

Cornell Climate Smart Farming: Decision Tools for Climate Variability and Change - The Irrigation Scheduler and More

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Cornell Institute for Climate Smart Solutions

Climate Smart Farming Program

Presentation for the NRCC Monthly Webinar

September 29th, 2016



Cornell University





- Cornell Institute: Formed 2013
- 140+ Cornell researchers working on climate change
- Vision: Working toward a future where agricultural, environmental, and social systems are resilient in the face of a rapidly changing climate and have reduced their impacts on the climate system.
- Climate Smart Farming Program and Extension Team: Launched 2015
- Research, Education/Outreach, and Partnerships

climateinstitute.cals.cornell.edu/

Program Goals

Cornell Climate Smart Farming

- Increase farm resiliency to extreme weather and climate variability through adoption of BMPs for climate change adaptation.
- Increase energy efficiency and renewable energy capacity to reduce operating costs and GHG emissions.
- Sustainably increase agricultural productivity, farming incomes, and food security.

Climate Change and Northeast Agriculture

Challenges:

- Temperature: Increased frequency of high temperature causes heat stress for both livestock and crops
- Water: Too much or too little; lack of efficient water management
- Pest, Disease & Weed Pressure
- Climate change much more complicated than just “warming”:
Uncertainty, Variability & Extremes

But also Opportunities:

- Heat stress challenges less severe than some other regions
- Relative to other regions: we have water!
- Longer growing seasons allow farmers to explore with different crop varieties and double-cropping
- Close proximity to many markets: 22% U.S. population

Infrastructure @ Cornell

- **Data & Models:** Northeast Regional Climate Center (NOAA)
- **Climate Change, Agriculture, Ecosystem, Community & Extension Expertise:** CALS Researchers, CSF Extension Team, Farmer Advisory Committee
- **Computer Programmers & Website Design**
- **Support:** Small, Short-Term Funds (USDA Federal Formula Hatch & Smith Lever Funds, and the New World Foundation funds): Need for long-term, core funding!

How is the changing climate affecting your farm?

Climate Smart Farming Decision Tools

Cutting-edge tools to help farmers manage climate risk.

See more Tools

CSF Growing Degree Day Calculator



Growing Degree Days (GDD) are a measure heat accumulation used to predict plant development and pest/disease outbreaks.

Grape Hardiness & Freeze Risk



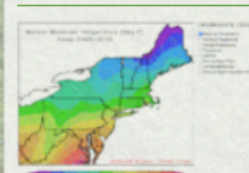
Charts hardiness temperature vs. daily observed/forecast temperatures for several varieties of grapes.

CSF Irrigation Scheduler



Monitor current and forecasted soil water deficit at your location to allow smart scheduling of irrigation.

Climate Normals - Northeast Regional Climate Center



Climate normals are an arithmetic average of a variable such as temperature over a prescribed 30-year period.

Climate Smart Farming Tools

Climate

Tools

Team

Resources

Forum

Videos

CSF Growing Degree Day Calculator



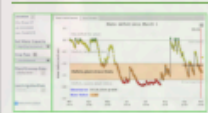
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Grape Hardiness & Freeze Risk



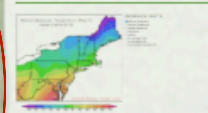
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Network for Environment and Weather Applications



NEWA makes it possible for farmers to share resources for weather data collection, analysis, distribution, and archiving

U.S. Drought Monitor



The map is based on measurements of climatic, hydrologic and soil conditions as well as reported impacts and observations from more than 350 contributors around the country.

NOAA Seasonal Outlook - Precipitation



A seasonal forecast is the best available prediction of what our climate will be like in the next few months.

NOAA Seasonal Outlook - Temperature



A seasonal forecast is the best available prediction of what our climate will be like in the next few months.

USDA Plant Hardiness Map



The USDA Plant Hardiness Zone Map is the standard by which gardeners and growers can determine which plants are most likely to thrive at a location.

