Distribution and Character of Late Blight in WI and the U.S. in Recent Years



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THE UNIVERSITY of WISCONSIN MADISON

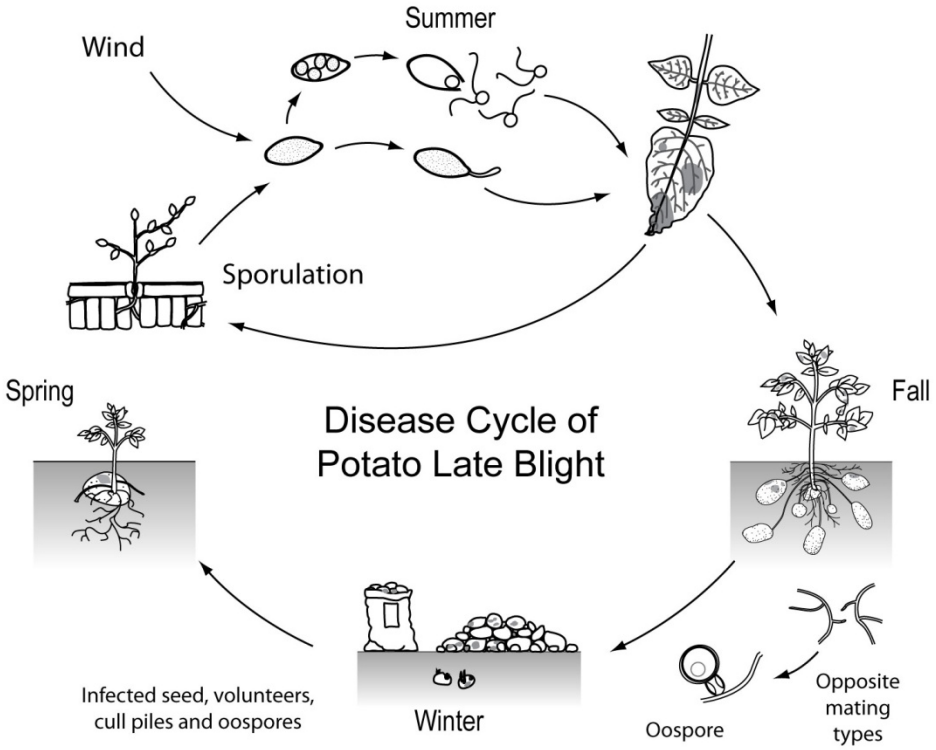
UW Extension Learning for life

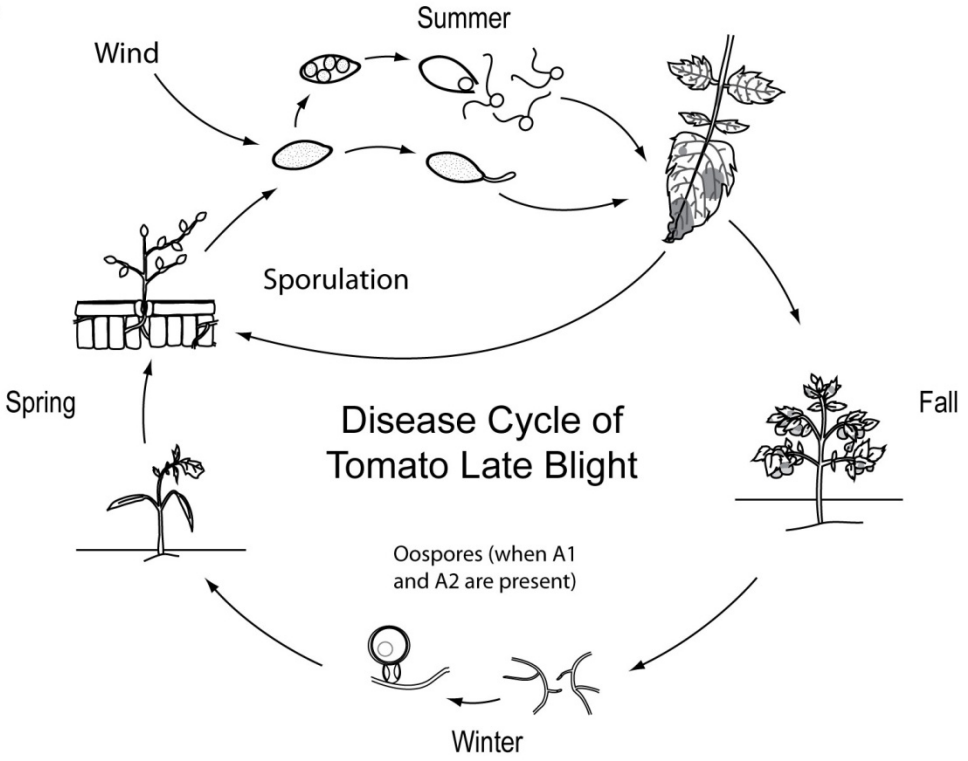
WI Crop Management Conference
January 17, 2013 – 9:00-9:25AM
Alliant Energy Center, Madison, WI

Potato Late Blight Symptoms

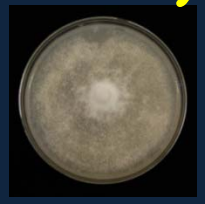
Tomato Late Blight Symptoms

Late blight disease cycles





National Late Blight Research & Extension Collaboration, 2011-2016



National Institute of Food & Agriculture - AFRI Coordinated Ag Project

Reducing losses to potato and tomato late blight by enhanced monitoring of pathogen populations and improved resistant plants, education, and extension

UW-Vegetable Pathology: report disease to website, characterize *P. infestans* for phenotype, develop decision support system including new rapid techniques for determining mefenoxam sensitivity, evaluate new tomato varieties for resistance, and distribute information in WI for improved disease control

Collaborators: Judelson, Fry, Ristaino, Grunewald, Smart, Gevens, Roberts, McGrath, Besley, Xiao, McComas, Klessig, Gloy, Boyles, Girke, Seebold, Johnson, Stone, Gugino, Everts, Scott, Birch, Gay

Information Collection & Sharing

usablight.org

USABLIGHT

A NATIONAL PROJECT ON LATE BLIGHT OF TOMATO AND POTATO IN THE UNITED STATES

About Late Blight | Occurrence Map | Reporting Outbreaks | Managing Late Blight | Cornell DSS | About Us | Internal Users

Current Disease Map

Click the map for more information

Quick Links

Alerts System is now operational! Click here or under the "Reporting Outbreaks" menu. **New user account system is operational!** Sign up for a CRONOS account here. Required for reporting, alerts systems, and other user-defined content!

Welcome to USAblight

Potato late blight lesion. Image courtesy of Jean Ristaino, NC State University.

Welcome to USA blight, a new national website that will act as an information portal on late blight. You can report disease occurrences, submit a sample online, observe disease occurrence maps, and sign up for text disease alerts. There are also useful links to a decision support system, and information about identification and management of the disease.

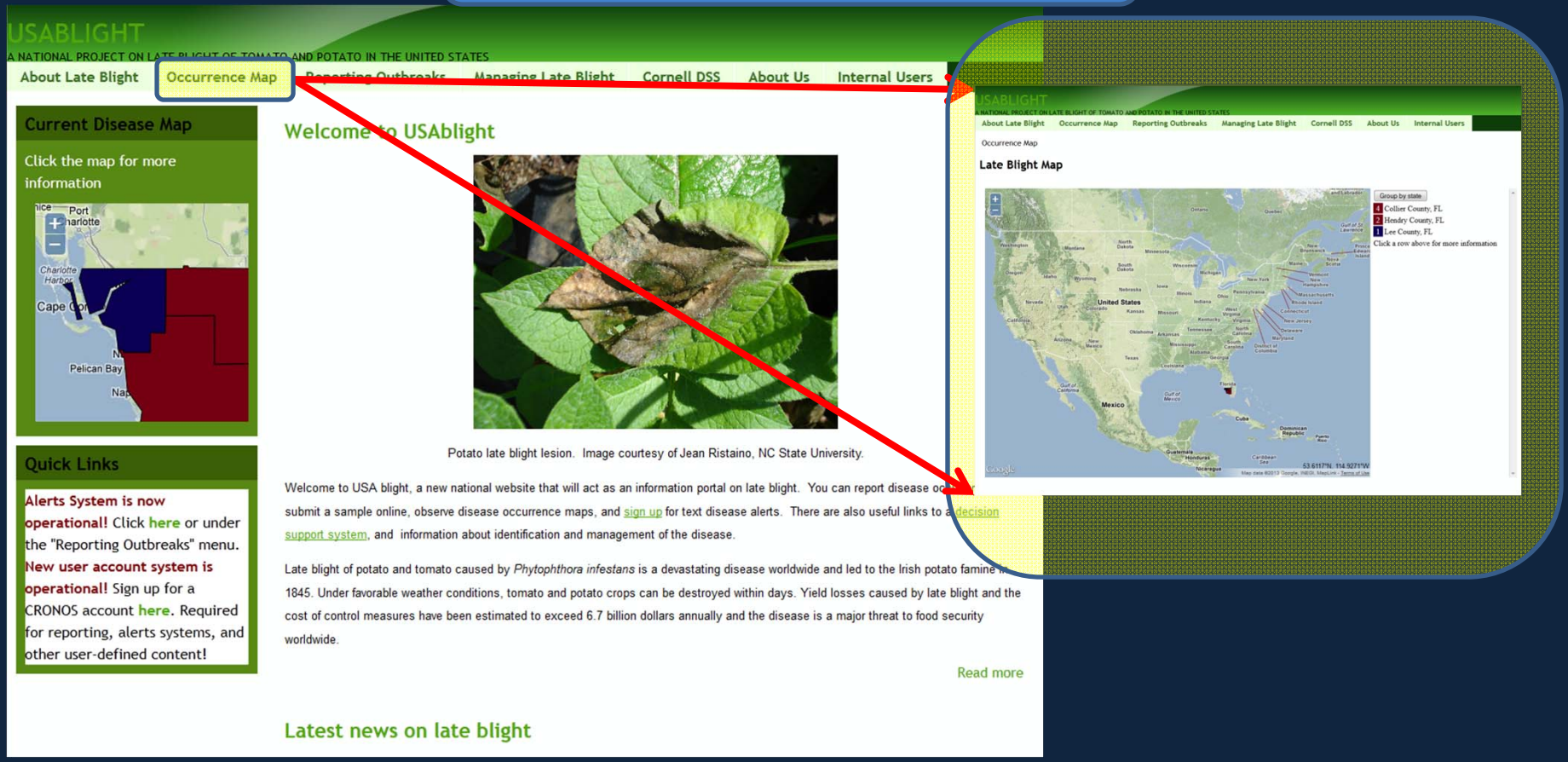
Late blight of potato and tomato caused by *Phytophthora infestans* is a devastating disease worldwide and led to the Irish potato famine in 1845. Under favorable weather conditions, tomato and potato crops can be destroyed within days. Yield losses caused by late blight and the cost of control measures have been estimated to exceed 6.7 billion dollars annually and the disease is a major threat to food security worldwide.

