

DDT Residue Disappearance from Field Sprayed Lettuce

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Since the use of DDT on lettuce for corn earworm, *Heliothis zea* - (Boddie), control usually necessitates the utilization of a series of applications approaching closely to the harvest date, the restrictions on such use have required the removal of outer leaves (1) to bring the product within legal tolerance limitations. Recent regulatory revisions prohibit DDT applications after the heads begin to form (2).

The economic problems of the grower in meeting these stipulations are sufficiently important that it seemed advisable to investigate the probable amounts of residue that would accrue at various times and after various numbers of sprays when the outer leaves were not removed at harvest.

Methods

In order to accomplish this, a plot 200' x 25' was planted to lettuce on August 13, 1968 and sprayed on September 20 with 50% wettable DDT at the rate of 1 lb actual DDT per acre. On October 3 the plot was subdivided and approximately 3/4 was given a second application. After 2 weeks, four additional applications were made at approximately 1 week intervals, subdividing the plot treated last each time so that portions of the original plot received one, two, three, four, and five applications, respectively. Samples were taken from all plots after each treatment as indicated in Table I. The entire sample was prepared for DDT residue analysis without removal of outer leaves. Since the seedlings were too small for sampling at the first application, the first collection was made after the second spray was applied.

Analytical Procedure

Sampling and Extraction. Approximately six heads of lettuce were picked at random from each plot per sample. These were finely chopped in a Hobart food chopper and mixed, and a subsample of about 200 grams frozen for analysis.

One hundred grams of sample were macerated 5 minutes with 200 ml of a solution containing 90% hexane: 10% isopropyl alcohol. The mix was allowed to settle and clear overnight in a freezer and part of the supernatant liquid was removed for gas chromatography. Portions of extracts were diluted to suitable volume for gas

