



Environment
Canada

Environnement
Canada

Forestry
Service

Service
des Forêts

ORTHENE AND ORTHO 9006 RESIDUES
IN POLLEN SAMPLES

By: K.M.S. Sundaram and
P.E. LeCompte

File Report No. 44 June 1976

CONFIDENTIAL - NOT FOR PUBLICATION

*This report may not be cited or published
in whole or in part without the written
consent of The Director, Chemical Control
Research Institute, Canadian Forestry Ser-
vice, Environment Canada, 25 Pickering
Place, Ottawa, Ontario K1A 0W3, Canada.*

INTRODUCTION

Acephate (O, S-dimethyl acetylphosphoramidothioate) introduced as an insecticide in 1971 after the field trials by Chevron Chemical Company under the trade mark Orthene[®], is found to be effective in controlling spruce budworm, Choristoneura fumiferana (Clemens). Recently Sundaram and Hopewell (1976) have reviewed its usage in Canadian forest spray programs. Acephate is partly metabolized to O, S-dimethyl phosphoramidothioate which has similar insecticidal properties. This compound was introduced in 1969 by the same company under the code number "Ortho 9006". This metabolite is the active ingredient in the trade mark material Monitor[®]. A method for determining Orthene[®] and Monitor[®] residues in forest environmental samples has been developed recently at this Institute (see also Leary 1974). Using this method, acephate and Ortho 9006 residues have determined from twenty-four pollen samples collected from bee-hives exposed to the spray deposit. This report presents the analytical data gathered in this study.

MATERIALS AND METHODS

Pollen Samples

The 24 pollen samples used in the analysis were supplied by the Ecological Impact Group at CCRI. The samples were collected from the Larose Forest by Dr. C.H. Buckner and Mr. B.B. McLeod during the experimental spray operation carried out in June 1975 using Orthene[®] for budworm control and stored in a freezer at 0°C until the analysis.

Analytical Methodology

The methodology used were similar to the one described earlier (1976). Full details of the procedure will be published elsewhere. Spiked pollen samples showed an average recovery of 85% Orthene and 80% of Ortho 9006. The low recovery of the metabolite is due to its loss in the column cleanup. About 20% of Ortho 9006 and about 10% of Orthene[®] were lost in the second elution of the silica column using 100 ml. of 5% methanol in ether.

Gas Chromatography

The GLC conditions and the parameters used are discussed in an earlier publication (Sundaram and Hopewell 1976).

The results are recorded in Table 1.

Table 1

Analysis of Orthene^(R) and Ortho 9006^(R) Residues in Pollen Samples
 Received from Larose Forest - Summer 1975 Spray Program
 [Ecological Impact Group of CCRI] - Spray Date: June 19, 1975

Sample No.	CCRI Number	Sample Description by EIG, CCRI	Mass (g)	Concentration (ppm)		
				Ortho 9006	Orthene	Total
1	16/76/171-1657	Pollen - Control, June 15	5.0	N.D.	N.D.	N.D.
2	16/76/172-1658	Pollen - Control, June 17	5.0	N.D.	N.D.	N.D.
3	16/76/173-1659	Pollen - Post spray, Control, June 19	5.0	T	0.02	0.02
4	16/76/174-1660	Pollen - Post spray, Control, June 20	5.0	T	T	T
5	16/76/175-1661	Pollen - Post spray, Control June 21	5.0	N.D.	T	T
6	16/76/176-1662	Pollen - Post spray, Control, June 22	5.0	N.D.	T	T
7	16/76/177-1663	Pollen - Post spray, Control, June 23	5.0	N.D.	N.D.	N.D.
8	16/76/178-1664	Pollen - Post spray, Control, June 24	5.0	N.D.	N.D.	N.D.
9	16/76/179-1665	Pollen - Bee Range I June 15	5.0	N.D.	N.D.	N.D.
10	16/76/180-1666	Pollen - Bee Range I June 17	5.0	N.D.	N.D.	N.D.
11	16/76/181-1667	Pollen - Bee Range I June 19, 1st post spray	5.0	0.40	1.85	2.25

Continued ...

Table I. Cont'd

Sample No.	CCRI Number	Sample Description by EIG, CCRI	Mass (g)	Concentration (ppm)		
				Ortho 9006	Orthene	Total
12	16/76/182-1668	Pollen - Bee Range I June 20, 2nd post spray	5.0	T	0.19	0.19
13	16/76/183-1669	Pollen - Bee Range I June 21, 3rd post spray	8.8	N.D.	0.05	0.05
14	16/76/184-1670	Pollen - Bee Range I June 22, 4th post spray	4.0	N.D.	0.04	0.04
15	16/76/185-1671	Pollen - Bee Range I June 23, 5th post spray	5.0	T	0.03	0.03
16	16/76/186-1672	Pollen - Bee Range I June 24, 6th post spray	5.0	T	0.01	0.01
17	16/76/187-1673	Pollen - Bee Range II pre spray, June 15	5.0	N.D.	N.D.	N.D.
18	16/76/188-1674	Pollen - Bee Range II pre spray, June 17	5.0	N.D.	N.D.	N.D.
19	16/76/189-1675	Pollen - Bee Range II post spray, June 19	5.0	0.07	0.62	0.69
20	16/76/190-1676	Pollen - Bee Range II post spray, June 20	5.0	0.01	0.05	0.06
21	16/76/191-1677	Pollen - Bee Range II post spray, June 21	5.0	N.D.	0.02	0.02
22	16/76/192-1678	Pollen - Bee Range II post spray, June 22	5.0	N.D.	T	T

Continued ...

Table 1 Cont'd

Sample No.	CCRI Number	Sample Description by EIG, CCRI	Mass (g)	Concentration (ppm)		
				Ortho 9006	Orthene	Total
23	16/76/193-1679	Pollen - Bee Range II Post spray, June 23	6.5	T	0.03	0.03
24	16/76/194-1680	Pollen - Bee Range II Post spray, June 24	7.0	N.D.	T	T

N.D. Not detectable

MDL = 0.01 ppm

RESULTS AND DISCUSSION

Amounts of Orthene[®] and Ortho 9006 residues found in the pollen samples are recorded in Table 1. The concentration levels are expressed in ppm units as sampled including the different variables and the data did not contain any correction for the percent recovery from the spiked samples. The limit of detectability of the method is 0.01 ppm for both the compounds.

The results indicate that the prespray pollen samples collected on June 15 and 17, 1975 did not contain any insecticide residues. After spraying on June 19, the control sample contained detectable levels of Orthene (0.02 ppm) which decreased to trace levels (<0.01 ppm) on June 20 to 22, 1975. None was detected on or after 23rd June. The first postspray sample in plots B.R.I and B.R.II contained 0.40 and 1.85 and 0.07 and 0.62 ppm of Ortho 9006 and Orthene[®] respectively which rapidly decreased to trace levels on June 24. The results indicate that the insecticide and the major metabolite dissipated rapidly from the pollen substrate analysed. No interferences either from the contaminants or from the impurities present in the substrate have been encountered.

REFERENCES

- Leary, J.B. 1974. Gas-Liquid Chromatographic Determination of Acephate and Ortho 9006 Residues in Crops. Jour AOAC, 57(1): 189.
- Sundaram, K.M.S. and W.W. Hopewell. 1976. Distribution, Persistence and Translocation of Orthene[®] in Spruce Trees After Simulated Aerial Spray Application. Env. Canada For. Serv. Chem. Cont. Res. Inst. Repr. CC-X-121, pp. 24.