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SHORT COMMUNICATION

First report of the teleomorph of *Marssonina juglandis* (*Gnomonia leptostyla*) in Kashmir

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Anthracnose is the only important foliar fungal disease that affects walnut in Kashmir valley. Contrary to earlier reports, this investigation revealed existence of *Gnomonia leptostyla* (teleomorph of *Marssonina juglandis*) in Kashmir and the ascospore maturity in the spring coincided with primary infection event and thus can be seen as a possible inoculum for primary infection besides conidia. The fungus formed hypophyllous, globose to sub-globose and blackish-brown perithecia having a long beak and containing ellipsoid to fusiform asci. Ascospores were hyaline and bicelled with a median to supramedian septum and were fusiform having small appendages.

Keywords: Anthracnose, *Gnomonia leptostyla*, perithecium, teleomorph, walnut

INTRODUCTION

Walnut anthracnose, also known as leaf blotch or black spot, has a wide geographical distribution in the temperate world. It is caused by *Marssonina juglandis* (Libert) Magnus [*Gnomon-ialeptostyla* (Fr.) Ces. and de Not.] belonging to kingdom-Fungi, division- Ascomycota, class-Sordariomycetes, order Diaporthales and family Gnomoniaceae (Kirk *et al*., 2008). Although most of the scientific reports including those from India mention *M. juglandis* as the incitant of walnut anthracnose (Hassan *et al*. 2017; Sanjeev *et al.* 2022), *Colletotrichum gloeosporiodes*, *C. aenigma*, *C. fioriniae, C. siamense, C. fruticola, C. nymphaeae* and *C. godetiae* have been also reported from countries like China, Hungary, France and Italy as cause of walnut anthracnose in the recent past (Laura *et al.* 2021; Varjas *et al.* 2019, 2021; Wang *et al.* 2017, 2018, 2020, 2021). As in many other parts of the world, *M.juglandis* was reported to overwinter in the form of dormant mycelium and conidia in diseased fallen leaves/ leaf stalks in Kashmir (Hassan *et al.,* 2017). There are also reports about the sexual state in some parts of the world except India (Dimova and Arnaudov, 2008; Jamshidi and Salahi, 2009) and keeping in view these reports the possible existence of its teleomorph in Kashmir conditions was hypothesised.

MATERIALS AND METHODS

In a preliminary investigation, fallen and partially decomposed leaf and twig samples of walnut were collected from orchard floor during spring 2021 for visual and microscopic examinations.The observations revealed presence of sub-epidermal fruiting bodies having long hair-like projections emerging through bark of leaf stalk. Those fruiting bodies were much like those of ascomata of *G. leptostyla*. In the following autumn a systematic study was conducted and anthracnose hit leaf stalks were collected and subjected to microscopy for confirming the association of *M. juglandis* before placing on orchard floor in a nylon mesh for monitoring of perithecial development. During spring 2022, the samples were drawn for microscopic examination at periodic intervals to keep track of the development of fruiting body, asci and ascospores.

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RESULTS AND DISCUSSION

Microscopy revealed that perithecia were hypophyllous, alone or in groups of up to three, globose to sub-globose and blackish-brown in colour. These were having a long beak (232-669.8 µm) which was straight to slightly curved and blackish brown in colour (Fig. 1a-c). Asci were ellipsoid to fusiform, hyaline with dimensions of 28-32 µm x 14-18 µm (Av. 29.34 x 14.56 µm) (Fig. 1d). Ascospores were hyaline,fusiform, straight to slightly curved, bicelled with median to supramedian septum and small appendages with dimensions of 13-16 x 3-5 µm (Av. 15.54 x 3.19 µm) (Fig. 1e). Similar descriptions were earlier reported for perithecia of *G. leptostyla* (Karov *et al.* 2014; Walker *et al.*2012).

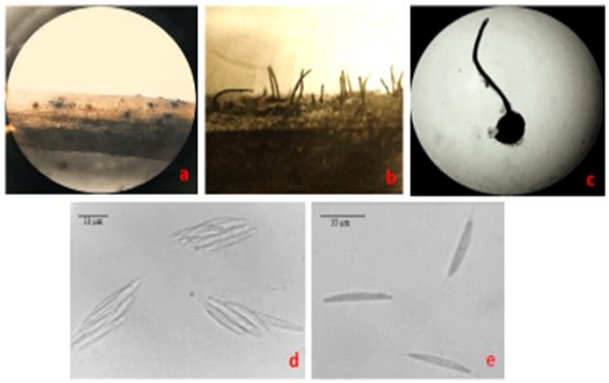

Fig. 1: *Gnomonia leptostyla:* (a) Pin head like initials of perithecia on petiole, (b) long protruding beak of subsurface perithecia, (c) Perithecium with beak intact, (d) Asci and (e) Ascospores.

