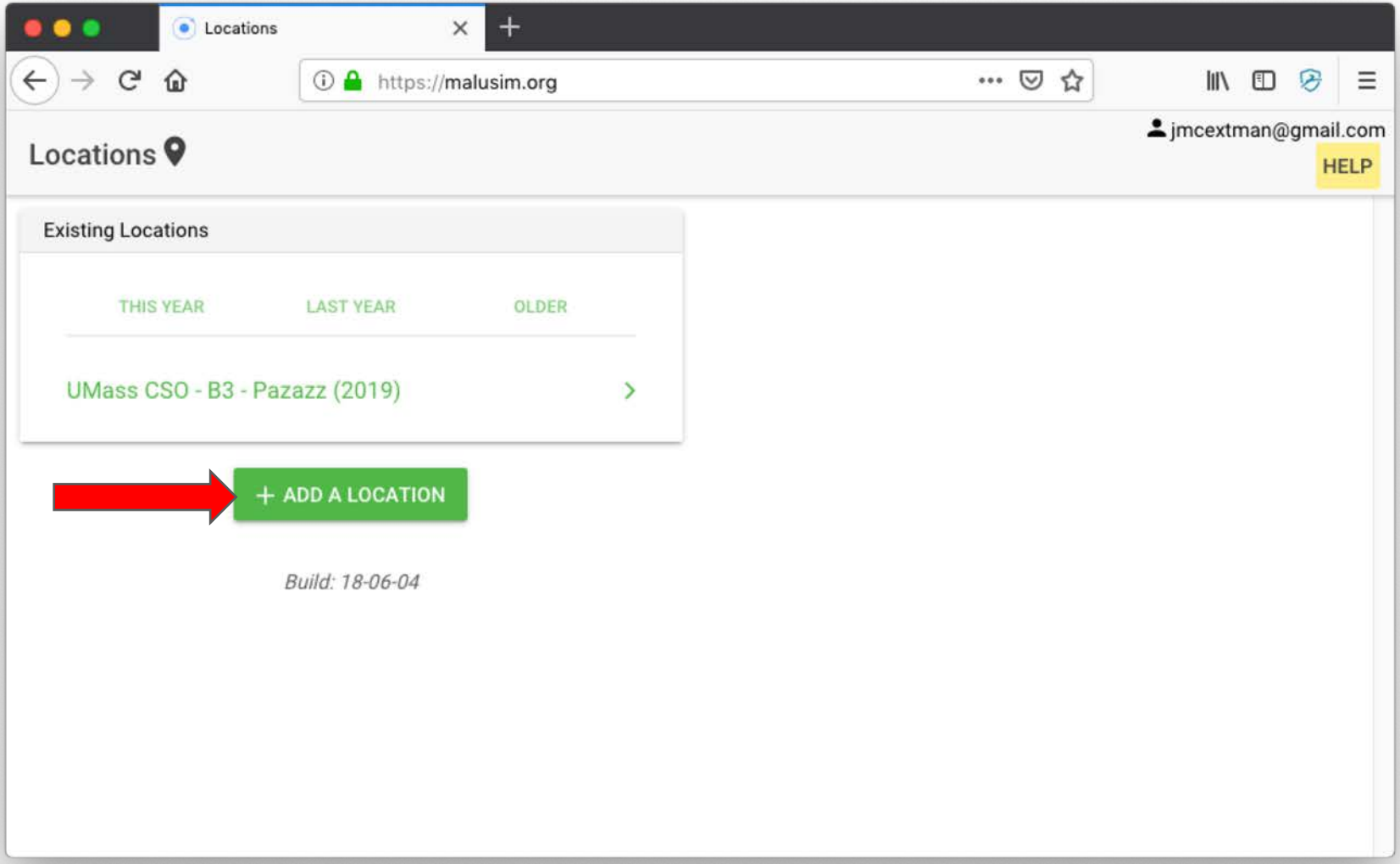
5/13	63	44	21.9	30.76	30.92	-0.16	-23.03	Decrease chemical thinner rate by 15%
5/14	74	49	20.7	31.08	49.37	-18.29	-32.31	Decrease chemical thinner rate by 15%
5/15	82	55	12.6	17.44	72.04	-54.60	-25.43	Decrease chemical thinner rate by 15%
5/16	63	50	13.5	28.78	47.87	-19.09	-15.29	Apply standard chemical thinner rate
5/17	74	55	15.0	32.71	69.95	-37.25	-14.98	Apply standard chemical thinner rate
5/18	66	46	23.0	59.12	49.93	9.20	-4.69	Apply standard chemical thinner rate
5/19	57	44	7.2	23.25	37.26	-14.01		
5/20	73	58	23.1	63.69	81.54	-17.85		
5/21	77	50	25.6	78.38	74.47	3.91		