Read more

Latest news on late blight

Information Collection & Sharing

usablight.org



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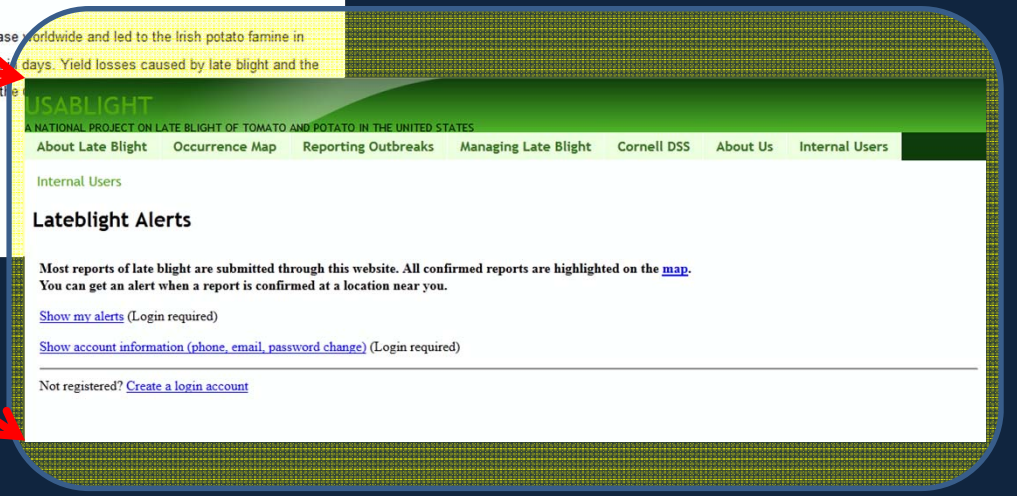
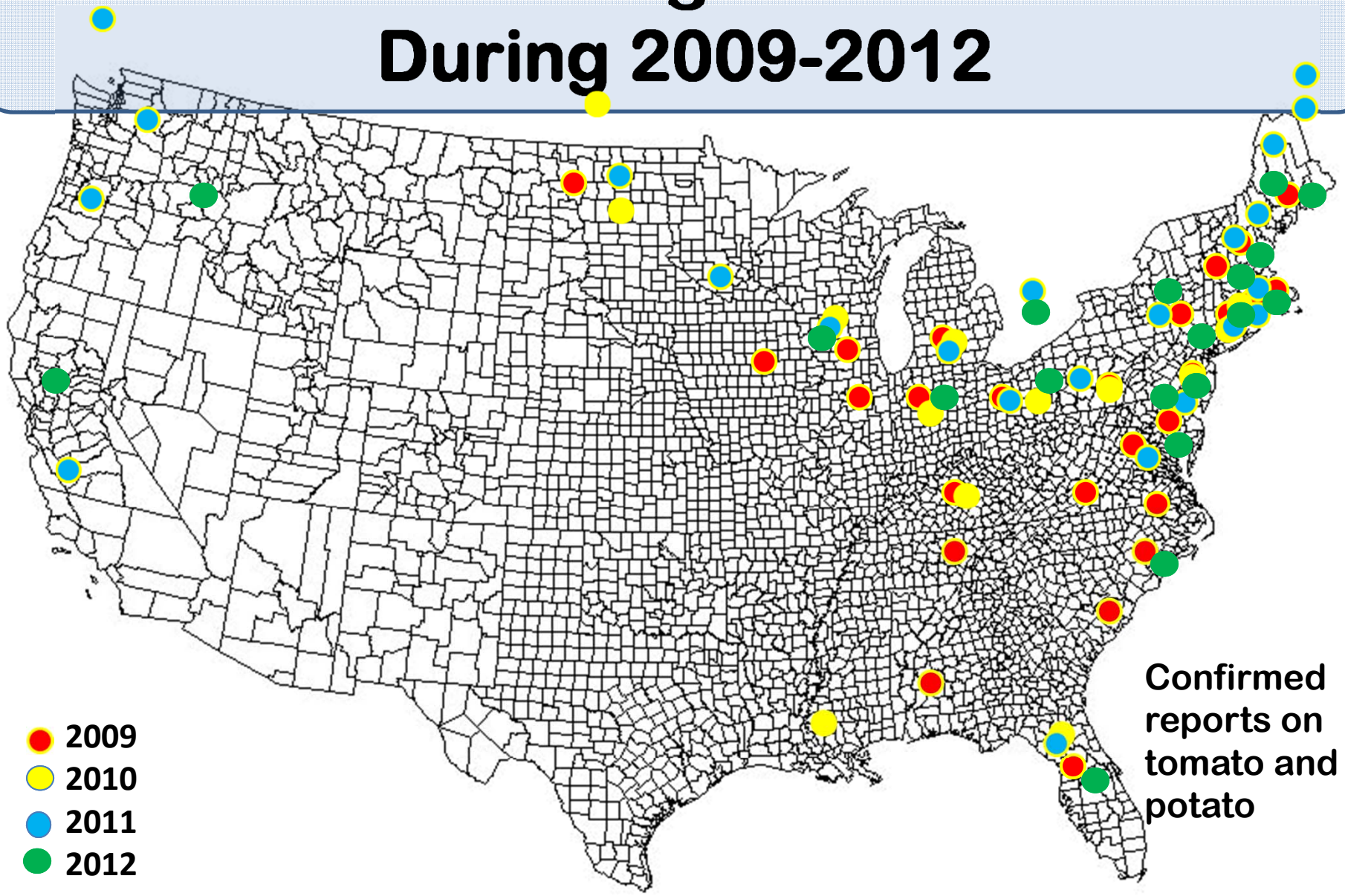
Latest news on late blight

