Sources of Initial Inoculum; Relative Importance, Timing and Implications for Late Blight Epidemics

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With the recent global migration of more aggressive *Phytophthora infestans* strains and populations, late blight epidemics have become less predictable and at the same time less controllable in potato producing areas. This paper aims to gain some insight in the possible changes in the appearance of late blight which take place when a surveyable and stable late blight situation changes into a less predictable one.

When a regional clonal reproducing population of *P. infestans* is being displaced by more aggressive late blight strains, the speed of the epidemic will increase dramatically. Further increased yield losses due to tuber blight attack are to be expected due to increased aggressiveness towards tubers. The pathogen will be totally dependent on overseasoning in infected tubers for its survival during the crop free period when no overlap from one growing season to the next and no alternative host plants are available. Aggressive isolates, which cause extensive tuber rot in storage, can have a selective disadvantage in such situations. However, since aggressiveness towards tubers and the foliage does not appear to be correlated, directional selection against isolates with high levels of aggressiveness to tubers will not automatically lead to decreased levels of foliar aggressiveness in asexually reproducing populations of *P. infestans*. If functional oospores are present in the field, *P. infestans* is no longer dependent on hibernation in infected tubers. Potato cultivars with intermediate levels of host resistance facilitate the production of oospores. In the Netherlands, oospores are commonly found to be present in leaflets of volunteer potato plants with multiple lesions per leaflet. Oospores were abundantly formed in partially resistant cultivars (up to 87 % oospore containing leaflets).

Until now, limited information has been gathered about the maximum survival time of oospores. Oospores of *P. infestans* buried in a sandy soil and a light clay soil were exposed to Dutch weather conditions and regularly checked for their infection potential for six years. The soils were found to be infectious for 48 and 30 months respectively. Oospores seem to require extensive periods of free water for their germination and infection of leaves. High risks of oospore-initiated infections therefore seem to occur in waterlogged situations in poorly drained soils and when the foliage makes direct contact with the soil or is submerged. In a spore-baiting experiment, the first oospore-initiated infections of potato leaves were observed after 92 hours of waterlogged conditions.

While tuber borne inoculum forms a threat during the start of the growing season, oospores are able to germinate whenever the conditions are favorable. Therefore, they can initiate new infections from the emergence of the crop until harvest time. Such lesions develop on the lower leaves of the plant, and are therefore extremely difficult to detect. At present, stem attack seems to be more common than in the past and forms a long-lived source of secondary infections in the field. Such stem attack is especially associated with the presence of more aggressive strains, which have the tendency to develop under low, sub-optimal temperatures. The concealed occurrence of the oospore-initiated infections in combination with increased levels of aggressiveness of the pathogen will interfere with a proper late blight control strategy based on early warnings and the use of protective fungicides.

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