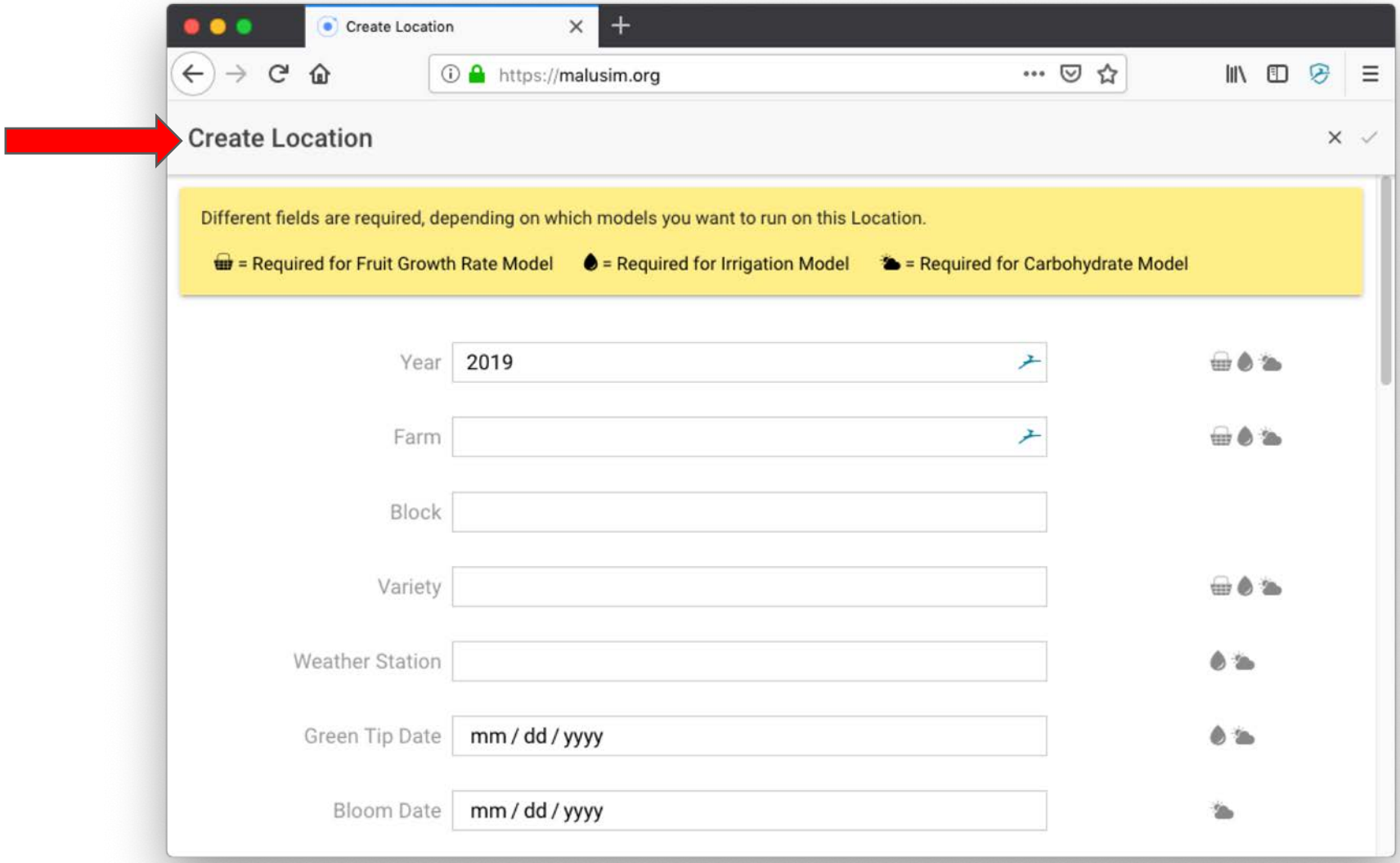
https://malusim.org - SIGN UP, SIGN IN...