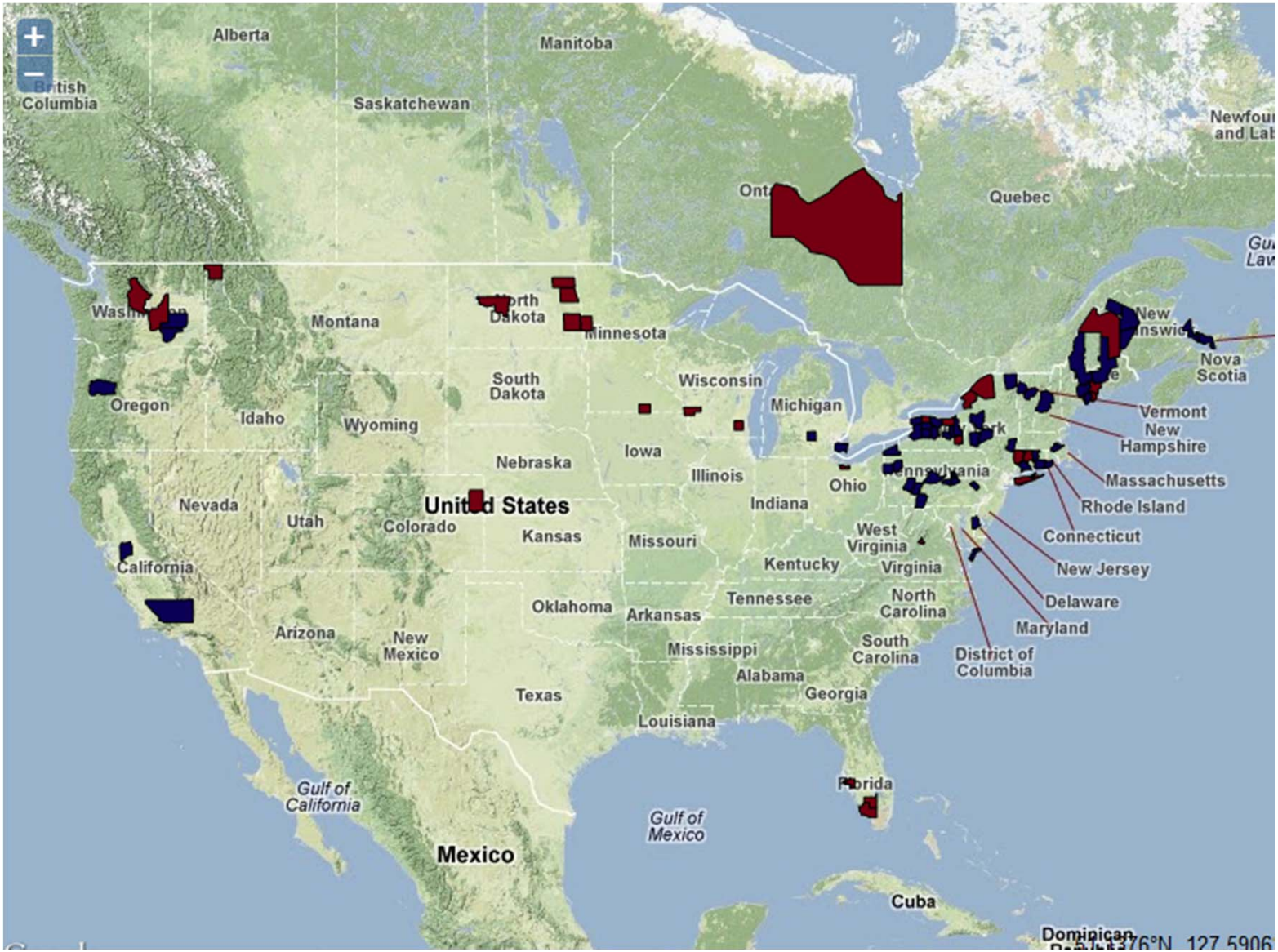


National Late Blight Occurrences During 2009-2012



Data for 2011-12 from usablight.org, 2009-10 data from state extension reports

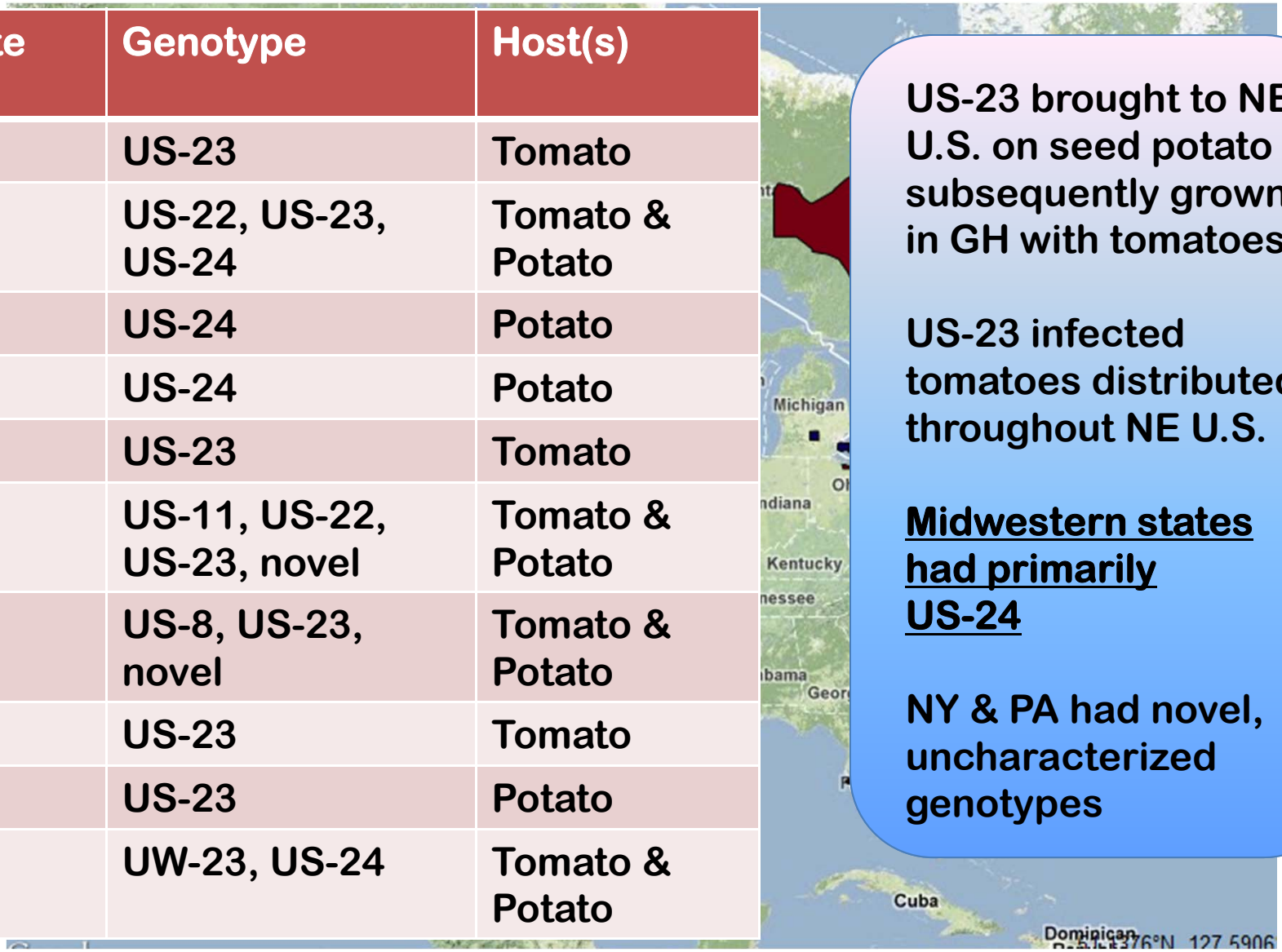
2011 Occurrence of Late Blight in U.S.



AFRI-Late Blight Project : usablight.org

2011 Occurrence of Late Blight in U.S.

State	Genotype	Host(s)
CT	US-23	Tomato
ME	US-22, US-23, US-24	Tomato & Potato
MN	US-24	Potato
ND	US-24	Potato
NH	US-23	Tomato
NY	US-11, US-22, US-23, novel	Tomato & Potato
PA	US-8, US-23, novel	Tomato & Potato
RI	US-23	Tomato
VA	US-23	Potato
WI	UW-23, US-24	Tomato & Potato



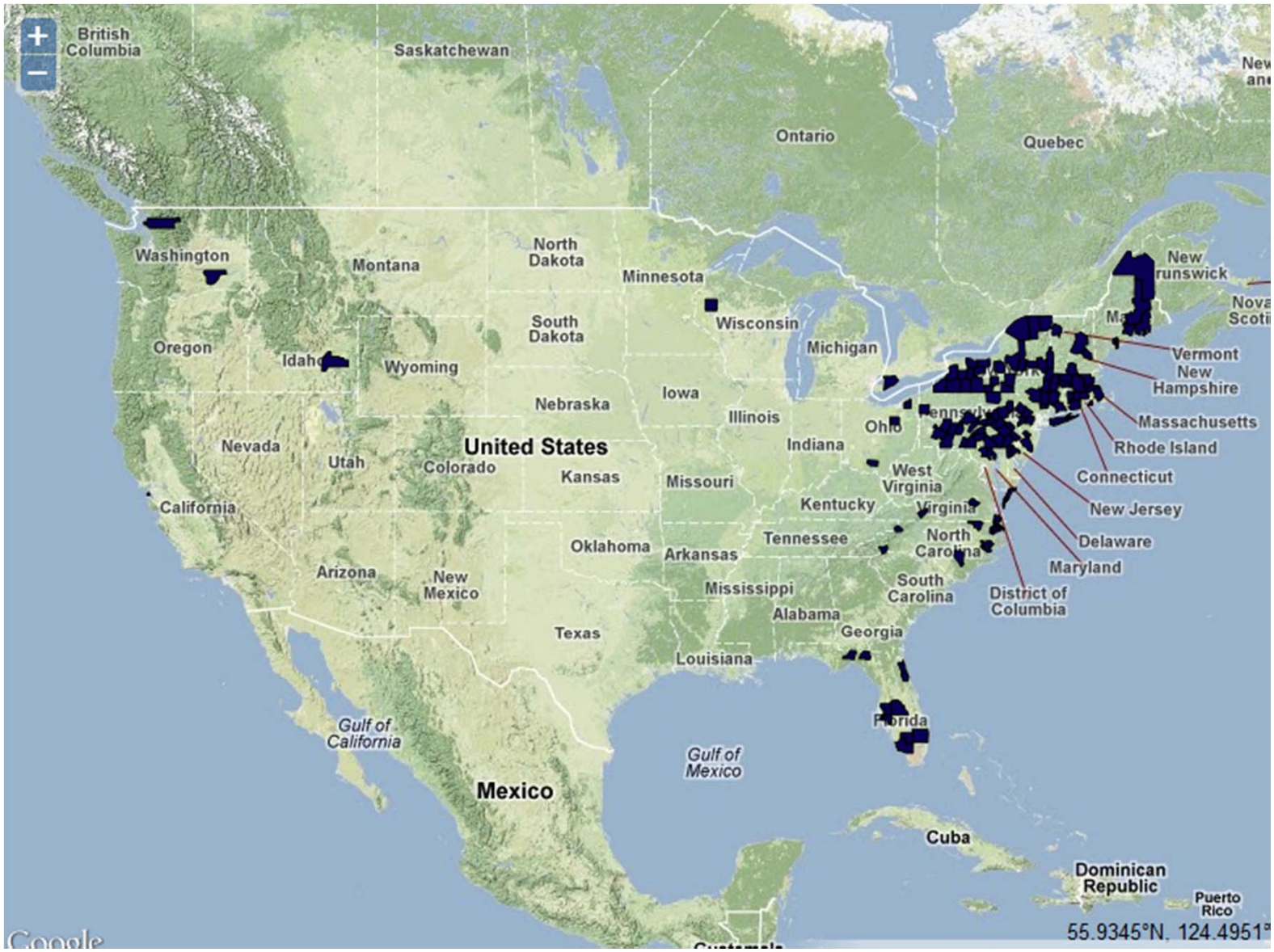
US-23 brought to NE U.S. on seed potato subsequently grown in GH with tomatoes

US-23 infected tomatoes distributed throughout NE U.S.

Midwestern states had primarily US-24

NY & PA had novel, uncharacterized genotypes

2012 Occurrence of Late Blight in U.S.



AFRI-Late Blight Project : usablight.org

2012 Occurrence of Late Blight in U.S.

State	Genotype	Host(s)
CA	US-11	Potato & Tomato
CT	US-23	Tomato
DE, MD, RI, VT	?	Tomato
FL	US-11, US-23	Potato & Tomato
ID	US-23	Potato
MA	US-23	Tomato
ME	US-23	Potato & Tomato
NC	US-11, -23, -24	Potato & Tomato
NH	?	Potato & Tomato
NJ	US-23	Tomato & Potato
NY	US-22, US-23	Tomato & Potato
OH	US-23	Potato & Tomato
PA	US-23	Tomato & Potato & Petunia
VA	US-8, US-23	Tomato (23) & Potato (8)
WA	?	Tomato & Potato
WI	US-23	Tomato & Potato

