Variability and survival of *Phytophthora infestans*

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Race surveys in North Wales over the past three years have shown that a large number of different physiologic races occur on potato crops mostly with no resistance genes. For example race (1, 2, 3, 4, 7, 8, 9, 10) which we classify as a complex race seems to spread as fast in the field as the relatively simple race (4, 11). One aspect of survival which, so far, has not been examined is that on dormant tubers over the winter period. It is likely that small numbers of blighted tubers which survive the winter provide a primary source of infection for summer outbreaks of blight. Selection must act to drastically reduce variability at this stage in the life cycle.

In late January 1971, 1.000 tubers of Craigs Royal were inoculated with hyphal plugs of race (1, 2, 3, 4, 7, 8, 9, 10) and 1.000 were inoculated with race (4, 11). 1.000 tubers were inoculated with agar blanks as a control. Tubers were stored for 10 weeks in open trays at a temperature of 4-10 °C. Sprouted tubers were planted out in the fields, 8 inches apart in rows spaced at 18 inches. The percentage establishment of plants was scored at six and nine weeks after planting and the crop was inspected for outbreaks of blight during June, July and August.

The results in Table I indicate that inoculation of tubers with race (4, 11) resulted in a large proportion which were unable to yield plants and gave rise to a plot without continuous ground cover. Race (1, 2, 3, 4, 7, 8, 9, 10) was much less aggressive and inoculated tubers gave rise to a plot with ground cover comparable to that from control tubers.

The first blight to appear was on the plot infected with the complex races on 7th July, and was identified as the same complex race inoculated. Further outbreaks on this plot and on the plot inoculated with the simple race were due to race (1, 2, 3, 4, 7, 8, 9, 10). By 30th August, blight was widespread and a sample of 25 infected leaflets were taken from each plot for race identification. Only 6% of the sampled plants were infected with race (4, 11), 74% were infected with the complex race, and the other 20% with contaminating races from an outside source. Clearly the complex race survived to initiate an extensive blight outbreak whereas the simple race only just survived and was not able to produce much disease in the crop.

These results indicate that lack of fitness shown by certain races, measured by their rarity in the field may not be due to a low level of aggressiveness but to a level which is so high that blighted tubers may survive the winter storage period to be planted in the following spring.

TABLE I

THE PERCENTAGE ESTABLISHMENT OF PLANTS OF CRAIGS ROYAL IN FIELD PLOTS FOLLOWING TUBER INOCULATION

Inoculum	Scored + 6 weeks	Scored + 9 weeks
Blank	96	94
(1,2,3,4,7,8,9,10)	56	52
(4,11)	28	24