First report of *Ustilago avenae* causing loose smut of oat (*Avena sativa*) in Shandong China

Jian Hu¹ · Jing Ya Yang¹ · Jie Li¹ · Tao Gao¹ · Gao Wen Yang¹ · Hai Yan Ren¹

Published online: 12 March 2018

© Società Italiana di Patologia Vegetale (S.I.Pa.V.) 2018

Keywords Oat smut · Teliospore · Basidiospore · *Ustilago avenae*

Oat (*Avena sativa* L.) is an important annual forage grass that is increasingly grown in many regions of China (Su 2013). In late May and early June of 2017, a smut disease was found on oat at the research station of Qingdao Agricultural University in Shandong province. The panicle was entirely destroyed except for the rachilla and glume, spores, olive-black in mass, appeared in all spikes of a panicle in place of seeds, forming powdery masses, similarly to the symptoms caused by loose smut (Punithalingam and Waterston 1970). Teliospores were irregularly globose to subglobose and reddish brown. Occasionally, elongated teliospores were also observed. Twenty-five teliospores were measured ranging in size from 6.1 to 9.1 × 5.5 to 8.2 µm with a black echinulate wall approximately 0.7 µm thick. Teliospores germinated within 12 h when plated on 1% water agar at 25 °C and formed a septate promycelium with four cells, uninucleate basidiospores budded out from the cells and increased in number by producing secondary sporidia. The teliospore morphology was consistent with previous descriptions of *Ustilago avenae* (Punithalingam and Waterston 1970). For molecular identification, DNA was extracted from teliospores. Part of the nuclear ribosomal internal transcribed spacer (ITS) region was amplified using ITS4 and ITS5 primers (White et al. 1990). A 753 bp PCR product was sequenced (GenBank accession No. MF417490) and a BLAST analysis showed 99% similarity to

U. avenae isolate MP2362 (AY344997) (Stoll et al. 2003). A voucher specimen has been deposited in China Center for Type Culture Collection (AF2017018). *U. avenae* has been reported from multiple locations in China, including Shanxi, Hebei, Jiangsu, Gansu, Henan and Heilongjiang (Guo 2000), but to the best of our knowledge, this is the first report of *U. avenae* causing loose smut on oat in Shandong China.

Funding This work was supported by a grant from the Fundamental Research Funds for the Central Universities (Grand No. KYZ201554).

References

- Guo L (2000) Flora fungorum sinicorum. Vol. 12. Ustilaginaceae. Science Press, Beijing
- Punithalingam E, Waterston JM (1970) *Ustilago avenae*. [Descriptions of fungi and bacteria]. *IMI descriptions of fungi and bacteria*, 28: sheet 279. CAB International, Wallingford
- Stoll M, Piepenbring M, Begerow D, Oberwinkler F (2003) Molecular phylogeny of *Ustilago* and *Sporisorium* species (*Basidiomycota*, *Ustilaginales*) based on internal transcribed spacer (ITS) sequences. *Can J Bot* 81:976–984
- Su RN (2013) Study on the development of oat industry in China—evidence of Inner Mongolia. Ph.D. Thesis. Inner Mongolia Agricultural University, China
- White TJ, Bruns T, Lee S, Taylor JW (1990) PCR protocols: a guide to methods and applications. Academic Press, San Diego

✉ Jian Hu
jaffyhu@njau.edu.cn

¹ College of Agro-grassland Science, Nanjing Agricultural University, Nanjing 210095, China