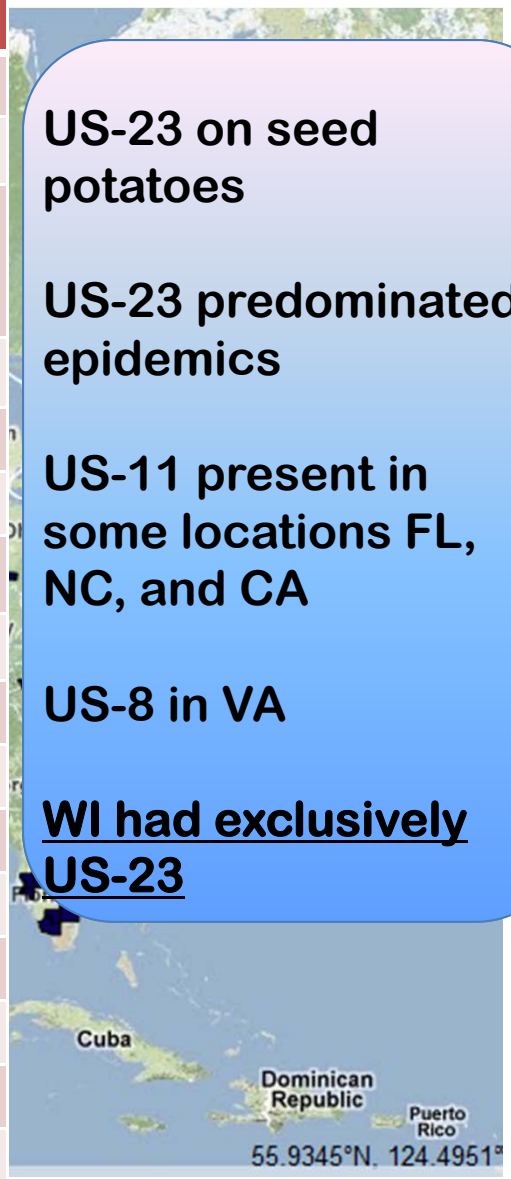
US-23 on seed potatoes

US-23 predominated epidemics

US-11 present in some locations FL, NC, and CA

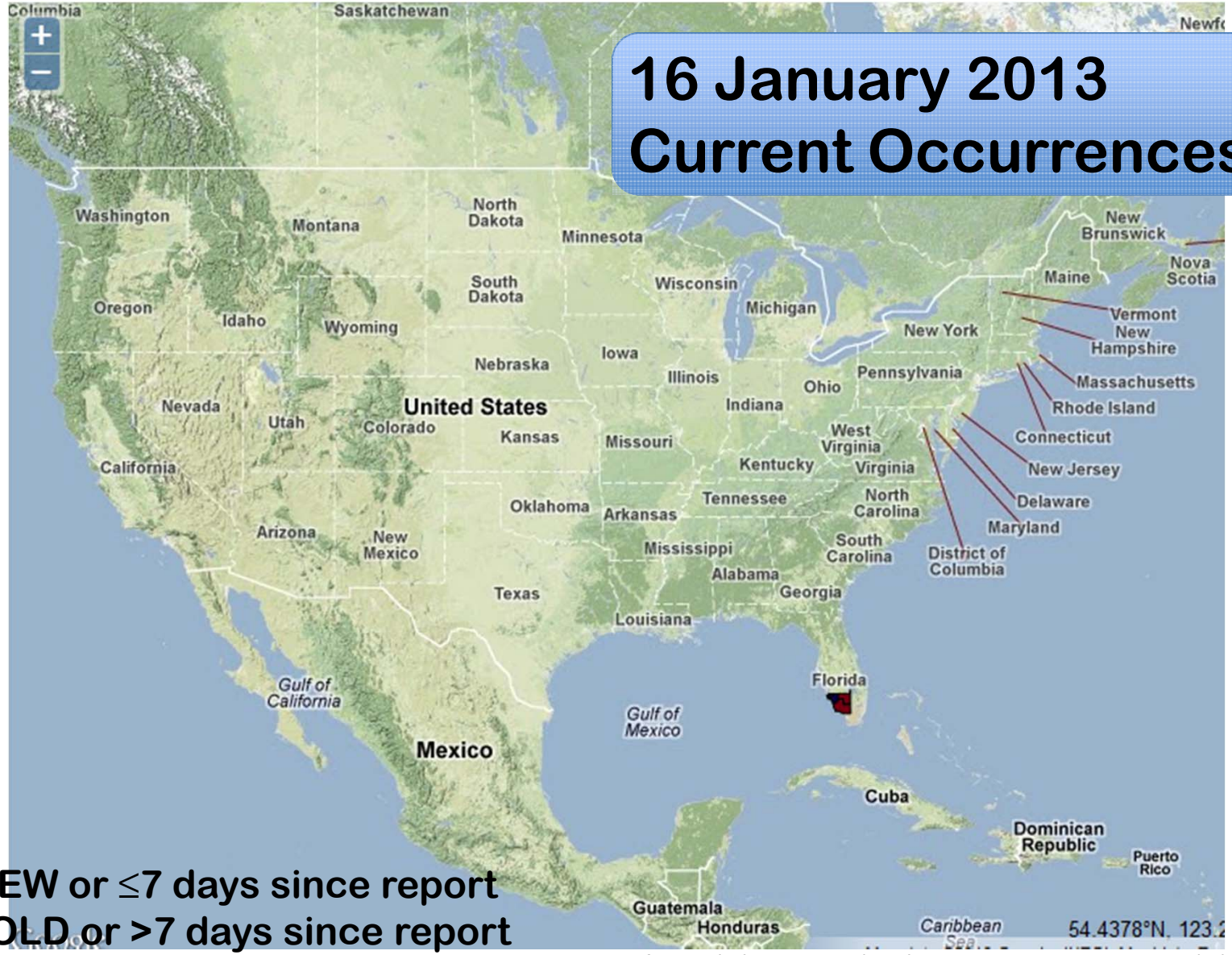
US-8 in VA

WI had exclusively US-23



AFRI-Late Blight Project : usablight.org

2013 Occurrence of Late Blight in U.S.

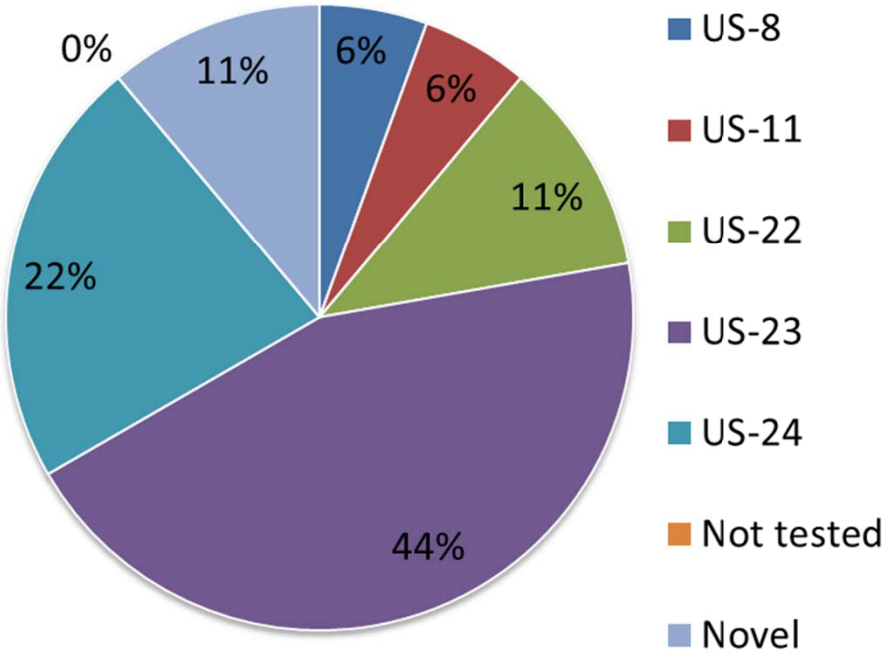


Red: NEW or ≤7 days since report
Blue: OLD or >7 days since report

AFRI-Late Blight Project : usablight.org

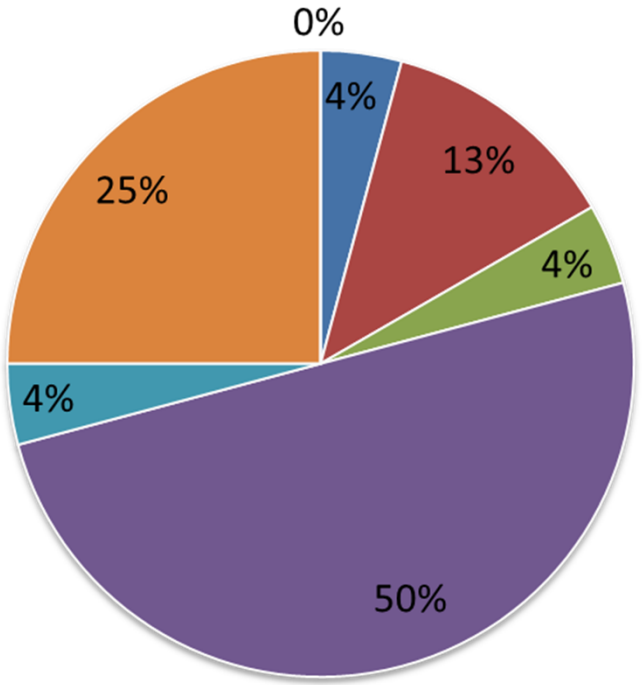
Phytophthora infestans genotypes detected in the U.S. during 2011 & 2012

2011



Total # of states reporting: 10

2012

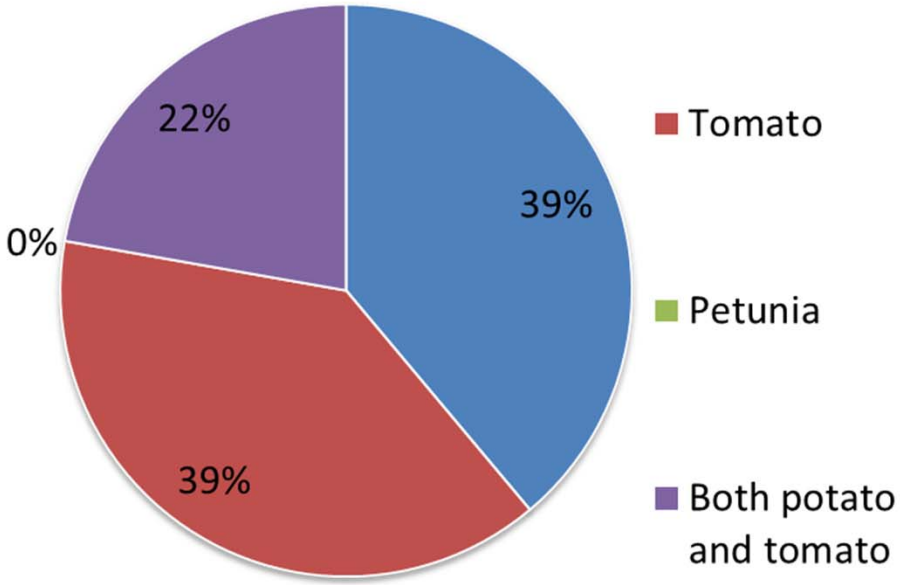


Total # of states reporting: 19

Data collected on 10 January 2012 from usablight.org

Crops infected with *Phytophthora infestans* in the U.S. during 2011 & 2012

2011



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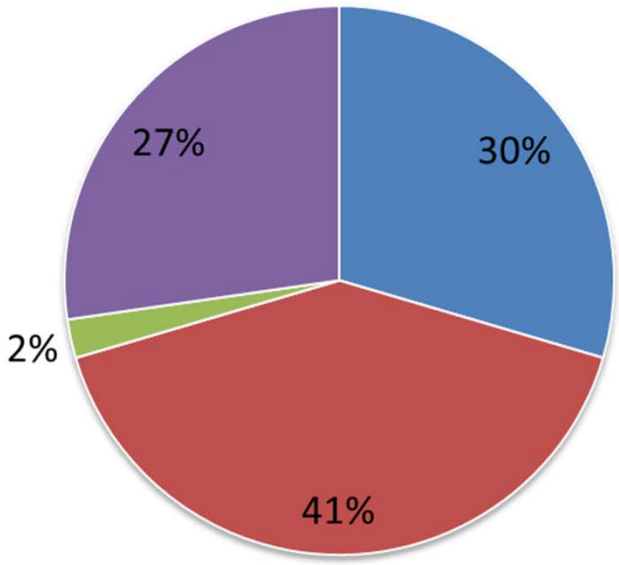
2012