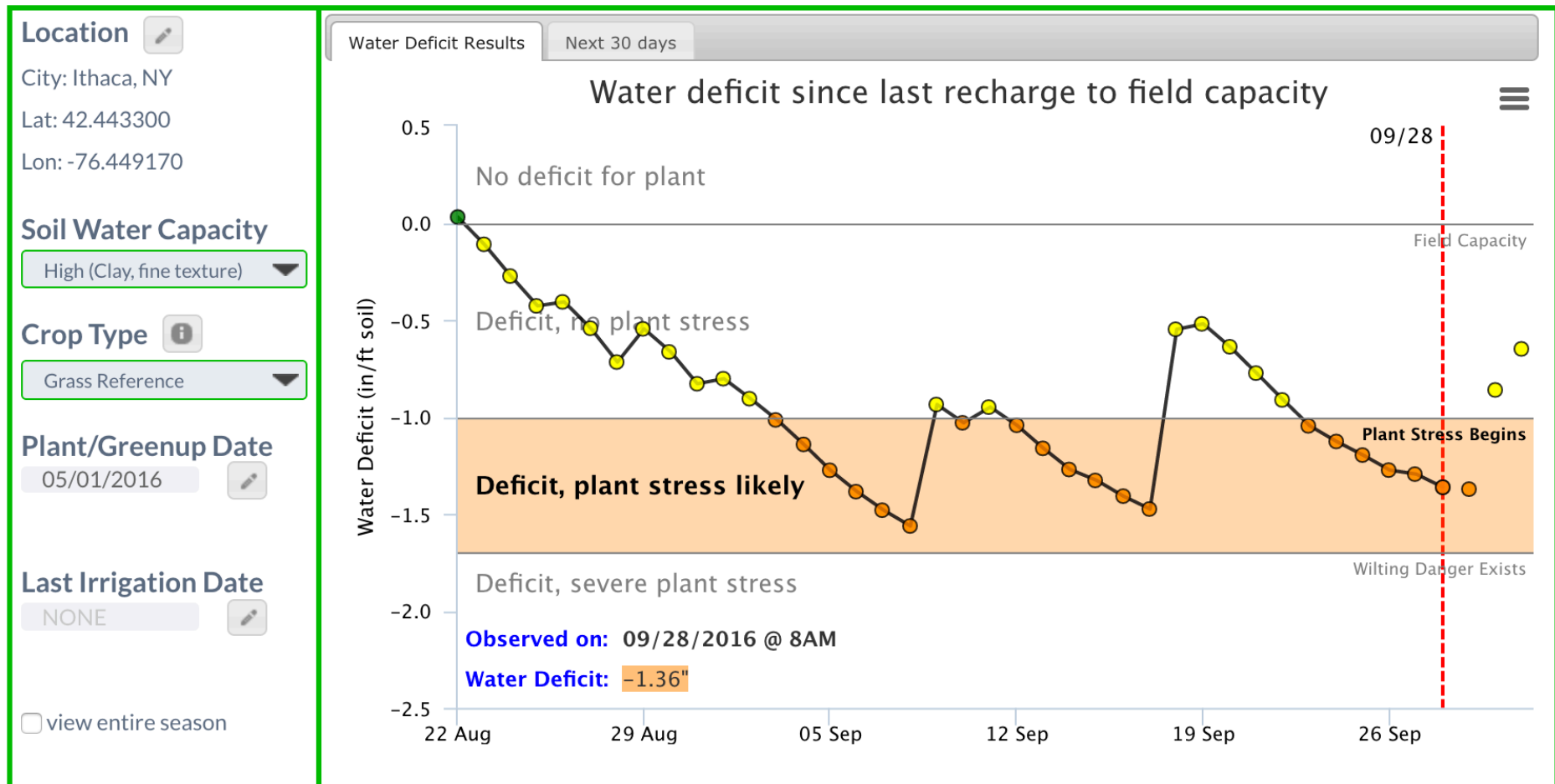
Adapt-N Nitrogen Management Tool



Adapt-N is an online tool that will help you precisely manage your N inputs for grain, silage or sweet corn.

