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Changes in the Irish *Phytophthora infestans* population affect potato late blight resistances

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Introduction Currently potato late blight, caused by the oomycete pathogen *Phtyophthora infestans,* is the most devastating disease of potato crops worldwide. With yield losses of up to 100%, fungicides are relied upon to provide protection. This is both economically and environmentally undesirable. The development of integrated control programmes utilising host resistance, forecasting and fungicides will provide a more sustainable method of disease control. Changes in *P. infestans* populations can quickly render host resistances ineffective and undermine such a strategy. Using data from the Teagasc Oak Park potato breeding programme screening trials we investigate how the recent changes in the Irish *P. infestans* population (Kildea *et al.*, 2009) have affected foliage blight resistance.

Materials and methods Plots (20 tubers) of seven potato varieties with varying levels of foliage blight resistance (Table 1) were planted as part of the Oak Park potato breeding programmes foliage blight trials in 2006 (old *P. infestans* population) and 2009 ('new' *P. infestans* population). In both seasons the trial was planted in late April as a completely randomised block design with six replicates. The trial site received no fungicide treatments and natural late blight infections were allowed develop. Disease assessments commenced in mid June (prior to first infection) and continued at seven day intervals until all plots were completely infected or were naturally senescing. Levels of infection were determined using the British Mycological Society foliage blight key (Cox and Large, 1969). Using this data the development of the disease on each variety was calculated as the relative area under the disease progress curve (RAUDPC) (Shtienberg *et al*. 1990), from which differences between varieties in the individual years were analysed by ANOVA.

Results In 2006 late blight was first detected on the 27th of July, while in 2009 it was first detected on the 29th of June. In both seasons plots of the susceptible varieties Bintje, British Queen and Eersterling became completely infected within three weeks from the first detection. Disease development on the more resistant varieties Cara, Robijn and Setanta was significantly greater in 2009 than in 2006.

Table 1 Effect of season on the development of late blight on seven potato varieties

Variety	Resistance Rating[¥]	rAUDPC[†]	
		2006	2009
Alpha	3	0.43 ^{A}	0.54 ^{AB}
Bintje	2	0.61 ^{A}	0.62 ^{A}
British Queen	2	0.57 ^{A}	0.65 ^{A}
Cara*	5	0.23 ^{B}	0.4 ^{B}
Eersterling	2	0.69 ^{A}	0.61 ^{A}
Robijn	6	0.17 ^{BC}	0.42 ^{BC}
Setanta*	8	0.09 ^{C}	0.57 ^{AC}

*Bred at Oak Park; [¥]Resistance rating 2006; [†]Relative Area under disease progress curve

Conclusions The change in resistance of the variety Setanta between 2006 in 2009 is a worrying development and suggests the presence of a single resistance gene overcome by the 'new' *P. infestans* population. Although the levels and speed of disease on both Cara and Robijn increased compared to 2006 it was not as dramatic and is likely due to the high disease pressure experienced in 2009. Similar changes in disease development has been observed on Lady Balfore and Sterling (Lees *et al.* 2008) which suggests re-evaluation of resistances among commercial varieties maybe required.

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References

Cox AE and Large EC 1969 Agricultural Handbook 174
Kildea S, Cooke LR, Dowley LJ, Hutton F and Griffen D 2009 Agricultural Research Forum 2009 p126.
Lees AK, Cooke DEL, Stewart JA, Sullivan L, Williams NA and Carnegie SF 2008 Euroblight Workshop 2008 p55-60
Shtienberg D, Bergeron SN, Nicholson AG, Fry WE and Ewing EE 1990 Phytopathology 80, 466-472