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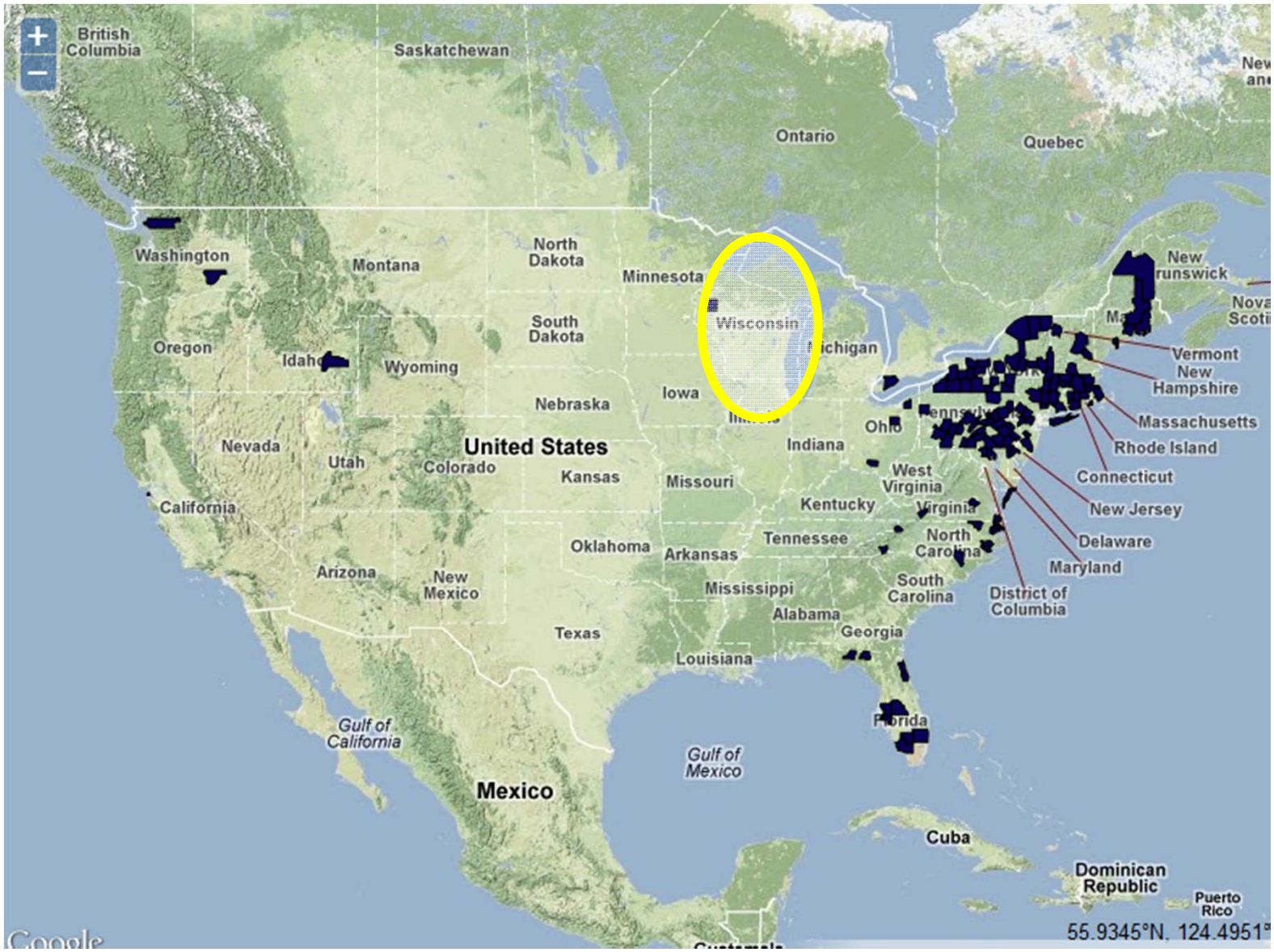
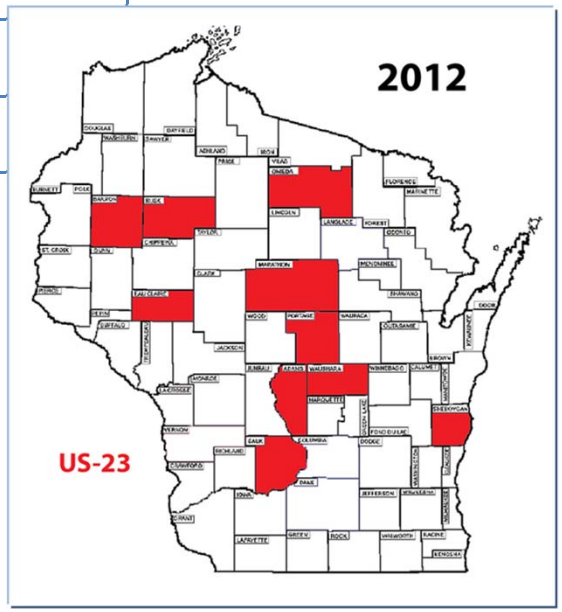
Late Blight in Wisconsin in Recent Years



Confirmed Late Blight in Wisconsin 2012

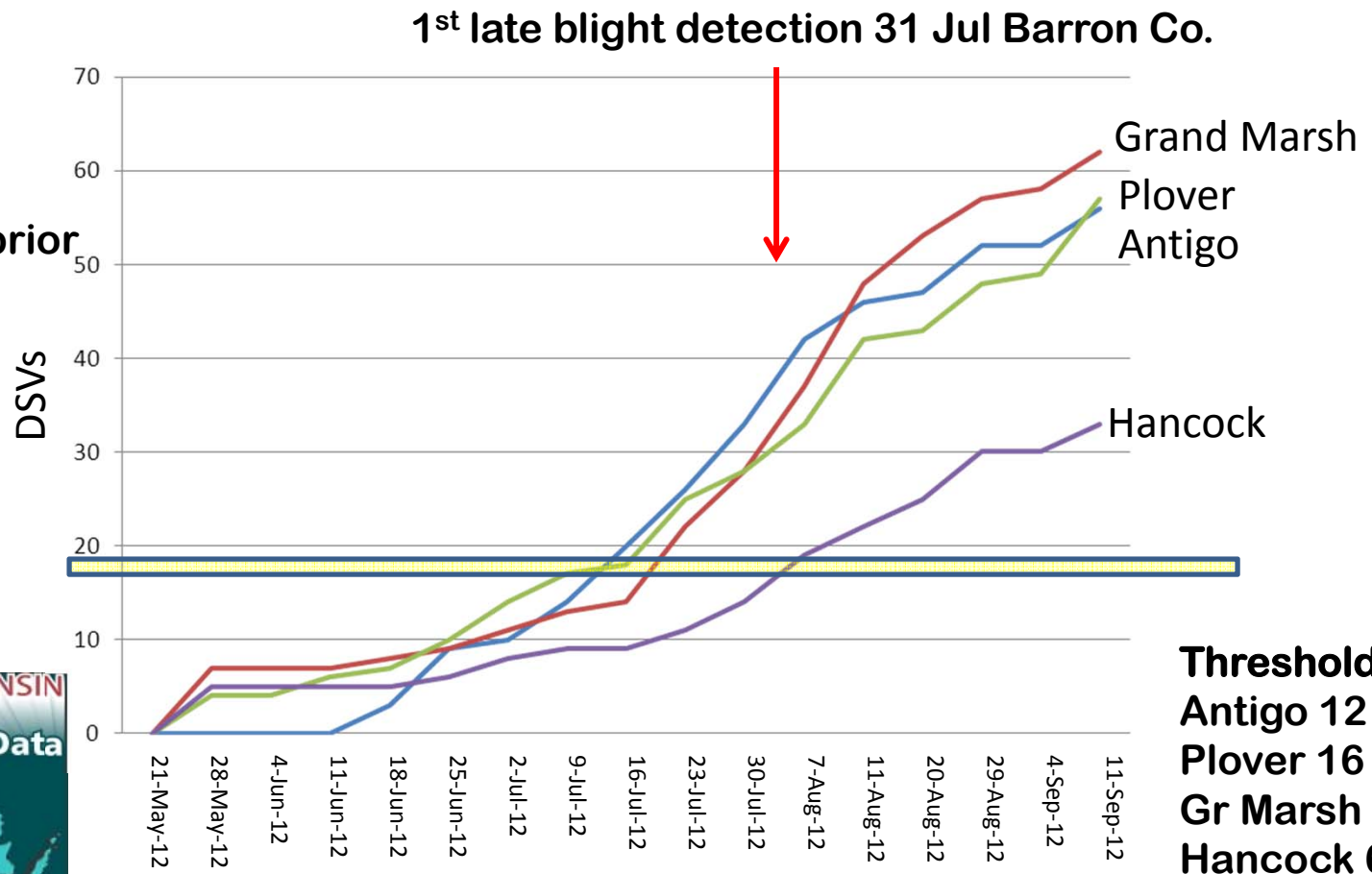
County	Crop	Date of Detection	Clonal Lineage
Barron	Potato/Tomato	31 July 2012	US-23
Adams	Potato/Tomato	31 July 2012	US-23
Portage	Potato/Tomato	2 August 2012	US-23
Oneida	Potato	4 August 2012	US-23
Waushara	Potato/Tomato	20 August 2012	US-23
Marathon	Potato/Tomato	22 August 2012	US-23
Rusk	Tomato	23 August 2012	US-23
Sheboygan	Tomato	24 August 2012	US-23
Sauk	Tomato	10 September 2012	US-23
Eau Claire	Tomato	14 September 2012	US-23



For confirmation and clonal lineage ID, we use:
symptoms & microscopic presence of sporangia consistent with Pinf, Agdia Phytophthora Immunostrip tests, allozymes analysis at Gpi locus, and PCR with Pinf primers

Potato Late Blight Management
2012 Wisconsin DSV Accumulations

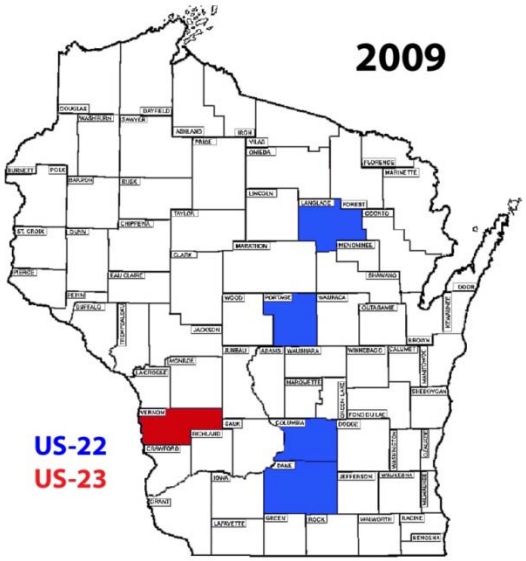
A Useful Tool!
Predictive Blitecast effectively indicated risk of late blight prior to field identification