Irrigation Scheduler

- Estimates effective root zone soil water content to inform decision makers about current and forecasted water deficits
- Uses precipitation, evapotranspiration, drainage, and runoff



Irrigation Scheduler

- Can “view entire season” by checking the box in the lower left-hand corner

Location

City: Ithaca, NY

Lat: 42.443300

Lon: -76.449170


Soil Water Capacity

High (Clay, fine texture) 

Crop Type

Grass Reference 

Plant/Greenup Date

05/01/2016 

Last Irrigation Date

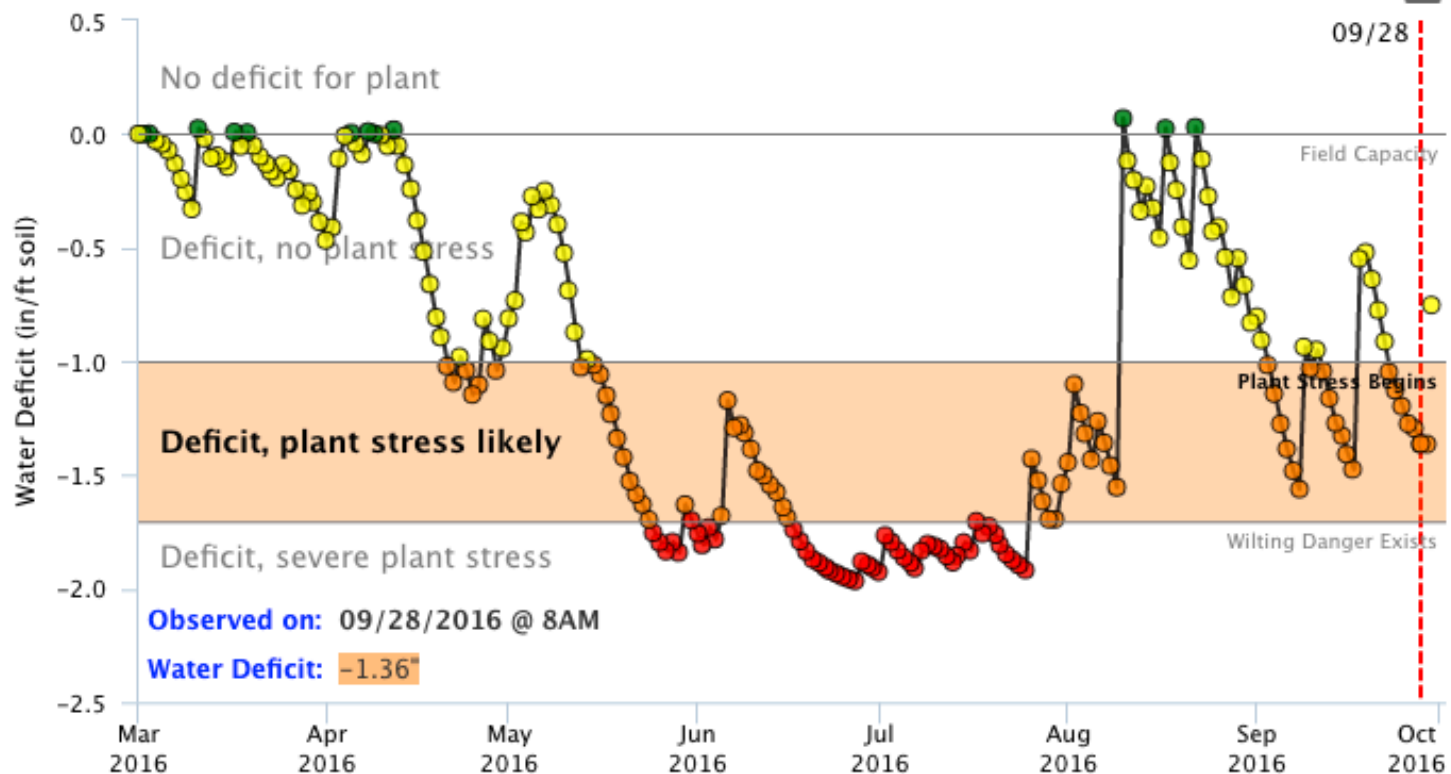
NONE 

view entire season

Water Deficit Results

