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Soil nutrients affect *Spongospora subterranea* infection of potato

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Bioassay, glasshouse and field experiments have been carried out to determine whether individual soil chemical factors can affect root or tuber infection of host plants by the powdery scab pathogen *Spongospora subterranea*. Some of the individual nutrients examined in these experiments were chosen from field evaluations in Australia that suggested low incidence of powdery scab in crops may be related to high soil concentrations of particular elements. Bioassay, and glasshouse experiments (as well as previous research) have indicated that *S. subterranea* can infect host roots over a range of soil pH, and that adjusting pH is unlikely to be a worthwhile option for reducing powdery scab. Bioassay and glasshouse experiments showed that concentrations of boron above 6 mg L⁻¹ in nutrient solution inhibited root infection by the pathogen, and a field trial confirmed that applications of boron to infested soil at planting (13 kg B ha⁻¹) reduced the incidence and severity of powdery scab in harvested potatoes. A glasshouse experiment demonstrated that manganese and zinc both reduced root infection by the pathogen, but only when applied at very high concentrations and field trials have shown that adding these elements at planting did not reduce disease incidence or severity of powdery scab in tubers at harvest. A glasshouse experiment demonstrated different rates of iron, up to very high concentrations, did not affect root infection by the pathogen. In a glasshouse experiment testing effects of different forms of nitrogen, ammonium nitrogen reduced root infection but nitrate nitrogen did not. A recent field trial has shown that adding urea or calcium nitrate to infested soil at planting reduced powdery scab severity in harvested tubers.

These experiments have shown that manipulation of some soil elements (particularly boron and nitrogen) has potential for reducing powdery scab in potatoes, and that this approach could be used as part of integrated management of the disease.