Development of a phytotron-based assay for potato resistance to *Spongospora subterranea* f.sp. *subterranea* root galls and tuber powdery scab

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The plant pathogen S*pongospora subterranea* f.sp. *subterranea* (*Sss*) causes powdery scab on potato tubers and root galls. Tuber skin lesions adversely affect quality and marketability of fresh and seed tubers, and tubers for processing. Root galls impact plant health, reduce production and contribute to inoculum build-up in the soil. *Sss* is also the vector of the potato mop-top virus (PMTV), which causes necrotic lines and rings in potato tubers. Presence of *Sss* and PMTV in soils in several countries is increasing. Germplasm screening for resistance/tolerance to *Sss* has been mostly based on field trials which are labour intensive, costly, time-consuming, and require the use of infected tubers for planting. These factors result in a resistance selection process that can take up to 4-5 years, making it unsuitable for early-generation selection in plant breeding programmes. Powdery scab and PMTV are also dependent on climatic conditions, which affect repeatability, reproduction and reliability of individual trails. The main focus of field trails has powdery scab skin lesions, because root gall field assessment is complex. An assay was therefore developed to assess susceptibility of germplasm to *Sss* at an early stage and under controlled environment conditions, which would assist resistance breeding. Effects on disease expression of temperature, humidity, LED light spectra, growth substrate, time of inoculation, and inoculum origin and concentration, have been assessed. Experiments conducted in a phytotron using *in vitro* cultured plantlets of several varieties have shown grades of tolerance to *Sss* root galling and tuber skin lesions.