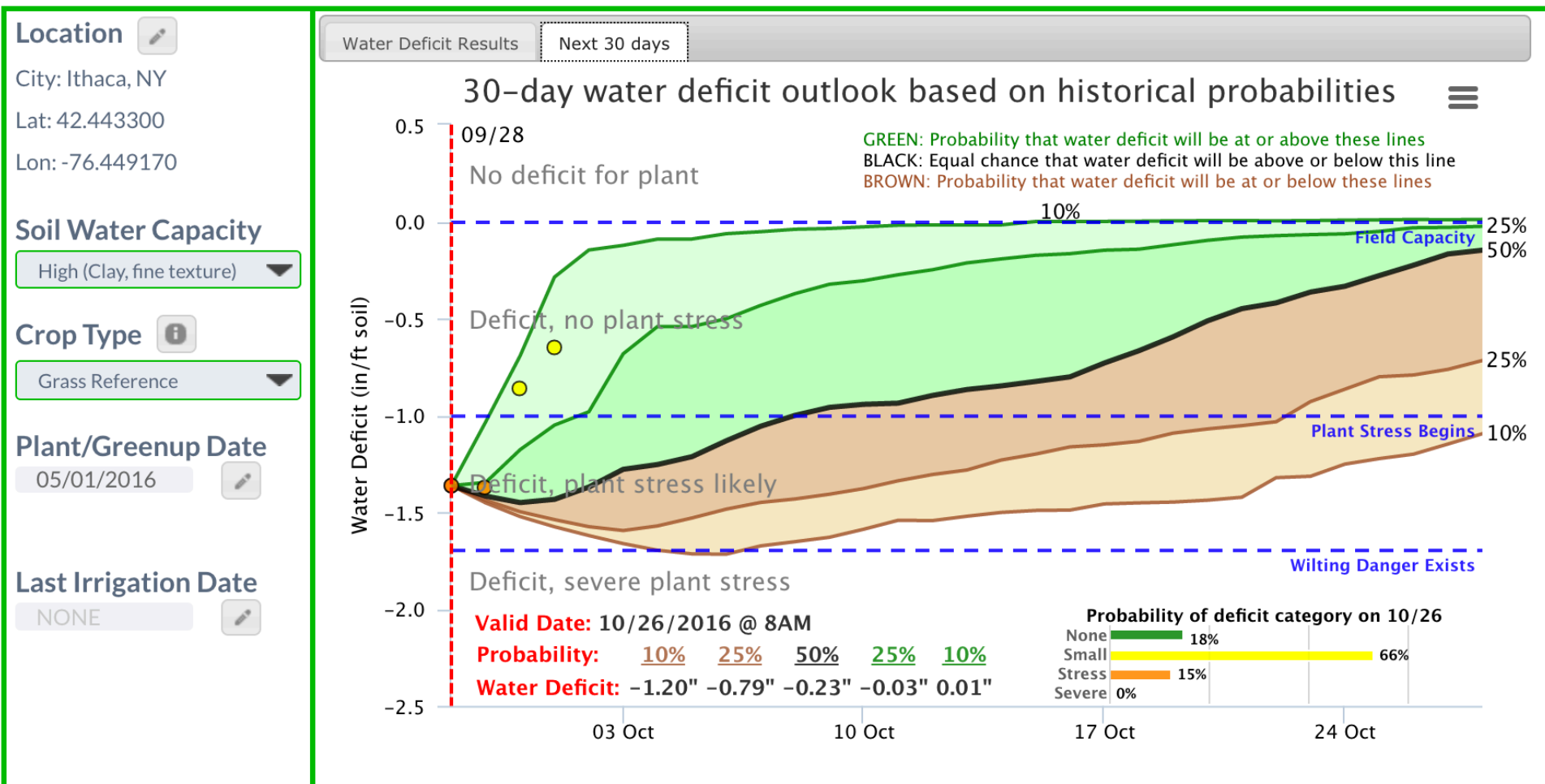
Next 30 days

Water deficit since March 1



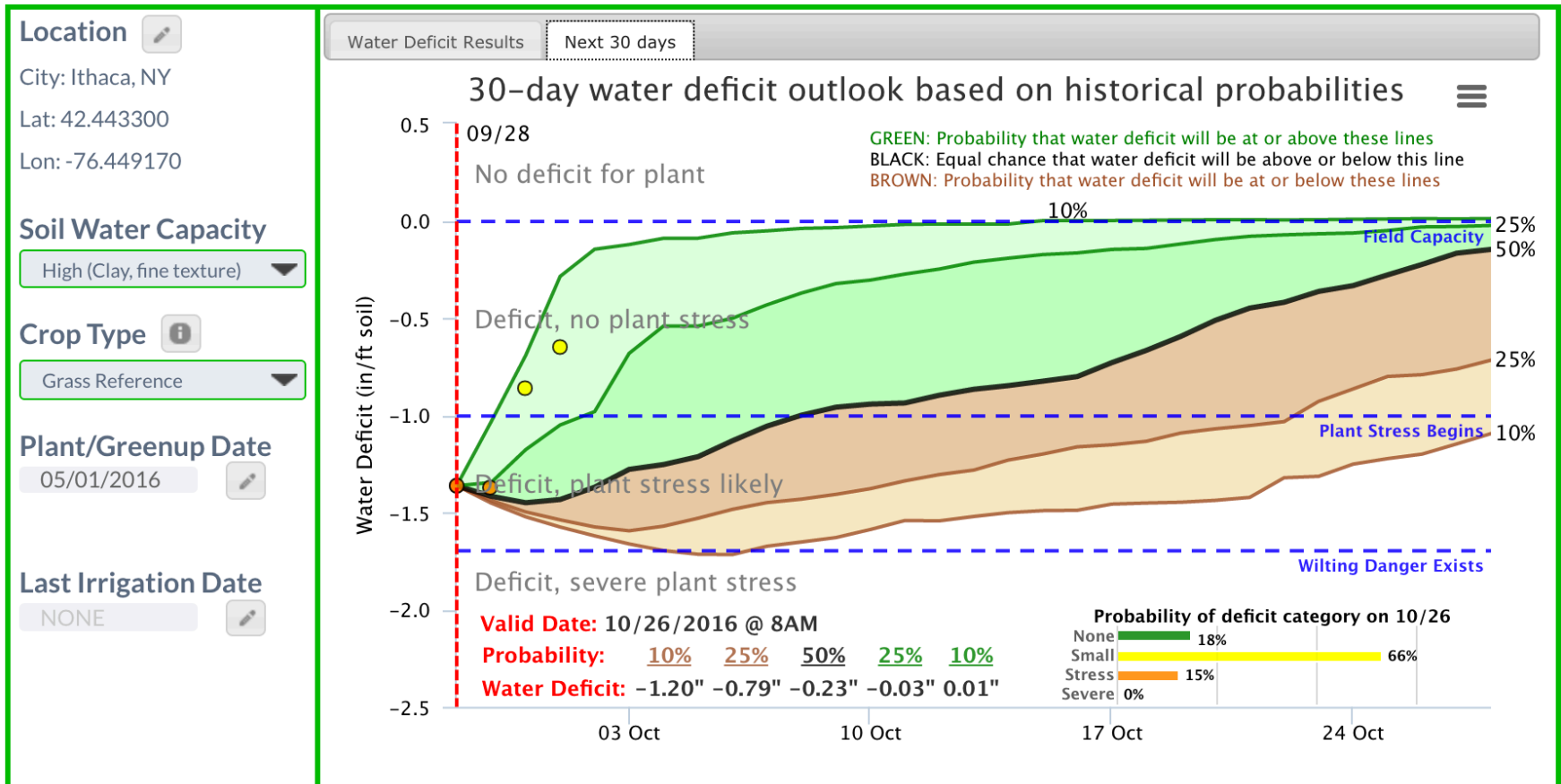
Irrigation Scheduler

- Can determine probability of water deficit over a 30-day range
- Scroll with tool tip to interact with bar chart in bottom right



