Can U.K. populations of *P. infestans* mate?

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Abstract:

Crops of potato were grown inside 3 polythene tunnels and infected with different pairs of A1 and A2 isolates of *P. infestans*. A fourth tunnel was inoculated with all 6 isolates. Oospores were formed within the foliage and crop debris was allowed to rot into the soil. New seed was planted in the same tunnels after four months. Lower stem and leaf lesions were observed soon after emergence. Both mating types were detected in all tunnels. Lesion samples were fingerprinted with SSR markers. Parental genotypes were not present and the evidence suggests that parents had recombined to yield new hybrid genotypes. Many of the "progeny" isolates showed tri-allele genotypes, typical of single-oospore progeny of *P. infestans*.

Key words: oospores; recombination; microsatellite markers

Interpretation and conclusions:

The genotypes detected in all four tunnels were non-parental. While there was evidence of recombination of parental alleles at many loci, evidence of non-Mendelian inheritance was also found. New alleles at several loci not detected in parental isolates may be artifacts or may be generated during sexual recombination. Tri-allelic isolates could have been trisomic or even triploid but mixtures of genotypes cannot at present be ruled out. Single-oospore progeny with three alleles at one or more loci are known from *in-vitro* genetic analyses (Carter *et al.*, 1999). Three more cropping cycles are planned to follow the evolution of genotypes in each tunnel.

Introduction

Due to the recent increase in frequency of the A2 mating type in U.K. both mating types are detected in some commercial fields. We need to find out if sexual mating and recombination is taking place and if new, fit genotypes are generated. We have selected common strains from the 2006 population and inoculated crops with compatible pairs of these within plastic greenhouses (tunnels). Our plan is to continue to plant new crops in the tunnels each Spring and Autumn and to sample from the resulting infected plants to find out if the genes detected in the parental strains are recombined in the new blight isolates.

Methods and Material:

Four tunnels, 20m x 5.5m (see below), were each planted with alternating beds of cv. Maris Piper and cv. Bintje in March, 2007. Compatible strains of *P. infestans* were inoculated on 24 April. Common A2 strain Blue 13 was used in Tunnel 1. The crop was harvested in July and was destroyed. Fresh seed was planted on 7 October and blight was first detected and sampled on 31 October. Single-lesion samples were transferred to FTA cards (Whatman) prior to determining SSR genotype (Cooke *et al*.)

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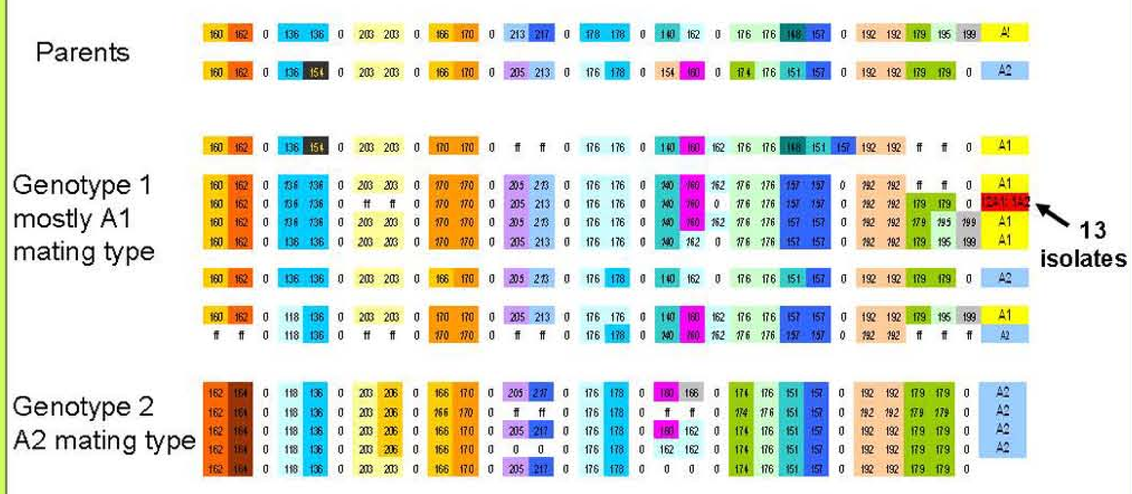
Results:

Microsatellite (SSR) genotypes of parents used to inoculate the tunnels are shown below. Alleles at 11 loci were assessed.

Blight occurred spontaneously on the second crop planted in each tunnel in November 2007.

Single-lesion isolates from each primary lesion were fingerprinted. Genotypes found in Tunnel 1 are shown below. Although two basic genotypes were found, variation was detected at several loci.



Similarly, two basic genotypes, one A1 and the other A2, were found in Tunnel 2. In Tunnel 3, one basic genotype was found and there was evidence of the presence of unique alleles from parents of Tunnel 1.
The fourth tunnel had been infected with all 6 parental isolates. The new crop there became infected more slowly than those in the other three tunnels. Unique alleles from parents of genotypes 1_A1, 13_A2 (Blue 13) and 8_2aA1 were detected.

References

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