Customized growing degree day (GDD) status and forecasting

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Review: What are GDD and how are they calculated?

- Also know as 'heat units'
- Used to predict the growth and development of organisms: plants, insects, fungal pathogens
- Can be calculated a number of ways, but the simply averaging method is most common.

$$GDD = \frac{(\max T + \min T)}{2} - \text{lower threshold}$$

- Where, max T= maximum observed daily temp and min T = minimum daily observed temperature
- The lower threshold is the temperate below which the organism stops growing or developing. This varies between crops. Most weather stations use a lower threshold of 50°F, this is the standard for corn and warm season annual crops. **This is not accurate for many of our crops.** For grass seed GDD, we use 0°C or 32°F. T-sum 200 or the 200 GDD mark for grass seed fertilization is based on 0°C as the lower threshold. This is what is reported on the Hyslop weather station. https://agsci.oregonstate.edu/hyslop-weather-station
- Units of °C or °F matter. Again, for grass seed we use 0°C as a base and Celsius units.
- GDD models of development are a simplification. We know that day length, precipitation, humidity, food sources and preceding weather patterns also affect development and growth.

Customizable GDD calculations using the uspest.org website:

- Combines US weather and climate data (29,000+ locations) with numerous models to support a wide range of agricultural decision making needs

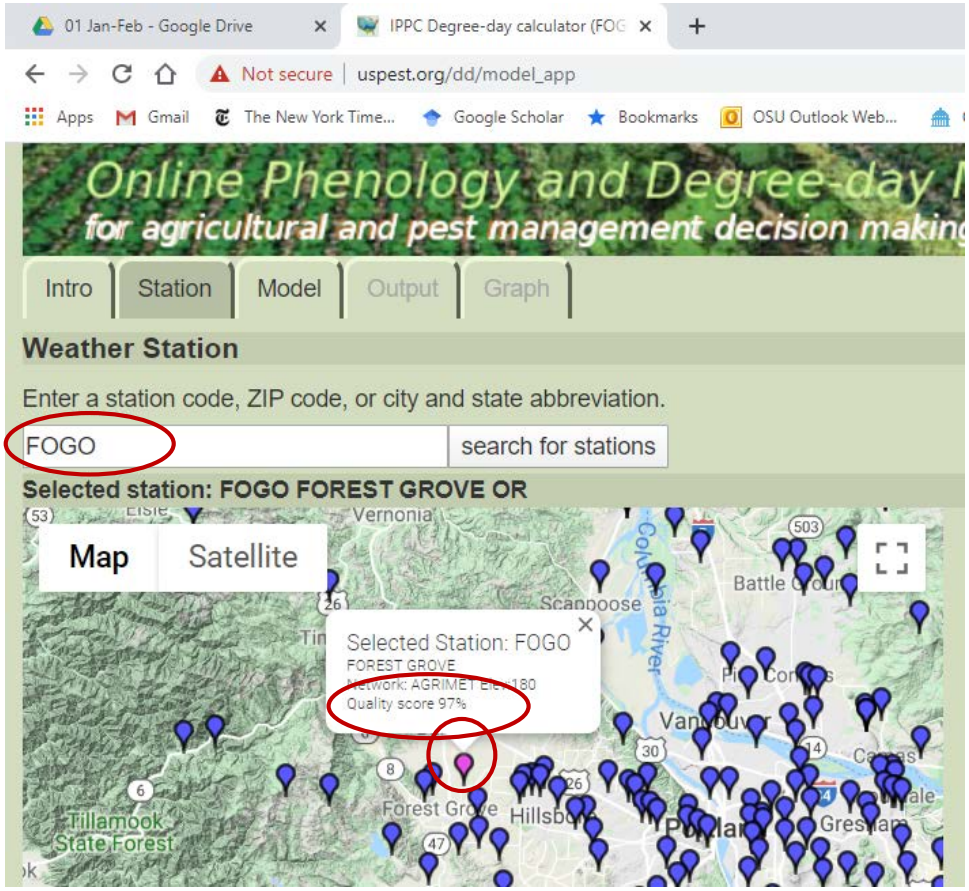
Instructions:

NOTE: This works best of a laptop or desktop computer. Some features, i.e. the data quality checking are not easily accessible on a IPad or phone.

