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Summary of Toxicity of Insecticides and Chemical Control  
Studies Against Balsam Woolly Aphid

Project CC-004

By

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In 1965 studies were initiated to determine if the balsam woolly aphid could be controlled by aerial application of systemic insecticides. Since then efforts have been concentrated to find effective systemic and other types of insecticides under laboratory and field conditions using ground and aerial application methods. The results are summarized in Tables 1, 2 and 3 from the reports listed at the end. It is clear from these results that four insecticides, propoxur (Baygon®), Dursban®, Furadan® and diazinon were more effective than others in the laboratory and on individual trees in the field (Tables 1 and 2). They gave more than 70% aphid mortality and could possibly be used in protecting ornamental trees and infested fir stands, where application can be made from the ground. These insecticides failed to control aphids when applied from the air to 40 acre blocks (Table 3).

The hypothesis that systemic insecticides would be more effective does not appear valid in the light of present findings that systemics (propoxur and Furadan) and non-systemics (Dursban and diazinon) are equally effective. When the systemic insecticide propoxur C<sup>14</sup> was studied for phloem transport there was no significant movement of the compound from the site of application. It appears that systemic insecticides have no advantage over other types for the control of this insect and in further search, for more effective insecticides, this should not be a main criterion. Other types of insecticides should be given equal consideration.

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It is suggested that in future, different formulations (WP, granular, ULV, EC and flowable) of the most effective insecticides (propoxur, Dursban, Furadan and diazinon) should be tested using different methods of ground application in the fir stands where some information on population dynamics of aphids and physiological conditions of trees is available so that the impact of chemical control on the insect population and on the development of balsam fir stands can be evaluated.

Table 1. List of Insecticides Tested Against Balsam Woolly Aphid Applied on Potted Plants (7"-13") at the Rate of 1.6 Ounces per Acre in the Laboratory at New Brunswick and Newfoundland from 1966 to 1970.

Insecticide		Type and Nature		Corrected % Mortality
1	Propoxur	carb	syst.	97.2
2	Furadan <sup>®</sup>	carb	syst.	95.6
3	Dursban <sup>®</sup>	O-P	cont.	94.5
4	Hercules 13462	O-P	syst.	84.8
5	Cytrolane <sup>®</sup>	O-P	syst.	81.6
6	Cyanox <sup>®</sup>	O-P	cont.	65.7
7	Bidrin <sup>®</sup>	O-P	syst.	64.7
8	Thimet <sup>®</sup>	O-P	syst.	59.5
9	SD 6073	urea	hormone	54.6
10	Aminocarb	carb	cont.	54.4
11	Surecide <sup>®</sup>	O-P	cont.	50.2
12	Bayer 38156	O-P	-	49.6
13	C 13963	carb	syst.	49.3
14	Morphotox <sup>®</sup>	O-P	syst.	44.7
15	Galecron <sup>®</sup>	amide	cont.	43.3
16	C 9491	O-P	cont.	41.2
17	Systam <sup>®</sup>	O-P	syst.	40.3
18	Baytex <sup>®</sup>	O-P	syst.	32.4
19	Famphur <sup>®</sup>	O-P	syst.	31.2
20	SD 8591	urea	hormone	30.7
21	Bayer 25141	O-P	cont.	29.0
22	Sophamide <sup>®</sup>	O-P	syst.	26.5
23	Phosdrin <sup>®</sup>	O-P	syst.	22.9
24	Ruelene <sup>®</sup>	O-P	syst.	21.0
25	Hopcide <sup>®</sup>	carb	cont.	20.8
26	Korlan <sup>®</sup>	O-P	syst.	18.1
27	Co-Ral <sup>®</sup>	O-P	syst.	16.0
28	Mareti <sup>®</sup>	O-P	syst.	15.5
29	Anthio <sup>®</sup>	O-P	syst.	15.3
30	C 9643	carb	cont.	14.9
31	Systox <sup>®</sup>	O-P	syst.	13.4
32	Meta-systox-R	O-P	syst.	12.0
33	Fenitrothion	O-P	syst.	10.8
34	Diazinon <sup>®</sup>	O-P	cont.	10.2
35	C 8353	carb	cont.	5.0
36	Meobal <sup>®</sup>	carb	cont.	0.14
37	Amiphos <sup>®</sup>	O-P	syst.	0.0
38	Bassa <sup>®</sup>	carb	cont.	0.0
39	Butacarb <sup>®</sup>	carb	cont.	0.0
40	C 20132	carb	cont.	0.0
41	Cyolane <sup>®</sup>	O-P	syst.	0.0
42	Dimetilan <sup>®</sup>	carb	cont.	0.0
43	DU 1410-X	carb	syst.	0.0
44	Fitios <sup>®</sup>	O-P	syst.	0.0
45	Monitor <sup>®</sup>	O-P	cont.	0.0



Table 1 (cont)

Insecticide	Type and Nature	Corrected % Mortality
46 Proban <sup>®</sup>	O-P syst.	0.0
47 R 10044	sulphur cont.	0.0
48 Supracide <sup>®</sup>	O-P cont.	0.0
49 VC 13	O-P cont.	0.0
50 Zytron <sup>®</sup>	O-P syst.	0.0
51 Zolone <sup>®</sup>	O-P syst.	0.0

O-P = Organo-phosphorus

carb = carbamate

syst. = systemic

cont. = contact

Table 2. List of insecticides tested against balsam woolly aphid on infested trees (25'-35') @ 12 to 25 lbs. active/acre or 2.5% to 10% active @ 0.25 to 1.0 litres/tree, by mist blower, in the field, from 1965 to 1970 (Insecticides arranged in descending order of toxicity).

1965 (Nfld.)	1966 (B.C.)	1966 (Nfld.)	1967 (Nfld.)	1969 (Nfld.)	1970 (Nfld.)
Propoxur	Propoxur	Propoxur	Dursban	Dursban	Propoxur EC
Diazinon	Furadan	Dursban	Propoxur	Methomyl	Propoxur UL
Menazon	Dylox	Bidrin	Diazinon	PP062	
Fenitrothion	Formothion	Ciba 8874	Furadan	Propoxur	
Meta-systox-R	Diazinon	Diazinon	Menazon	Dupont 1642	
Bay 37289	C 8514	Zectran		Amer. Cyan 47470	
Aramite	Bidrin	Dicapthon		PP511	
Dimethoate	Fenitrothion	Dylox		Herc. 13462	
	Meta-systox-R	Methomyl			
		Formothion			
		Aphidan			
		Fenitrothion			
		Ciba 9491			
		Meta-systox-R			
		Thimet			

EC = Emulsifiable concentrate  
ULV = Ultra low volume formulation

BC = British Columbia  
Nfld. = Newfoundland

Table 3. Insecticides tested against balsam woolly aphid by aerial application in 40 acre blocks in Newfoundland (1968).

Insecticide	Dosage	% Mortality
Propoxur	16 oz. active/acre in 1 gallon	26.4
Furadan	4 oz. active/acre in 2 gallons	25.6
Dursban	8 oz. active/acre in 2 gallons	22.6
Diazinon	10 oz. active/acre in 2 gallons	12.8
control	-	37.2

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