Fungi Isolated from Soil with Quicksets of *Chamaecyparis lawsoniana* and their Influence on the growth of *Phytophthora cinnamomi* and *Rhizoctonia solani*

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Abstract

Chamaecyparis lawsoniana is often attacked by other pathogens (from genera: *Phytophthora, Pythium, Fusarium, Rhizoctonia*) both when the quicksets are taken root and later, when the young plants are planted. The aim of the study was to determine an effect of saprobiotic fungi isolated from soil with quicksets *Chamaecyparis lawsoniana* on the growth of *Phytophthora cinnamomi* and *Rhizoctonia solani*. In our experiment, method series biotic was used (MAŃKA 1974). This method allowed to determine index of impendence for plants by *Phytophthora cinnamomi* and *Rhizoctonia solani* with the help of summary biotic effect. The results of observation on the biotic interaction of saprobiotic fungi isolated from soil with quicksets *Chamaecyparis lawsoniana*, analysed as biotic series and *Phytophthora cinnamomi* and *Rhizoctonia solani* showed, that this of fungal community did not limited growth of these pathogens. Summary biotic effects were negative. Environment of saprobiotic fungi more promoted growth of *Rhizoctonia solani* than *Phytophthora cinnamomi*. It means, that in the soil under *Chamaecyparis lawsoniana* crop, *Rhizoctonia solani* could have a better of conditions for growth than *Phytophthora cinnamomi*.

Keywords: biotic effect; *Chamaecyparis lawsoniana*; soil fungi; *Phytophthora cinnamomi*; *Rhizoctonia solani*

INTRODUCTION

In the modern production of ornamental plants, one of fundamental factors is protection against diseases. Plants, which are designed to reproduction and trade must be free from diseases and pests (ORLIKOWSKI & ORLIKOWSKA 1998).

Chamaecyparis lawsoniana is often attacked by various pathogens, when the quicksets are taken root and later or when the young plants are planted. The following fungi from the genera: *Phytophthora* (*Phytophthora cinnamomi, P. citricola, P. cryptogea*), *Pythium, Fusarium, Botrytis cinerea* and *Rhizoctonia solani* are most isolated (ŁABANOWSKI *et al.* 2001).

The accumulation of pathogenic fungi affecting a plant root system may cause infections and development of disease. However, species antagonistic to pathogens and able to reduce their aggressiveness can occur among saprotrophic microorganisms (MAŃKA 1990; KURZAWIŃSKA & PACYNA 2000).

MATERIAL AND METHODS

The material for an investigation was taken at second decade of October in a private horticultural farm in Cracow.

The soil and plants samples for mycological analyses were taken after two years growth of quicksets, when the symptoms of disease were intensified.

The isolation of fungi from the soil with *Chamaecyparis lawsoniana* quicksets was carried out using the sand method (MAŃKA 1974).

P. cinnamomi and *R. solani* were isolated from foot-rot and sore of system roots of *Chamaecyparis*. The isolates selected for the investigation were tested for a pathogenicity against *Chamaecyparis* quicksets in an infection experiment.

The effect of soil fungi communities on the growth of *P. cinnamomi* and *R. solani* was investigated using the biotic series method by MAŃKA (1974).

Table 1. Biotic effect of fungal communities isolated from the soil of *Chamaecyparis lawsoniana* quicksets on the growth of *Phytophthora cinnamomi* and *Rhizoctonia solani*

Species of fungi	Frequency	Biotic effect on			
		Phytophthora cinnamomi		*Rhizoctonia solani*	
		IEB*	GBE**	IEB*	GBE**
Penicillium expansum Link ex. Gray	50	–2	–100	–5	–250
Penicillium stoloniferum Thom	38	–2	–76	–6	–228
Phoma chrysanthemicola Hollós	25	–1	–25	–3	–75
Cladosporium cladosporioides (Fres) de Vries	24	–2	–48	–4	–96
Phoma hibernica Grimes, O'Conner, Cummis	24	–2	–48	–4	–96
Paecilomyces lilacinus (Thom) Samson	23	–3	–69	–6	–138
Acremonium kiliense Grütz	21	–3	–63	–7	–147
Gonytrichum macrocladum (Sacc.) Hughes	20	–1	–20	–7	–140
Mortierella alpina Peyronel	18	–2	–36	–5	–90
Trichoderma harzianum Rifai	18	+7	+126	+6	+108
Trichoderma viride Pers ex. Gray	18	+8	+144	+8	+144
Trichoderma polysporum (Link ex. Pers.) Rifai	16	+7	+112	+6	+96
Rhizoctonia repens Warcup and Talbot	14	+7	+98	0	0
Pythium ultimum Trow	10	–3	–30	–4	–40
Paecilomyces farinosus (Holm ex Gray)	9	–2	–18	–5	–45
Fusarium culmorum (Smith) Sacc.	7	+4	+28	+2	+14
Fusarium oxysporum Schl.	6	+2	+12	0	0
Total	341				
Summary biotic effect			–13		–983

IEB* – individual biotic effect
GBE** – general biotic effect

RESULTS AND DISCUSSION

The total number of 341 colonies of fungi was isolated from the soil of *Chamaecyparis* quicksets. The isolates represented 17 species of eleven genera (Table 1).

The fungi of the: *Penicillium, Trichoderma* and *Phoma* genera were the dominant species. *Penicillium* was the most numerous genus of the dominanting group (25.8%). This confirmed the data given by DORENDA (1986) and KURZAWIŃSKA (1995).

Almost 15.2% of the fungi isolated were species of the genus *Trichoderma,* of strong antagonistic activity. Appearance of *Trichoderma* spp. on high level in the community investigated is undoubtedly a positive element since the fungi of this genus are important in biological protection of plants against soil pathogens (MAŃKA 1990; KURZAWIŃSKA 1995; KURZAWIŃSKA & PACYNA 2000).

Fungi of genus *Phoma* were one of components of investigated community and belonged to the dominant group. This confirmed the data given by KOWALIK (1990).

The investigation with the use of biotic series method that the saprobiotic fungi of community from the soil of *Chamaecyparis* quicksets were negative in relation to both *P. cinnamomi* and *R. solani*. This indicating that the communities of these fungi as a whole did not limit the growth of pathogens (Table 1). However, the development of pathogens was not positively affected to the same degree.

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