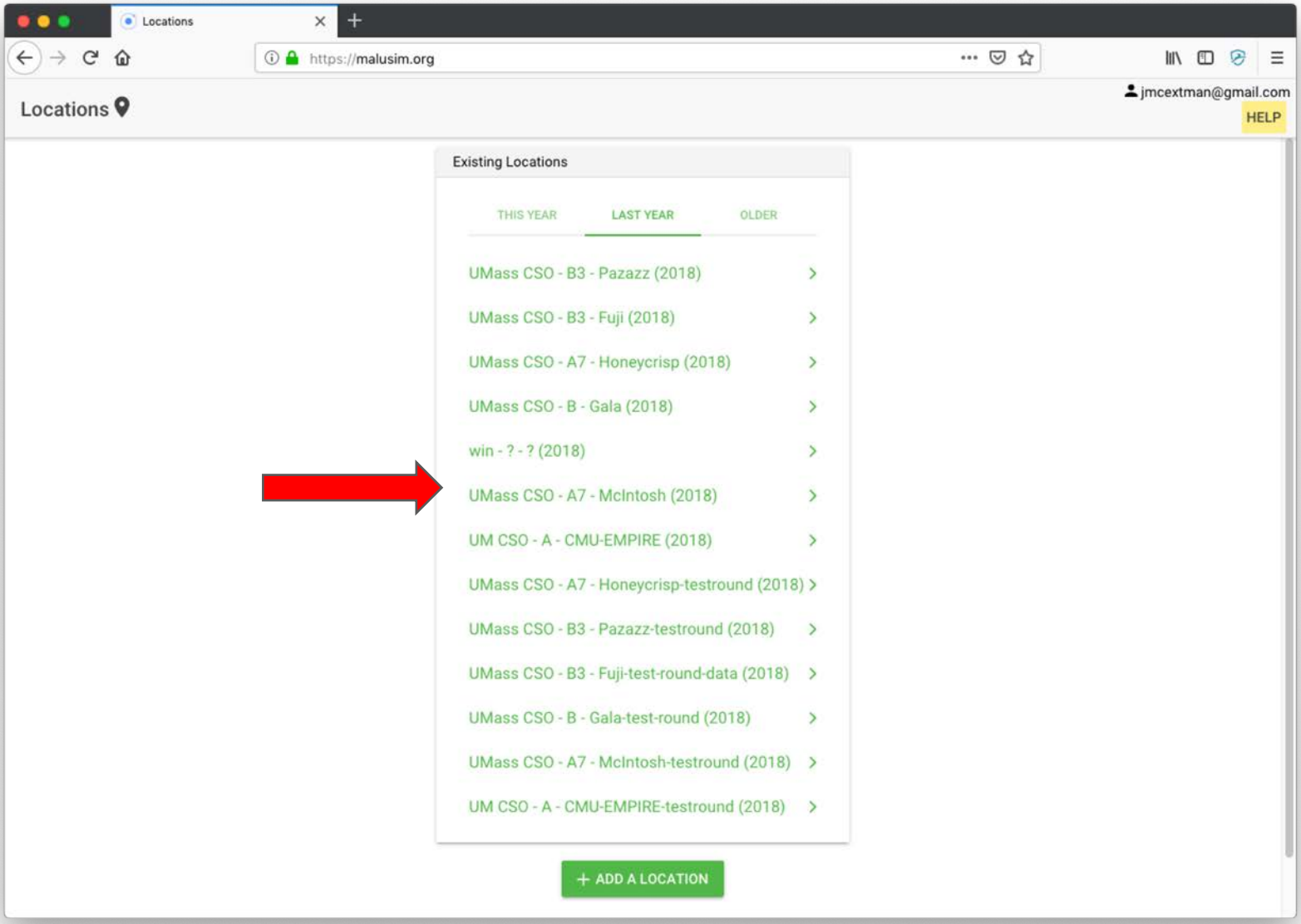
Malusim.org -- ADD A LOCATION



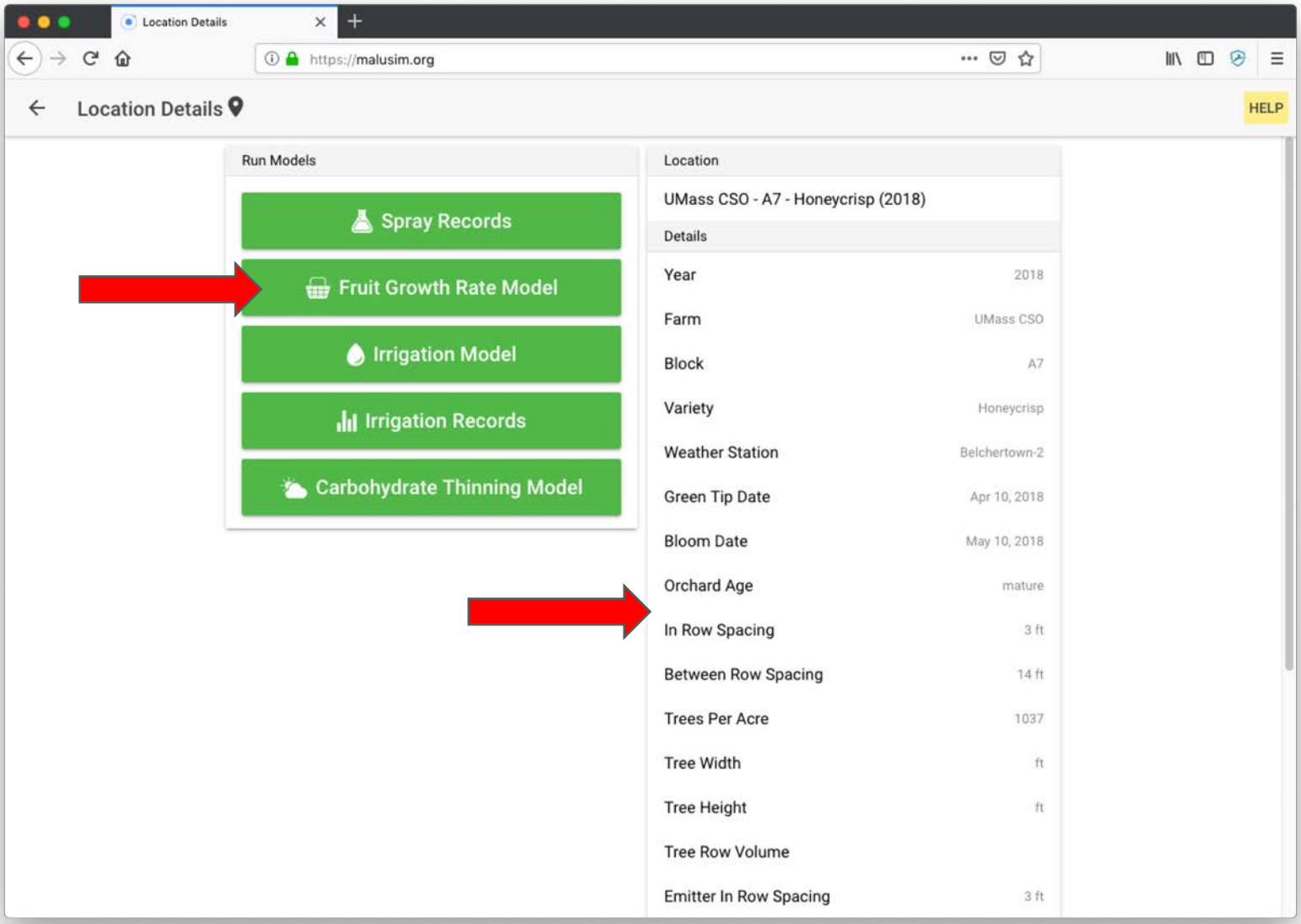
