DETERMINATION OF DIMECRON RESIDUES ON COTTON, RICE AND 'BHINDI' FOLIAGE

MUHAMMAD BASHIR AND MUHAMMAD AKHTAR*

Residues of dimecron on cotton, rice and 'bhindi' foliage, treated in the concentration of 0.05 per cent, were determined during summer and autumn 1969 and 1970, using total phosphate method. According to results obtained the residues lasted for 10 to 14 days on cotton and rice and 10 to 12 days on 'bhindi' plants. Residues did not persist for a very long time and more than 60 per cent of the insecticide was lost during first five days of application and came down to tolerance limit within 15 days. The disappearance of the insecticide was quicker during summer.

INTRODUCTION

Chemical control of insect pests and diseases is quite popular in Pakistan and although we have gained much by increasing agricultural production by way of plant protection measures but new problems like health hazards and insecticide residues have also come up. A lot of work has been done on the toxicity of dimecron against insect pests but no attention has been paid to work on its residues persisting under different ecological conditions. Determination of residues becomes essential with a view to safeguard human and animal life and it is for this reason that present studies were taken up with dimecron applied to some important crops like cotton, rice and 'bhindi' (*Hibiscus esculentis*).

Menzer and Ditman (1963a) found that phosphamidon (dimecron) disappeared from lucerne, tobacco and most of the vegetables and fruits within 4 days of application, though it could be detected for 8 days on spinach and for 9 to 16 days on peas. Abdullah (1969) recorded residues of dimecron for 7 to 12 days on radish and tobacco crops. Brewerton (1963) working with total phosphorus analysis of phosphamidon found residues of 1 ppm, 12 days after application, which fell to about 0.5 ppm after 25 days and further declined to 0.2 ppm after 50 days, in apple fruits, when applied at the rate of 7 fluid ounces of 50 per cent phosphamidon per 100 gallons of water.

*Department of Entomology, University of Agriculture Lyallpur

MATERIALS AND METHODS

Dimecron residues were analysed following total phosphate method. Each crop was sprayed twice, once in summer and then in autumn with 0.05 per cent solution of insecticide, whereas, check plants were sprayed with simple tap water. Leaves of uniform size and age were collected on the day of application and then after every 48 hours till the residues were detectable. These samples were oven dried at 100° C, overnight.

Wet digestion of these samples for the determination of total phosphorus was done according to the method given by Richards (1954). Optical density of samples was read with the help of Unicam spectrophotometer at 420μ. Actual amount of dimecron was calculated with the help of regression equation based on the readings recorded by using known amounts of the insecticide in a series of dilutions.

RESULTS AND DISCUSSION

The results of residue analysis in all the three crops under trial are given in Table 1.

In cotton the initial deposits of dimecron were 336.6 and 338.9 ppm during summer and autumn experiments, respectively, on the day of application, which fell to 0.9 ppm, in the first case on 10th day and 1.2 ppm in the second on 14th day of application. No residues were detectable after that. The maximum temperature during experimental period ranged from 93.6 to 103.6°F in summer and 81.3 to 91.3°F in autumn while relative humidity was 77 to 91 and 69 to 89 per cent, respectively. There was 0.86 inch rainfall during experimental period in summer.

In case of rice the maximum quantity of the insecticide was found to be 370.8 ppm during summer and 394.5 ppm during autumn, on the day of application, which degraded to 2.2 and 0.8 ppm in the respective seasons after 10 and 14 days and was not detectable thereafter. The maximum temperature during experimental period ranged from 91.3 to 95.7°F in summer and 83.5 to 98.4°F in autumn, while relative humidity was recorded to be 75 to 91 and 69 to 87 per cent with respective total rainfall of 1.0 and 0.04 inch.

The initial deposit on the day of application was 256.8 and 336.2 ppm on 'bhindi' which went down to 1.1 and 1.5 ppm after 10 and 12 days during summer and autumn experiments, respectively. Residues could not be detected after that. The maximum temperature ranged from 83.5 to 97.6°F

during autumn and 106.8 to 111.3°F during summer with respective relative humidity of 62 to 87 and 36 to 60 per cent during experimental period. There was 0.04 inch rainfall during autumn experiments.

