FGC **Forest Genetics Council of British Columbia**

## Forest Genetics Council Seed Pest Management Program

# Project Report: *Reports are due no later than March 31,2002.*


**Name of Project Leader**
**Gary G.Grant**

**For Official Use Only**

**SPM Project #**

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**Financial Officer: Jerry Longo**


**Project Title:** Identification of an effective sex pheromone lure for the fir coneworm, *Dioryctria abietivorella,* and demonstration of its efficacy in seed orchards

**Approved Project Funding: $ 6,500**

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### Objectives:

Chemistry:

1. Field collected infested cones containing *D. abietivorella* will be obtained from the US Forest Service seed orchard at Chico, California, and sent to J. Millar, Univ. of California, Riverside for preparation of pheromone extracts from virgin female moths by several methods, including solvent extraction of dissected pheromone glands and solid phase microextraction (SPME) collections of the pheromone produced by live, undisturbed females. The target insect from Chico and similar specimens from locations in BC and Ontario, have been confirmed as *D. abietivorella* by Amanda Roe and Felix Sperling, Univ. of Alberta, using mDNA analysis).

2. GC-EAD studies will be conducted on the SPME-collected volatiles from live females, and on gland extracts, to clearly define the pheromone blend in terms of the number and identities of the components, and their ratios.

3. Pheromone components of very high purity would be prepared for field testing. This may involve synthesis of components, followed by cleanup by selective derivatization, high performance liquid chromatography (HPLC) or related purification methods.

4. As required, potential inhibitory compounds will be prepared to test and demonstrate their antagonistic activity. This will help to account for past failures in identifying the pheromone, and will provide information crucial to developing commercial specifications for an active pheromone

blend.

Field work

5. Trapping will be conducted in known infestations in seed orchards at Chico, California and in Quebec. If available, a suitable infestation in a BC seed orchards also will be targeted. Use of more than one field site will allow for trials at different time periods, allowing for optimized modification of candidate test lures during the same field season. There are potentially two flight seasons at Chico and one in Quebec. Pherocon IC sticky traps known to be effective for *Dioryctria* species will be used and hung in the upper canopy where catch is typically more effective.

6. Laboratory bioassays: Wind tunnel or other suitable behavioral bioassays may be conducted (Sault Ste. Marie) to assess the possibility of a thermally unstable component in the pheromone blend that is destroyed during GC analysis. Thus, a gland extract will be split, with half passed through a preparative gas chromatograph and collected as one fraction. The activity of the collected material will then be tested against that of the other half of the extract which had not been subjected to gas chromatography.

**Results:**

Pupae were obtained from the US Forest Service seed orchard at Chico, CA and sent to Jocelyn Millar at Riverside CA. Pheromone extracts from female glands and SPME sampling were obtained from emerging female and subjected to GC-M<S analysis to identify pheromone components (see report from Millar).

Field tests were conducted at Chico, CA (in co-operation with the US Forest Service) during two flight periods (June and August) of the fir coneworm, at several seed orchard sites near Vernon, BC (in Co-operation With Dr. Ward Strong, BC MF), and at a seed orchard in Quebec (in co-operation with Dr. R. Trudel, Laval University). Low but promising trap catches at Chico during the early flight were the basis for preparing lures for subsequent filed tests at Chico and the tests in BC and Quebec. In sum, the catches were low in California and Vernon and nil in Quebec. As high purity pheromone components were incorporated into the lures and two different chemical stablizers were utilized, it appears that the poor catches were not due to chemical impurties or degradation of the pheromone chemicals in the lures. This suggests that either a key pheromone component is missing or, less likely, that some physical factor (e.g. traps design) has been overlooked.

Larval or pupal collections of the fir coneworm were made from the seed orchards in California, BC, and Quebec and sent to the Canadian Forest Service laboratory in Sault Ste., Marie, to establish a laboratory colony to provide addition insects for GC-EAD and chemical analysis and for behavioural bioassays, particularly wind tunnel tests to evaluate candidate lures. Lab colonies based on the two west coast insects failed to establish beyond the 1$^{st}$ generation, with many insects dying at the late pupal stage. The cause of this failure is unknown. Insects from the Quebec have established and it is expected that insect material will be available this spring (2004) for both chemical analysis in Jocelyn Millar's lab (an import permit has been obtained) and for behavioral bioassays in Ontario.

**Output and Deliverables:**

Operational lures for monitoring populations of the fir coneworm are expected with the successful completion of this work. Also, a research paper describing the work would be published in a scientific journal with the successful completion of this work

**Financial:**

Because the funds for this project were received later than expected due to administrative mixup in BC, certain expenses (travel trap supplies) were charge against CFS accounts and could not be journal vouchered back to this account.

**Employment:**

**Signature Block:**

**Name (Project Leader):** _____

**Signature:** _____

## Forest Genetics Council Seed Pest Management Program

# 2001/2002 Financial (maximum one page)

Note: Information in this section will be routinely and publicly released

| | Quarter | | | | |
|---|---|---|---|---|---|
| | 1st | 2nd | 3rd | 4th | Total Year 1 |
| a) Salaries and benefits | | | | | |
| b) Equipment | | | | | |
| c) Travel | | ** | | | |
| d) Materials & supplies, (misc. and insect rearing) | | ** | | $3276 | |
| e) Other expenses - | | | | | |
| f) Administrative Costs | | | | | |
| **TOTALS** | | ** | | **$3276** | **$3276** |

** Because the funds for this project were received late due to administrative mixup in BC, travel expenses of $1055 and trap supplies shipped to Vernon BC for $220 were charge against CFS accounts and could not be journal vouchered back to this account.