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Influence of inoculum density, virulence of *P. brassicae* isolates and cultivar resistance on clubroot development and build-up of resting spores in oilseed rape cultivars

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We conducted a series of controlled greenhouse studies to determine the effects of soil inoculum densities and virulence of *Plasmodiophora brassicae* populations on disease development of oilseed rape genotypes differing in their clubroot resistance (cvs.: *Visby* (s), *Mendel* (r)). Two field populations of *P. brassicae* were selected representing two pathotypes differing in their virulence to the cultivars (P1: virulent on *Visby*, avirulent on *Mendel*; P1(+): virulent on both cultivars). Different soil inoculum levels (101, 103, 105 and 107 spores/g soil) were adjusted by incorporation of resting spores. Seeds were directly sown one day later in the infested soils. Disease intensity index (DII), root fresh weight and propagation of resting spores were recorded in two-week intervals starting at 14 days post sowing (dps) and ending at 56 dps. Results showed that two cultivars behaved significantly different in tested parameters. ANOVA-analysis displayed that the interactions of cultivars with inoculum densities and pathotypes were highly significant. In cv. *Visby* grown in soil infested with *P. brassicae*-P1, clubroot symptoms, increased in root weight and propagated resting spores inside the root occurred at inoculum levels of 101 resting spores and higher, whereas *Mendel* was not affected in soils providing the three lowest inoculum densities. Very low levels of clubroot symptoms were observed from 42 dps in the soil with the highest spore load. In contrast, the P1(+)-population had a dramatic effect on DII, root weight and spore propagation in both cultivars. In *Visby*, the DII of 100% was achieved after 28 dps in all inoculum densities except 101 resting spores/g soil (DII: 35%). In *Mendel*, all plants grown in 105 and 107 resting spores/g soil clubbed and 80% DII developed at 28 dps. Visible clubs with DII of 10 and 30% were found even in *Mendel* grown at lower spore densities of 101 and 103 at 28 dps, respectively. Comparing disease development of both *P. brassicae* populations, it was obvious that P1(+) led to earlier and more severe symptoms on the susceptible cultivar. DII of 100% was recorded at a soil spore load down to 103/g soil, which was one magnitude less than for the P1-population.

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