

MICROBIOASSAY OF PERMETHRIN AND CYPERMETHRIN ON GRAM

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ABSTRACT

The residues of synthetic pyrethroids such as cypermethrin 0.005% and permethrin 0.005% on gram (*Cicer arietinum* L.) were determined by residue film microbioassay method using one day old vinegar flies, *Drosophila melanogaster* Meig. The initial deposits of 1.94 and 1.35 ppm of permethrin and 1.95 and 1.79 ppm of cypermethrin were obtained on leaves and pods of gram immediately after spraying respectively. The residues of cypermethrin and permethrin were found to persist for 21 days on gram leaves and pods, but the residues reached below tolerance limit of 0.5 ppm in 7 days on gram leaves and in 5 days on gram pods, indicating a waiting period of 5-7 days before consumption of leaves and pods for vegetable purpose. No residue on pods and in grains at harvest was detected.

INTRODUCTION

Synthetic pyrethroids have been reported to be more effective against the pest complex of gram than commercially used traditional insecticides (Gahukar et al., 1985; Chhabra and Kooner, 1985; Bhalani and Kotadia, 1986). Since the leaves of gram (in initial stage) and pods and seeds are consumed by human beings, in one way or the other, the study of the residues of such insecticides on this crop was carried out so as to set a proper waiting period between last spraying and harvesting of crop.

MATERIAL AND METHODS

A field experiment was conducted at the Agronomy Farm of the Rajasthan College of Agriculture, Udaipur during 1987-88. There were 3 treatments including control and each was replicated thrice. The plot size was 4 m x 3 m. The gram variety 'C-235' was sown on 25th October, 1987 and sprays of cypermethrin 0.005% and permethrin 0.005% were done on 1st February, 1988, keeping 833 litres spray volume per hectare.

The samples of leaves and pods were taken randomly from each treated plot at interval of 0, 7, 14, 21 days and at harvest time pods and grain samples were also taken.

The leaves of gram were chopped into small pieces with the help of a pair of scissors while the pods and grain samples were crushed in a glass pestle and mortar. Each chopped or crushed sample was subjected for extraction using acetone as solvent @ 4 ml per g sample as per methodology described by Gupta (1968).

For the determination of cypermethrin and permethrin residues, the microbioassay was adopted following Gupta (1968). The recovery of cypermethrin and permethrin was more than 86% and 83% from the fortified samples of the gram leaves and pods, respectively.

RESULTS AND DISCUSSION

The spray of permethrin (0.005%) applied @ 41.25 g ai/ha resulted in the initial deposits of 1.94 and 1.35 ppm on gram leaves and pods (Table 1 and 2). A loss of residue by more than 50% was recovered within a week of application on both leaves and pods. Similarly within 21 days 97% dissipation of residues from both substrates was observed. However, there was little difference on half life values (3.8 days on leaves and 3.4 days on pods) and some more difference in waiting period (7.4 days on leaves and 4.8 days on pods). Present findings are in close conformity with the results of Awasthi and Anand (1983a) who found the persistence of permethrin on cauliflower to be 21 days and dissipation rate based on half life value was 3.5 to 5.2 days. Considering human safety in account, the waiting period based on the residues dissipation less than the prescribed tolerance limit of 0.5 ppm

Table 1. Residues of 0.005 per cent permethrin in leaves of gram

Days after treatment	Average residue (ppm)	Reduction (%)	Half life (days)	Waiting period days
0	1.9434			
7	0.7542	61.19		
14	0.0954	95.09	3.81	7.45
21	0.0552	97.16		

Table 2. Residues of 0.005 per cent permethrin in pods of gram

Days after treatment	Average residue (days)	Reduction (%)	Half life (days)	Waiting period (days)
0	1.3519			
7	0.6539	51.63	3.41	4.89
14	0.0482	96.43		
21	0.028	97.93		

Pods and grains at final harvest (46 days after spray) contained no measurable residue

were worked out to be as 4.8 days on gram pods. Similarly Awasthi and Anand (1983b) suggested the waiting period of 4 days for permethrin on okra.

The spray of cypermethrin (0.005%) applied @ 41.25 g a.i./ha resulted in the initial deposits of 1.95 and 2.79 ppm on gram leaves and pods (Table 3 and 4) with a half life of 3.36 and 2.75 days, and of 6.6 and 5.07 days as waiting period respectively. About 60 per cent loss of residues of cypermethrin from gram crop was observed within 7 days while about 98 to 99 per cent dissipation could be achieved in 21 days. Such findings for cypermethrin residues were also reported by Srivastava et al. (1984) in green gram and cowpea.

Table 3. Residues of 0.005 per cent cypermethrin in gram leaves

Days after treatment	Average residue (ppm)	Reduction (%)	Half life (days)	Waiting period (days)
0	1.9524			
7	0.7662	60.75	3.36	6.61
14	0.0803	95.88		
21	0.0338	98.26		

Table 4. Residues of 0.005 per cent cypermethrin in gram pods

Days after treatment	Average residue (ppm)	Reduction (%)	Half life (days)	Waiting period (days)
0	1.7943			
7	0.7331	59.14	2.75	5.07
14	0.0311	98.26		
21	0.0145	99.19		

Note : The samples of pods and grains collected at final harvest (46 days spray) contained no measurable residue

The dissipation and persistence trend of cypermethrin and permethrin are more or less similar. Since no detectable residue was measured at harvest in pods and grains, therefore, gram grains could be consumed without human health hazard at harvest.

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