Fig. 2: (a) Leaf spot symptoms (b) One month old colony of *M. juglandis* on PDA medium and (c) Bi-celled and crescent shaped conidia of *M. juglandis*

Periodic examination of the specimen in spring 2022 further revealed the development of perithecial initials during 2nd week of February to 2nd week of March. Complete ascocarps with mature ascospores were seen during 3rd week of March and onwards. Furthermore, the primary anthracnose symptoms expected towards the end of March appeared in the 2nd week of April under natural epiphytotic conditions. The apparent delay of about 10 days in symptom appearance in present case was due to prevalence of dry weather towards March end during 2022. Microscopic examination of resultant mature leaf spots revealed presence of acervuli and conidia and colony (Fig. 2a-c) typical of *M.juglandis*. Thus the possibility of ascospore acting as primary inoculum for walnut anthracnose is Kashmir are evident though the results were not reproduced by artificially inoculating ascospores.

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DECLARATIONS

Conflict of interest: Authors declare no conflict of interest.

REFERENCES

Dimova, M. and Arnaudov, V. 2008. Control of the over-wintering stage of anthracnose (*Gonomonia leptostyla* (Fr.) Ces. and de Not) in walnut. *Rasteniev-din-nouki***45**: 32-35.

Hassan, M., Ahmad, K., Badri, Z.A., Khan, N.A., Bhat, Z.A. 2017. Anthracnose disease of walnut (*Juglans regia*) in Kashmir valley. *Ind.Phytopath.***70**: 45-51.

Jamshidi, S., Salahi, S. 2009. Growth and sporulation of some *Gnomonia leptostyla* isolates in various culture media. *J. New Agri. Sc.***4**: 1-10.

Karov, I., Mitrev, S., Kovacevik, B., Stoyanova, Z., Arsov, E., Rodeva, R. 2014. *Gnomonia leptostyla* (Fr.) Ces. et de Not. cause of walnut anthracnose in the east part of the Republic of Macedonia. Yearbook, Faculty of Agriculture, GoceDelcev University.

Kirk, P.M., Canon, P., Stalpers, J., Minter, D.W. 2008. *Anisworth and Bibsy's Dictionary of Fungi* (10th ed.) CABI publishing. Oxon, U.K. 771 p.

Laura, L., Galli, M., Garaguso, I., Petrucci, M. and Vitale, S. 2021. First report of *Colletotrichum fioriniae* and *C. nymphaeae* as causal agents of anthracnose on walnut in Italy. *Plant Dis.***106**: 327.

Sanjeev, A., Shah, M.D., Padder, B.A., Ahmad, J., Zarar, S.M., Bhat, J.I., Ahmad, M. 2022. Isolation and characterization of *Marssonina juglandis*from walnut using ITS markers. In: *National Symposium on Impact of Climate Change on Emerging Plant Diseases*. SKUAST-K, Shalimar, Srinagar, J&K. pp. 25.

Varjas, V., Kovacs, C., Lakatos, T., Toth, T., Bujdoso, G. 2019. First report of walnut anthracnose caused by *Colletotrichum fioriniae* on English (Persian) walnut fruits in Hungary. *Plant Dis.* **103**: 2964-2964.

Varjas, V., Lakatos, T., Toth, T., Kovacs, C. 2021. First report of *Colletotrichum godetiae* causing anthracnose and twig blight on Persian walnut in Hungary. *Plant Dis.* **105**: 702-702.

Walker, D.M., Castlebury, L.A., Rossman, A.Y., Mejía, L.C., White, J.F. 2012. Phylogeny and taxonomy of *Ophiognomonia* (Gnomoniaceae, Diaporthales), including twenty-five new species in this highly diverse genus. *Fung. Diver.***57**: 85-147.

Wang, Q.H., Fan, K., Li, D.W., Han, C.M., Qu, Y.Y., Qi, Y.K. and Wu, X.Q. 2020. Identification, virulence and fungicide sensitivity of *Colletotrichum gloeosporioides* responsible for walnut anthracnose disease in China. *Plant Dis.***104**:1358-1368.

Wang, Q.H., Fan, K., Li, D.W., Niu, S.G., Hou, L.Q., Wu, X.Q. 2017. Walnut anthracnose caused by *Colletotrichum siamense* in China. *Aus. Plant Path.***46**: 585-595.

Wang, Q.H., Li, D.W., Duan, C.H., Liu, X.H., Niu, S.G., Hou, L.Q., Wu, X.Q. 2018. First report of walnut anthracnose caused by *Colletotrichum fructicola* in China. *Plant Dis.***102**: 247-247.

Wang, X., Liu, X., Wang, R., Fa, L., Chen, L., Xin, X., Zhang, Y., Tian, H., Xia, M., Hou, X. 2021. First report of *Colletotrichum aenigma* causing walnut anthracnose in China. *Plant Dis*. **105**: 225.