Diseases Caused by Fungi and Fungus-Like Organisms

Rhizoctonia solani AG2-1 Causing Root Rot of Wasabi (*Eutrema japonica*) in the United Kingdom

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In 2014, glasshouse-grown wasabi (*Eutrema japonica*) grown in a compost-based medium displayed symptoms of poor growth and wilting. Visual assessment of the roots showed that 25% of the symptomatic plants sampled had raised black lesions on the roots affecting between 5 and 20% of the total root area. To isolate the causal agent, affected material (approximately 5 mm³) was surface disinfested in sodium hypochlorite (2%) for 30 s, rinsed twice in sterile water, and plated on to water agar medium amended with penicillin G (0.2 g/liter) and streptomycin sulfate (0.8 g/liter). Plates were incubated at 20°C until fungal colonies were visible. After 3 days, colonies of *Rhizoctonia solani* were identified based on the presence of septate hyphae with right-angle branching, and a pure culture was obtained through hyphal tip transfer onto a new plate of potato dextrose agar (PDA). DNA was extracted from a 7-day-old plate of the isolate (WAS1) as described previously (Woodhall et al. 2013). The anastomosis group (AG) of WAS1 was determined as AG2-1 using a subgroup-specific real-time PCR assay (Budge et al. 2009b) and confirmed by DNA sequencing as described previously (Lekuona Gómez et al. 2015). The sequence was 100% identical (587/587 bp) to a pre-

viously identified AG2-1 isolate 1971 (GenBank accession FJ435126) (Budge et al. 2009a). Pathogenicity of the isolate was confirmed by inoculating three healthy 1-year-old wasabi plants grown in loam-based compost (John Innes No.3) each with four 5-mm fully colonized PDA plugs of isolate WAS1 placed at approximately 40 mm depth in the soil. Four sterile PDA plugs were placed in each of three control plants. All six plants were placed in a greenhouse at 21°C, 18-h/6-h light/dark, and watered as required. After 21 days, multiple black root lesions typically 3 to 5 mm in length were observed on the roots of all inoculated plants. No lesions were observed on the control plants. From three lesions per plant, isolations were attempted as described above. *R. solani* was recovered from all isolations, and the resulting cultures all tested positive for AG2-1 using the real-time PCR assay. Isolations were attempted from the roots of healthy control plants, but *Rhizoctonia* was not recovered. Here we demonstrate that *R. solani* AG2-1 is associated with root necrosis of *E. japonica*. *R. solani* AG2-1 has been reported previously in various *Brassica* crops in the United Kingdom (Budge et al. 2009a) and on *Matthiola incana* (Lekuona Gómez et al. 2015). It has also been reported causing disease in potatoes and as widely present in U.K. field soils (Woodhall et al. 2013). Although *R. solani* AG1 and AG4 of *R. solani* have been reported to infect *E. japonica* in Japan (Takeuchi et al. 2003, 2008), this is the first finding that identifies AG2-1 as the causal agent. The potential presence of AG2-1 in soil and/or as plant debris should be considered prior to planting susceptible hosts.

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