Irrigation Scheduler

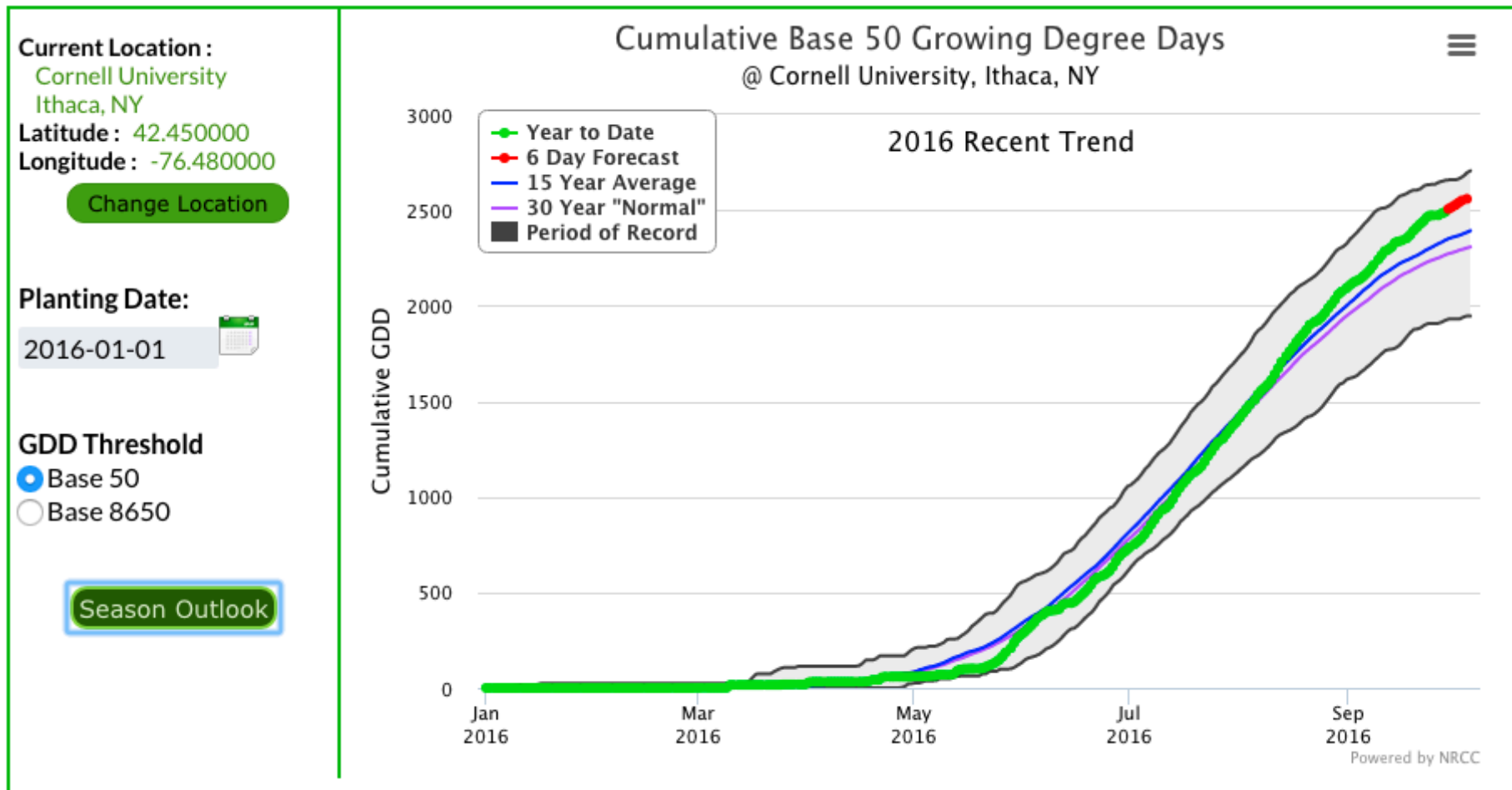
- Can be used to plan water applications to minimize plant stress and maximize water conservation
- Assesses the probability of naturally reaching certain levels of soil water content over the next month



