Diseases Caused by Fungi and Fungus-Like Organisms

First Report of Collar and Root Rot of Faba Bean Caused by *Rhizoctonia solani* AG-2-2 IIIB in Bangladesh

S. K. Paul,¹ D. R. Gupta,² N. U. Mahmud,² A. N. M. Muzahid,² and M. T. Islam^{2,†}

¹ Department of Agronomy, Bangladesh Agricultural University, Mymensingh 2202, Bangladesh

² Institute of Biotechnology and Genetic Engineering (IBGE), Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur 1706, Bangladesh

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Faba bean (*Vicia faba* L.) is an underutilized promising grain legume commercially grown in central and northern Bangladesh (Yasmin et al. 2020). In January 2021, faba bean plants exhibiting symptoms of collar and root rot and yellowing of leaves were observed in 30 plots of an experimental field at the Bangladesh Agricultural University (24.75° N, 90.50° E), Mymensingh, Bangladesh. Infected plants had dark brown to black lesions on the roots, extending above the collar region. Average disease incidence and severity was 7.16% and 6.91%, respectively. Eight diseased plants were collected from the field by uprooting one plant from each of eight randomly selected experimental plots and surface disinfected with sodium hypochlorite (0.2%) for 3 min followed by 1 min in ethanol (70%), and then rinsed three times with distilled water and dried on sterile paper towels. Collar and root pieces (5 × 5 mm) of symptomatic tissues were placed on potato dextrose agar (PDA). Plates were incubated at 25°C for 3 days and isolates were purified from single-tip culture. The isolates produced brown mycelia often with brown sclerotia. Under a microscope, fungal colonies exhibited right-angled branching with constriction at the base of hyphal branches and a septum near the originating point of hyphal branch consistent with the description of *Rhizoctonia solani* Kuhn (Sneh et al. 1991). The isolates grew at 35°C on PDA (5 mm/24 h). Molecular identification of the isolates BTRFB1 and BTRFB7

was determined by sequencing the rDNA internal transcribed spacer (ITS) region using primers ITS1 and ITS4 (White et al. 1990). A BLAST search showed that the sequences (GenBank accession nos. MZ158299.1 and MZ158298.1) had 99.28% similarity with *R. solani* isolates Y1063 and SX-RSD1 (GenBank accession nos. JX913811.1 and KC413984.1, respectively). Phylogenetic analysis revealed that the present isolates grouped with *R. solani* anastomosis group AG-2-2 IIIB. To confirm pathogenicity, both isolates were grown individually on sterile wheat kernels at 28°C for 6 days (D'ae et al. 2011). Faba bean seedlings were grown in plastic pots containing sterile potting mix (field soil/composted manure/sand 2:2:1 [v/v]). Two-week-old plants were inoculated by placing five infested wheat seeds adjacent to the roots. Control pots were inoculated with sterile wheat kernels using the same procedure. Plants were placed in a growth room with a 16 h/8 h light/dark photoperiod at 25 ± 2°C after inoculation. Fifteen days after inoculation, typical collar and root rot symptoms developed on inoculated plants, similar to symptoms observed in the field. Control plants remained nonsymptomatic. Finally, six isolates of *R. solani* were isolated from the symptomatic plants and identified by morphological and molecular analysis. *R. solani* is the causal agent of seed and root rot, hypocotyl canker, and seedling damping-off diseases of faba bean in many other countries (Assunção et al. 2011; Rashid and Bernier 1993). To our knowledge, this is the first confirmed report of *R. solani* causing collar and root rot of faba bean in Bangladesh. This finding will be helpful for the development of management strategies to control this disease and to expand the production of faba bean in Bangladesh.

References:

- Assunção, I. P., et al. 2011. Hort. Bras. 29:492.
D'ae, J., et al. 2011. Phytopathology 101:996.
Rashid, K. Y., and Bernier, C. C. 1993. Can. J. Plant Pathol. 15:23.
Sneh, B., et al. 1991. Identification of *Rhizoctonia* Species. APS Press, St. Paul, MN.
White, T. J., et al. 1990. Page 315 in: PCR Protocols: A Guide to Methods and Applications. Academic Press, San Diego, CA.
Yasmin, W., et al. 2020. Arch. Agr. Environ. Sci. 5:11.

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[†]Indicates the corresponding author.
M. T. Islam; tofazzalislam@bsmrau.edu.bd