

SUMMARY OF CHEMICAL CONTROL STUDIES AGAINST BALSAM WOOLLY APHID  
IN BRITISH COLUMBIA, 1973 - 74

by

P. C. NIGAM

Report CC-X-123

Chemical Control Research Institute  
Canadian Forestry Service  
Department of the Environment  
Ottawa, Ontario

January, 1976

SUMMARY OF CHEMICAL CONTROL STUDIES AGAINST BALSAM WOOLLY APHID  
IN BRITISH COLUMBIA, 1973-74

by

P. C. Nigam

INTRODUCTION

In 1972 after the Balsam Woolly Aphid Work Meeting held by the Canadian Forestry Service at Ottawa, it was decided that chemical control work against balsam woolly aphid would be carried out with the co-operation of the Pacific Forest Research Centre (P.F.R.C.), Victoria, B.C.

In the preliminary meeting between the staff of the Chemical Control Research Institute (C.C.R.I.) and P.F.R.C., held at Victoria in February, 1973, the initial plans were drawn. Due to limitations of resources, it was decided that systemic activity of only carbofuran (Furadan<sup>®</sup>) and propoxur (Baygon<sup>®</sup>) should be explored; these were the most effective insecticides under laboratory and field conditions in the work carried out since 1965 (Randall et al. 1967; Nigam, 1972).

In 1973 tests, Furadan and Baygon were used for xylem transportation as stem injection in *Abies grandis* and *Abies amabilis* respectively, with the co-operation of Dr. J.R. Carrow and Dr. G.S. Puritch. In 1974, Furadan with and without nitrogenous fertilizer was applied as granules in the soil for translocation through roots of *Abies amabilis*.

MATERIALS AND METHODS

(A) The details of the 1973 trials are as follows:

- (1) Insecticides:- Baygon and Furadan Technical grade.
- (2) Concentrations of Insecticides:- 1, 5 and 10%. Various concentrations, were formulated in a solvent mixture containing 80% Acetone, 15% Benzene, 5% Tween 80. (Vol/Vol).
- (3) Tree species:- *Abies amabilis* and *Abies grandis*  
Two trees per concentration were used, and 4 trees for two types of control were used (i) two trees for solvent control (ii) two trees without any treatment i.e., a total of 10 trees of each species were used. Baygon was used in *Abies amabilis* and Furadan was used with *A. grandis*.
- (4) Method of Treatment:- Injections of 5 cm<sup>3</sup> of insecticide formulation at 12.7-cm (5-inch) intervals were given in the stem at breast height. The number of cups used depended upon the diameter at breast height. The injection was done with a Mauget applicator. The insecticide was introduced into the xylem tissue underneath the bark layer at a depth of 1.27 to 1.91 cm (1/2" to 3/4"). The depth of injection was based on the heat pulse study by Dr. Puritch.
- (5) Mortality and Population assessment:- In *Abies amabilis*, balsam woolly aphid populations were delineated on the stem at 4 different places per tree and counted before and after 2 weeks of treatment. In the case of *Abies grandis* 2.54 cm (one inch) square bark pieces were removed before and after two weeks of injection. The live aphids were counted on these pieces. Four pieces per tree were taken for each count.



(B) Experimental Method in 1974 Field Tests

- (1) Insecticide formulations and applications:- Furadan 10% granules at the rate of 1.121 and 4.484 kg/ha (1 lb and 4 lbs. per acre) were applied with 448.4 kg/ha (400 lbs. per acre) of nitrogen, and one application was made of 4.484 kg/ha (4 lbs. per acre) of Furadan without fertilizer, but mixed with sand for ease of dispersal. The mixtures were distributed at a radius of approximately 10.06 m (33 feet) from the stem. These treatments were applied on April 4th and were followed by 1.91 cm (0.75 inches) of rainfall on April 4th and 6.02 cm (2.37 inches) over the next 4 days.
- (2) Method of Observations:- The observations were taken on June 17th and August 13th. The method of observation of stem populations was the same as in 1973. The crown populations were observed on 10 nodes taken from each tree on each day, and all balsam woolly aphid on the nodes were counted as live or dead.

RESULTS

The results of field tests are presented in Table 1 and 2 for 1973 and in Table 3 for 1974. It appears from Tables 1, 2 and 3 that there was no effect of injection and soil treatment of insecticides on the stem populations of aphids. There appears to be some activity of Furadan on the crown population when applied with urea as soil treatment in 1974 (Table 3). A decline in crown population was observed in the June 17th observations but the observations of August 13th were not

so consistent. These types of experiments need to be repeated in the future for conclusive results.

#### ACKNOWLEDGEMENTS

Thanks are due to Drs. J. R. Carrow, G. S. Puritch and S. Ilnytsky and their staff for their co-operation and for providing the technical assistance in carrying out the programme.

#### REFERENCES

- NIGAM, P.C., 1972. Summary of toxicity of insecticides and chemical control studies against balsam woolly aphid. Chem. Contr. Res. Inst., Environ. Can., Forest. Serv., Inform. Rep. CC-X-26, 7 pp.
- RANDALL, A.P., W.W. HOPEWELL and P.C. NIGAM, 1967. Chemical Control studies on the balsam woolly aphid (*Adelges piceae* Ratz). Can. Dept. Forest. Rural Develop., Bi-Mon. Res. Notes 23: 18-19.

Table 1

Effect of Baygon injection on stem population of balsam woolly aphid  
in *Abies amabilis* during 1973 field experiments

Insecticide	Percent of pre-treatment count		
	Live	Dead	Missing
Baygon 1%	48.7	46.3	5.0
Baygon 5%	44.6	43.0	12.4
Baygon 10%	47.0	39.2	13.8
Solvent control	52.5	44.6	2.9
Control	59.8	26.9	13.3

Table 2

Effect of Furadan injection on stem population of balsam woolly aphid  
in *Abies grandis* during 1973 field experiments

Insecticide	Live Adults	
	Pre-treatment % of total	Post-treatment % of total
Furadan 1%	23.5	33.4
Furadan 5%	18.5	25.5
Furadan 10%	14.4	23.4
Solvent control	13.4	23.1
Control	22.3	25.5

Table 3

Effect of soil application of Furadan and Fertilizer on node and stem populations of balsam woolly aphid in *Abies amabilis* during 1974 field experiments

Insecticide	Tree No.	% Dead all Stages		
		Node Count		Stem Count
		June 17	Aug. 13	June 17
Furadan 4.484 kg/ha (4lbs/acre)	600	100	0	55
+				
Urea	3805	81	6	55
Furadan 1.121 kg/ha (1 lb/acre)	602	88	23	87
+				
Urea	701	88	2	20
Furadan 4.484 kg/ha (4 lbs/acre)	700	48	7	42
+				
Sand	3803	61	14	50
Control	NF-1	56	3	51
	NF-2	42	25	59