Diseases Caused by Fungi and Fungus-Like Organisms

First Report of Stem Smut Caused by *Tranzscheliella hypodytes* on *Leymus secalinus* in India

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Leymus secalinus (Georgi) Tzvelev (blue wild rye) is a perennial grass species distributed in the Leh-Ladakh region of India. Culms are usually solitary, 20 to 100 cm tall, two- to five-noded, smooth, and glabrous. It is found on mountain slopes, grassy places, riverbanks, sandy and alkaline soils, and rocky, stony, and pebbled soils. It is one of the dominant species of the region and is mostly used for forage and grazing. *L. secalinus* plants with blackish-brown powdery spore mass/sori on the culm were observed in Leh region of Jammu and Kashmir, India, during a wheat germplasm exploration (to collect wild relatives, land races, cultivars, etc. of cultivated wheat) in September 2018. Initially, sori were covered by the leaf sheath and at a later stage more or less exposed with the absence of peridium. Infected culms and leaves are stunted, and inflorescences are abortive. Spores are globose, subglobose to ovoid, blackish-brown in color, 3 to 5 × 4 to 4.5 µm in size, wall 0.5 µm thick and smooth. The fungus was identified as *Tranzscheliella hypodytes* (Schltld.) Vánky & McKenzie based on morphological characteristics (Li et al. 2017; Vánky 2012, 2003;

Vánky and McKenzie 2002). Ustilospore germination was not observed on potato dextrose agar during the laboratory experiment. In some cases, ustilospore germination is recorded in other smut fungi, which shows considerable variation according to media and conditions used (Ingold 1983). Moreover, there is no report available for the artificial culture of *T. hypodytes*. Identity was confirmed using the internal transcribed spacer (ITS) region of ribosomal DNA, amplified with universal primer ITS1, which was then sequenced. NCBI-BLAST showed 99.28% similarity with the ITS sequence of *T. hypodytes* (GenBank accession no. MH855460.1). The sequence was deposited in NCBI GenBank with accession number MN108147. A pathogenicity test was conducted in a glasshouse wherein smut-infected samples of *L. secalinus* collected from Leh were made into small pieces and mixed with the sterilized soil filled in three pots before sowing. In addition, seeds were also mixed with smut spores before sowing. Inoculated pots after sowing were kept at 16 ± 2°C temperature and a relative humidity of 70% in a glasshouse. Control pots were maintained without inoculum. Inoculated and control pots were placed in separate chambers of the same glasshouse. Seventy days after sowing, inoculated plants were symptomatic, matching those described above, and produced no seed. Pathogen reisolated from infected plants was identical in all respects to the isolate used to inoculate the plants, which confirmed Koch's postulates. Control plants remained healthy and produced seed. Leh region is covered by sparse vegetation due to its topography and cold desert climate (cold, dry winter and warm, dry summer with very low precipitation, occurring in temperate region). Stem smut in *L. secalinus* can have significant negative impact on the fodder and grazing situation of the region. To our knowledge, this is the first report of stem smut caused by *T. hypodytes* on *L. secalinus* in India. A voucher specimen of the fungus was deposited at Herbarium Cryptogamae Indiae Orientalis (HCIO) (52182), ICAR-Indian Agricultural Research Institute, New Delhi.

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