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First Report of *Globisporangium ultimum* Causing Constriction on Hypocotyl of *Beta vulgaris* in North Dakota, USA

Haque ME[1] and Parvin MS[2,3]*

[1]University of North Dakota, USA

[2]Bangladesh Agricultural Research Institute, Bangladesh

[3]Gottfried Wilhelm Leibniz Universität Hannover, Germany

***Corresponding author:** Parvin MS, Bangladesh Agricultural Research Institute, Bangladesh

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Editorial

Sugar beet (*Beta vulgaris*) sowing to post-harvest is continuously encountered with wide range of soil-borne pathogens including *Rhizoctonia, Fusarium, Aphanomyces, Rhizopus, Pythium, Talaromyces*, *Clonostachys,* and *Geotrichum.* These evident to cause substantial qualitative and quantitative losses. In May/2019, dark brown to black irregular water-soaked lesions were observed near the soil-line (constriction of hypocotyl) on sugar beet seedlings in Prosper (46.9630° N, 97.0198° W), North Dakota (Figure 1). Approximately 2-5% of disease incidence was recorded. Small pieces (10 mm^2) of symptomatic root tissues were cut from the margins between infected and healthy tissue, and disinfected with 10% sodium hypochlorite for 1 min, rinsed three times with autoclaved water, and then placed on Corn Meal Agar (CMA) amended with pimaricin-vancomycin-Pentachloronitrobenzene (PCNB) [1] for incubation at 20°C in the dark for 5 days. Subsequently, single hyphal tips were transferred to Water Ager (WA) (Figure 2). In total, 8 isolates were developed from diseased beets. Isolates were developed light fungal biomass on WA in 14 days. Microscopically, hyphal swelling and globular or lemon shaped sporangia were present (Figure 3). Based on macroscopic and microscopic characteristics, the fungus was speculated to be Oomycetes genus [2]. Determining the species, genomic DNAs of 8-isolates were used for Polymerase Chain Reaction (PCR) using ITS-6 and ITS-7 primer. PCR amplicons were cleaned with E.Z.N.A ®Cycle Pure Kit, OMEGA, and 8 samples were sent for Sanger sequencing to GenScript (Piscataway, NJ) [3]. The sequences were identical, and standard nucleotide blast search showed 99% sequence identity to *Globisporangium ultimum* (Genbank accessions: MK794771.1). The nucleotide sequence was deposited in Genbank (MN086365.1). Phyto-pathogenicity testing was performed with 2-week old sugar beet susceptible cultivar which was inoculated with a 2-week old WA culture (5 mm^2 mycelial cut). This plug/mycelial cut was placed at a 1/2-inch depth close to seedlings in each plastic pot (27 x 13 x 13 cm, T.O. Plastics, Inc.; Clearwater, MN, USA) which was filled with vermiculite and perlite mixer (PRO-MIX FLX) amended with osmocote (N-P-K:15-9-12) fertilizer (Scotts Company; Marysville, OH). The pots were arranged in completely randomized design. The study was done twice with four replicates and 10 plants per replicate. One week of post-inoculation, 40% of the inoculated plants developed

Figure 1: Infected sugar beet seedlings with constriction on hypocotyl collected from field.

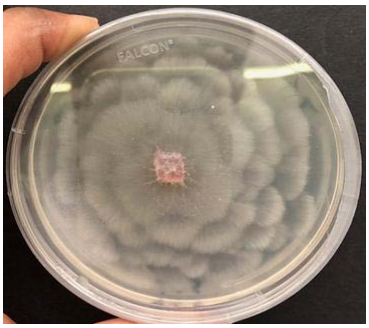

Figure 2: *Globisporangium ultimum* grown on water agar.

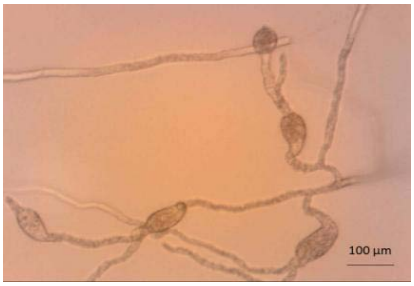

Figure 3: Morphological characteristics of *G. ultimum.*

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Figure 4: Inoculated artificially with *G. ultimum.*

similar damping-off symptoms as discussed above (Figure 4), whereas mock-inoculated plants were healthy. Pathogen re-isolated from the infected hypocotyl tissue and was further confirmed morphologically and molecularly, fulfilled Koch's postulates. *Globisporangium* species complex were previously reported to cause damping-off on aleppo pine (*Pinus halepensis* Mill) in Australia, Africa, Mediterranean, root-crown rot of pepper (*Capsicum annuum*) in Turkey and alfalfa [4-7]. To our best knowledge, this is the first report of *Globisporangium ultimum* causing constriction on hypocotyl of sugar beet seedlings in North Dakota, USA.

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