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A New Record on Algal Leaf Spot of Quince from Himachal Pradesh, India

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A B S T R A C T

Quince (*Cydonia oblonga*) is a hardy tree and very less susceptible to diseases. Therefore, used as a dwarfing rootstock for pear, depending on the scion desired and characteristics of the production area. Algal leaf spot is a foliar disease most commonly seen in warm humid climate or in greenhouse conditions. The spots were circular or blotchy in shape, 1-5mm in size and were somewhat raised from the plant surface. The edges of the spots were wavy or feathered. They varied in colour from a crusty grey-green to yellowish orange. The severity of the disease was rated 15-20 per cent on 0-5 scale. Based on morphological characteristics viz., sporangiophore, head cell and sporangiate laterals (suffultory cell and sporangium) the algal leaf spot of quince was found to be associated with *Cephaleuros virescens*. The measurement of sporangiophores varied from 305.3-670.4 x 11.1 -19.2 µm (Av. 472.3 x 14.5 µm), sporangia from 22.4-32.8 x 16.8-23.07 µm (Av. 27.6 x 19.9 µm) and that of head cell from 30.2- 57.4 x 29.4- 56.2 µm (Av. 43.6 x 42.5 µm). The number of septa of sporangiophores varied from 4-8.This is the first report on the occurrence of algal leaf spot of quince caused by *Cephaleuros virescens* from Himachal Pradesh, India.

Introduction

The quince (*Cydonia oblonga*) is the sole member of the genus *Cydonia* in the family Rosaceae. It is a small deciduous tree that bears a pome fruit, similar in appearance to a pear, and bright golden-yellow when mature. Throughout history the cooked fruit has been used as food, but the tree is also grown for its attractive pale pink blossoms and other ornamental qualities. Quince is used to prepare jams, jellies, and puddings, as well as a side dish or a breakfast food. Different countries use quince in different ways, often using the juice as a flavouring agent. However, the real benefit of quince is eating the skin and the fleshy fruit, since it is packed with beneficial nutrients, including vitamins, minerals, phenolic compounds, antioxidants and dietary fibre. Besides being a readily available and delicious fruit, quince is also valued because of its important place in human health. Quince is used as a dwarfing rootstock for pear, depending on the scion desired and characteristics of the production area. Quince is a good rootstock for the Comice pear, demonstrating high yield efficiency and vigour. A factor which limits the broad use of quince as a pear rootstock is poor compatibility with the popular scion

Bartlett. Of the various rootstocks of quince, Quince BA-29 is most preferred one as it is tolerant of heavy soils, wet soil, and root lesion nematode, with good resistance to crown gall and has moderate tolerance to pear decline. Less desirable traits of the rootstock include low susceptibility to chlorosis and fire blight, and a fair anchorage rating, due to the quince shallow root system (Reil *et al.*, 2007).

Quince is a hardy tree and very less susceptible to diseases. However, in Himachal Pradesh, during disease survey, quince BA 29 rootstocks planted at progeny cum demonstration orchard, Patta Mahlog of Department of Horticulture were found infected with algal leaf spot caused by *Cephaleuros* sp. In most cases *Cephaleuros* is mistaken for a fungus, because the symptoms show erect, yellow to red filaments and hairs like a fruiting body that is raised on the leaf surface, which matches the characteristics of rust fungi (Marlatt and Alfieri, 1981). The identification of *Cephaleuros* can be based on morphological characteristics, although they do not provide definitive separation to distinguish between the species. According to Thompson and Wujek (1997) the features most valuable in determining the species are: (i) thallus growth habit, (ii) manner of bearing head cell or sporangiate laterals, and (iii) the kinds of lesions produced.

Symptoms

Algal leaf spot is a foliar disease most commonly seen in warm humid climate or in greenhouse conditions. Initially the plants perform well but soon after rainy season in September 2016, leaves of some of these rootstocks exhibited symptoms of algal leaf spoton adaxial surface especially in plants growing under trees. The spots were circular or blotchy in shape, 1-5 mm in size and were somewhat raised from the plant surface. The edges of the spots were wavy or feathered. They varied in colour from a crusty grey-green to yellowish orange (Fig. 1). However, in October 2016 when the algae are reproducing, the spots took on a crusty, red-brown appearance due to the production of reddish, spore-producing structures. The severity of the disease was rated 15-20 per cent on 0-5 scale. Though often not much serious, the *Cephaleuros* sp. cause indirect damage to the plants due to reduced leaf photosynthetic area.

