

ANTAGONISTIC TESTS BETWEEN ENDOPHYTIC FUNGI OF RED PINE AND *GREMMENIELLA ABIETINA*

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Summary

The aim of this study is to find natural endophytic fungi of red pine that were antagonistic to *Gremmeniella abietina*. Red pine needles were collected from three different plantations in Quebec, Canada. Needle sections were surface sterilized with 10% sodium hypochlorite for 10 min., washed twice with sterile water and put on PDA medium. Thirty different isolates were then collected. G. Antagonistic tests were conducted on PDA plates with V-8 juice added. A European race isolate of *G. abietina* was tested against the endophytic isolates. One 3-mm plug was put on one side of the plate and an endophytic isolate on the other side with 3 cm between them. The plates were incubated at 20°C. Four types of interactions between endophytic fungi and *G. abietina* growth were recorded: 1. Endophytic fungi were inhibited by *G. abietina*; forty percent of collected fungi belong to this group and *Hormonema dematioides*, a very common fungus on red pine shoots, is included in it. 2. There was no interaction between endophytic fungi and *G. abietina*; 37% of collected fungi belong to this group. 3. Growth of *G. abietina* was inhibited by endophytic fungi; 10% of collected fungi belong to this group. 4. *G. abietina* was inhibited and parasitized by endophytic fungi. Four endophytic isolates out of a total of 30 were found to belong to this group. These isolates have been retained for further experiments as potential biological control agents against scleroderris canker.

Key words: *Hormonema dematioides*, biological control.

Introduction

Scleroderris canker, caused by *Gremmeniella abietina* (Lagerb.) Morelet, is a serious disease in red pine plantations in North America (Laflamme 1991). Spores of *G. abietina* seem to germinate and infect pines through the base of the needles (Patton et al. 1984) and then they invade the whole shoot.

To prevent the entrance of the fungus, chemicals are used but with mixed results. The objective of this study is to isolate natural endophytic fungi from red pine needles and to test their ability to be antagonistic to *G. abietina*; then, if such fungi are found, they could be tested as biological agents to control scleroderris canker.

Materials and Methods

Healthy red pine shoots were collected at random at three different locations in Quebec, about 200 km apart. They were:

1) Mayo, near Ottawa; 2) Berthierville, near Trois-Rivières; and 3) Sainte-Anne-du-Lac, north of Montreal.

One hundred current-year needles and one hundred previous-year needles were randomly selected from each location. Two millimetre long sections were cut from upper, mid and basal parts of each healthy needle. Sterilization methods were similar to the ones reported by Petrini (1986). Needle sections were surface sterilized in a solution of 10% sodium hypochlorite for 10 min. and washed twice with sterile water, then put on a PDA medium. The plates were incubated at 20°C for up to two weeks. Fungal colonies formed from needle sections were subcultured on a new PDA medium and also incubated at 20°C.

Antagonistic tests were conducted on PDA plates with V-8 juice added. A European race isolate (CF-83-043) of *G. abietina* from the culture collection of the Laurentian Forestry Centre was tested against the endophytic isolates. One 3-mm plug was put on one side of the plate and an endophytic isolate on the other side with 3 cm between them. The plates were incubated at 20° C.

Results

A total of 30 different species were collected. Five species were present at the three locations while two species were found at Mayo and Berthierville and an other four species were isolated at Berthierville and Sainte-Anne-du-Lac (Table 1).

Four types of interactions between endophytic fungi and *G. abietina* growth were recorded:

- 1 - Endophytic fungi were inhibited by *G. abietina*.
Forty percent of collected fungi belong to this group and *Hormonema dematioides* Lagerb. & Melin, a very common fungus on red pine shoots, is included in it.
- 2 - There was no interaction between endophytic fungi and *G. abietina*.
Thirty-seven percent of collected fungi belong to this group.
- 3 - Growth of *G. abietina* was inhibited by endophytic fungi.
Ten percent of collected fungi belong to this group.
- 4 - *G. abietina* was inhibited and parasitized by endophytic fungi.
Four endophytic isolates out of a total of 30 were found to belong to this group.

Discussion

At least four isolates were able to inhibit and parasitize *G. abietina* and have been retained for further experiments as potential biological control agents against scleroderris canker. They could be used alone or in combination, or with *Phaeothea dimorphosphora* DesRochers & Ouellette, an other antagonistic fungi to *G. abietina* (Yang et al. 1993). No special attempt was made to carry out fungi identification prior to testing, but we are currently working on identifying the four interesting ones.

Acknowledgements

The authors are grateful to Mrs. Pamela Cheers for the correction of the English text.

Table 1. Number of endophytic fungi species isolated from three different red pine plantations in Quebec, Canada.

	Misc.	Group A	Group B	Group C	Total
Mayo	8	5	2		15
Berthierville	7	5	2	4	18
Sainte-Anne-du-Lac	4	5		4	13

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