Diggin' In LATE BLIGHT | By Amanda Saville & Jean Ristaino

World Traveler

Study finds late blight pathogen stoked outbreaks on six continents

North Carolina State University researchers continue to track the evolution of different strains of the plant pathogen *Phytophthora infestans*, which set down roots in the U.S. before attacking Europe and causing the Irish potato famine in the 1840s.

NC State plant pathologists studied the genomes of about 140 pathogen samples—historic and modern—from 37 countries on six continents to track the evolution of differing strains of *P. infestans*, a major cause of late blight disease on potato and tomato plants.

The study, published in Scientific Reports, shows that the historic lineage

called FAM-1 was detected in nearly three-fourths of the samples (73 percent) and was found on all six continents.

"FAM-1 was much more widespread than previously assumed, spreading from Europe to Asia and Africa along British colony trade routes," says Jean Ristaino, an NC State professor of plant pathology and the corresponding author (with research technician Amanda Saville) of the study. "The lineage was also found over a span of more than 140 years."

FAM-1 caused outbreaks of potato late blight in the U.S. in 1843 and then

two years later in Great Britain and Ireland. It was also found in historic samples from Colombia, suggesting a South American origin. FAM-1 caused massive and debilitating late blight outbreaks in Europe, leaving starvation and migration in its wake. Ristaino theorizes that the pathogen arrived in Europe via infected potatoes on South American ships or directly from infected potatoes from the U.S.

FAM-1 survived for about 100 years in the U.S. but was then displaced by a different strain of the pathogen called US-1, Ristaino says.

"US-1 is not a direct descendant of



Broekema, When Reliability Matters

Powerful Technology, Durable Solutions

Do you sometimes wonder why some components are more expensive than competitive brands?

The choice of quality materials, a well-engineered design, and expedient production can be decisive to guarantee an uninterrupted harvest or production process.

Downtime at critical moments, as a result of failing components, represents major direct and indirect costs.

Make Broekema Conveyor Belts your choice and benefit from the innovative quality and reliability that they are known for.





info@broekema.us www.broekemabeltway.com FAM-1, but rather a sister lineage," says Ristaino. "We found US-1 in 27 percent of samples in the study, and they were found much later."

US-1 has since been elbowed out of the U.S. by even more aggressive strains of the pathogen that originated in Mexico. Winter tomato crops grown in Mexico and imported into the U.S. harbor the pathogen, Ristaino says.

The study also suggests that the pathogen spread first in potatoes and then later jumped into tomatoes.

Ristaino says spread of the pathogen in ripe tomatoes in ships' holds would have been unlikely.

The pathogen's effects aren't limited to the decimation of Ireland's potato crop some 175 years ago. Billions are spent worldwide each year in attempts to control the pathogen. Potatoes in the developing world are particularly vulnerable as fungicides are less available and often unaffordable.

Funding for this research was provided by the USDA's Agriculture and Food Research Initiative (Grant 5197-NC-SU-USDA-3179 and Grant 2011-68004-30154) and by the North Carolina Agricultural Research Service.

Jean Ristaino is a professor in the Entomology & Plant Pathology Department at North Carolina State University. NCSU's Ristaino Lab focuses particularly on the epidemiology and population genetics of oomycete plant pathogens. She can be reached at jbr@ncsu.edu.

Amanda Saville is a research and laboratory specialist at the Ristaino Lab, and can be contacted at acsavill@ncsu.edu.



The FAM-I strain of P. infestons has been detected on all six continents where potatoes are grown.





Irrigating Potatoes

PIVOT POINT TO END GUN



Potato plants are highly sensitive to over- and under-irrigation. Small deviations in water availability can decrease yields. Choose Nelson products for maximum uniformity of water application.



Pivot Point Control Valves: Air Control, 800 & 1000 Series



Pivot Sprinklers & Regulators: R3030 Rotator[®] with Brown Plate



End of Pivot Solutions: R55VT, SR100 Big Gun[®] & 800P

nelsonirrigation.com - 1.509.525.7660