

<http://smalfarms.oregonstate.edu/croptime>

CROPTIME: VEGETABLE DEGREE-DAYS

Andrews, Bubl, Coop, Garrett, Kawai, Myers, Noordijk,
Peachey & Sullivan

nick.andrews@oregonstate.edu

Cell: 503-913-9410



Hypothesis

Degree-days (DD) are may be more accurate than calendar days for predicting when a crop will mature.

Degree-days were first used in the 1950's and 1960's, but they've only been adopted by a few industries (i.e. tree fruit).

DDs might be more useful than calendar days for scheduling and managing vegetable crops.

Our goals – by 2016

1. Identify crops and varieties to model with cooperating growers and seed companies.
2. Verify DD models for at least 60 vegetable varieties, 4 weed species and DD sensitive nitrogen information
3. Incorporate these new models into the OSU-IPPC phenology modeling website.
4. Identify new features for the IPPC modeling site that will be useful to vegetable growers and seed companies.
5. Train farmers and other agricultural professionals in the PNW to use the croptime website.
6. “Open-source” models. Make the modeling information available on the croptime site so other Extension agents, vegetable breeders, seed company staff, farmers and students can contribute data for new vegetable DD models in the future.

Justification

David Brown, Mustard Seed Farms, St. Paul, OR:

David has developed his own vegetable degree-day models. “I have used degree day models for over 20 years to schedule successive plantings of vegetables. I have made some educated guesses. More information, based on some research, would be helpful in refining my schedules and maybe using the information for more crops.”

Frank Morton, Wild Garden Seed, Philomath, OR:

“The ‘days to maturity’ varietal information available in most seed catalogs is not useful to farmers, except in a vague relative sense. If seed breeders and catalogs could provide degree-day information for their vegetable varieties, farmers would be able to more accurately model their crop delivery schedules in years of unusual weather patterns or extremes.”

Small and mid-sized farms

Tanya Murray, Sauvie Island Organics, Portland, OR:

“We plan for each week's (CSA) share very carefully. The dramatically different weather we have had this spring and last makes it hard to know what to expect. A project that would help our farm use degree days to predict days to maturity would be very helpful.”

Bob Egger, The Pumpkin Patch, Portland, OR:

“We need a steady flow of crops like cabbage. This would help me eliminate gaps in harvest. When we have a couple weeks of wet weather in spring we could use this program to choose varieties we might not be familiar with but would help keep our production up.”

Bob also told me he thought croptime would help him compete with bigger farms in CA, because the big buyers don't waste time with you if you don't have the right product available at the right time.

Degree-days

$$\frac{T_{max} + T_{min}}{2} - T_{base} = \text{degree days}$$

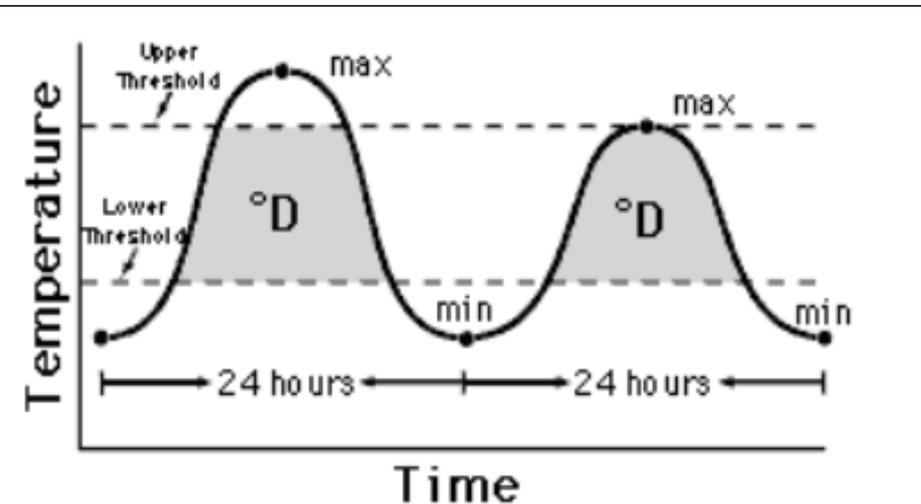


Figure 1. Thresholds and accumulated degree-days

From UC Davis:

<http://www.ipm.ucdavis.edu/WEATHER/ddconcepts.html>

- Formula is simple average.
- “single sine curves” describe the curvature more accurately.
- Lower thresholds: when growth stops, cold damage.
- Upper temperature thresholds important with some crops.