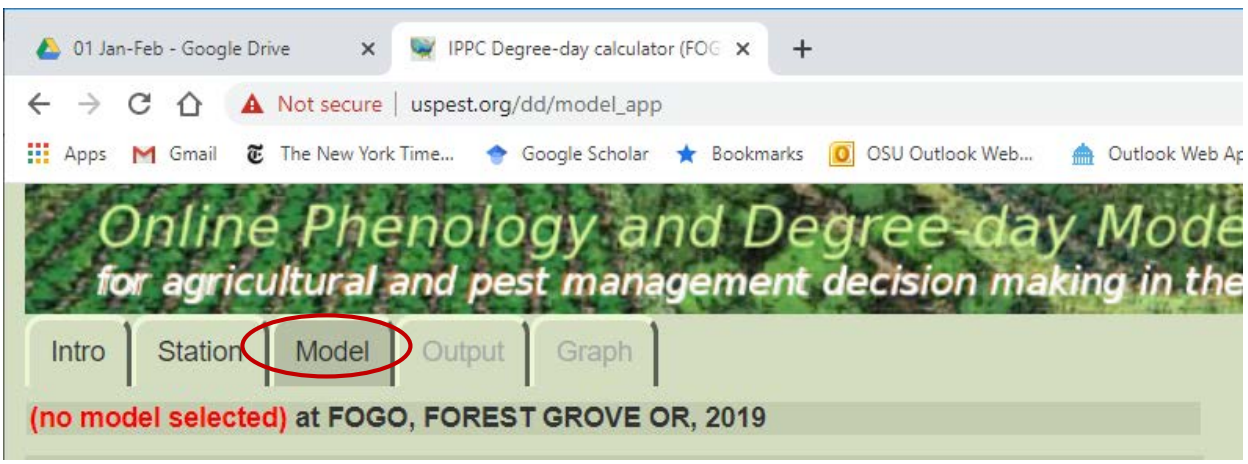
1. Go to uspest.org
2. Select the second option, https://uspest.org/dd/model_app

3. Go to “station” tab. Type in your zip code and hit “search for stations”. Click on “MAP” for one the stations. This will pull up a map and allow you to better identify a station that is a good fit for you.