Pathogen

The leaves were brought to the laboratory for microscopic examination of algal structures viz., sporangiophore, head cell and sporangiate laterals (suffultory cell and sporangium) which characterize *Cephaleuros* sp. Slides were prepared using sterile distilled water as mounting medium. Images of micromorphological structures were captured under a Magnus ICON trinocular phase contrast microscope with a CIS-400-C digital camera. Sporangiophores forming head cell with sporangia on the top (Fig. 2). Also produce sporangiate laterals i.e. sporangia and suffultory cells. Sporangia were elliptical in shape, dark brown in colour.

The sporangiophores were sparsely produced on the upper leaf surface, solitary or in a tuft (Fig. 3). Algal structures were measured using Magnus Pro Image Analysis Software (100X), obtaining the average of 20 measurements for each structure. Measurement of the sporangiophores varied from 305.3-670.4 x 11.1 -19.2 µm (Av. 472.3 x 14.5 µm), sporangia from 22.4-32.8 x 16.8-23.07 µm (Av. 27.6 x 19.9 µm)and that of head cell from 30.2- 57.4 x 29.4- 56.2 µm (Av. 43.6 x 42.5 µm). The number of septa of sporangiophores varied from 4-8. The pathogen was identified as *Cephaleuros virescens* on the basis of the morphological features and it has been agreed with the description of Vasconcelos *et al.,* (2016) and Thompson and Wujek (1997).

Fig.1 Symptoms of algal leaf spot on quince

Fig.2 Algal structures (SP- Sporangiophore, HC- Head cell, SC- Suffultory cell and S-Sporanium) of *Cephaleurosvirescens*

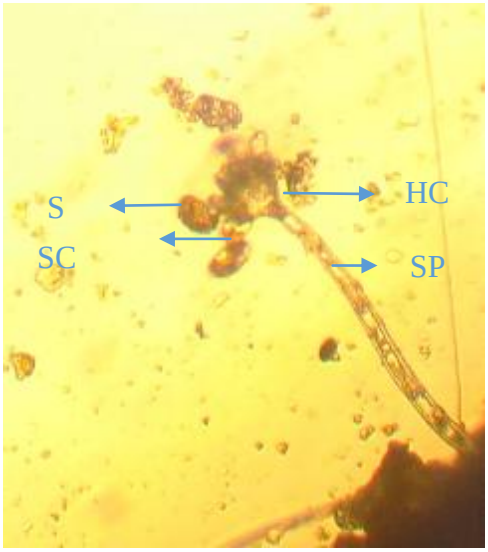
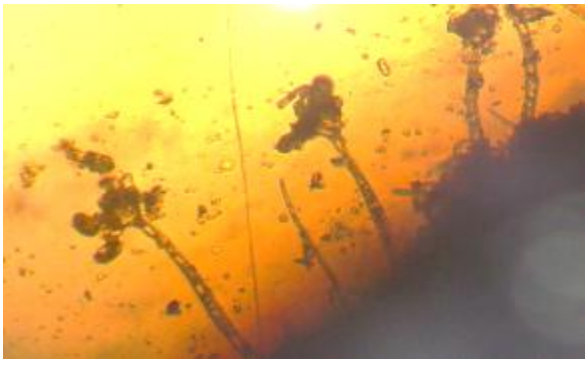


Fig.3 Sporangiophores with sporangia



Results and Discussion

Cephaleuros species are found in tropical and subtropical climates, in all continents and probably allislands between about 33°N and 33°S of the equator, provided the temperature and humidity are suitable for their growth and reproduction.

On leaves, symptoms vary according to the *Cephaleuros*-host species combination.

Species of *Cephaleuros* are very common on the leaves of such economically important tropical trees and shrubs as tea (*Camellia sinensis*), kava (*Piper methysticum*), pepper (*Piper nigrum*), magnolia (*Magnolia grandiflora*), coffee (*Coffea arabica*), oil palm (*Elaeis guineensis*), avocado (*Perseaa mericana*), vanilla (*Vanilla planifolia*), acacia (*Acacia auriculiformis*), mango (*Mangifera indica*), breadfruit (*Artocarpus altilis*), guava, coconut (*Cocos nucifera*), cacao (*Theobroma cacao*), as well some citrus (*Citrus* spp.) cultivars (Joubert and Rijkenberg, 1971; Holcomb,1986;Paracer and Vernon, 2000;Sunpapao and Pitaloka, 2015; Thomas *et al.*, 2016 and Vasconcelos *et al.*, 2016).

There is no report of the *Cephaleuros virescens* on quince from India. Hence, this constitutes the first report of *C.virescens* on quince from Himachal Pradesh, India.

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