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Glycine latifolia- A New Host Record of *Colletotrichum capsici*

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ABSTRACT

The experimental pots containing different *Glycine* species maintained under greenhouse condition at ICAR-NBPGR, Regional Station, Akola, Maharashtra, India showed characteristic symptoms of anthracnose such as leaf spot, anthracnose, die-back, pod rot, etc. on one of the wild relatives of soybean, *Glycine latifolia*. Isolation of the pathogen from such infected leaves as well as seeds resulted in detection and identification of *Colletotrichum capsici* (Syd.) Butler & Bisby. Though *C. capsici* is a common pathogen causing anthracnose of soybean, its occurrence on any of the wild relatives of soybean is not yet reported. Therefore, occurrence of *C. capsici* on wild relative of soybean, *Glycine latifolia* is reported for the first time as a new host record. This information will be of great value when this species will be used in crop improvement programmes.

Key words: blotter test, *Colletotrichum capsici*, *Glycine latifolia*, drought tolerance.

Soybean (*Glycine max* L.) Merrill is one of the most economically important oilseed and legume crop and an important source of low-cost food in the world. The harvested seed has the largest useable protein content among cultivated legumes and is also highly valued because of its oil (Hymowitz 1990). The importance of soybean in India has become overwhelming in view of the shortage of edible oil in the country. At present there is large area under soybean cultivation in India, particularly in Bihar, Gujarat, Himachal Pradesh, Madhya Pradesh, Maharashtra, Karnataka, Rajasthan, and Uttar Pradesh. During 2013-14, the total area under cultivation in India was 13.05 m ha and total production was 15.68 million metric tons with an average productivity of 1.2 t/ha (Anonymous, 2014). India occupies 7.14% of total world area and only produces 2.37% of total world production; the average yield is about one-third of world average. Under dry land conditions, although soybean seed yield /plant are lesser, percentage oil content and fatty acid composition essentially

remain unaltered and that significant differences can occur in individual fatty acid contents between genotypes (Sultan *et al*. 2015). *Glycine latifolia* is a drought-tolerant wild relative of soybean with perennial plant habit, mostly trailing or twining stem up to one meter or more, long, leaves are trifoliate with leaflets 2.0-6.0 × 1-3.0 cm. This deep-rooted perennial legume like native of soybean has potential for ameliorating salinity problems.

Among major oilseed crops, soybean is the most sensitive to water stress (Sinclair & Ludlow, 1986). However, other species within the genus *Glycine* and in particular, *G. latifolia* are highly tolerant to water stress (McLean *et al.* 2000). Wild relatives of soybean possess a useful genetic resource for improving the ability of crops to overcome a range of biotic and abiotic stresses. However, the production of *Glycine max* is adversely affected by several biotic stresses and among biotic stresses, fungal diseases, especially anthracnose is one of the most important ones causing drastic loss in farmer's field. The present study reports observations recorded during experimental study of wild relatives of soybean.

The experiment was conducted at Indian Council of Agricultural Research- National Bureau of Plant Genetic resources (ICAR-NBPGR), Regional Station, Akola, Maharashtra, India during 2015. Three species *viz. G. curvata* (EC 333770), *G. latifolia* (EC 333777) and *G. tabacina* (EC 333785) were used in the present study. The leaf and seed samples were collected from plants of *G. latifolia* showing characteristic symptoms were brought to the laboratory. The infected leaves were cut into small bits, surface sterilized, transferred on potato dextrose agar (PDA) medium and the seeds were placed on 3 layers of moist blotters in 110 mm labeled plastic Petri plates (10 seeds/plate). All the plates were incubated at 22 ± 1^0C under alternate cycles of 12 h light and darkness and all the three species of *Glycine* comprising 50 seeds were subjected to blotter test. All the incubation materials were examined on eighth day for presence of fungal pathogen(s) and the fungal characters were studied in details and fungus was identified on the basis of colony characters, fruiting bodies and conidia under stereo-binocular microscope and compound microscope. A single acervulus of the fungus on seed was picked up (Akhtar *et al*. 2014) and transferred on PDA to isolate pure fungal cultures for ascertaining the identification.

During the green house experiment, the observation revealed that out of three wild species of soybean, only one species, *Glycine latifolia* showed characteristic symptoms of anthracnose such as leaf spot, anthracnose, die-back, pod rot, etc.Typical symptoms on leaf were observed as circular, sunken lesions with orange spore masses with a dark center (Fig. 1).

