Diseases Caused by Fungi and Fungus-Like Organisms

First Report of *Rhizoctonia solani* AG4 HG-II Infecting Barley Stems in Idaho

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In June 2019, barley plants (*Hordeum vulgare* L., cultivar Voyager) from an irrigated field in southeast Idaho were submitted to Parma Research and Extension Center for diagnosis. The plants were approximately 2 months old, displaying spots with light to dark brown margins on the leaf sheaths and browning also present at the stem base. Approximately 25% of the plants within a 1-ha area of the field were estimated to be infected. To determine the causal agent, pieces (3 mm in length) of symptomatic stems were sterilized in sodium hypochlorite (2%) for 1 min, rinsed twice in sterile water, dried on sterile paper towels, and placed on water agar amended with penicillin G (0.2 g/liter) and streptomycin sulfate (0.8 g/liter). After 3 days at 21°C, fungal colonies with septate hyphae and right-angled branching resembling *Rhizoctonia solani* were observed. To confirm species identity, hyphal tips of suspected *R. solani* colonies were transferred to potato dextrose agar (PDA) and grown for 2 weeks at 21°C. DNA was then extracted from a single representative isolate (IRB1), and rDNA ITS sequencing was conducted as described previously (Woodhall et al. 2019). The rDNA ITS sequence of IRB1 (GenBank accession no. MT444151) was 100% identical (702/702 bp) to another sequence previously identified as *R. solani* AG4 HG-II (MN160702). To confirm pathogenicity, 20 barley plants (cv. Voyager) were grown in premium potting compost (Scotts) in a glasshouse with 21°C temperature regime. During the period that the plants remained in the glasshouse, the typical light regime was 16 h. After 20 days, 20 plants were inoculated with a fully colonized 10-mm² plug taken from a 2-week-old PDA culture of IRB1,

which was placed next to the stem, 20 mm below the soil. Ten plants were inoculated with sterile PDA plugs as controls. After a further 28 days, each plant was assessed for stem disease as described previously (Scott and Hollins 1974). Root lesions were observed on 18 of the 20 inoculated plants. Six of the 20 plants showed lesions on the stem (mean stem disease index of 1 out of 3). No root or stem disease was observed on control plants. *R. solani* was consistently isolated from the symptomatic stems and roots on water agar, and real-time PCR was used to confirm that the reisolated fungi were *R. solani* AG4 HG-II (Budge et al. 2009) and therefore confirm Koch's postulates. This is the first report of *R. solani* AG4 HG-II causing stem disease in barley in Idaho. Ogoshi et al. (1990) previously conducted survey work in which they isolated *R. solani* AG4 from wheat and barley roots in the Pacific Northwest but did not mention Idaho specifically, nor did they find that *R. solani* AG4 isolates caused disease on barley. *R. solani* AG4 HG-II has been reported causing a foliar and leaf sheath blight of barley in Iran (Choupannejad et al. 2017); although a leaf blight was not observed in Idaho, the sheath symptoms were similar. Bacharis et al. (2010) found that AG4 HG-II isolates from cotton in Greece were also aggressive to barley. In Idaho, *R. solani* AG4 HG-II has been reported causing disease in snow pea (Woodhall et al. 2019), potatoes (Woodhall et al. 2012), and sugar beets (Strausbaugh et al. 2011). To our knowledge, this is the first report of *R. solani* AG4 HG-II infecting barley in Idaho. Growers should consider using an appropriate seed to avoid introducing *R. solani* AG4 HG-II into fields where the pathogen is not present.

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