Persistence of Carbofuran Residues in Some British Columbia Soils

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Carbofuran (2,3-dihydro-2,2-dimethyl-7-benzofuranyl methylcarbamate) has been used in British Columbia since 1970 for the control of a number of soil insects such as wireworms and root maggots.

Although a number of studies have been reported on the degradation of this insecticide (GETZIN 1973; CARO et al. 1973; READ 1969) detailed knowledge of its behavior under local conditions has been lacking. As a preliminary to a more complete study, soils which had been treated with carbofuran one and/or two years previously were sampled and analysed. Surprisingly high residues were found and there was evidence of build-up where treatments were repeated for two successive years.

EXPERIMENTAL

In March 1975 soil samples were taken from two areas in the Fraser Valley. Three fields were tested; two were subdivided, one into three and the other into four areas according to carbofuran use. Each subdivision was sampled separately. The samples, consisting of twenty 15 x 2.5 cm cores, were thoroughly mixed then held in frozen storage until analysed.

Analysis: 20 g samples of soil were extracted by shaking for three 2 hr periods with 70 ml portions of a 2:5 v/v methanol:dichloromethane mixture. The combined extracts were concentrated until free of methanol then partitioned into dichloromethane. Clean-up on alumina and glc determination with a Coulson conductivity detector in the nitrogen mode were as previously described (WILLIAMS and BROWN 1973). Results were corrected for soil moisture content.

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RESULTS AND DISCUSSION

Table I shows the residues found in the eight areas sampled.

TABLE I

Carbofuran Residues After One and Two Year Periods

	Soil type	Year(s) of treatment	Carbofuran found ppm (dry weight)
I	Poorly drained Clay-muck	1 Control	0.17
		2 1973 & 1974	2.62
		3* 1973	0.78
		4 1973	1.18
II	Well drained Clay-muck	1 1974	2.08
		2 1973 & 1974	3.88
		3 1973	0.73
III	Poorly drained Clay	1 1974	0.38

* area of better drainage

The data are insufficient to draw firm conclusions but the following observations are relevant. The carbofuran levels are remarkably high. The recommended application rate of 50 lb/acre Furadan 10G (5 lb a.i.) should result in an initial concentration of 2.5 ppm based on a 6 in. acre of 2×10^6 lb. Thus degradation appears to have been particularly slow in these soils. Moreover, a build-up of carbofuran is apparent in fields treated for two successive years. This would indicate a need for the study to be continued in order to substantiate these results and to determine the degree of residue build-up and rate of degradation over a period of several years of treatment.

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