Solanum nigrum, a new host for powdery mildew disease of *Capsicum annuum* in the Madurai district of Tamil Nadu, India

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Abstract. In October–November 2004, a severe outbreak of powdery mildew disease incited by *Leveillula taurica* was observed on *Capsicum annuum* (cv. K2) (chilli) and caused yield loss up to 80%. A similar type of symptom was also recorded on *Solanum nigrum* grown in and around chilli fields. Based on the morphological characteristics and cross infectivity, it has been confirmed that the powdery mildew pathogens from *C. annuum* and *S. nigrum* are the same. The pathogen from *C. annuum* could infect *S. nigrum* and *vice versa*. Other cultivated plant species were not infected. This might be due to the probable occurrence of physiological races. This is the first report of this organism causing powdery mildew in *S. nigrum* in the Madurai district of Tamil Nadu. The ability of *L. taurica* to infect the native host *S. nigrum* is particularly important because this host plant might serve as an inoculum reservoir for adjacently cultivated *C. annuum*.

Powdery mildew incited by *Leveillula taurica* (anamorph *Oidiopsis taurica*) is one of the most important diseases of chilli (*Capsicum annuum*) worldwide and causes yield losses up to 10–15% (Cerkauskas *et al.* 1999). During October and November 2004, a severe outbreak of *L. taurica* was observed in almost all chilli growing areas of Tamil Nadu. About 70–80% yield reduction was recorded on chilli cv. K2. A similar type of symptom was also observed on the green leafy vegetable *S. nigrum* grown in and around chilli fields. The present study therefore aimed to establish the relationship between these two powdery mildew diseases based on morphological characteristics and host infectivity.

Leaves of *C. annuum* and *S. nigrum* showing typical powdery mildew symptoms were collected separately. Conidia were harvested by dislodging them from infected tissue onto a strip of clear tape, using a camel hair brush. The tapes were mounted on microscopic slides. Slides were stored at 4°C after returning them to the laboratory (Correll *et al.* 1987). Morphological characteristics of the pathogen such as location of mycelia on the host, presence of dimorphic conidia, size and shape of conidia and branching of conidiophores were recorded within 72 h.

Pathogenicity of powdery mildew fungi was tested separately on their respective hosts using the method described by Correll *et al.* (1987). Tissues showing evidence of infection and sporulation from *C. annuum* and *S. nigrum* were collected separately from the field and incubated at 26 ± 2°C in the laboratory, before use as an inoculum source. In greenhouse tests, seedlings of *C. annuum* and *S. nigrum* used for inoculation and cross inoculation were transplanted separately into earthenware pots (diam. 10 cm) containing a garden soil mixture, at the rate of two seedlings per pot. Fifty-day-old seedlings of *C. annuum* and *S. nigrum* were spray-inoculated separately with conidial suspensions (5×10^5 conidia/mL) of the respective powdery mildew fungus after making pinpricks. In

another set of experiment, the conidial suspensions were cross inoculated after making pinpricks. For each inoculation about fifteen seedlings were maintained. The relative humidity was maintained between 70 and 80% RH for a 12-h period. Symptom development was recorded at weekly intervals.

In greenhouse tests, the infectivity of powdery mildew fungi from *C. annuum* and *S. nigrum* was tested separately on various cultivated plant species, including *Allium cepa*, *Allium sativum*, *Cajanus cajan*, *Cicer arietinum*, *Cyamopsis tetragonoloba*, *Dolichos laboratory laboratory*, *Glycine max*, *Gossypium hirsutum*, *Hibiscus cannabinus*, *Lycopersicon esculentum*, *Phaseolus vulgaris*, *Ricinus communis*, *Solanum melongena* and *Trigonella foenum graecum*. The plants were maintained in earthenware pots (diam. 10 cm) at the rate of three seedlings per pot. For each plant species 12 seedlings were maintained. A month after seedlings establishment, 50% of the plant species were spray-inoculated with powdery mildew fungus from *C. annuum* and the remaining 50% of plant species were spray-inoculated with powdery mildew fungus from *S. nigrum*. Symptom development was observed at weekly intervals.

Infectivity of chilli powdery mildew (*L. taurica*) on various economical crops cultivated close to chilli fields was tested by artificial inoculation. Typical powdery mildew symptoms were observed within 7–10 days of inoculation. White powdery growth covered the entire lower surface of leaves within 15 days and corresponding yellow patches on the upper leaf surface were observed. Among the plants tested, only *S. nigrum* was readily infected by *L. taurica* within 10 days of inoculation under greenhouse condition. This is the first record of this organism causing powdery mildew on *S. nigrum* in the Madurai district of Tamil Nadu (Fig. 1). Other crops did not show any symptoms even after 30 days.

In the laboratory, the morphological characteristics of the powdery mildew pathogen from *C. annuum* and *S. nigrum*

Fig. 1. Powdery mildew of *Solanum nigrum* caused by *Leveillula taurica*.

were identical. Mycelium was endophytic, conidia pyriform to obclavate, borne singly on branched conidiophores. Mean conidial measurement were $70.5\text{--}48.3 \times 24.5\text{--}15.9\text{ }\mu\text{m}$. The morphological characteristics of powdery mildew pathogens from *C. annuum* and *S. nigrum* were identical and closely resembled those of *Oidiopsis taurica*, the anamorphic stage of *L. taurica*, described by Mukerji (1968), Boesewinkel (1980) and Correll *et al.* (1987).

The relationship between these powdery mildew fungi was further confirmed by cross inoculation. The powdery mildew from *C. annuum* could infect *S. nigrum* and *vice versa*. None of the other plant species tested were infected by these pathogens. The powdery mildew fungus, *L. taurica*, is a unique foliar pathogen in its ability to infect a large and diverse number of plant species. (Hirata 1968; Palti 1974; Correll *et al.* 1987). Though

L. taurica has a wide host range worldwide, in Tamil Nadu the pathogen from *C. annuum* could infect only *S. nigrum*. This might be due to race or a specialised form of *L. taurica*. A similar observation was also recorded by Correll *et al.* (1987), where *L. taurica* from artichoke (*Cynara scotynus*) could also infect tomato but none of the other plant species tested; Correll *et al.* (1987) suggested the possible occurrence of physiological races as an explanation for this result. This is the first record of this organism causing powdery mildew disease on *S. nigrum* in the Madurai district. The ability of *L. taurica* to infect the native host *S. nigrum* is particularly important because this host plant might serve as an inoculum reservoir for adjacently cultivated *C. annuum*.

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