Threshold dates
Antigo 12 Jul
Plover 16 Jul
Gr Marsh 20 Jul
Hancock 6 Aug

www.plantpath.wisc.edu

Late Blight Occurrence & Genotype Profile in Wisconsin, 2009-12

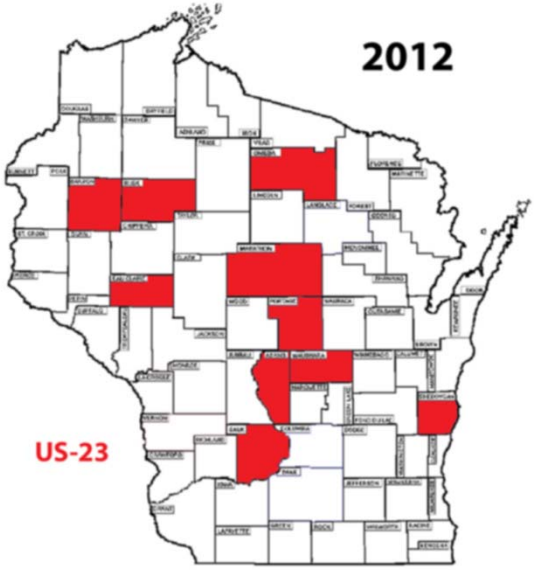


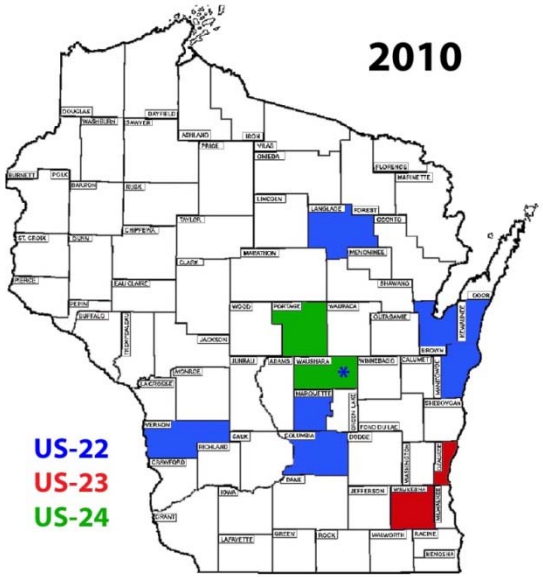
Mating Type:

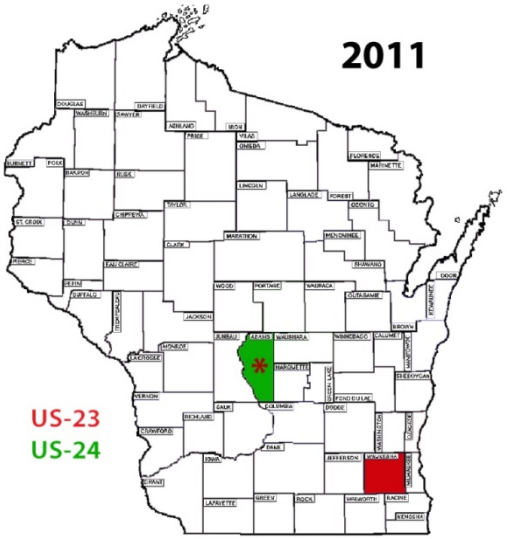
US-22: A2

US-23: A1

US-24: A1

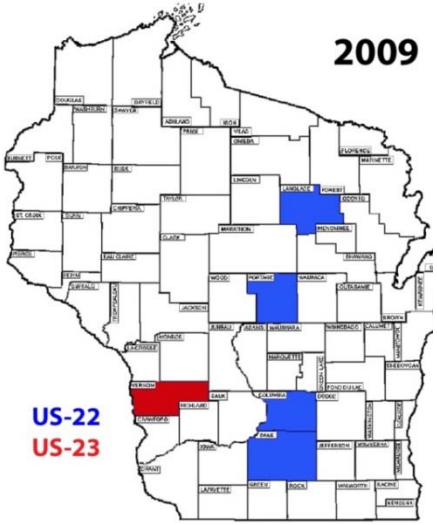


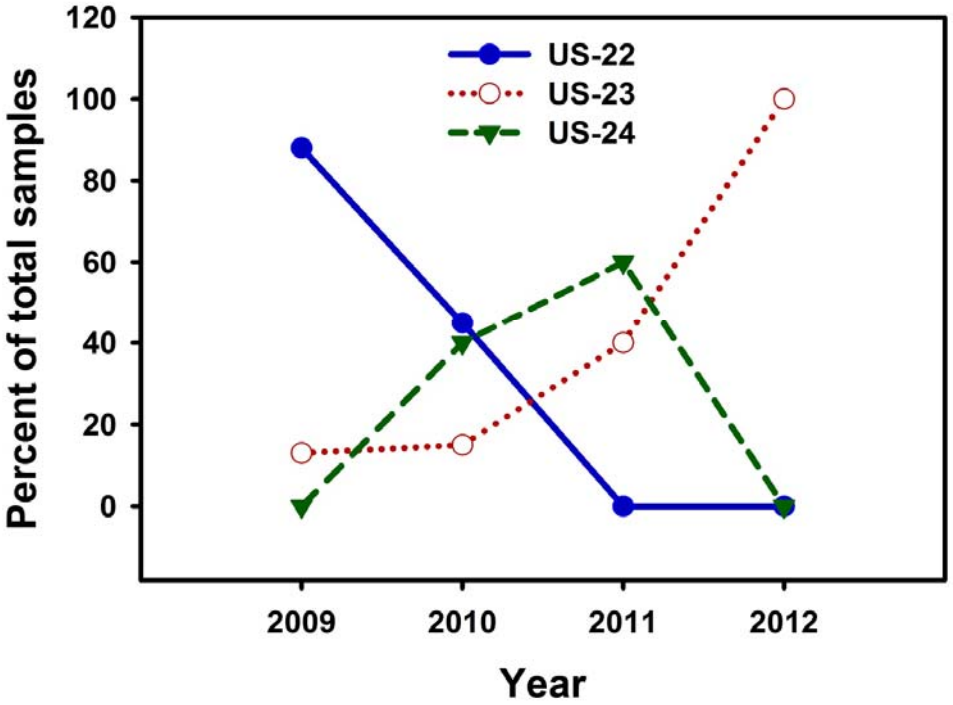


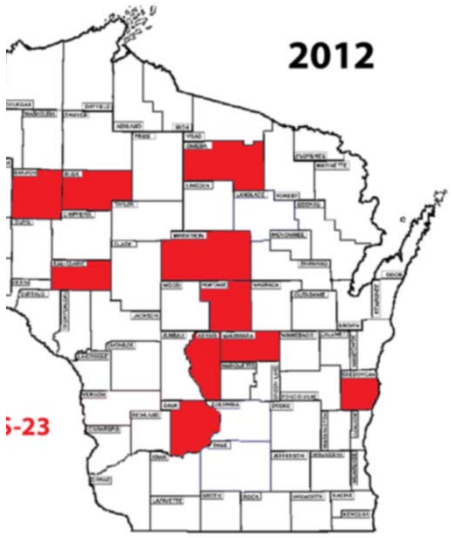


Clonal lineage determined with Gpi allozymes (Gevens, UW-Madison). Subset of isolates confirmed with RFLP with RG57 probe (Fry, Cornell)

Late Blight Occurrence & Genotype Profile in Wisconsin, 2009-12







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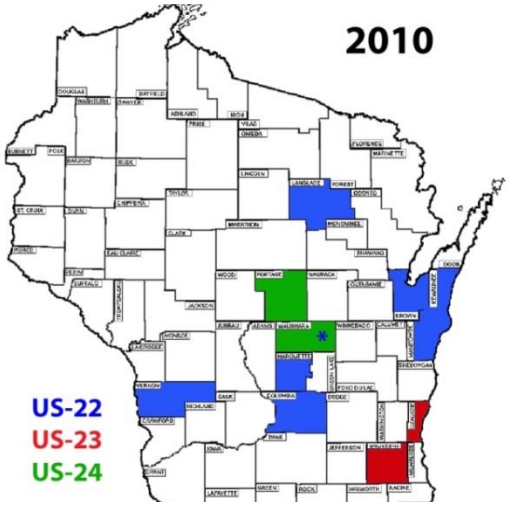
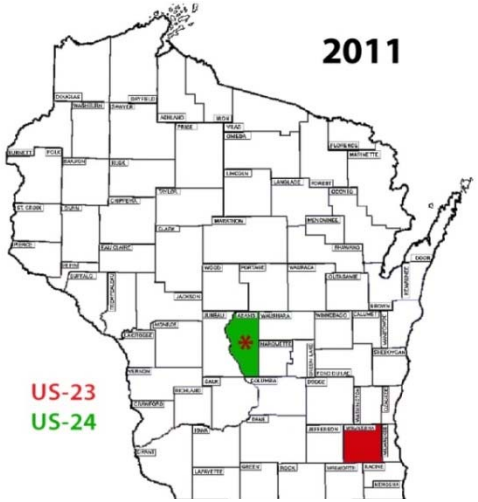
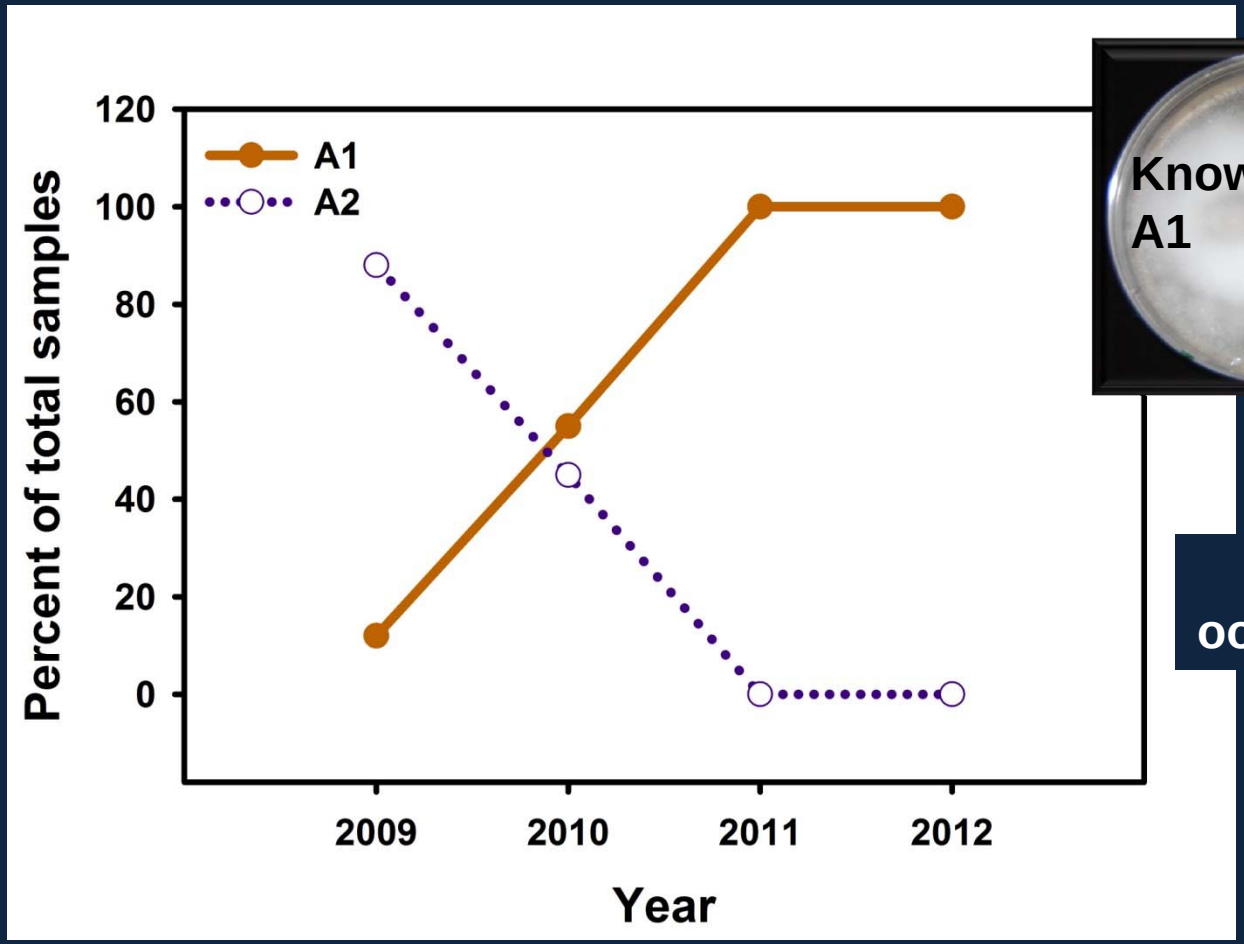
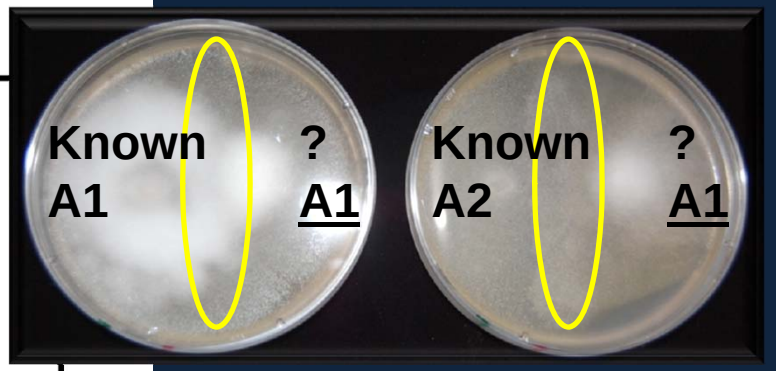


