

PERSISTENCE OF DICHLORVOS RESIDUES IN OKRA AND ITS EFFECTS ON SUGAR CONTENT OF THE VEGETABLE

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Okra (*Hibiscus esculentus*) was grown in a field and at the time of maturity, the vegetable was sprayed with 0.1% dichlorvos (DDVP) solution at the rate of 100 gallons acre⁻¹. Samples of okra were taken from that plot daily and were analysed for DDVP residues, quantitatively. The amount of DDVP was maximum on first day following the spray (94 µg 100 g⁻¹) and thereafter it decreased to 1.5 µg 100 g⁻¹ on the 9th day.

The samples of okra were also collected randomly from fields and markets in and around Faisalabad for quantitative estimation of DDVP. 20% of samples were found to contain DDVP ranging from 16.5 to 46.0 µg 100 g⁻¹ of the vegetable. The calculated daily consumption of DDVP by human population, thus falls between 0.76 and 2.12 µg kg⁻¹ body weight which is below the admissible daily intake (ADI) of 4.0 g kg⁻¹ as recommended by FAO. The maximum amount of total, reducing and non-reducing sugars were 5.22, 0.040 and 5.18 µg 100 g⁻¹ of total, reducing and non-reducing sugar contents was observed up to 10th day.

INTRODUCTION

The protection of crops from insects is essential for production of food of best quality in sufficient amounts. Pesticides are man's most powerful weapon against pests. Consumers are directly or indirectly exposed to the insecticides either through inhalation of the released vapours during spray or otherwise by taking contaminated food.

Organophosphorus compounds are one of the four major groups of the pesticides, currently in use. One member of this family "dichlorvos" (DDVP) is a contact and systemic insecticide with its fumigant action. It is widely sprayed on vegetables, fruits and cereals. When sprayed on plants, it can pass into their products (Dolezalk *et al.*, 1977). In continuation of our previous work (Iftikhar *et al.*, 1985; Ilahi *et al.*, 1986 a, b; 1987; 1988), the present project was, therefore, planned to study the persistence of residue

of DDVP after spraying on okra and its effect on contents of various sugars in okra under indigenous environment and to conduct a survey for levels of DDVP residues on okra marketed in Faisalabad.

MATERIALS AND METHODS

Fifty samples of okra (*Hibiscus esculentus*) were collected randomly from different fields and markets in and around Faisalabad for the survey. Further okra crop was sown in an experimental plot measuring 3.25 m². At the time of maturity, it was sprayed with 0.1% DDVP at the rate of 100 gallons acre⁻¹. Okra samples were taken from that plot daily until there was no residues of the insecticide were detected in the samples. The samples (both randomly collected and sprayed) were quantitatively screened for DDVP residues by cholinesterase inhibition method (Giang *et*

al., 1956). In positive samples, total sugars were estimated by a colorimetric method (Dubois *et al.*, 1956). Reducing sugars were estimated by Nelson Somogyi method (Oser *et al.*, 1976).

g^{-1}) on the first day after spray. A steady decrease in the residual contents was observed after the first day wherein it decreased to $1.5 \mu\text{g } 100 \text{ g}^{-1}$ on 9th day. On 10th day following the spray, DDVP could

Table 1. Post-spray effect of DDVP on sugars in okra crop

Days	DDVP ($\text{g } 100 \text{ g}^{-1}$)	Total sugars ($\text{g } 100 \text{ g}^{-1}$)	Reducing sugars ($\text{g } 100 \text{ g}^{-1}$)	Non-reducing sugars ($\text{g } 100 \text{ g}^{-1}$)
0	0.00	5.22	0.040	5.18
1	94.00	5.22	0.032	5.19
3	82.00	4.90	0.024	4.88
3	65.00	4.24	0.032	4.21
4	51.50	4.57	0.024	4.55
5	39.00	3.92	0.024	3.89
6	25.00	3.25	0.016	3.23
7	17.50	2.61	0.016	2.59
8	6.00	2.94	0.008	2.93
9	1.50	2.61	0.008	2.60
10	Not	2.28	0.008	2.27

DDVP residues vs total sugar

$r = 0.826^{**}$

DDVP residues vs reducing sugar

$r = 0.824^{**}$

DDVP residues vs non-reducing sugar

$r = 0.826^{**}$

r = Correlation coefficient; ** = Significant at 0.01.

