FIRST REPORT OF CYLINDROCLADIA MORGAN IN POLAND

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Received: February 25, 2011
Accepted: June 10, 2011

Abstract: Cylindrocladium scoparium Morgan was isolated from diseased stem parts of Cuphea hyssopifolia cuttings, which were rooting on greenhouse benches. In the laboratory trial, the species colonized leaf blades as well as stem parts and roots with a significantly quicker spread of necroses on cv. Violet than on cvs. White and Rose. In the greenhouse trial, yellowing and dying of cuphea leaves was observed already after 7 days of rooting the cuttings in substratum infested by C. scoparium. After 2 weeks, all cuttings that were rooting in noninfested substratum produced roots, and no symptoms were observed on leaves. On plants growing in substratum infested with the tested species, yellowing, dying of leaf blades and only rooting of 1/5 of the cuttings was observed on cv. Violet, whereas cvs. White and Rose were less susceptible.

Key words: Cuphea, rooting, Cylindrocladium, symptoms, cultivars

Cuphea hyssopifolia is a perennial plant grown for about 4–6 weeks under cover and later on flower beds or in balcony compositions. The genus Cuphea includes approximately 250 species of annual, evergreen perennials, and short shrubs native to central and south America (Cacciola et al. 2006). In the early stage of plant development, species of Pythium and Phytophthora may be responsible for seedling blight and damping-off (Berti et al. 2008). In Poland, cutting which are about 6-weeks-old, and rooted on greenhouse benches, are export products to western European countries. In February 2011, in one commercial ornamental nursery, inhibition of rooting or lack of roots forming, yellowing and dying of lower leaves, defoliation and rotting of stem bases was observed (Fig. 1).

Fig. 1. Cuphea cv. Violet affected by C. scoparium

During the rooting process, greenhouse benches were covered with greenhouse film for about 2 weeks, with the temperature fluctuating between 20 to 24°C. The disease symptoms occurred in points with a few pots, and usually on cv. Violet but also occasionally on cvs. Rose and White. On leaves of dying plants white mycelium with spores, and very small, white and later dark microsclerotia were observed. The purpose of the study was to evaluate a causal agent of cuphea collapse.

Isolation of fungi from symptomatic cuphea cuttings and from substratum

About 50 cuttings showing disease symptoms were collected in plastic bags. Additionally, substratum from affected plants was also collected and transferred to the laboratory. After washing under the tap and washing with distilled water, drying between layers of blotting paper, and sterilizing over a burner flame, about 3–5 mm long pieces of symptomatic stem parts were plated on PDA medium in 90 mm Petri dishes, and incubated 3 days at 25°C in the dark. Parts of colonies growing around inocula were transferred into PDA plants. Rhododendron leaf baits and the procedure described by Themann and Werres (1998) were used for detection of fungi from substratum. Obtained isolates were grouped by growth pattern and their morphology. Representative cultures were identified to species based on morphology features (Linderman 1972).

Colonisation of cuphea parts and cuttings by Cylindrocladium scoparium

In laboratory trials, the colonization of leaf blades, stem parts, and roots of 3 cuphea cultivars were studied using the procedure described by Orlikowski and Szkuta
(2002). In the greenhouse experiment, the cuttings of 3 cuphea cultivars were planted into peat which was free of C. scoparium, and to substratum artificially infested with the tested species (Orlikowski 1999). Plants were covered with greenhouse film, and cuttings were rooted over a 14 day time period. The number of infected leaves, and the rooted and dead cuttings were evaluated 1 and 2 weeks after planting. The experimental design was completely randomized with 4 replications and 5 plant parts and cuttings in each replication. Trials were repeated twice.

RESULTS AND DISCUSSION

C. scoparium dominated among the fungal species obtained from affected cuphea cuttings. The species was isolated from 9/10 of the analysed cuttings of stem parts, whereas Botrytis cinerea Pers. from 1/5, and Pythium ultimum Trow. from 1/10 plants. Mucor and Penicillium species were isolated only sporadically. Using rhododendron leaf blades as the bait resulted in the detection of C. scoparium from substratum taken from under diseased cuttings.

In vitro inoculation of cuphea parts by C. scoparium resulted in their colonization, and necroses spread significantly quicker on cv. Violet than 2 other cultivars (Table 1). Plant roots were colonized quicker than leaves and stem parts (Table 1).

