Implications to Late Blight Epidemiology of Recent Pathogen Migrations

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The recent distribution to much of the world of "exotic" strains of *Phytophthora infestans* has enhanced the need to develop more effective and sustainable management strategies for late blight. There is now ample evidence that recently distributed strains are a greater threat to potato (and tomato) production than was the previously dominant pathogen population. An initial management response has been to apply fungicide more intensively, but this response is not desirable in the long term and probably is not sustainable. Plant resistance and accurate knowledge of disease epidemiology are required to construct environmentally benign management systems. Unfortunately, achievement of each requirement is difficult. Resistant plants are the topic of other sessions. Here we focus on epidemiology.

The epidemiology of late blight is being modified due to the diversity of new strains of *P. infestans*, and the details are only now becoming clear. Epidemiologists will integrate the important factors into a management approach appropriate for specific agro-ecosystems.

There are a series of questions that need to be answered. Some of these include:

- Is there a limit to pathogen aggressiveness and, if there is, what is it? Might new genotypes be even more aggressive?
- Will (has) sexual reproduction contributed to greater aggressiveness of *P. infestans*?
- Will the host range of *P. infestans* stabilize, or will it continue to grow?
- What factors drive pathogen evolution in natural vs. agricultural ecosystems?
- What is the relative importance of the diverse sources of the pathogen? Infected seed tubers? Alternate hosts? Oospores?
- Might the soil microbiota factor in suppressing disease?
- What are the quantitative roles of diverse sources of the pathogen in disease development?
- In terms of disease management, what are the most important differences among diverse agro-ecosystems?
- What factors determine the importance of the various sources of the pathogen? (Can these be quantified so that predictions of importance can be made?)
- How will the newly introduced pathogen diversity (in relation to physical and biological parameters) influence disease development?
- Will the increased available computing power enable the creation of more effective forecasts and management systems that are practical in application?
- Can we predict the stability of host resistance?

Answers and progress to answering these questions will be used in constructing agro-ecosystem-specific management programs. Some of these topics will be discussed in this symposium— indicating action and progress. However other topics are not the subject of this symposium and need additional effort.

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