Blotter test revealed that leaves (with 85% frequency) and few seeds (with 10% frequency) of only *G. latifolia* were developed as tiny black dot like structures. These structures later developed into fungal colony showing dark acervuli (Fig. 2a). Acervuli were sub-epidermal emerging by disrupting outer epidermal cell walls of host. Setae were dark brown, rigid, swollen at the base, slightly tapered to the paler acute apex, 1 to 5 septate, 250 x 6 µm. Conidia were hyaline, falcate with acute apex and narrow truncate base, aseptate, uninucleate, 15-27×2-5 µm (Fig. 2b). Fungal colony on PDA was initially white later became grey-dark brown (Fig. 2c). Mycelium formed light to dark grey cottony growth and acervuli with abundant dark setae. Based on the morphological characters including acervuli, conidia and mycelial culture growing on the seed, leaves and PDA (Fig. 2d), the fungus was identified as *Colletotrichum capsici* (Syd.) E.J. Butler & Bisby (CAB International, 2007).

Other two species namely, *G. curvata* and *G. tabacina* were free from *C. capsici* and any other fungal pathogens. Detection of this fungal pathogen is of further significance as it has not been reported on this host.The infected seeds give rise to weak seedlings which then become the primary source of inoculum in the field as the fungus is reported to be seed borne and is known to survive in and on seed as acervulus and micro-sclerotia (Pernezny *et al*. 2003: Dev *et al*. 2012).

Crop wild relatives (CWR) have contributed significantly in the improvement of major crop species such as paddy, wheat, potato, brinjal, tomato, sugarcane etc. and also in other economically important plants. The CWR form a reservoir of genes governing useful characters such as yield, nutritional quality, adaptation and genetic diversity and also valuable sources of resistance to various biotic and abiotic stresses. As these wild species have significant role in ecosystem, so this report would help conserve the wild relatives from biotic stresses, especially seed-borne pathogens.

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Fig. 1. Leaves of *Glycine latifolia* infected with *Colletotrichum capsici.*

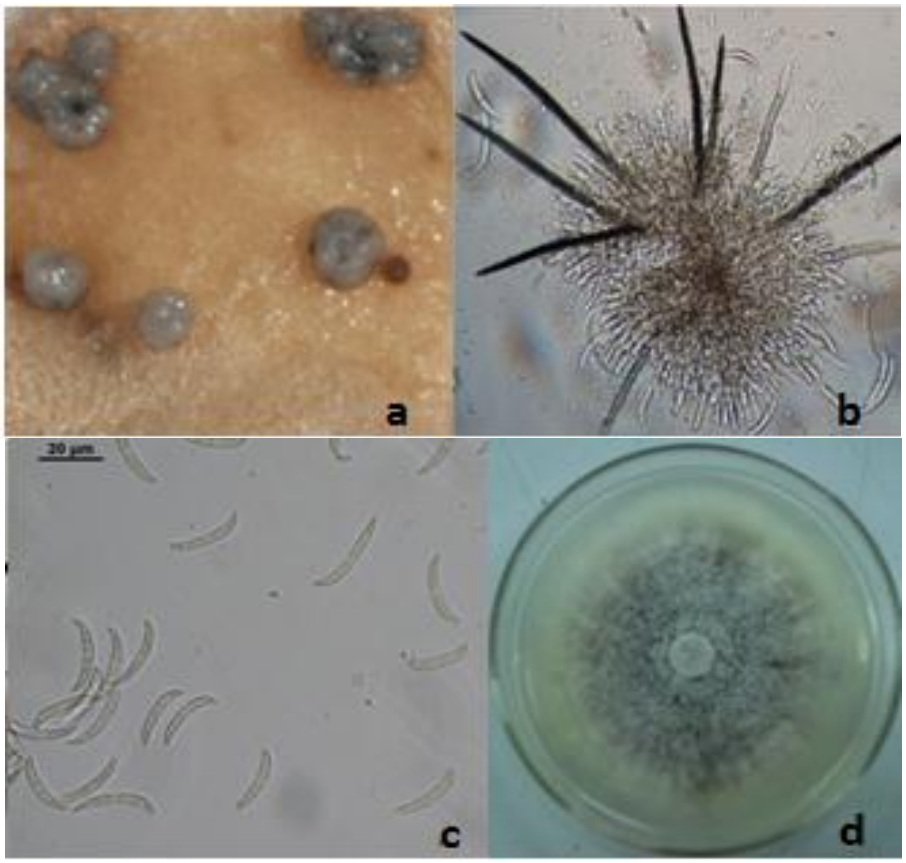

Fig. 2. *Colletotrichum capsici* on seed of *Glycine latifolia* (a), Cetal morphology (b), Conidial morphology (c) and fresh culture (d).

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