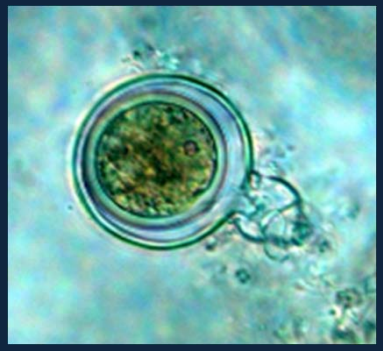


Late blight mating types in WI, 2009-12



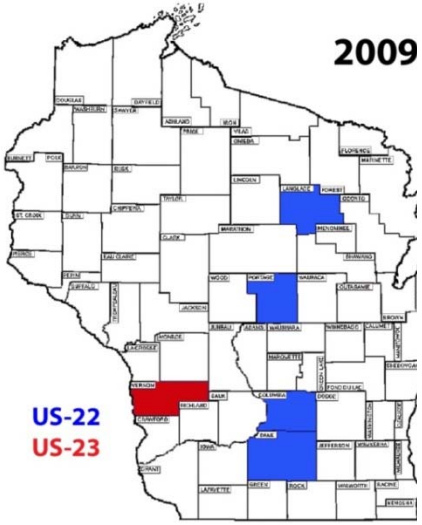


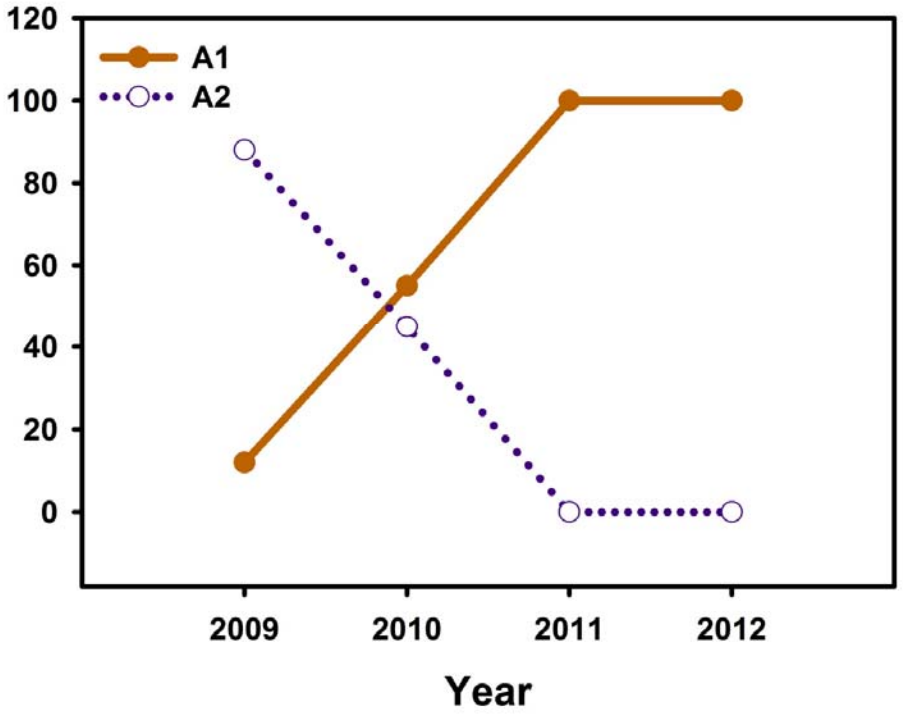
No oospores

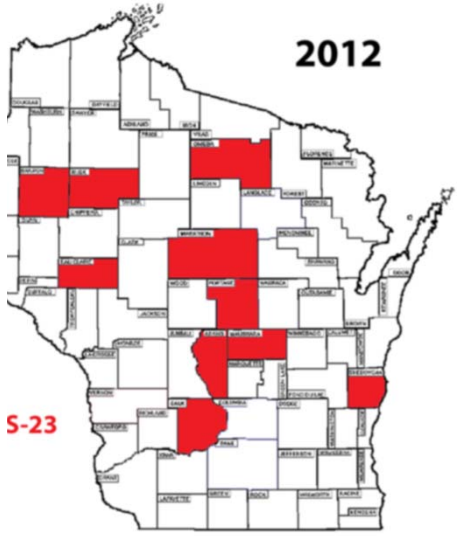


Oospores (risk of persistence in soil and sexual recombination)

Late Blight Occurrence & Mating Type Profile in Wisconsin, 2009-12







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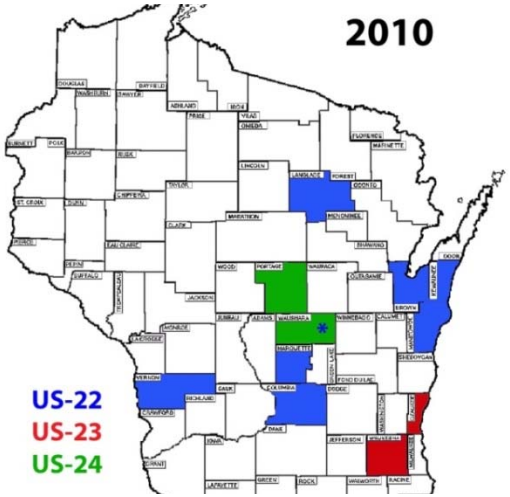
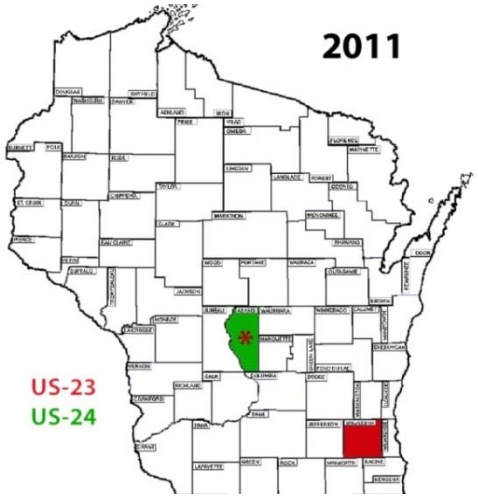
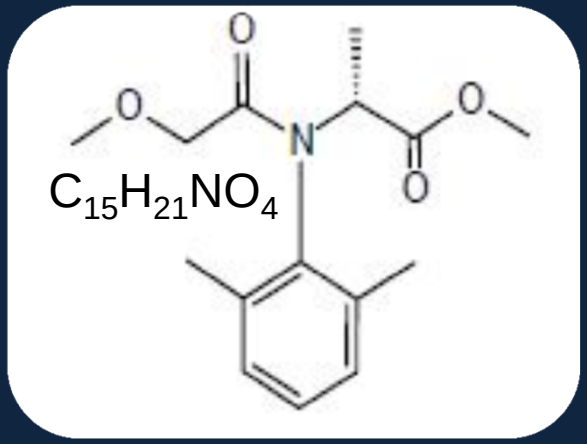