Data recorded in Table 1 show that there was a gradual decrease in the phosphamidon concentration after application and that amount of insecticide varied both with respect to initial deposit as well as its residues on different crops. Residues on cotton were reduced to below tolerance limit (1 ppm) within 10 days after application during summer while in case of rice and 'bhindi' these were little above this limit and were not detectable on 12th day. During autumn, howere, residues of 2.8, 2.3 and 1.5 ppm were recorded on cotton, rice and 'bhindi' foliage, 12 days after application, which went down to below 1ppm on 14th day in rice and 'bhindi' but might have taken a little longer in cotton as 1.2 ppm were recorded on 14th day and were not detectable thereafter. These findings conform to those of Brewerton (1963) who reported that residues of phosphamidon degraded to 1 ppm after 12 days of application on apples. The residues in the present studies were detected for 10 to 14 days on cotton and rice and for 10 to 12 days on 'bhindi' and it is in line with the observations that residues of phosphamidon persited for 10 days on radish (Abdullah, 1969) and 8 to 16 days on lucerne, tobacoo, vegetables and fruits (Menzer and Ditman, 1963a).

TABLE 1. *Residues of Phophamidon on cotton, rice and 'bhindi' foliage treated during summer and autumn.*

Days after treatment	Total quantity of Insecticide (ppm)					
	Cotton		Rice		Bhindi	
	Summer	Autumn	Summer	Autumn	Summer	Autumn
0	336.6	338.9	370.8	394.5	256.8	336.2
2	159.3	179.6	207.6	225.0	81.4	159.7
4	87.4	128.7	114.5	143.5	25.8	83.0
6	21.7	71.7	34.2	83.6	4.9	20.6
8	7.6	18.7	10.5	38.9	1.2	5.3
10	0.9	8.5	2.2	7.8	1.1	2.6
12	—	2.8	—	2.3	—	1.5
14	—	1.2	—	0.8	—	—

TABLE 2. *Progressive loss of Phosphamidon residues on cotton, rice and 'bhindi' during Summer and Autumn.*

Days after treatment	Summer						Autumn					
	Cotton		Rice		Bhindi		Cotton		Rice		Bhindi	
	Net loss of insecticide (ppm.)	%age progressive loss	Net loss of insecticide (ppm.)	%age progressive loss	Net loss of insecticide (ppm.)	%age progressive loss	Net loss of insecticide (ppm.)	%age progressive loss	Net loss of insecticide (ppm.)	%age progressive loss	Net loss of insecticide (ppm.)	%age progressive loss
2	177.3	52.39	163.2	44.01	175.4	68.30	159.2	46.97	169.5	42.96	176.5	52.49
4	71.9	73.87	93.1	69.11	55.6	89.95	51.0	62.01	81.5	63.61	76.7	75.30
6	65.7	93.50	80.3	90.76	20.9	98.08	57.0	78.83	59.9	78.79	62.4	93.86
8	14.1	97.71	23.7	97.15	3.7	99.52	53.3	94.54	44.7	90.68	15.3	98.41
10	6.7	99.71	8.3	99.38	0.1	99.56	9.9	97.46	31.1	98.00	2.7	99.21
12	—	—	—	—	—	—	5.7	99.14	5.5	99.39	1.1	99.53
14	—	—	—	—	—	—	1.6	99.61	1.5	99.77	—	—

Data given in Table 2 show that phosphamidon disappeared at the rate of 52.39, 44.01 and 68.30 per cent during summer on cotton, rice and 'bhindi', respectively, after 2 days of application, while respective loss during autumn at the same interval was 46.97, 42.96 and 52.49 per cent which was significantly different from that in summer. It clearly shows that the rate of loss was higher during summer which may be due to higher temperature prevailing during experimental period as it has been suggested by Menzer and Ditman (1963b) that high temperature decreased the residual period as the breakdown of phosphamidon was faster by 2 days for a difference of 15°F in temperature.

In cotton and rice crops, residues fell below or near tolerance limit after 14 days of application during autumn and the total loss on that day was 99.61 and 99.77 per cent, respectively, whereas, in case of 'bhindi' the loss was 99.53 per cent on 12th day after application. Loss in 'bhindi' was significantly different from that on rice and cotton. As the environmental factors were more or less the same for all the three crops the higher rate of loss in case of 'bhindi' can be attributed to internal factors like metabolism, etc., because externally there was not much difference in the leaf structure or hairiness of cotton and 'bhindi' crops. However, it needs further investigations to confirm this point.

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