In the greenhouse trial, after a 7-day-rooting of cuttings in substratum infested by C. scoparium resulted in their colonization, and necroses spread significantly quicker on cv. Violet than 2 other cultivars (Table 1). Plant roots were colonized quicker than leaves and stem parts (Table 1).

Table 1. Colonisation of C. hyssopifolia parts by C. scoparium; 4(a) and 6 (b) days after inoculation; diameter/length of necrosis in mm in laboratory trial

<table>
<thead>
<tr>
<th>Cultivars</th>
<th>Leaf blades</th>
<th>Stem parts</th>
<th>Roots</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
<td>a</td>
</tr>
<tr>
<td>Rose</td>
<td>8.7 b–d</td>
<td>10.8 a</td>
<td>7.0 ab</td>
</tr>
<tr>
<td>White</td>
<td>7.3 a–c</td>
<td>11.5 a</td>
<td>5.7 a</td>
</tr>
<tr>
<td>Violet</td>
<td>9.2 cd</td>
<td>15.2 b</td>
<td>10.0 d</td>
</tr>
</tbody>
</table>

Means in columns, followed by the same letter do not differ with 5% of significance acc. to Duncan’s multiple range test. Means separation for each observation period

Burns and Linderman (2001) indicated Cylindrocladium diseases as being primary during nursery propagation. The damage can occur at all stages of plant production but cuttings are the most vulnerable to infection during propagation because of high temperature, substrate moisture and close spacing. Severe leaf infection, their yellowing and defoliation can result due to the high levels of ethylene induced by the pathogen. Intensive sporulation of C. scoparium on infected leaves at cuphea cutting bases, was connected mainly with their contact with moist, infested substratum. Overhead irrigation of young plants disseminates conidia and provides favourable conditions for spor germination and infection (Linderman 1972). The species was previously noticed as the stem base and root pathogen of coniferous rootstocks (Orlikowski and Jarecka 2005). This is, however, the first report describing Cylindrocladium cutting rot of C. hyssopifolia in Poland.

Fig. 2. Influence of C. scoparium on healthiness of rooted Cuphea cuttings 7 days after planting; greenhouse trial
Fig. 3. Cuphea cuttings of 3 cultivars, rooting in peat infested with C. scoparium. From left to right: control noninfested; cvs. White; Rose; Violet

Table 2. Influence of C. scoparium on rooting of C. hyssopifolia cuttings 14 days after planting; greenhouse trials

<table>
<thead>
<tr>
<th>Cultivars</th>
<th>Number of dead leaves</th>
<th>Number of rooted cuttings* (n = 5)</th>
<th>Number of dead cuttings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rose</td>
<td>4.3 b</td>
<td>1.5 b</td>
<td>1.0 a</td>
</tr>
<tr>
<td>White</td>
<td>2.9 a</td>
<td>1.8 b</td>
<td>0.8 a</td>
</tr>
<tr>
<td>Violet</td>
<td>5.5 b</td>
<td>0 a</td>
<td>1.8 a</td>
</tr>
</tbody>
</table>

*all cuttings rooted in noninfested substratum produced roots and were healthy

Means in columns, followed by the same letter do not differ with 5% of significance acc. to Duncan's multiple range test. Means separation for each observation period.

REFERENCES


POLISH SUMMARY

PIERWSZE DONIESIENIE O WYSTĘPOWANIU CYLINDROCLADIUM SCOPARIUM NA CUPHEA HYSSOPIFOLIA W POLSCE

Z porażonych sadzonek Cuphea hyssopifolia, ukorzenianych na parapetach w szklarni, izolowano Cylindrocladium scoparium. W doświadczeniach laboratoryjnych badany gatunek kolonizował blaszki liściowe, części łodyg i korzeni 3 odmian kufer z istotnie szybszym rozwojem nekrozy na odmianie Violet. W doświadczeniach szklarniowych na sadzownikach ukorzenionych w substancie torfowym zakażonym przez C. scoparium już po 7 dniach stwierdzono żółknięcie i zamieranie dolnych liści. Po 2 tygodniach wszystkie sadzonki rosnące w niezakażonym podłożu wytworzyły korzenie, a ich liście były zdrowe, podczas gdy na roślinach ukorzenionych w torfie zakażonym przez C. scoparium obserwowano żółknięcie blaszek liściowych i ich zamieranie. Sadzonki odmiany Violet ukorzeniły się w około 1/5 podczas gdy 2 pozostałe odmiany były bardziej tolerancyjne na badanego patogena.