Malusim.org -- Create Location



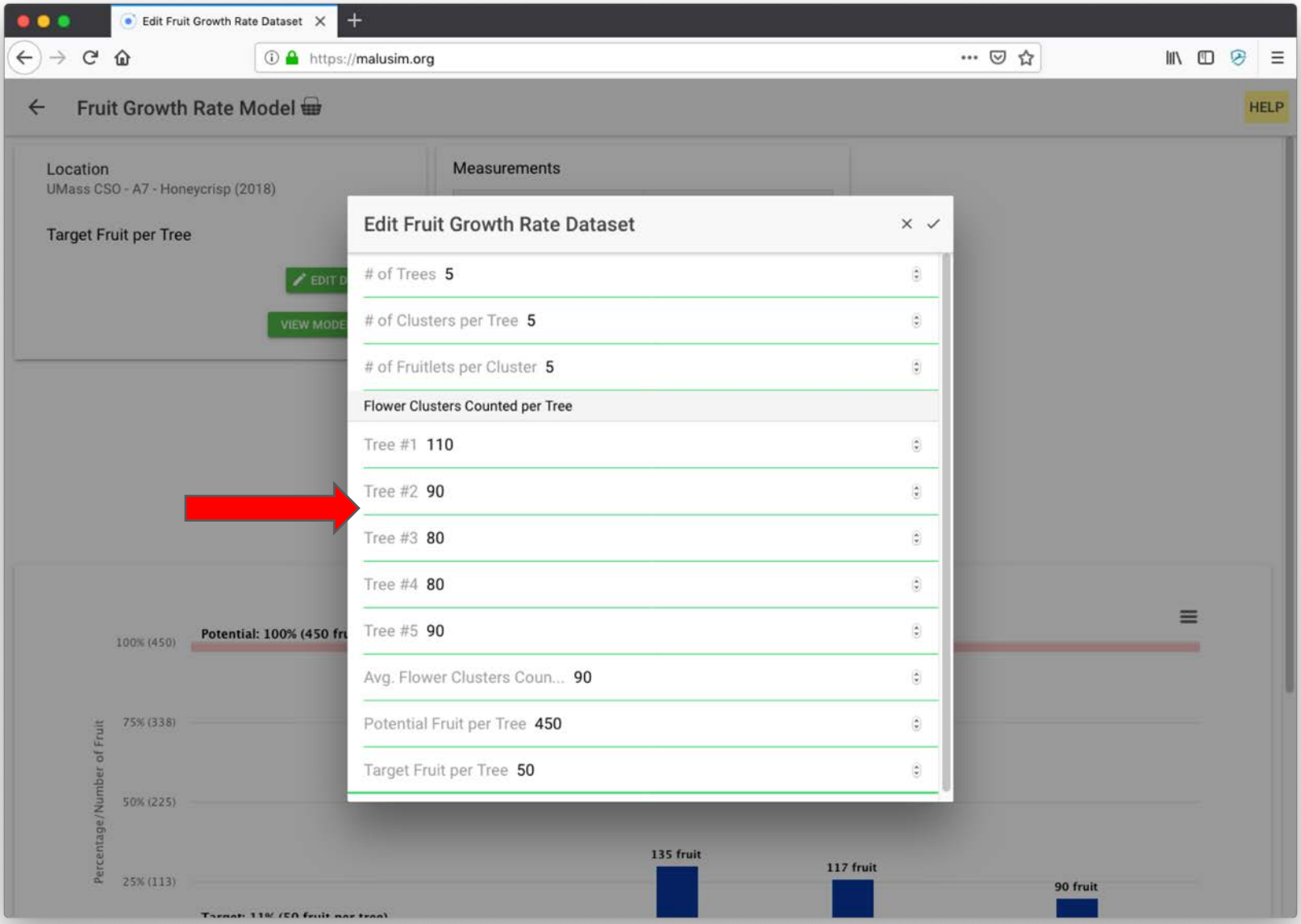
Malusim.org -- Locations



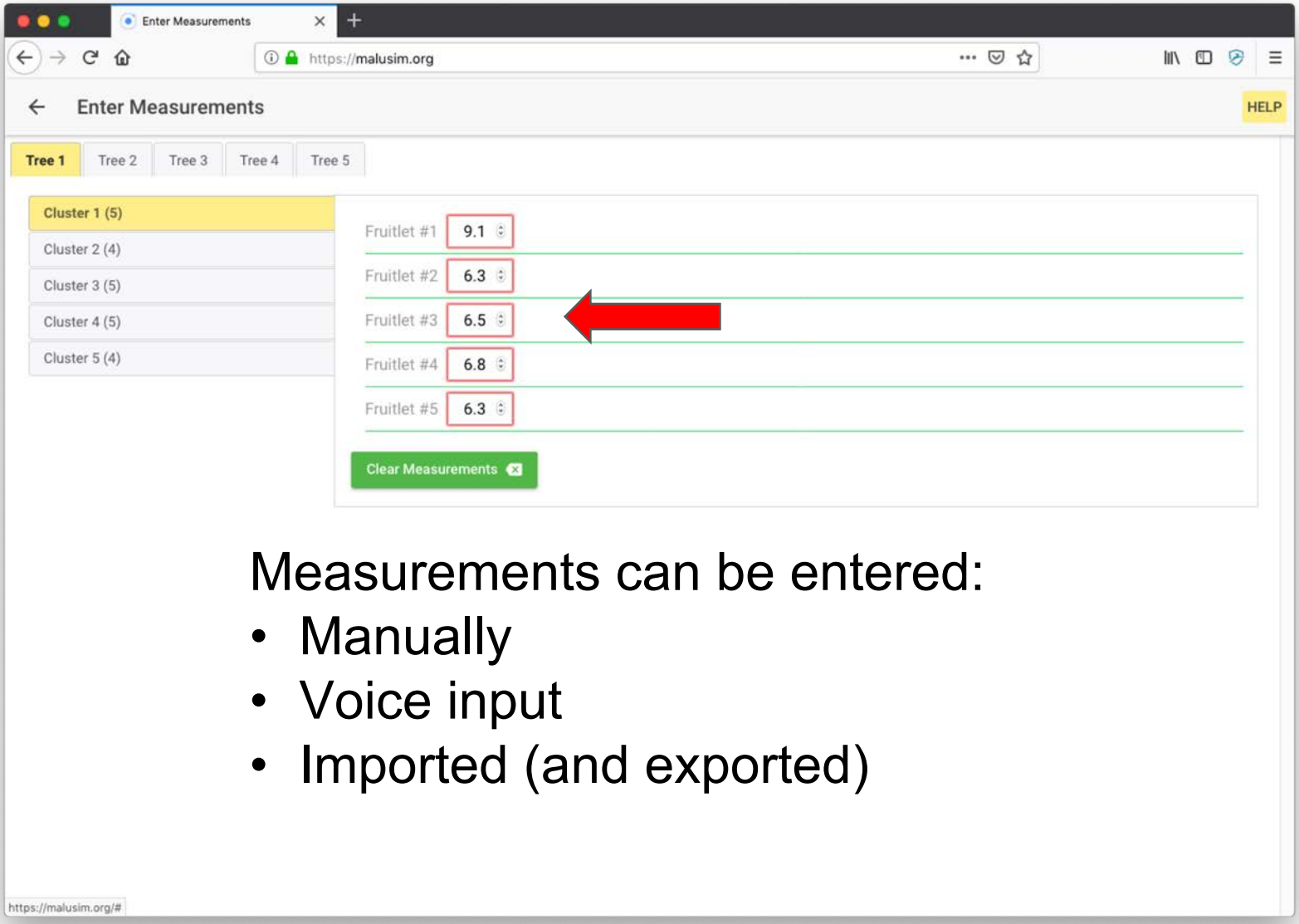