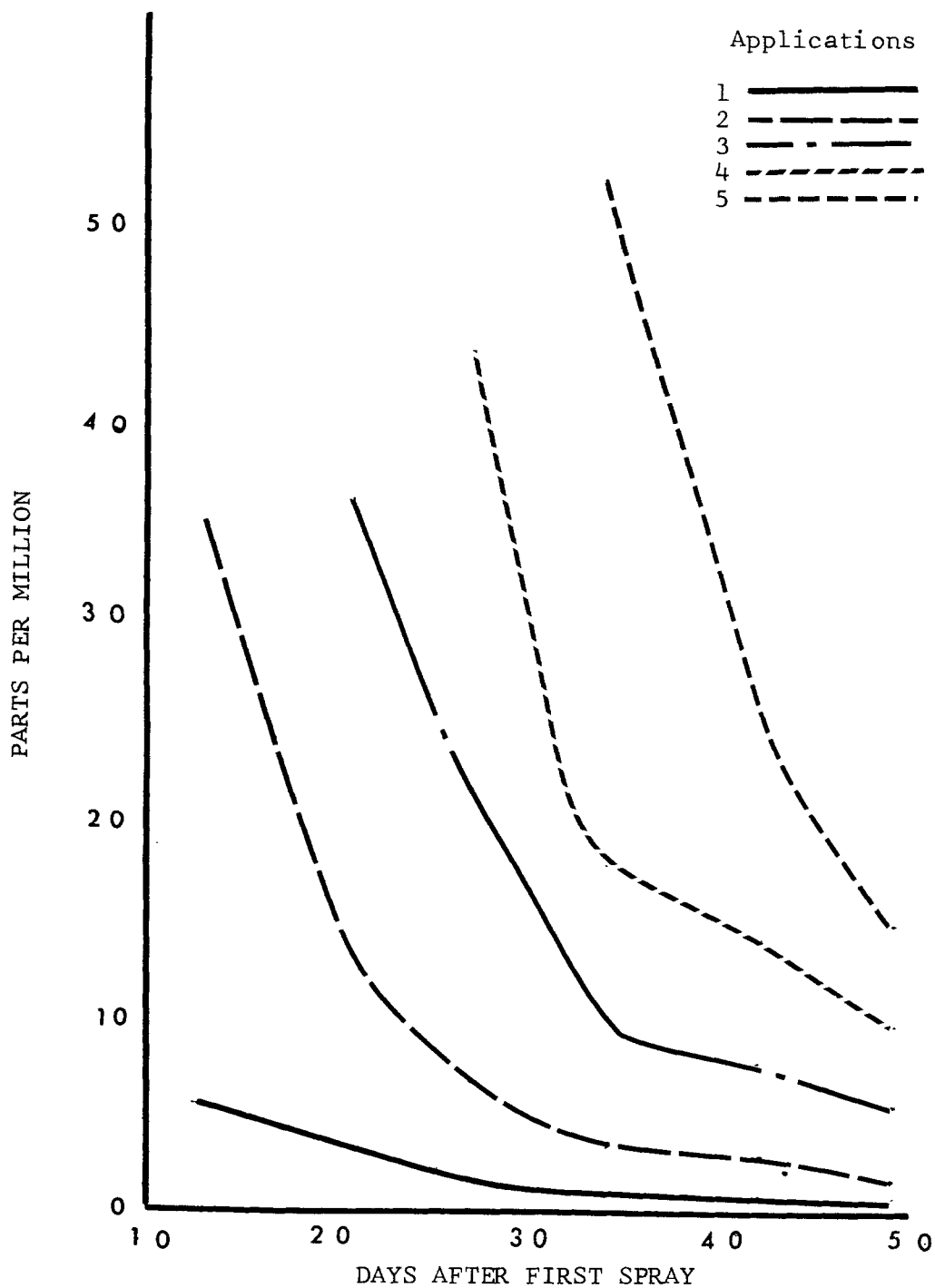


Figure I - DDT in Lettuce

Table I
DDT Residue on Head Lettuce (PPM)

Total Number Appl.	Date of Last Appl.	10/3/68	10/11/68	10/17/68	10/24/68	11/1/68	11/8/68
1	9/20/68	5.35	3.07	1.54	0.89	0.59	0.28
2	10/3/68	35.6	12.0	6.8	3.2	2.9	1.4
3	10/10/68	-	36.0	21.4	8.6	7.3	5.1
4	10/17/68	-	-	44.2	17.5	13.6	9.4
5	10/24/68	-	-	-	53.0	24.0	14.6

Table II
Rainfall and Temperature¹.

Period	Rainfall (inches)	Average Temperature (F)	
		Maximum	Minimum
9/20 - 10/2	0.00	79.5	58.6
10/3 - 10/10	0.83	67.7	45.1
10/11- 10/16	0.02	68.3	51.8
10/17- 10/23	0.72	71.4	49.9
10/24- 10/31	0.42	58.6	41.1
11/1 - 11/8	0.47	58.0	41.1

1. Rainfall and temperature records were supplied through the courtesy of D. Dunlap, U.S. Weather Bureau Cooperative Station, Meteorology Dept. Rutgers-The State University.

chromatography without cleanup. Five-microliter injections were made on the column. Untreated blanks were run in a similar manner.

Standard curves were run using analytical standards of pp' and op' DDT at levels of 0.02-0.1 ppm. Recovery studies were made by adding known amounts of DDT in hexane solution to lettuce blanks and allowing to stand 10 minutes before extraction and analysis as above. A value of 84% recovery was found.

Gas Chromatography. The samples were injected on column in a Research Specialties Co. gas chromatograph using the following conditions:

Column : 1.5% OV210 on gas chrom Q
 Detector : E. C. Strontium 90
 Inlet Temp. : 175°C
 Column Temp. : 175°C
 Detector Temp.: 215°C
 Nitrogen Flow : 100 ml/min
 Measurement : Peak Height

Results and Discussion

Both p,p' and op' isomers of DDT were measured and reported as DDT since these were the major components of the technical material. No other isomers or metabolites of relative consequence were found.

Rainfall and temperature data for the duration of the experiment are shown in Table II. There does not appear to be any pronounced effect on residue disappearance which could be attributed to these factors. None of the periods between sprays had excessive rainfall or extremely high temperatures which might have hastened DDT dissipation.

Table I lists the corrected values for total DDT found in the field treated samples and Figure 1 shows the disappearance of DDT residue after each final application. It is apparent that early applications of DDT will dissipate to a safe level, but that repeated applications will result in levels in excess of tolerances when the outer leaves are not removed.

References

1. U.S.D.A. Summary of Registered Agricultural Pesticide Chemical Uses, U. S. Department of Agriculture, Agricultural Research Service, Washington, D.C., 2nd edition, p 219 (1967).
2. Food Chemical News 11, 4, 17 (1969).

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