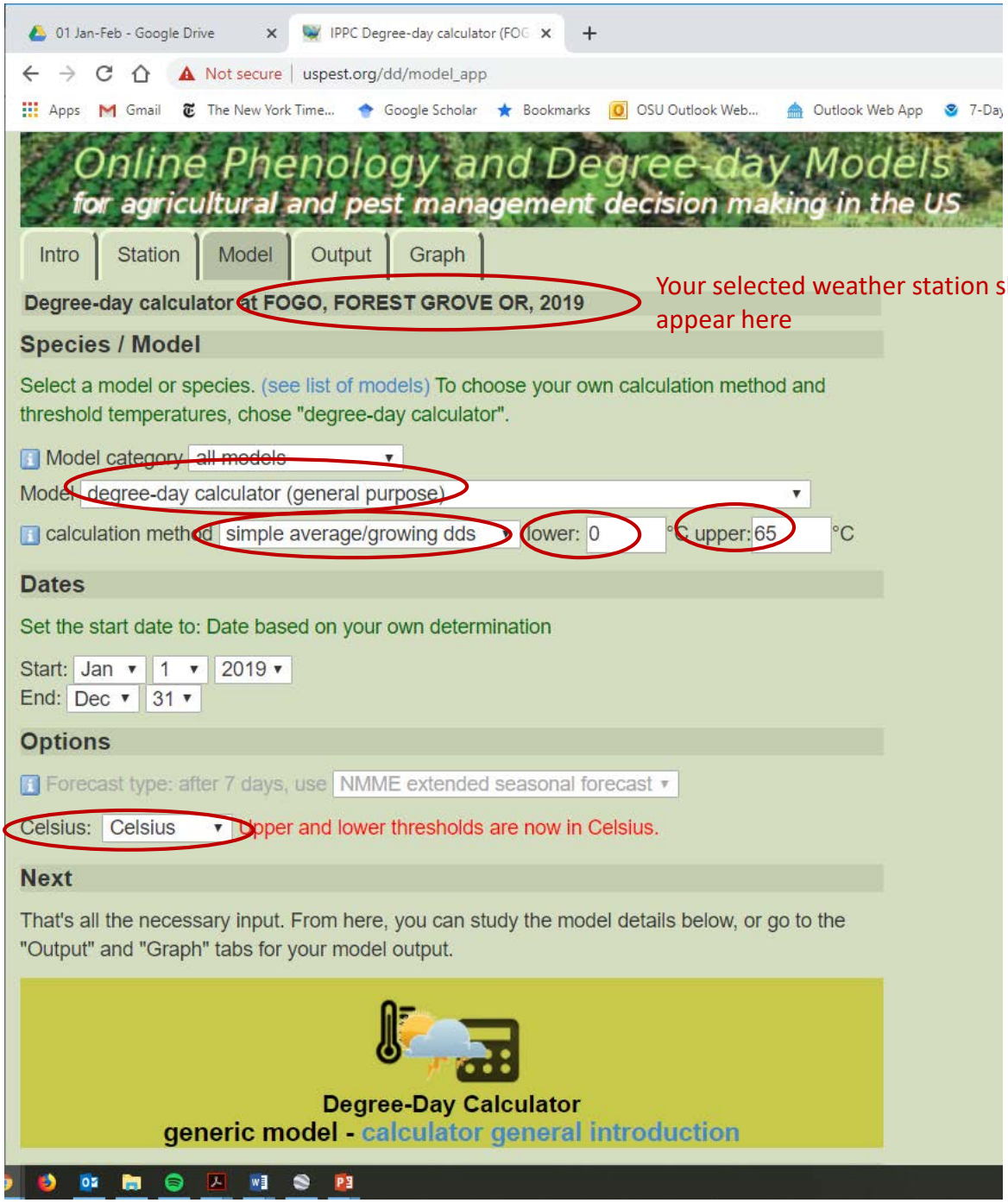
4. Hover over the blue icon for a station and you can see the data quality. Select a station with good quality weather data (QA > 85% is a good threshold). Click on blue icon to select the station. It will turn purple and you should see the station name appear in the search box.



