

Title Postharvest dark skin spots in potato tubers are an oversubерization response to *Rhizoctonia solani* infection

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Abstract

Israeli farmers export 250,000 tons of potato tubers annually, \approx 40,000 tons of which are harvested early, before skin set. In recent years, there has been an increase in the occurrence of dark skin spots on early-harvested potato tubers ('Nicola') packed in large bags containing peat to retain moisture. The irregular necrotic spots form during storage and overseas transport. Characterization of the conditions required for symptom development indicated that bag temperature after packing is 11 to 13°C and it reaches the target temperature (8°C) only 25 days postharvest. This slow decrease in temperature may promote the establishment of pathogen infection. Isolates from typical lesions were identified as *Rhizoctonia* spp., and Koch's postulates were completed with 25 isolates by artificial inoculation performed at 13 to 14°C. Phylogenetic analysis, using the internal transcribed spacer sequences (ITS1 and ITS2) of rDNA genes, assigned three isolates to anastomosis group 3 of *Rhizoctonia solani*. Inoculation of wounded tubers with mycelium of these *R. solani* isolates resulted in an oversubерization response in the infected area. With isolate Rh17 of *R. solani*, expression of the suberin biosynthesis-related genes *StKCS6* and *CYP86A33* increased 6.8- and 3.4-fold, respectively, 24 h postinoculation, followed by a 2.9-fold increase in *POP_A*, a gene associated with wound-induced suberization, expression 48 h postinoculation, compared with the noninoculated tubers. We suggest that postharvest dark spot disease is an oversubерization response to *R. solani* of AG-3 infection that occurs prior to tuber skin set.