Vegetable DD model goal: 60 varieties of 17 crops

- Amaranthaceae: spinach
- Apiaceae: carrot and parsnip
- Asteraceae: head lettuce
- Brassicaceae: broccoli, Brussels sprout, cabbage, cauliflower and kale
- Cucurbitaceae: cucumber, summer squash, winter squash and pumpkin
- Fabaceae: snap beans
- Poaceae: sweet corn
- Solanaceae: pepper and tomato

Using vegetable models

- Scheduling planting dates so crop supply can be timed to meet market demands:
 - “I want about 100 lbs of broccoli every week from August through October. When should I plant them?”
 - “I’ve been rained out for the last 3 weeks, are there any shorter season varieties I can use so I don’t have a big gap in supply during harvest season?”
 - “It’s getting late in the year to plant, will this variety mature by the end of the season?”
- Transplants and Plastic mulch?



Using vegetable models

- Predicting harvest dates more accurately during the season.
 - Schedule harvest crews
 - Communicate with buyers when unusual weather is making crops mature more quickly or slowly than expected
 - Estimate ripeness (i.e. winter squash, Alex Stone)
- Predictions rely on 7-day weather forecasts then 30-year historical temperature averages.
- Len Coop is investigating more accurate long-term forecasts for the IPCC modeling site.

Using weed models (Ed Peachey)

- Pigweed, lambsquarter, hairy nightshade and barnyard grass
- Will that emerging weed go to seed before I harvest the crop?
- If so, supplemental weed management is valuable to prevent weed seed rain and reduce weed seed bank.

>20 farm & seed company collaborators

Thomas Barnett	Jim Gill, NORPAC	
Frank & Matt Battilega, Big B Farm	Peter Kenagy, Kenagy Family Farm, Inc.	Brian Montecucco, Montecucco Farms
Jim Bronec, Praying Mantis Farm	Steve & Ryan Koch, Koch Farms	Frank Morton, Wild Garden Seed
David Brown, Mustard Seed Farms	Casey Kulla, Oakhill Organics	Pete Postlewait, Postlewait Farms
Bill Case, Bill Case Farms	Scott Latham, Sauvie Island Organics	Manfred Schosnig, C&S Farm
Jim Christopherson, Bejo Seeds	Brian Logan, Logan-Zenner Seed	Joe Siri, Siri & Son Farms
Bob Egger, The Pumpkin Patch	Laura Masterson, 47th Ave Farm	Ray Stafford, Kraemer Farms

<http://smallfarms.oregonstate.edu/croptime>

CROPTIME

We are developing this website to help vegetable growers make farming decisions using degree-day models and automatic weather stations available through OSU's [Integrated Plant Protection Center](#) websites.

The CROPTIME website will be launched publicly in 2015. CROPTIME will be set up to encourage open source development of vegetable variety models. In this project we are developing:

- ▶ More than 70 degree-day (DD) models to predict maturity dates for vegetable varieties.
- ▶ Six weed DD models to help you prevent weeds going to seed.
- ▶ A DD nitrogen tool to help you make nitrogen available when your crop needs it.

CROPTIME Calculator

This calculator is part of the OSU-IPPC modeling site and is linked to 15,000 automatic weather stations around the US. We are developing the vegetable, weed and nitrogen models to help you manage crops. Follow these steps:

<http://smalfarms.oregonstate.edu/croptime>

CROPTIME: VEGETABLE DEGREE-DAYS

Andrews, Bubl, Coop, Garrett, Kawai, Myers, Noordijk,
Peachey & Sullivan

nick.andrews@oregonstate.edu

Cell: 503-913-9410