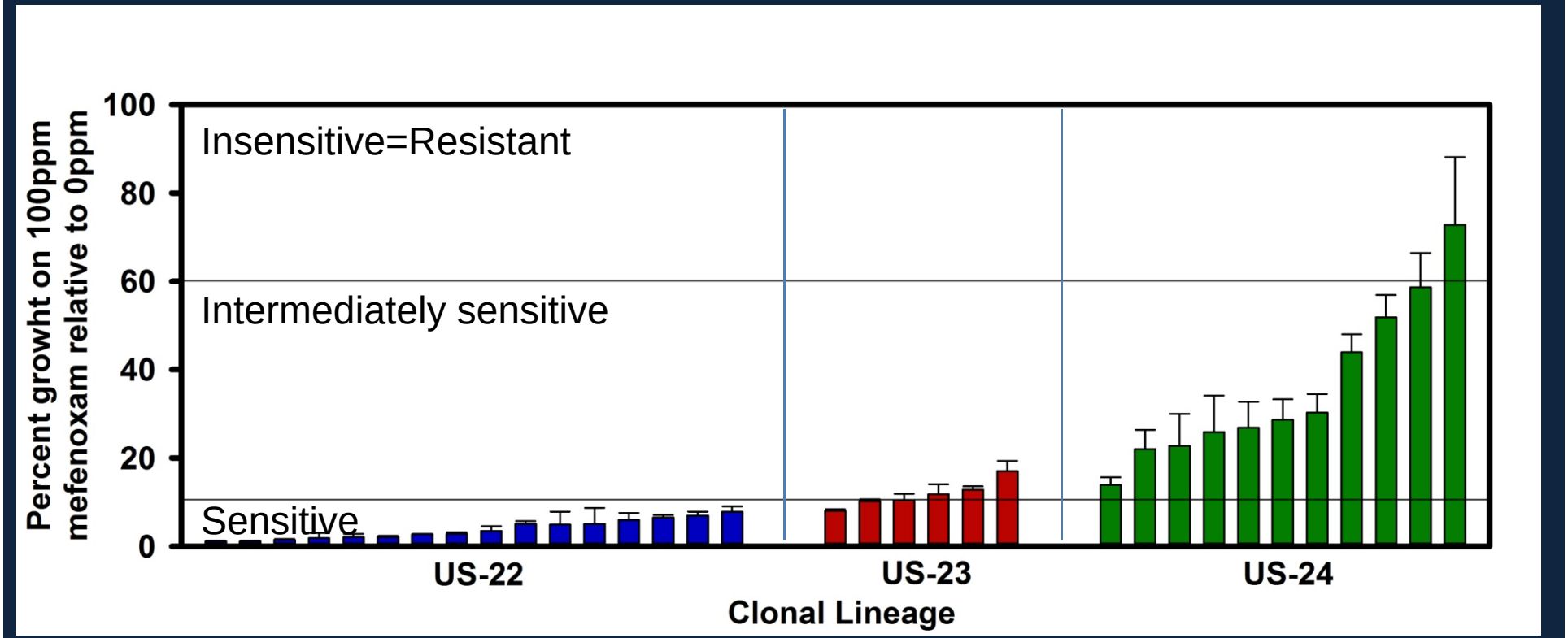
Resistance to Mefenoxam
(active ingredient in Ridomil)



-Truly systemic fungicide
-Very effective in late blight control if pathogen is sensitive

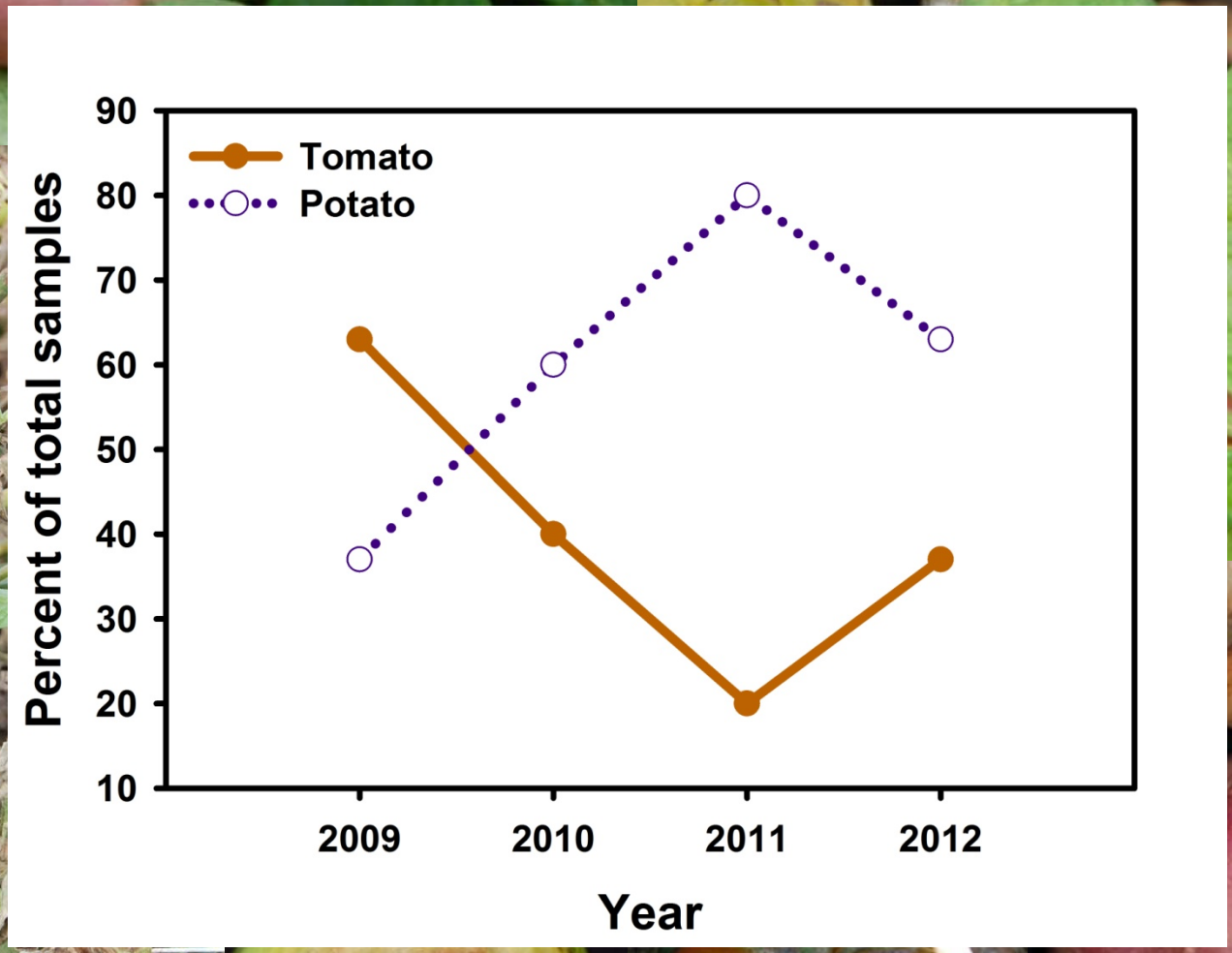
× 100% = Sensitivity Value

Mefenoxam Resistance in Late Blight Pathogen Isolates in WI, 2009-2011



Isolates selected for visual comparison represented multiple years, locations, and hosts

Hosts of Late Blight in WI, 2009-2012

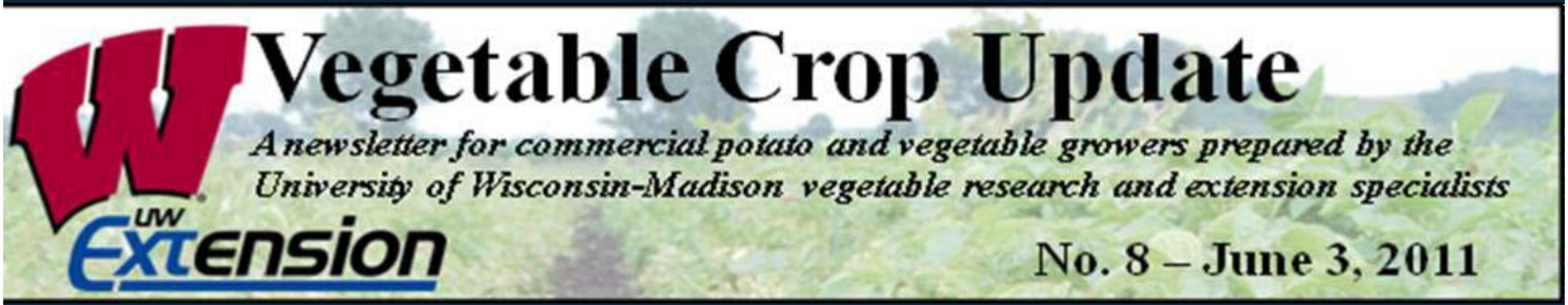


Summary of WI *P. infestans* Genotypes

Genotype	Mating Type	Optimum Growth Temperature	Host Range Comments	Years Found in WI	Resistance to mefenoxam (WI isolates)
US-22	A2	24°C	-tomato and potato -poor pathogen on pepper, eggplant, tomatillo	2009, 2010	Sensitive
US-23	A1	18°C	tomato and potato	2010, 2011, 2012	Intermediately sensitive
US-24	A1	20°C	potato	2010, 2011	Intermediately sensitive (variability among isolates)

Information Dissemination

University of Wisconsin Vegetable Disease Website (newsletter access)
http://www.plantpath.wisc.edu/wivegdis/



Newsletters provide: information on late blight, other diseases, and overall vegetable production provided from mid-March-October

Acknowledgements

UW-Vegetable Pathology
Steve Jordan
Ken Cleveland
Abigail Mitchell
Amilcar Sanchez Perez
Scott Donovan

UW-Extension

UW-Plant Disease Diagnostic Clinic
Brian Hudelson

WI Potato & Vegetable Producers

WI Crop Consultants

WI Potato & Vegetable Growers Association and USDA Hatch for graduate funding

Fungicides for Late Blight Control

multi-site protectants also effective on early blight

Fungicide	a.i.	FRAC	PHI tomato	PHI potato	Activity
Bravo, Equus, Echo	chlorothalonil	M5	0 days	7 days	protectant
Dithane, Penncozeb, Mancozeb	mancozeb	M3	5 days	3 days	protectant
Kocide, Champ	copper (not all coppers OMRI approved)	M1	0 days	0 days	protectant
Agri-tin, Supertin*	triphenyltin hydroxide (TPTH)	30	Not labeled	7 days	protectant

*** Restricted Use Fungicide**

Most WI growers are treating the crop for early blight as early as late June or just prior to row closure (often aligning with P-Day 300). Rarely, late blight specific fungicides begin at emergence if seed source had risk of late blight (or known LB). Seed trts with MZ or Curzate have become more common (>60% seed trted). LB trts typically begin as DSVs near threshold of 18.

Fungicides specific for late blight: *water mold – specific materials*

Fungicide	a.i.	FRAC	PHI tomato	PHI potato	Activity
Acrobat/Forum	dimethomorph	40	4 days	4 days	systemic
Curzate	cymoxanil	27	3 days	14 days	locally systemic
Fosphite	potassium phosphite	NC	0 days	0 days	systemic
Gavel	mancozeb + zoxamide	M3+22	5 days	3 days	protectant
Omega	fluazinam	29	Not labeled	14 days	protectant
Presidio	fluopicolide	43	2 days	Not labeled	systemic
Previcur	propamocarb	28	5 days	14 days	systemic
Ranman	cyazofamid	21	0 days	7 days	protectant, limited systemic
Revus Top	difenoconazole + mandipropamid	3 + 40	1 day	14 days	preventativesystemic, curative
Ridomil Gold Mz[1]	mefenoxam + mancozeb	4 + M3	5 days	14 days	systemic
Tanos	cymoxanil + famoxadone	27	3 days	14 days	locally systemic, curative

[1]some formulations are only labeled for at plant application (no foliar)