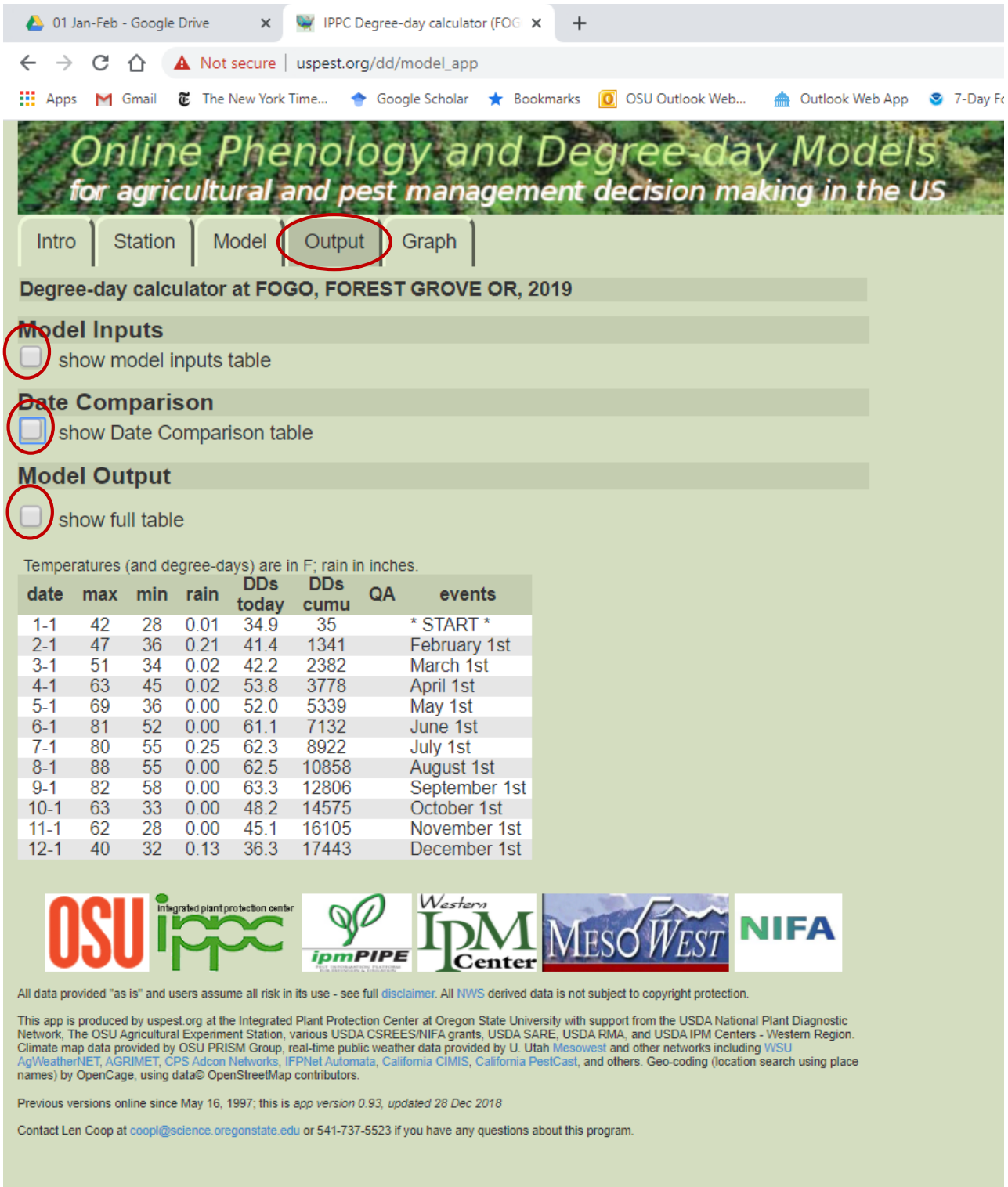
5. With your weather station selected, now click on the “Model” tab



