

DISSIPATION OF MONOCROTOPHOS IN PIGEON PEA, *Cajanus* *Cajan* (L.) MILLSP., VAR. 'PRABHAT'*

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Dissipation of 0.04% monocrotophos in pigeon pea sprayed twice at the pod formation stage was studied during 1980 and 1981 by chemical assay as well as by microbioassay technique using male vinegar fly, *Drosophila melanogaster* Meigen. A minimum waiting period of 11 days may be fixed for the consumption of green pods after monocrotophos application. Grain and straw were free from the toxic residues of monocrotophos at harvest.

Various workers have recommended the spraying of monocrotophos at the time of pod formation, for the effective control of pod borers (Shetgar and Puri, 1978; Sinha *et al.*, 1979). Since monocrotophos is a long persisting systemic insecticide, its use may create problems after consumption of green pods and grain. Although, residues of monocrotophos on several crops (Narkhade, *et al.*, 1977; Awasthi, *et al.*, 1978; Vyas, *et al.*, 1979) have been estimated in India and abroad, no published information is available on the residues of monocrotophos in pigeon pea. The present paper deals with the dissipation of 0.04% monocrotophos in pigeon pea, applied as foliar spray.

MATERIAL AND METHODS

Pigeon pea, variety 'Prabhat' (extra early group) was sown on July 4, 1980 and July 3, 1981 in a plot size of 22.5 m² replicated four times at the Experimental Farm, Indian Agricultural Research Institute, New Delhi. Monocrotophos 0.04% was sprayed at the time of pod

formation stage. The second spray was given 10 days after at the same rate. Green pod samples were collected from each replication on days 0, 1, 3, 5, 7, 10, 12 and 15 of first spray and on days 0, 7, 12 and 15 of second spray. Grain and straw samples were collected at harvest during both the years.

Green pod samples were chopped into small pieces replication wise and sub sample of 50 g was extracted with acetone @ 3 ml/g for 3 minutes and the contents were filtered through a Buchner funnel fitted with filter paper. The pulp was again blended with fresh acetone and filtered. The combined acetone extract was transferred to Kuderna Danish Evaporator and concentrated by adding a drop of propylene glycol. The concentrated extract was partitioned with 50 ml of chloroform after adding 10 ml saturated sodium chloride solution to check emulsion formation. The clean up process suggested by Jain *et al.* (1974) was followed and lower chloroform layer was passed through a glass column (2x32 cm) containing 5 cm layer

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of anhydrous sodium sulphate, overlaid with 5 g of adsorbent mixture (2:2:1) of activated charcoal: celite: magnesium oxide.

Twenty five gram of grain and straw samples were extracted by Soxhlet extraction by refluxing over a water bath at 80° c for 3 hours. The extract was collected in a 100 ml volumetric flask and the procedure adopted by Cook *et al.* (1969) was used to remove the fatty materials from the extract. For micro-bioassay, dry film technique using male vinegar fly, *Drosophila melanogaster* Meigen (Kavadia and Rattan Lal, 1967) was used. Colorimetric, method of Getz and Watts (1964) and modified by Jain *et al.* (1974) was followed. The time taken in days for the residues to reach below the tolerance level (Ttol) and half life value (RL₅₀) were worked out using Hoskins's formula (1961).

RESULTS AND DISCUSSION

Recoveries of monocrotophos in green pods and grain by colorimetric method were 91.8 and 94.7%, respectively and recoveries of monocrotophos in green pods and grain by microbioassay were 90.00 and 91.00%, respectively.

The initial deposits of 4.22 and 4.166 ppm in green pods, measured chemically after the first spray fell below the tolerance level of 0.2 ppm (FAO/WHO, 1978) in 10.20 and 10.62 days with the half life values of 2.60 and 2.61 days, respectively

during the two years. No residues could be detected in green pods on days 15 of insecticidal application, both first and second rounds. Similarly, the initial deposits of 4.10 and 4.06 ppm in green pods, measured by micro-bioassay, fell below the tolerance level of 0.2 ppm in 10.30 and 10.25 days with the half life values of 2.55 and 2.50 days, respectively during the two years. No residues could be detected on days 15 of first and second round of insecticidal application. Grain and straw were found free from the toxic residues of monocrotophos at harvest when estimated by chemical as well as micro-bioassay technique

The slight variation observed in the data on safety aspect, i.e., Ttol and RL₅₀, obtained by the chemical method and micro-bioassay may be due to the sensitivity of the two methods. The present findings are in close conformity with the results obtained by Awasthi *et al.* (1977) who reported that the initial deposit of 3.73 ppm in green pods of cowpea resulting from 0.03% monocrotophos spray fell below the tolerance level after 11 days. Further, they observed that the residues were non-detectable in grain and straw at harvest. Singh and Gupta (1981) also studied the dissipation trend of 0.04% monocrotophos in chickpea applied at pod formation stage and reported a waiting period of 16.31 days with a half life value (RL₅₀) of 3.85 days

Table 1: Dissipation of monocrotophos in pigeon pea.

Days elapsed	CHEMICAL ASSAY		Days elapsed	MICRO-BIOASSAY	
	Residues	(ppm)		Residues	(ppm)
	1980	1981		1980	1981
<u>A. First spray</u>			<u>A. First spray</u>		
0	4.22—	4.16—	0	4.10—	4.06—
1	2.52	2.45	1	2.40	2.51
3	2.10	2.07	3	2.10	2.12
5	1.65	1.61	5	1.61	1.60
7	0.66	0.64	7	0.62	0.65
10	0.34	0.32	10	0.32	0.31
12	0.18	0.16	12	0.16	0.15
15	**N.D.—	N.D.—	15	*N.D.—	N.D.—
T_{tol}	10.20 days	10.62 days	T_{tol}	10.30 days	10.25 day
RL_{50}	2.60 days	2.61 days	RL_{50}	2.55 days	2.50 days
<u>B. Second spray</u>			<u>B. Second spray</u>		
0	4.55—	4.52—	0	4.30—	4.32—
7	0.68(85.27)	0.67(85.17)	7	0.64(85.11)	0.66(84.72)
12	0.19(95.82)	0.18(95.01)	12	0.15(96.51)	0.17(96.06)
15	**N.D.—	N.D.—	15	*N.D.—	N.D.—
* N.D. = Non-detectable (below 0.01 ppm); **N.D. = Non-detectable (below 0.05 ppm).					
Meteorological data for the experimental period.					
Year	Temperature °c		AV. R.H (%)	Rainfall	
	Max.	Min.		Days	Total (mm)
1980					
First Round	34.1	18.2	55.0	—	—
Second Round	33.5	17.9	55.0	—	—
1981					
First Round	33.9	17.8	55.0	—	—
Second Round	33.6	17.4	56.0	—	—

and this variation may be due to the slow rate of dissipation of monocrotophos in winter season when the experiment was conducted and also due to different crop. In the light of the above observations, the waiting period for the consumption of treated pigeon pea pods can be safely fixed at 11 days after the application of 0.04% monocrotophos @ 800 lit/ha. At harvest grain are completely safe for consumption.

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