Malusim.org -- Location Details



Malusim.org -- Edit Fruit Growth Rate Dataset



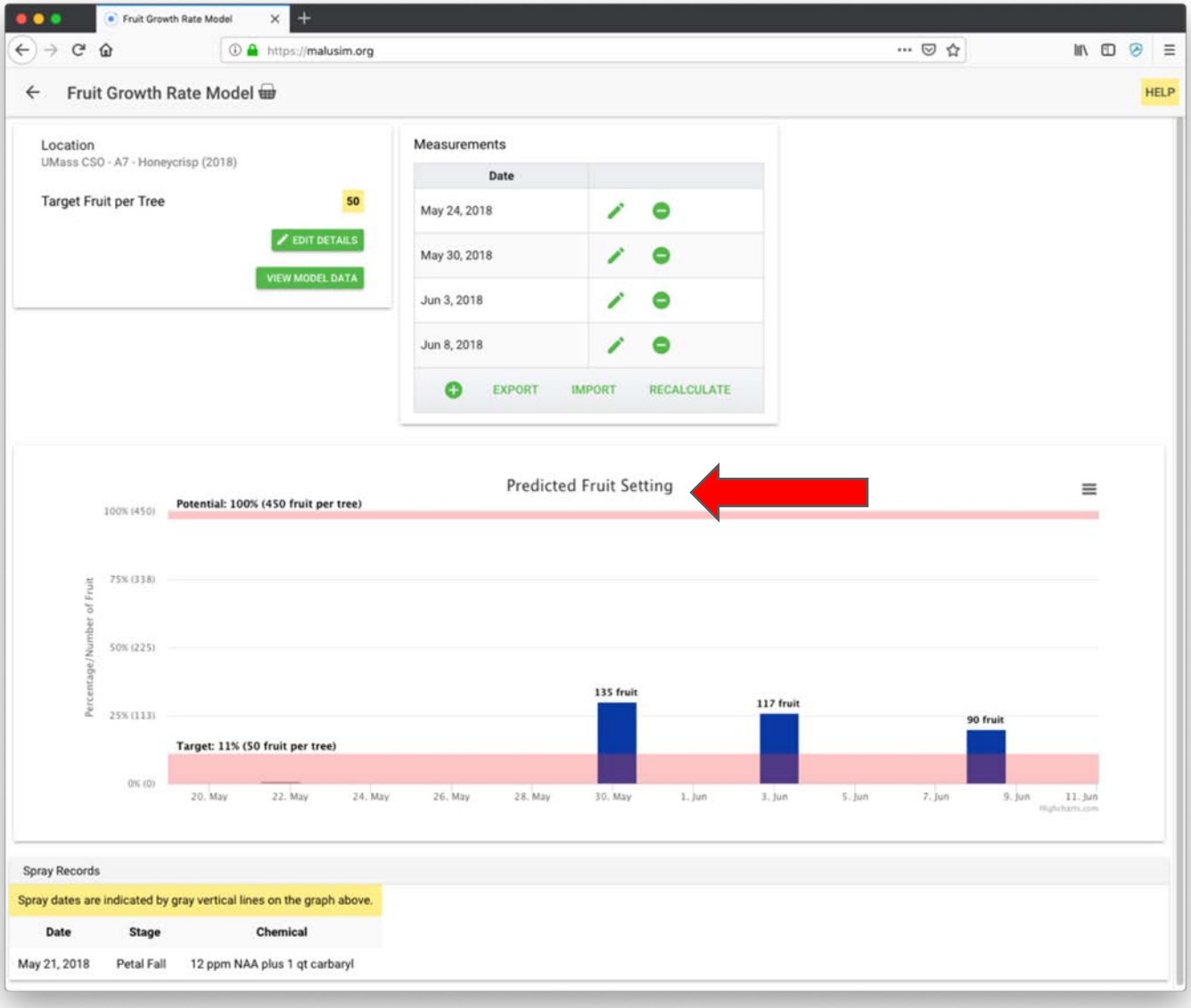