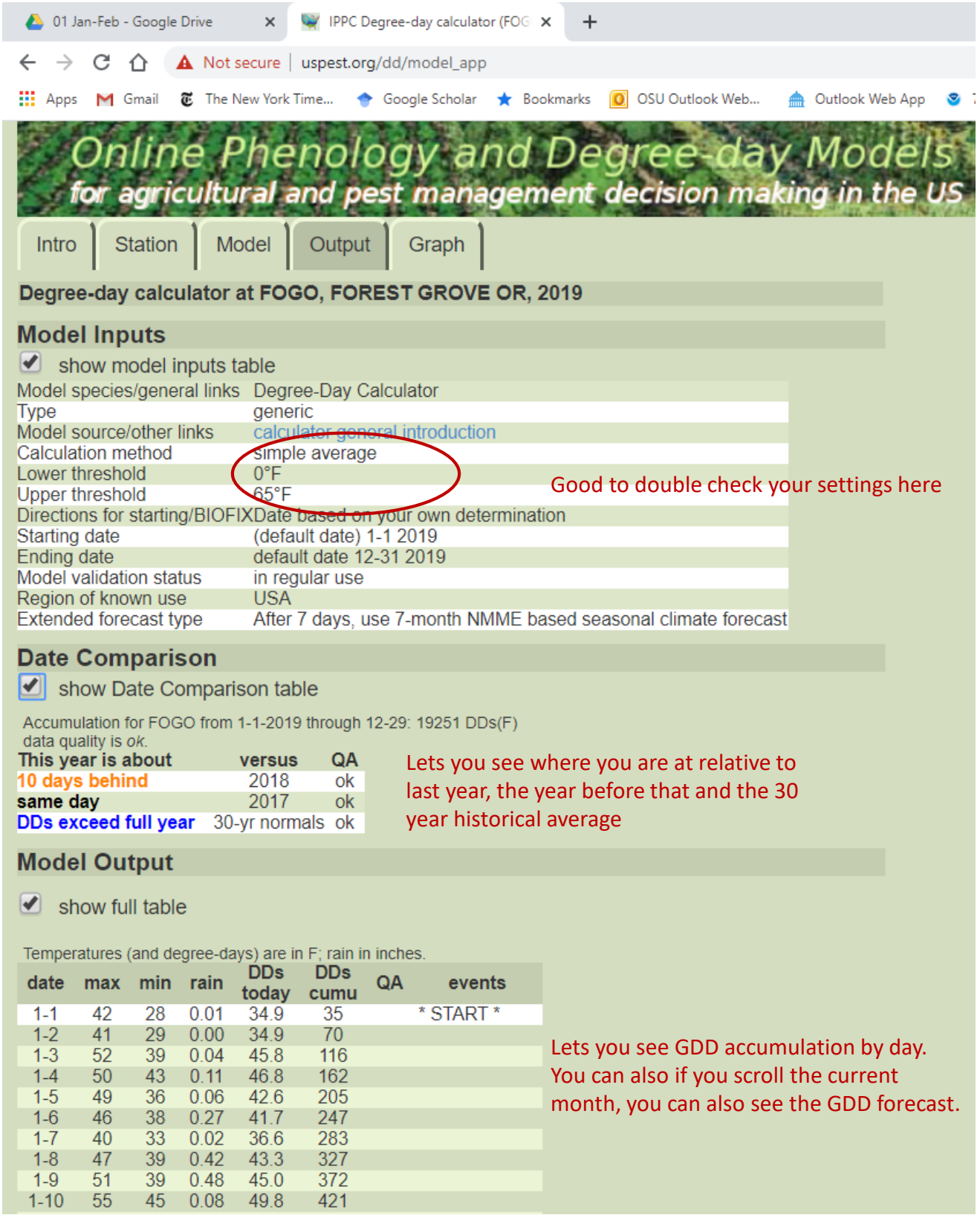
6. In the “Model” drop down menu, select, “degree-day calculator (general purpose).
7. For calculation method, select: “simple average/growing dds”
8. Set lower to ‘0’, upper to ‘65’
9. DO NOT CHANGE THE START DATE. The default of Jan. 1st is correct.
10. Select “Celsius” as the degree units.



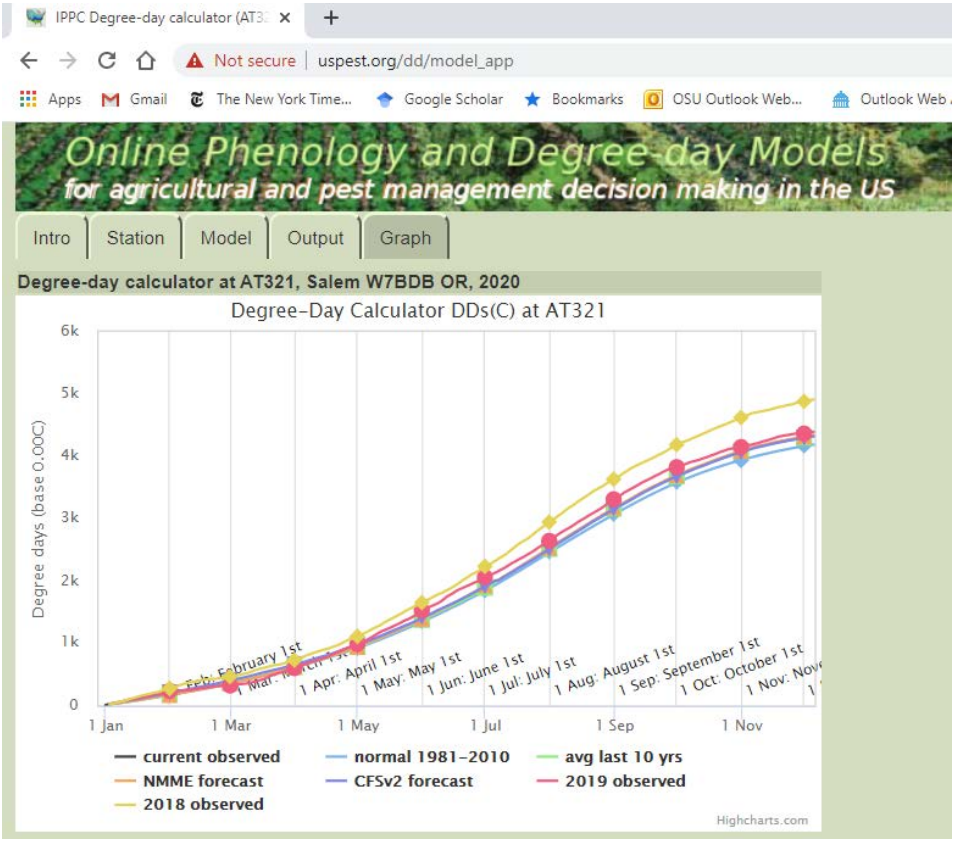
11. Now go to the output tab. Check the boxes next ‘show model inputs table’, ‘show Date Comparison Table’ and ‘show full table’ to see the full output.