Growing Degree Day Tool

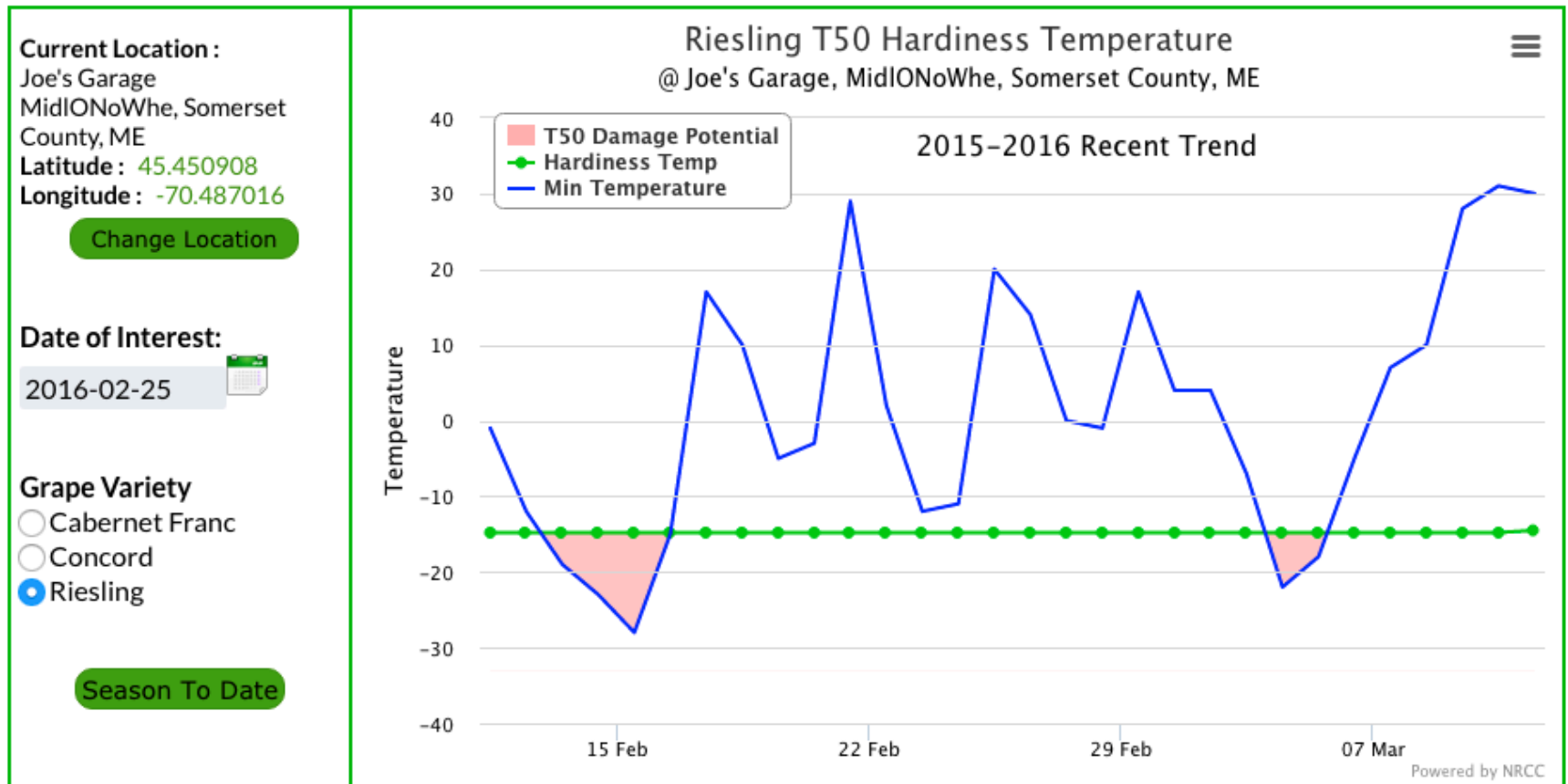


- GDD Measures heat accumulation over the season
- Tool can be used to predict important stages in plant growth and predict pest and disease outbreaks