The data were statistically analysed using simple correlation to see the effect of dichlorvos on total, reducing and non-reducing sugars in okra.

RESULTS AND DISCUSSION

The present study revealed that the residues of DDVP in okra crop following its spray persisted up to 9 days and diminished thereafter (Fig. 1). The amount of DDVP residues were at the maximum ($94 \mu\text{g } 100$

not be detected due to the crop in its contents below the detectable limits.

The quantitative analysis of randomly collected samples indicated that 20% of the samples contained DDVP residues ranging from 16.5 to $46.0 \mu\text{g } 100 \text{ g}^{-1}$ vegetable. The calculated daily consumption of DDVP by human population falls between 0.76 and $2.12 \mu\text{g kg}^{-1}$ body weight which is within safe limits as recommended by FAO as $4 \mu\text{g kg}^{-1}$ body weight.

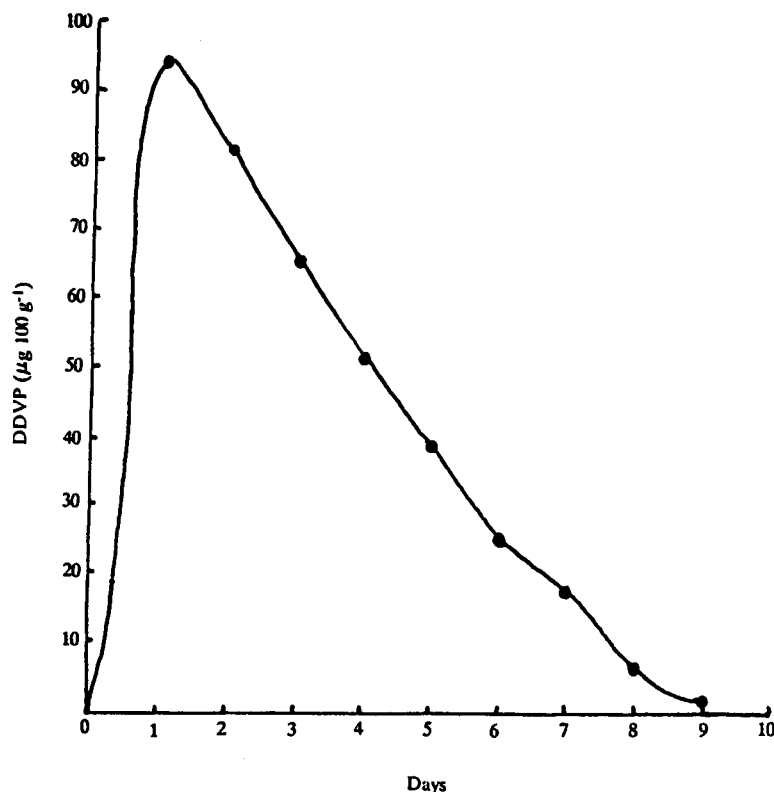


Fig. 1. Post-spray persistence of DDVP residues in okra as a function of time.

The present study revealed that the total, reducing and non-reducing sugar contents of okra crop following the spray of 0.1% solution of DDVP, gradually decreased up to the persistence of the pesticide (Table 1). The maximum amount of total, reducing and non-reducing sugars were 5.22, 0.040 and 5.18 g 100 g⁻¹ vegetable, respectively on first day after spray. A steady decrease in total, reducing and non-reducing sugar contents was observed after first day wherein it decreased to 2.28, 0.008 and 2.27 g 100 g⁻¹ vegetable on 10th day. Statistical analysis revealed that the correlations between total reducing and non-reducing sugars and residues of DDVP were highly significant and positive.

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