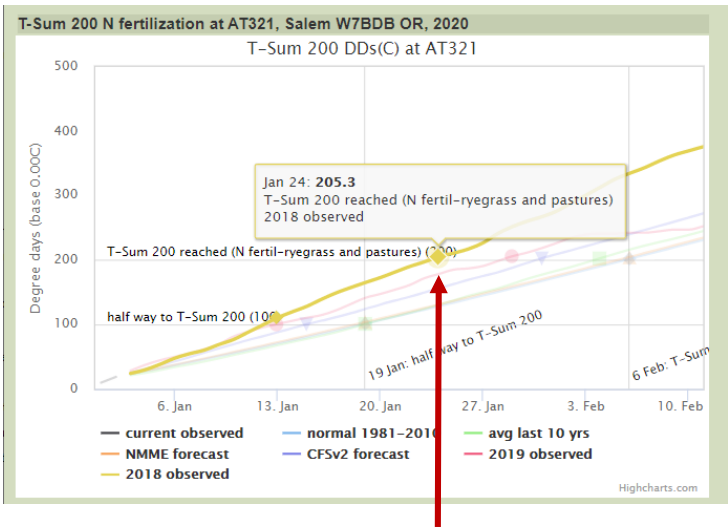
12. Review the output. You can also go to “Graph” tab and view a graph of GDD.

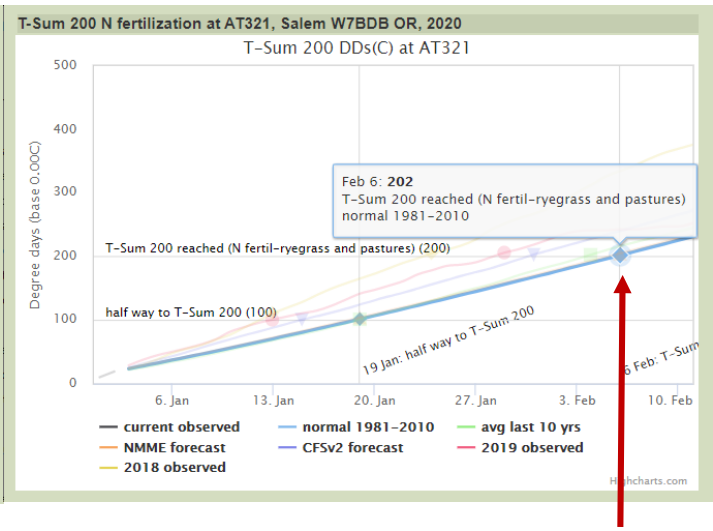


13. Example of graph generated



14. Another option is to use the model "T-Sum 200 N fertilization". This model is designed specifically to calculate the 200 GDD mark using a base temp of 0°C to guide N applications to forage pastures and grass seed production. You have to go back to the "Model" tab and select this model in the drop down menu. You do not have to re-select your weather station. An example of the graphical output of this is below. These graphs are more detailed and allow you to really zoom in and look at the different predictions and past history of when we usually reach the 200 GDD point.





In 2018, 200 GDD was reached on Jan. 24th

30 year average is for 200 GDD to be reached around Feb 6th