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Data Sheets on Quarantine Pests

Phialophora cinerescens

IDENTITY

Name: *Phialophora cinerescens* (Wollenweber) van Beyma
Synonyms: *Verticillium cinerescens* Wollenweber
Taxonomic position: Fungi: Ascomycetes (probable anamorph of Hypocreales)
Common names: Phialophora wilt (English)
Maladie bleue, verticilliose (French)
Welkekrankheit der Edelnelke (German)
Lakastumistauti (Finnish)
Nejlikvissnesjuka (Swedish)
Nellikevifteskimmel (Danish)
Nellikvisnesjuke (Norwegian)
Bayer computer code: PHIACI
EPPO A2 list: No. 77
EU Annex designation: II/A2

HOSTS

Carnations are the main host. A number of caryophyllaceous garden plants are secondary hosts. Glasshouse carnations are the main crop at risk in all parts of the EPPO region.

GEOGRAPHICAL DISTRIBUTION

P. cinerescens is an indigenous European species.
EPPO region: Belgium, Bulgaria, Czech Republic (intercepted only), France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Romania, Russia (European), Slovenia, Spain, UK, Yugoslavia.
Asia: China.
South America: Colombia.
North America: Canada (Ontario), USA (Colorado, Oregon).
EU: Present.

BIOLOGY

The fungus can survive saprophytically for many years in soil. In the Netherlands, in a glasshouse where the disease had occurred, but where carnations had not been grown for 13 years, plants were attacked by *P. cinerescens* following planting. It is reported that the spores remain viable in surface water for about 8 weeks.

Sporulation is up to maximum at temperatures around 18-23°C (10-28°C); at low temperatures, more spores are produced but in a longer time, and the spores tend to be larger than those produced at higher temperatures. Disease development is usually greater from November to May, after which it is arrested by high summer temperatures.

Infection experiments suggest that spores of *P. cinerescens* enter the xylem vessels directly through wounds on the roots. The fungus becomes widespread in the plant, which may or may not show visible signs of infection. The incubation period is comparatively long, varying between 45 and 106 days for susceptible and resistant cultivars, respectively. For more information, see Wickens (1935), Hellmers (1958), Hantschke (1961), Moreau (1970), Hawksworth & Gibson (1976).

DETECTION AND IDENTIFICATION

Symptoms

Following infection, leaves and stems become bluish-grey in colour. Subsequently, there is a rapid wilt of the whole plant (without rotting). The root system remains intact and apparently unaffected. Peeling off the cortex or taking longitudinal or transverse sections of the stem will reveal a browning of the vascular zone. This discoloration tends to be localized to a number of small groups of vessels and tracheids, so appearing as a series of longitudinal brown stripes when the cortex is removed. There is no extensive rotting of the pith or cortex. Another vascular wilt pathogen, *Fusarium oxysporum* f.sp. *dianthi*, which induces a similar disease syndrome, may be simultaneously present or be the causal organism. The only method of differentiating the two fungi is by examining pure culture isolations. For more information, see Wickens (1935), Hellmers (1958), Hantschke (1961), Tramier (1967), Hawksworth & Gibson (1976).

Morphology

Conidiophores simple or branched, septate, hyaline becoming pale-brown with age, smooth-walled, mainly 8-20 x 2-3 µm. Phialides flask-shaped and arranged in densely verticillate bunches on the conidiophores, 8-12 x 2.5-3.5 µm, ending in a darker, very short but distinct collarette with a minute flaring margin. Conidia aseptate, hyaline to pale-brown, cylindrical, ovoid or ellipsoidal with slightly apiculate basal ends, smooth-walled and containing one to two oil drops, 3-6 x 1.5-2.6 µm. Hyphae septate, hyaline to pale-brown, 1-3 µm wide; on ageing, frequently develop irregularly swollen cells covered with flat warts and up to 6 µm wide. These cells have been mistakenly identified as chlamydospores.

Colonies on 2% malt extract agar, characteristically woolly, light mineral-grey in the centre, merging via smoke-grey and deep slate-olive into a 0.7-cm broad hyaline margin of appressed mycelium.

Chlamydospores and sclerotia are absent.

Detection and inspection methods

There are various means of testing cuttings for vascular pathogens, based principally on isolating from or incubating stem sections (Hellmers, 1958; Jenkins, 1958). A rapid and early diagnosis can be achieved through fluorescence microscopy which shows infected areas of *P. cinerescens* as bright fluorescent spots at the level of the woody vessels (Bonifacio & Rumine, 1984).

MEANS OF MOVEMENTAND DISPERSAL

As a soil-borne pathogen, *P. cinerescens* has an extremely limited potential for natural spread. The main pathway for spread is international trade in carnation cuttings.

PEST SIGNIFICANCE

Economic impact

Following its first description in France around 1950, *P. cinerescens* has spread throughout areas of European carnation production and is now considered one of the most serious pathogens of this crop. The disease is of great economic importance in many carnation-cultivating areas of the EPPO region. In Colombia, this fungus is regarded as one of the two most important pathogens of carnations; the other is *Fusarium oxysporum* f.sp. *dianthi* (Arbelaez, 1988a).

Since cuttings may harbour latent infections, this fungus is easily introduced into new areas and, once established, it is extremely difficult to eradicate. Given the relatively constant and favourable environment of a glasshouse, carnation wilt has great potential for rapid spread, with resultant heavy losses.

Control

Direct control is difficult, but soil sterilization by heating (over 66°C) or fumigation (methyl bromide at 100 g/m^3), and fungicidal root dips have given promising results (Schol-Schwarz, 1970). However, systemic fungicides such as benomyl, carbendazim, thiophanate-methyl and thiabendazole have completely failed to control the disease (Rumine & Parrini, 1982; Arbelaez, 1988b). In practice, the disease is mainly controlled by use of disease-free planting material, which may be obtained from stem-tip cuttings of infected plants.

Phytosanitary risk

P. cinerescens is considered as an EPPO A2 quarantine organism (OEPP/EPPO, 1982) and is also of quarantine significance for NAPPO. Its further spread within the Euro-Mediterranean region would cause considerable economic losses. However, EPPO now recommends the application of a nuclear-stock certification scheme for carnations (OEPP/EPPO, 1991), and this may lead EPPO to reconsider the quarantine-pest status of *P. cinerescens* (see below).

PHYTOSANITARY MEASURES

In countries where *P. cinerescens* occurs, growing season inspections should be carried out and cuttings should be taken from separately grown mother plants which have been tested by an EPPO-approved method within the last 2 years (OEPP/EPPO, 1990). Suspected infected plants should be sectioned to see if there is any vascular discoloration. Isolation of the causal fungus may be necessary for correct identification. The integration of such measures into a general nuclear-stock certification scheme, as already proposed (OEPP/EPPO, 1991), may finally be the most satisfactory phytosanitary measure.

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