



Occurrence of rust on *Solidago canadensis*, a new host record for *Coleosporium asterum* from India

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Abstract

In September 2012, leaves of *Solidago canadensis* with typical symptoms of rust were collected in the Botanical Garden of Yashwantrao Chavan Institute of Science, Satara (MS, India). The rust was identified as *Coleosporium asterum*. This rust is recorded on *S. canadensis* in India for the first time.

Key words – Asteraceae – Coleosporiaceae – *Coleosporium asterum* – *Solidago canadensis*.

Introduction

Solidago canadensis L. (Asteraceae) (cf. The Plant List, 2014) (Fig. 1A), commonly called Canadian goldenrod, is native to North America (Hegi 1979). It often occurs as a weed in abandoned fields and roadsides, grasslands, forest edges and human-influenced habitats in urban areas and settlements (Walck et al. 1999). It is also cultivated as an ornamental in botanical gardens and home gardens in various parts of the world. The plant is exotic to India and was introduced for its ornamental value. The inflorescence of the plant forms a broad pyramidal panicle with a central axis and recurving branches giving it a gorgeous look. Its golden yellow attractive inflorescence is largely used in bouquets. It has been also used in European phytotherapy for a long time as an urological and antiphlogistical medicament (Apáti et al. 2003).

Since September 2012 the population of *S. canadensis* in the Botanical Garden of YCIS, Satara (17° 42.940'N, 73° 48.786'E, altitude 733 m, temperature 25–30°C, humidity 45–70 %) was found to be infected by rust (Fig. 1B, 1C). Yellow-orange, circular to sub-circular spots measuring 1–2.5 mm in diameter were observed initially on the upper surface and then on the lower surface, turning brick-red at advanced stages and occupying the whole leaf.

Materials & Methods

Infected leaves were collected and the morphological features of the rust examined by light microscopy. A reference specimen (KR-M-0041696) was deposited in the herbarium at the Natural History Museum Karlsruhe, Germany.