Malusim.org -- Enter Measurements



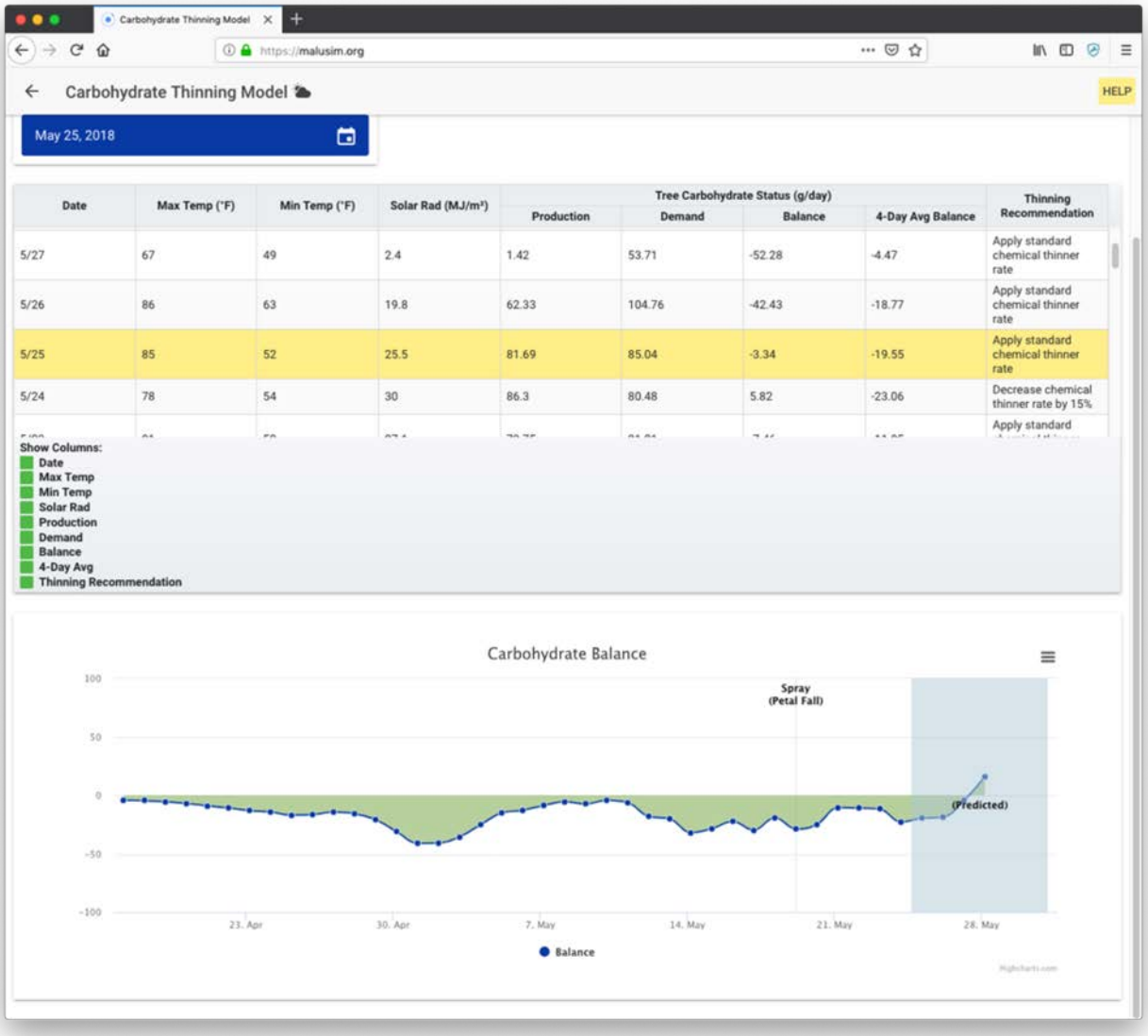
Measurements can be entered:

- Manually
- Voice input
- Imported (and exported)

Malusim.org – Predicted Fruit Setting

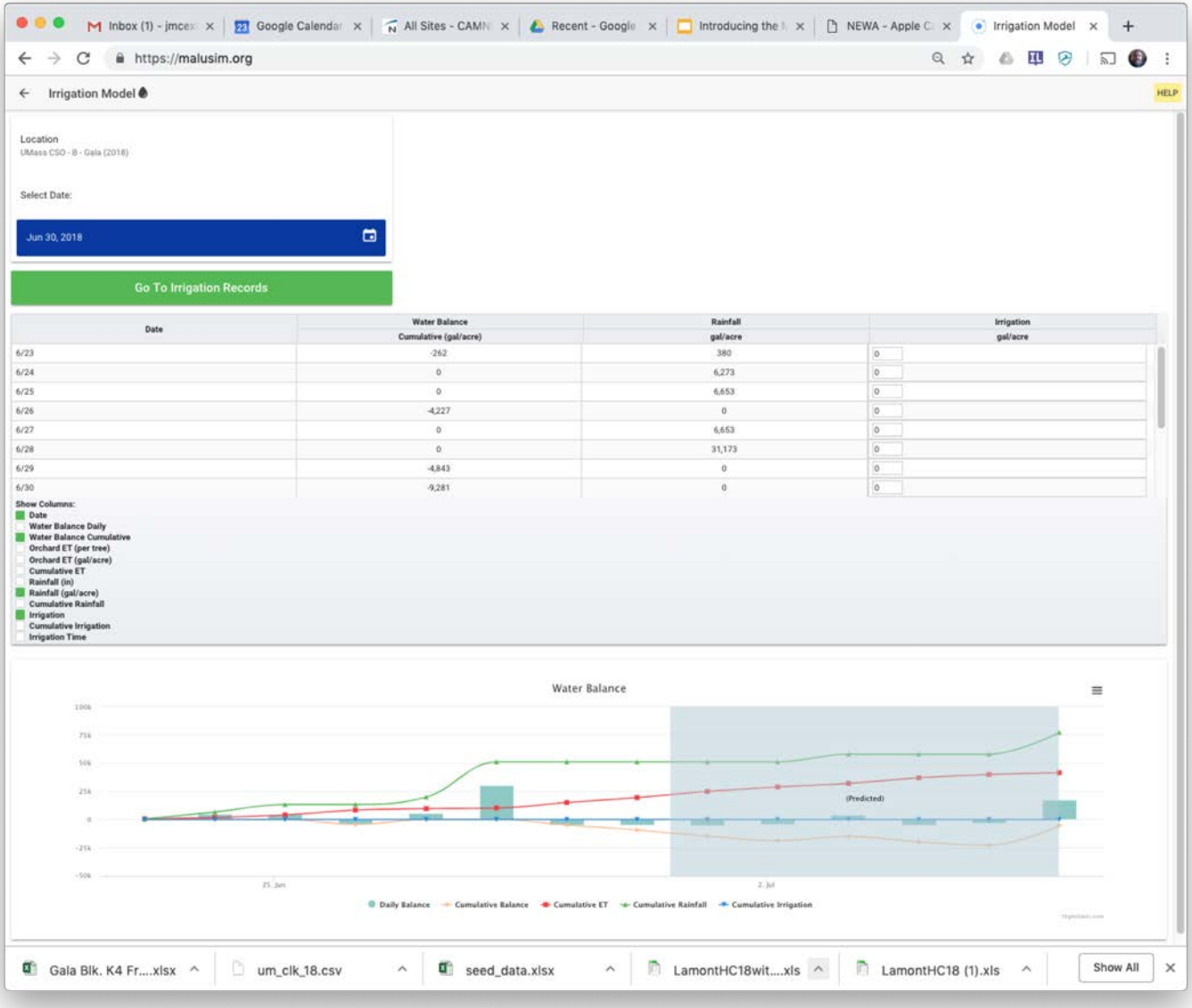


Malusim.org -- Carbohydrate Thinning Model

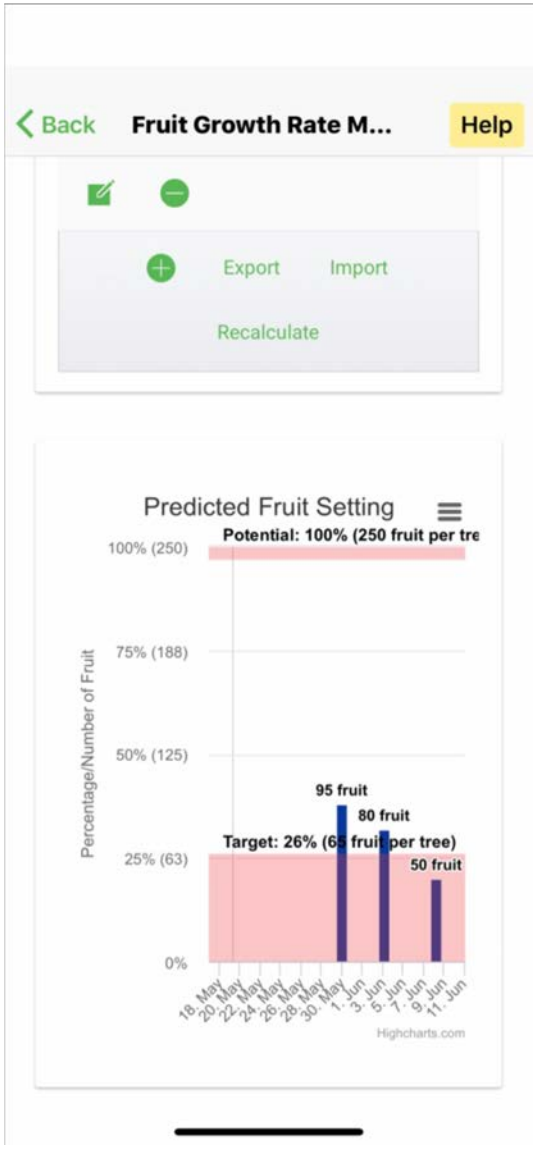


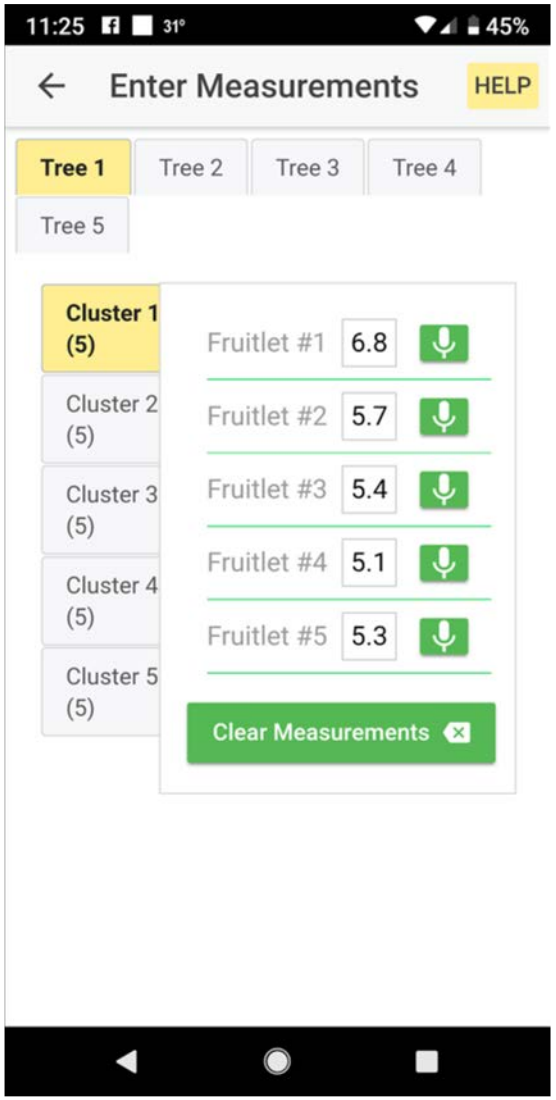
Date	Max Temp (°F)	Min Temp (°F)	Solar Rad (MJ/m²)	Tree Carbohydrate Status (g/day)				Thinning Recommendation
				Production	Demand	Balance	4-Day Avg Balance	
5/27	67	49	2.4	1.42	53.71	-52.28	-4.47	Apply standard chemical thinner rate
5/26	86	63	19.8	62.33	104.76	-42.43	-18.77	Apply standard chemical thinner rate
5/25	85	52	25.5	81.69	85.04	-3.34	-19.55	Apply standard chemical thinner rate
5/24	78	54	30	86.3	80.48	5.82	-23.06	Decrease chemical thinner rate by 15%
								Apply standard

Malusim -- Irrigation model



Malusim – on iPhone and Android





Thanks to NY *farm viability* Institute...

"Improving Apple Grower Profitability Through Precision Management by Developing and Implementing a Smart App" (Jaume Lordan Sanahuja)

NY *farm viability* INSTITUTE