

Characterization of *Phytophthora infestans* populations in North America from the 2009-2011 late blight epidemics

K. L. DEAHL

USDA-ARS/PSI, Genetic Improvement of Fruits and Vegetables Laboratory, Beltsville, MD, U.S.A.

Late blight caused by *Phytophthora infestans* (Mont.) de Bary is one of the most destructive diseases of potato and tomato worldwide and also attacks a range of other Solanaceous hosts. Late blight epidemics in the United States in 2009 were severe due to widespread inoculum and weather that was conducive to disease.

We collected and cultured more than 140 isolates of the pathogen from the 2009 late blight outbreaks on potato and tomato along the eastern seaboard from Florida to Maine and from several Midwestern states including Indiana, Wisconsin and North Dakota. We had previously isolated the pathogen from tomato late blight outbreaks in the southeastern and northeastern US. Our objectives were to (i) identify the genotype that caused the major disease outbreaks in the eastern North America in 2009-2011; (ii) examine the phenotypic and genotypic structure of *P. infestans* populations in eastern North America from 2009-2011 and compare them to genotypes identified from previous years.

Table 1. Summary of genotype characterization of *Phytophthora infestans* in North America from the 2009-2011 late blight epidemics

Genotype	Host	Mating type	Allozyme genotype		Sensitivity to mfenoxam	RG57 RFLP
			Gpi	Pep		
US-8	Potato	A2	100/111/122	100/100	R/I	1,5,10,13,14,16,20,21,23,24,25
<u>2009- 10 ISOLATES</u>						
US-21	Tomato	A2	100/122	100/100	R/I/S	1,5,10,13,14,18,20,21,24,25
US-22	Tom/Potato	A2	100/122	100/100	S/I	1,5,13,14,16,20,21,24,25
US-23	Tom/Potato	A1	100/100	100/100	S/I	1,2,5,6,10,13,14,17,20,21,24,24a,25
US-24	Tom/Potato	A1	100/100/111	100/100	I	1,3,5,7,10,13,14,16,20,21,23,24,25
<u>2011 ISOLATES</u>						
US-23	Tom/Potato	A1	100/100	100/100	S/I	1,2,5,6,10,13,14,17,20,21,24,24a,25
US-24	Tom/Potato	A1	100/100/111	100/100	I	1,3,5,7,10,13,14,16,20,21,23,24,25

Characterization of isolates from 2009 showed the emergence of new A1 and A2 genotypes on both potato and tomato. These new genotypes have been found to persist and were identified again in isolates from 2010 and 2011, indicating that they are fit and capable of surviving over the winter. The new genotypes have been designated US-21, a tomato-specific A2 genotype, US-22, an A2 genotype which has moved from tomato to potato, US-23, an A1 genotype found on both potato and tomato, and US-24, an A1 genotype specific to potato. US-22 has been shown to have been spread on tomato transplants.

The disease led to millions of dollars of lost income to growers in many areas of the northeastern US and some organic tomato growers abandoned production altogether. The pathogen has reemerged as a significant disease threat to the organic tomato industry in the US where management options are limited.

Understanding phenotypic and genotypic variation in populations of *P. infestans* is clearly a significant factor in the planning of effective and durable control strategies but *P. infestans* populations continue to be in a state of flux and late blight management remains a significant challenge to the potato and tomato industry.