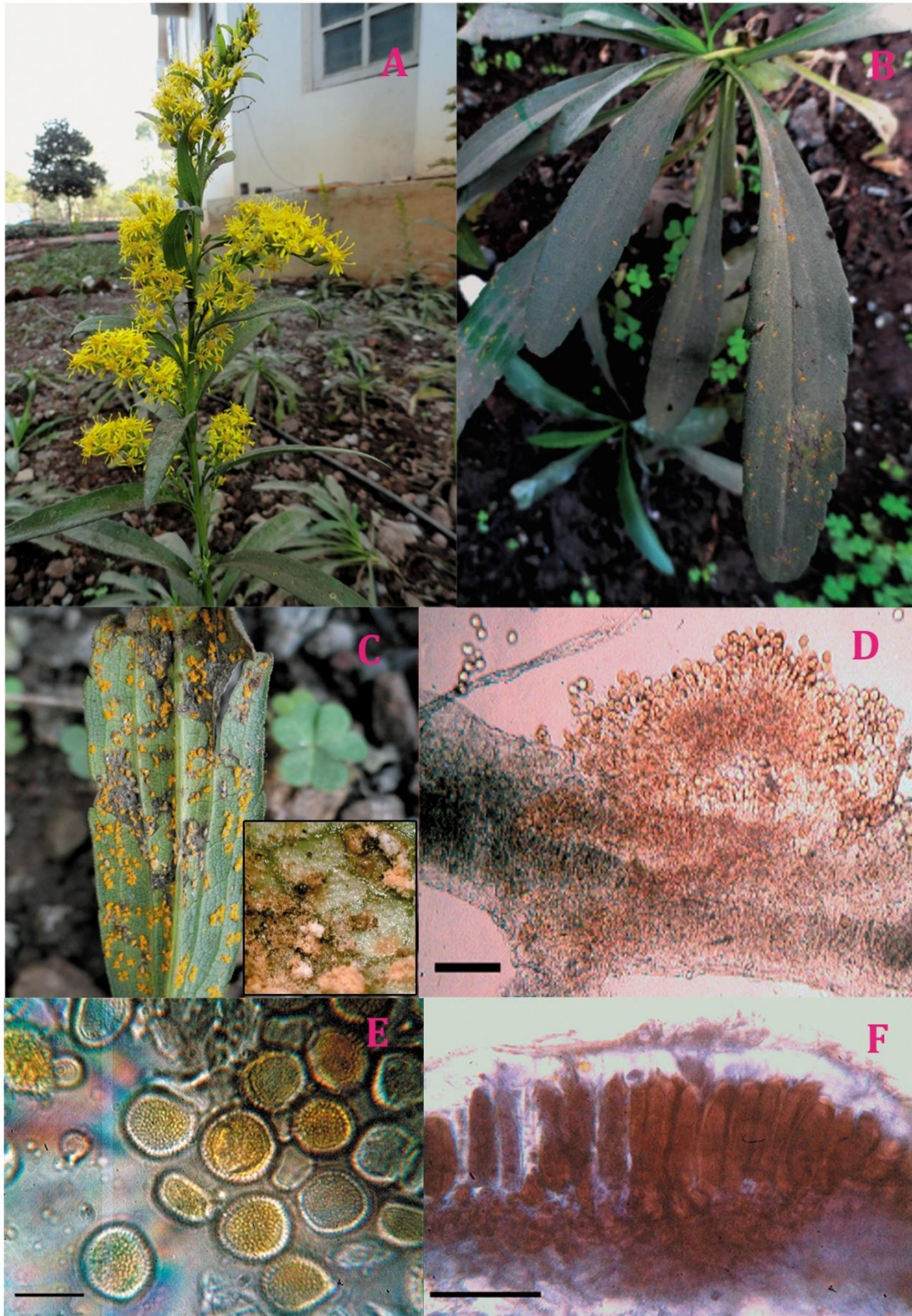


Fig. 1 – *Coleosporium asterum* on *Solidago canadensis*. A Habit of host plant. B Infection on upper leaf surface. C Infection on lower leaf surface, inset – enlarged uredinia. D Transverse section of leaf showing urediniospores (bar = 100 μ m). E Urediniospores (bar = 50 μ m). F Transverse section of leaf showing teliospores (bar = 50 μ m).

Results

Light microscopic studies of infected leaves showed uredinia and telia. Uredinia hypophyllous, spread along veins, erumpent, cupulate, peridiate, young conoid, with apical central opening, mature flat, aecioid. Urediniospores irregular, sub-globose to ellipsoid, golden-yellow due to pigments dissolved in oil globules, verrucose, $28.0\text{--}34.5 \times 24.5\text{--}27.0 \mu\text{m}$ (Fig. 1D). Urediniospores are similar to aeciospores, but not in chain (Fig. 1E). Telia innate, towards upper leaf surface, flat to convex, waxy, non-erumpent, orange-red, found in late September. Teliospores sessile, cylindrical, laterally coalescent, paraphysate, palisade like, hyaline, thin-walled, 1-celled, becoming 4-celled at maturity, $73\text{--}86.5 \times 22\text{--}37 \mu\text{m}$ (Fig. 1F). On the basis of these characters, the pathogen was identified as *Coleosporium asterum* (Dietel) Syd. & P. Syd. (Cummins & Yasuyuki 1984). These spore forms appear at different seasons of the year or successively on the same host in the same season depending upon its nature of life cycle.

Discussion

The genus *Coleosporium* (Coleosporiaceae) was established by Léveille in 1847 (Patil 2000) and currently comprises about 100 species worldwide (Kirk et al. 2008). To date six species of *Coleosporium* have been recorded from India. Of these, *C. clematidis* has been recorded on *Clematis buchananiana* (Ranunculaceae), and *C. montana* from Himalaya and nearby regions (Arthur & Cummins 1933, Singh & Palni 2011), *Clematis* sp. from Kerala (Hosagoudar 1988), *C. hedysarifolia* and *C. wightiana* from Kolhapur and Mahabaleshwar. *Coleosporium oldenlandiae* was observed on *Oldenlandia aspera* (Rubiaceae) from Pune, and *C. campanulae* on *Wahlenbergia gracilis* (Campanulaceae) from Khandala and Mahabaleshwar (Jagtap & Singh 2002). *C. plumeriae* was recorded on *Plumeria alba* (Apocynaceae) (Baiswar et al. 2008, Kavale & Patil 2009) and *P. rubra* an exotic plant (Hosagoudar & Archana 2011), *C. dopatri* on *Dopatrium junceum* (Scrophulariaceae) (Patil 2000) from Kolhapur and *C. asterum* on *Launaea pinnatifida* (Asteraceae) from North India (Sinha & Singh 1992).

C. asterum is reported to infect more than 160 plant species globally (Farr & Rossman 2015), especially members of the Asteraceae. Its occurrence on *Solidago canadensis* is reported from Canada, Idaho, Indiana, Mississippi, Montana, Oregon and Washington (Parris 1959, Emmons et al. 1960, Shaw 1973, Ginns 1986). Sinha & Singh (1992) reported *C. asterum* on *Launaea pinnatifida* (Asteraceae) from India. A literature survey (Bilgrami et al. 1991, Jamaluddin et al. 2004) revealed that no rust has been recorded on *S. canadensis* from India. Therefore, it is considered as new host record for *C. asterum* in India.

Solidago canadensis has been cultivated as a floriculture crop in and around study area for many years. However, rust infection was only observed within the past two years. The rust is now consistently observed in fields, gardens and self-sown plants away from the source and, as a result, cultivation of the host is under threat. The rust fungi, as obligate parasites, depend for their geographical distribution primarily on their host plants and environmental conditions in introduced area. Thus, it can safely be concluded that this pathogen is widely spreading and establishing in India on this host, at least in the study area. If it continues, other members of family Asteraceae, which are cultivated on a large scale, may also become infected with this rust.

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