

Monitoring of Natural Outbreaks of *Phytophthora ramorum* in the United Kingdom¹

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Abstract

Over 40 outbreaks of *Phytophthora ramorum* have occurred in managed gardens in the United Kingdom. Three of these sites, one in the southeast of England and two in the southwest, have been closely monitored since October 2003. These sites represented differing disease scenarios at the start of monitoring, as eradication action had already taken place at the site in the southeast, whereas no action had taken place in the southwest. The progress of existing infections and the development of new infections were monitored at all sites. A number of current or previously infected areas within the gardens was selected for experimentation and marked out in 1-m² grids to cover at least 3 m in all directions from the original infected plant. Samples of soil and leaf litter, taken each month, were analyzed for presence of *P. ramorum* by isolation and microscopic examination of the cultures; positives were confirmed by TaqMan® PCR. In areas of high infection, sequential sampling was carried out through the soil profile to examine the depth of contamination. Baits were deployed along all watercourses on a 3-month basis to investigate extent of contamination in ponds and streams within the gardens, and to quantify the effect of seasonal variation on inoculum levels. The influence of environmental factors on timing and quantity of spore release was investigated using volumetric spore samplers, rainwater traps and logging of meteorological data by weather stations. Sampling strategies have successfully established the level of contamination at each of the sites and have shown that the pathogen can survive winter conditions in the south of England within plant material and in the wider environment. Monitoring of the selected sites revealed different levels of infection in terms of the number of plants affected and the degree of soil contamination. Higher levels of infection and contamination occurred in the southwest sites. No direct evidence of significant vector involvement in pathogen dispersal was found, but a number of pathways used by members of the public were found to be infested in the southeast site. The seasonal baiting of watercourses at this site has indicated widespread contamination of streams, ponds and lakes. However, significantly lower levels of *P. ramorum* contamination were detected in the summer when compared to the spring. This may reflect a general reduction in inoculum as a result of the earlier eradication strategies adopted but may also

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indicate less favorable conditions for sporulation and spread during the summer. There have been no new plant infections at the southeast site (other than on regrowth) and levels of soil and leaf litter contamination are low. This also suggests that the strategy of early removal of infected plants and surface leaf litter has been successful in reducing disease inoculum and spread.