Diseases Caused by Fungi and Fungus-Like Organisms

First Report of Take-All Root Rot Caused by *Gaeumannomyces graminis* on Hybrid Bermudagrass in China

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Take-all root rot caused by *Gaeumannomyces graminis* (Sacc.) Arx & Olivier is a destructive disease of hybrid bermudagrass (*Cynodon dactylon* × *C. transvaalensis* Burt-Davy) (Elliott 1991; Stephens and Kerns 2020). In April 2018, multiple circular to irregular patches (10 to 200 cm in diameter) were evident on ‘Tifway419’ bermudagrass fairways of Wuhu golf course (Huangshan City, Anhui Province). Patches were found at 5 of the 18 fairways and showed a decrease in stand density. Individual plants in patches exhibited off-color to white foliage, and dark and necrotic lesions were frequently observed on roots and associated stolons. Ectotrophic runner hyphae and lobed hyphopodia were ubiquitous on the surface of necrotic roots. Two diseased samples were collected from each patch by a soil corer (10 cm in diameter), and a total of 10 patches were sampled across the five symptomatic fairways. Symptomatic roots or stolons were cut into 2 to 3 cm lengths and surface disinfested for 3 min in 0.6% sodium hypochlorite solution. The sterilized tissues were rinsed, air dried on sterile filter paper for 5 min, and placed on potato dextrose agar amended with 50 mg/liter each of ampicillin, streptomycin sulfate, and tetracycline. Plates were incubated in the dark at 20°C for 5 days, and similar colonies were

consistently recovered from 85% of the symptomatic tissues. After hyphae purification, a total of 20 fungal isolates were obtained with morphology similar to *G. graminis* (Hernández-Restrepo et al. 2016). DNA was extracted and amplified with primers ITS5/ITS4 (White et al. 1990). PCR products were sequenced (deposited as MZ889119 and MZ889120 in GenBank) and showed 99.43 to 99.81% homology when compared with a known *G. graminis* isolate (accession no. KX306505). To complete Koch’s postulates, healthy Tifway419 hybrid bermudagrass was grown in 5- × 20-cm Cone-Tainers containing a sand and Pindstrup substrate (Pindstrup Mosebrug, Pindstrup, Denmark) mixture (1:1, v/v) 9 weeks after transplanting it from the experimental field at the Institute of Botany, Jiangsu Province, and the Chinese Academy of Sciences. Five sterile oat seeds infested with *G. graminis* were inserted 5 cm below the soil surface in the root zone of Tifway419. Cone-Tainers inoculated with five noninfested sterile oat seeds served as controls, and each treatment was replicated three times. All Cone-Tainers were transferred into a growth chamber with a 12-h day/night cycle at 25/20°C and 95% relative humidity. They were covered with plastic bags for the first week and watered once daily to encourage disease development. Hybrid bermudagrass inoculated with *G. graminis* decreased in plant density and turfgrass quality, and black and necrotic roots covered with lobed hyphopodia were observed 8 weeks after inoculation. No symptoms were present on the roots or aboveground on noninfested control plants. *G. graminis* was consistently reisolated from symptomatic roots and stolons and confirmed by sequencing the ITS region as mentioned above. To our knowledge, this is the first report of *G. graminis* causing take-all root rot of hybrid bermudagrass in China, which may influence the management of this important root disease.

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The author(s) declare no conflict of interest.

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