Grape Hardiness Tool

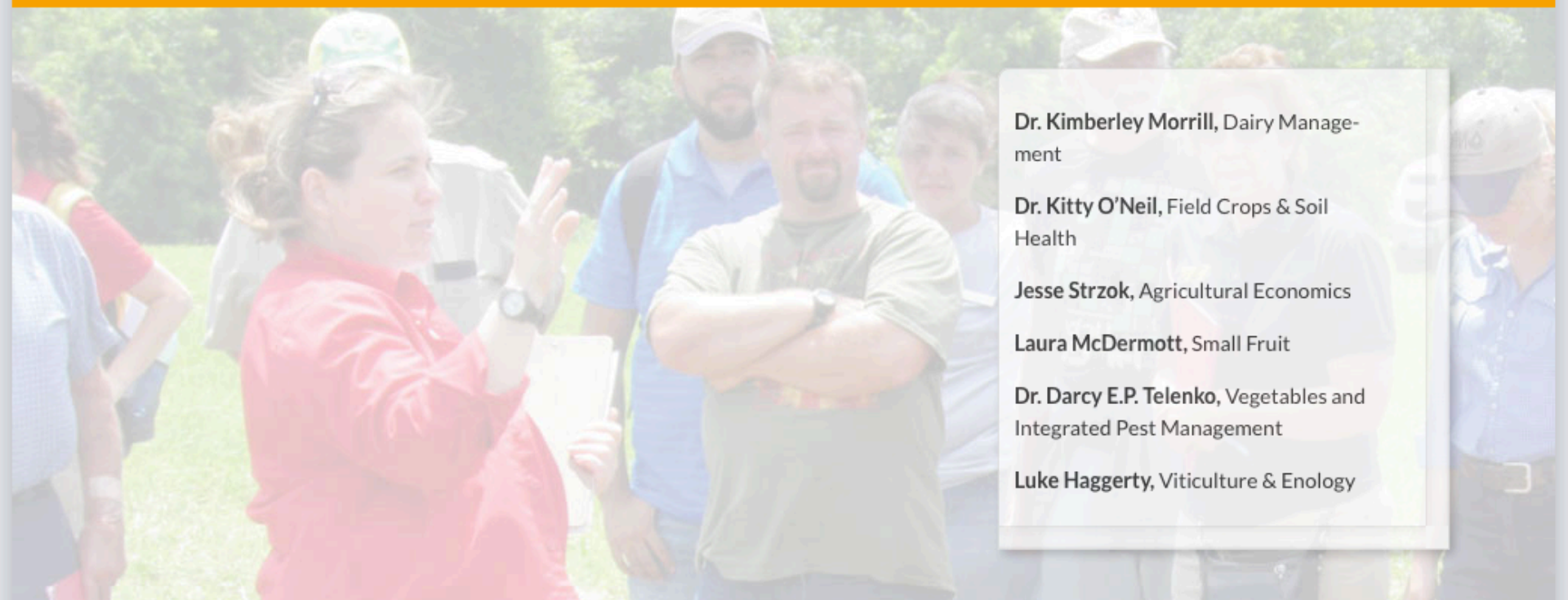
- Spring frosts not receding as quickly as flowering is advancing
- Can be used to determine level of freeze injury to grapes as a product of weather conditions and stage of plant development



Climate Smart Farming Extension Team

Let us help you increase your farm's resiliency and sustainability.

[Read about the Team](#)

A photograph showing a group of people outdoors. A woman in a red shirt is in the foreground, gesturing with her hands as if speaking. Behind her, several other people are visible, some wearing hats and casual clothing, listening attentively.

Dr. Kimberley Morrill, Dairy Management

Dr. Kitty O'Neil, Field Crops & Soil Health

Jesse Strzok, Agricultural Economics

Laura McDermott, Small Fruit

Dr. Darcy E.P. Telenko, Vegetables and Integrated Pest Management

Luke Haggerty, Viticulture & Enology

Resources and Best Management Practices

Reduce emissions. Increase resiliency and profitability. Realize opportunities.

[See more Resources](#)

TOP RESOURCES

[About My Woods](#)

[Adaptation Workbook for Forest Management and Conservation](#)

[Anaerobic Digester Business Model and Financing Options](#)

[Animal Agriculture in a Changing Climate](#)

[Annual Phosphorus Loss Estimator](#)

[Building soils for better crops](#)

Questions? Thank You!

Jonathan Lambert

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