Conditions for Infection of Oilseed Rape Leaves by Ascospores of UK (A group) and Polish (B group) *Leptosphaeria maculans* (stem canker)

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Infection conditions for ascospores of *Leptosphaeria maculans* from the UK and Poland were compared in controlled environment experiments at Rothamsted, as part of the European Union IMASCORE project (Balesdent & Rouxel, 1998). Isolates of *L. maculans* from the UK and Poland are known to differ genetically (Jedryczka *et al.*, personal communication); in the UK the A group predominates whereas in Poland the l ess damaging B group predominates. The A and B groups of *L. maculans* are probably different species (Taylor *et al.*, 1991; Williams & Fitt, 1999).

Ascospores of *L. maculans* ejected from naturally infected stem debris obtained from Rothamsted in the UK or Cerekwica near Poznan in Poland produced colonies on agar without or with the characteristic yellow-brown pigmentation to confirm that they were A group or B group, respectively. Oilseed rape plants (cv. Nickel) were grown in pots filled with a peat-based compost. Mature pseudothecia of *L. maculans* were excised from the stem debris obtained from the UK (A group) or Poland (B group), then crushed in water with a pestle and mortar to release the ascospores. Plants with four expanded leaves (GS 1,4) were inoculated by spraying with an ascospore suspension. Treatments were temperature (growth cabinets at 4, 8, 12, 16, 20 or 24°C) and leaf wetness duration (4, 8, 16, 20, 24, 30, 48 or >72 h after inoculation, maintained by covering plants with polyethylene bags). Numbers of new phoma leaf spot lesions which appeared were counted regularly (generally daily) until no new lesions appeared. Data were analysed to investigate the effects of temperature and wetness duration on the maximum number of lesions and on the leaf spot incubation period (estimated as time from inoculation to the appearance of one lesion).

Lesions produced on leaves by Polish B-group isolates were smaller and less distinctive, with fewer pycnidia, than those produced by UK A-group isolates. Ascospores of both groups of *L. maculans* were able to infect leaves and cause phoma leaf spots at temperatures from 8 to 24°C and leaf wetness durations from 8 to 72 h. The optimum conditions for infection, when the greatest numbers of leaf spot lesions were produced, were a leaf wetness duration of 48 h at 20°C for A-group isolates, but there was little difference between 20°C and 16°C for B-group isolates. Numbers of lesions decreased with decreasing leaf wetness duration and increasing or decreasing temperatures away from the optima. At 20°C with 48 h of leaf wetness, it was estimated that one out of four spores infected leaves to cause a lesion whereas at 8 h of leaf wetness only one out of 300 spores caused a lesions. There was no evidence that the maximum number of lesions produced per ascospore inoculated differed between A-group and B-group isolates.

As temperature increased from 8 to 20°C the time from inoculation to the appearance of the first lesions (incubation period) decreased from 15 to 5 days for A-group isolates but there was less evidence that leaf wetness duration *per se* affected the length of the incubation period. The incubation period of B-group isolates was shorter than that of A-group isolates, with the first lesions appearing after 2 days rather than 5 days at 20°C and 48 h leaf wetness, and after 7 days rather than 13 days at 8°C. Analyses suggested that there were no effects of temperature or wetness duration on incubation period expressed as degree-days; the time until *c.* 20% of leaves had A-group lesions was about 145 degree-days.

A linear regression of square root (% leaves with lesions (P_l)) on % plants with lesions (P_p) accounted for 93% of the variance : $(P_l)^{0.5} = 1.31 + 0.061 P_p$. This relationship was also investigated in winter oilseed rape field experiments at Rothamsted, in unsprayed plots during the period from October to April in 1995/96 (cv. Envol)), 1997/98 (cvs. Bristol and Capitol) and 1998/99 (cvs. Apex, Bristol and Capitol) seasons. The linear regression of square root (% leaves with lesions) on % plants with lesions again accounted for 90% of the variance and had a similar slope to the controlled environment relationship : $(P_l)^{0.5} = 0.81 + 0.051 P_p$. These results will be used to examine relationships between infection criteria (temperature, rainfall) measured in autumn in field experiments at Rothamsted and ADAS farms and the development of phoma leaf spot on plants in winter oilseed rape crops.

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