Evaluation of the usefulness of a late blight decision support system

Pamela D Roberts
Southwest Florida Research and Education Center
Immokalee, FL
Late Blight caused by *Phytophthora infestans* on tomato
Genotype

'genotype' is defined as the genetic makeup of an organism

Phenotype

Host preference
Fungicide sensitivity
Mating type

Control Strategies

Late blight decision support system (DSS)
Fungicide selection
Importance of genotyping *P. infestans*

**Genotype**

‘Genotype’ is defined as the genetic makeup of an organism

- Currently DNA ‘Fingerprinting’
  - SSR = Microsatellite markers on more than 10 loci (Lee et al, 2006)

- Send samples to Dr Bill Fry at Cornell for quick SSR typing

- Samples processed very quickly
US-23 dominated in northeast U.S. in 2014 and so far in 2015

In Florida, only US-23 detected in 2014 and 2015 on tomato

US-23 genotype is characterized as mefenoxam sensitive
Publications

- Citrus
- Cucurbita
- Peppers
- Tomato

- Evaluation of compounds for the management of late blight on tomato, spring 2014
- Evaluation of compounds for management of bacterial spot in tomato, spring 2013
- The continuing challenge of late blight caused by Phytophthora infestans on Tomato and Potato
- Evaluation of compounds for management of late blight in tomato, spring 2012
- Evaluation of compounds for management of late blight in tomato, spring 2011
- Evaluation of compounds for management of bacterial spot in tomato, fall 2011
- Evaluation of compounds for management of bacterial spot in tomato, fall 2010
- Evaluation of compounds for management of late blight in tomato, spring 2010
- Evaluation of compounds for management of late blight in tomato, spring 2009
- Evaluation of compounds for management of late blight in tomato, fall 2008
- Evaluation of compounds for control of foliar diseases in tomato, fall 2007
- Evaluation of fungicides and bactericides for control of late blight and bacterial spot in tomatoes, 2000

http://swfrec.ifas.ufl.edu/programs/plant-path/faculty/roberts/roberts-publications/
USABlight Webinar on Jan 14th, 2014

Organic farmers: join the USABlight extension team in a free Webinar and Live Chat Session on Tuesday, January 14th at 2pm EST through eOrganic to learn about the current status of the pathogen and efficacy of management practices from research and farmer experiences.

For more details, and to register for this free webinar, click here.

Welcome to USAblight
Cornell DSS

Cornell Decision Support Home

The Potato/Tomato Late Blight Decision Support System (DSS) is a brand new disease management tool. It enables you to use weather (including farm-specific National Weather Service forecasts) to predict the need for future fungicide applications to control late blight. In addition, the DSS includes:

i) standard Blitecast readings (severity values);
ii) predicted Blitecast readings based on future weather;
iii) another disease forecast system (Simcast) that includes fungicide weathering and varietal susceptibility in determining the need for fungicide; and
iv) opportunity to experiment (virtually) with different fungicide strategies before actually making an application.

The DSS allows you to set up individual fields or farm locations that you would expect to have different climate conditions because of elevation or exposure. It saves the information for each field or farm for the season, allowing you to record fungicide applications and track fungicide weathering along with the disease severity.

To use the DSS you'll need some training and an account. Contact Laura Joseph (lje5@cornell.edu) about setting up an account and arranging training.

Use the following link to go to the DSS web page. [http://blight.eas.cornell.edu/blight/](http://blight.eas.cornell.edu/blight/)

For a "How-To" on the DSS, please consult the webinar below (conducted on May 30th, 2012)
Late Blight Decision Support System (DSS) (Small et al. 2015)

Decision Support System (DSS) is the term used for programs (mostly computer based) developed to assist growers in making disease management decisions.

1. Location-specific weather data (NWS, local FAWN)

2. Disease forecasting tools based on relative humidity; rainfall, and temperature:
   - Blitecast (estimates favorability of weather)
   - Simcast (blight units, fungicide units and accounts for host resistance)

3. Can input varieties and US genotype

4. Alerts (email or text)
Late Blight Decision Support System

Current Location: Geneva

Input

Cultivar: Yukon Gold
Resistance: susceptible

Variety

Emergence date: 05/15/2013
First potato foliage (culls, volunteers, current crop) or first tomato foliage (e.g. transplants) in the region - approx. 30 mile radius

Pathogen Lineage: US-24

Pathogen

Potato: susceptible  Tomato: not susceptible  Mefenoxam: generally effective (only moderately effective in some cases)

Please fill in the requested information and then click on the ‘Submit Fungicide’ button.

Fungicide

Date:  Select Hour:  Select Fungicide Ingredient:

Submit Fungicide  Cancel Fungicide

Get Reports
Blitecast used prior to late blight to predict when LB

Threshold will change based on varietal susceptibility

Threshold will change based on fungicide applied
Purpose: Examine the usefulness of using the Cornell DSS for determining fungicide applications for late blight on tomato

• Two cultivars:
  • very susceptible (‘FL 47’ or ‘Charger’)
  • less susceptible ‘Legend’

• Small, replicated plots

• Three treatments
  • Untreated control
  • Weekly fungicide spray program initiated soon after transplanting (LB in area)
  • Fungicide spray program triggered using the DSS

• Disease severity (% affected tissues) over time used to calculate Area Under the Disease Progress Curve (AUDPC)
Evaluation of a DSS for fungicide applications on very susceptible ‘FL47’ and moderately susceptible ‘Legend’ tomato, 2014

AUDPC

Untreated= no sprays
7 day full season= 9 sprays all chlorothalonil
DSS= Cornell Decision support system= 7 sprays for ‘FL 47’ and 4 for ‘Legend’

2 spray reduction
But same level of Late blight suppression

5 spray reduction
But same level of Late blight suppression
Evaluation of a DSS for fungicide applications on very susceptible ‘Charger’ and moderately susceptible ‘Legend’ tomato, 2015

Untreated = no sprays
7 day full season = 11 sprays: all late blight fungicides
DSS = Cornell Decision support system = 13 sprays for ‘Charger’ and 7 for ‘Legend’
Plots of tomato plants within same trial: fungicide not effective vs highly effective fungicide control of late blight
Highly susceptible tomato cultivar
  • In 2014, 20% reduction in number of sprays; same level of disease suppression
  • In 2015, increased number of spray applications but significantly reduced AUDPC
Results of 2014 and 2015 DSS trials using DSS

Moderately resistant tomato cultivar
- In 2014, 55% reduction in number of sprays; same level of disease suppression
- In 2015, 35% reduction in number of spray applications but significantly reduced AUDPC
In conclusion, DSS appears promising to aid in timing of fungicide applications and trials using
This year we are planning to expand to some commercial sites

Please refer to: Usablight.org
Acknowledgements

- Dr. Mellinger, Galen Frantz, Leon Lucas and personnel at Glades Crop Care
- Sonia Tighe, FFVA
- SWFREC: Jessie Watson
- Funding from USDA Specialty Crops
- USDA –AFRI  This project was supported by the Agriculture and Food Research Initiative Competitive Grants Program Grant 2011-68004-30154 from the USDA National Institute of Food and Agriculture.