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HARVEST TIME RESIDUES OF MONOCROTOPHOS AND FENITROTHION IN, ON PIGEONPEA

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PIGEONPEA (*Cajanus cajan* L. Millsp.), an important pulse crop of north Bihar, is attacked by many insect pests, such as the pod fly *Melanagromyza obtusa*, the pod weevil *Apion clavipes*, and pod borers. The pests are controlled by foliar sprays of either monocrotophos or fenitrothion¹. However, no information is available about residues of these insecticides on the crop. The present investigation was undertaken to study harvest time residues of these insecticides in/on pigeonpea grains and straw.

Pigeonpea variety 'Bahar' was grown during rabi season of 1985-86 in a randomized block design with four replications at the Tirhut College of Agriculture, Dholi (Muzaffarpur), according to the recommended package of practices. The plot size was 25 m². The insecticides monocrotophos (36 WSC) and fenitrothion (50 EC) were sprayed twice, first at 50% flowering and again at 50% pod formation. The first spraying was done on 28.12.85 and the second on 2.2.1986. Two pesticide loads were sprayed, 0.5 and 1 kg/ha. Samples of pod and straw from each replication were collected at harvest, i.e. 30 days after the second spray. The grains were separated from the pods. The grain and straw samples from each replication were analysed separately.

Sample (50 g) was blended for 2 min, thrice with 100, 50 and 50 ml of distilled acetone and the homogenate filtered through sodium sulphate and glass wool. Acetone was evaporated on a Kuderna-Danish evaporator and the extract partitioned in chloroform. The extracts were cleaned up² by column chromatography through an adsorbent mixture of activated charcoal, celite and MgO in the ratio 2:2:1. The packed column was washed

Table 1 Monocrotophos and fenitrothion residues in/on pigeonpea grains and straw at harvest

Insecticide	Dose (kg/ha)	Average* residue (ppm) in/on	
		grains	straw
Monocrotophos	0.5	0.02 ± 0.005	0.83 ± 0.12
	1.0	0.06 ± 0.01	1.47 ± 0.05
Fenitrothion	0.5	0.06 ± 0.01	0.69 ± 0.08
	1.0	0.08 ± 0.01	1.18 ± 0.13

*Average of four replicates.

with 50 ml of petroleum spirit. The chloroform extract was then passed through the column and the cleaned up extract was collected in conical flasks for residue estimation by the colorimetric method of Getz and Watts³ as modified by Jain *et al.*².

Recovery was checked using independent samples fortified with standard solutions of monocrotophos and fenitrothion. Both grain and straw samples were fortified over a range of 0.2 to 2 ppm. Monocrotophos and fenitrothion from grain and straw samples were recovered to the extent of 83.88 and 84.15%, and 88.14 and 84.89% respectively.

The data (table 1) show that in straw at harvest the amount of residues of monocrotophos was more than that of fenitrothion, whereas in grains residues of fenitrothion were higher than those of monocrotophos. This may be due to difference in penetration of the two insecticides in pigeonpea grains. Monocrotophos and fenitrothion residues in/on pigeonpea grains were less than the tolerance limits of 0.2 ppm and 0.3 ppm⁴ respectively. These results agree with those of Singh⁵, who reported that monocrotophos residues were not detectable in/on gram grain and *bhusa* at harvest, and that of Duhra⁶, who reported that cauliflower treated with fenitrothion did not have substantial residues of the pesticide at harvest on curds.

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PRESENT STATUS OF THE POTATO CYST NEMATODES IN THE NILGIRIS, TAMIL NADU

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FIELD-TO-FIELD survey conducted during 1964–70, in the Nilgiris district of Tamil Nadu, for the potato cyst nematodes, *Globodera rostochiensis* and *G. pallida* showed that an area of approximately 3050 ha was infested^{1,2}. A random roving survey was conducted during July 1987 to assess the status of the potato cyst nematodes in the Nilgiris. Information on the time of planting, variety and management practices, including application of organic manure and nematicides, and crop rotation followed, were recorded for each holding surveyed. Potato production figures for the district for 1971–76, during which period very high doses of fensulfothion were applied, were also analysed with the objective of assessing yield loss due to the nematodes.

The survey was conducted in the crop planted during April–May 1987 in 48 revenue villages. The intensity of infestation³ was graded as follows:

Females per inch of root	Grade
None	1
1	2
5	3
> 10	4

The potato area in the Nilgiris represents 1.1% of the total area in the country under this crop. The average production is 6.717 mt/ha. During 1971–76, when massive doses of fensulfothion were applied

under the Indo–German Hill Development Programme, the yield increased to 8–11 mt/ha, and declined steadily thereafter to yields below 6 mt/ha.

Cyst nematode infestation was prevalent in all the three divisions of the district, viz. Uthagamandalam (Ooty), Coonoor and Kotagiri (table 1). Both *G. rostochiensis* and *G. pallida* were found in all three divisions and mixed populations of both the species were more common. The infestation level was grade 2.7 (2.5–8 females per inch of root) in fields where potato was rotated with wheat, garlic, cole crops or finger millet, compared to 2.8 (2.5–8.5 females per inch of root) where potato followed potato.

In Uthagamandalam division farmers generally applied 25–50 kg of carbofuran 3G per ha during planting. The level of infestation was grade 2.84 in the nematicide-treated holdings compared to 3.74 in holdings where no nematicide was applied. In Coonoor and Kotagiri divisions carbofuran 3G was applied at lower doses ranging from 12.25 kg per ha and the infestation level was 3.19 and 2.55 in treated and untreated fields in Coonoor and 2.42 and 2.91, respectively, in Kotagiri.

Both *G. rostochiensis* and *G. pallida* infested the resistant cultivar Kufri Swarna and the mean level of infestation was 1.7 (1–2.5 females per inch of root). The infestation level in susceptible cultivars like Kufri Jyothi and Holland was 2.7 (3.8 females per inch of root).

The mean level of infestation of 2.7 observed in the present survey in susceptible cultivars would result in about 30% loss in yield on the basis of the regression between root population per inch of root and yield³. The annual loss in yield then would be 6090 mt, if the infested area is taken as 70% of the total area under potato in the district. The monetary loss would be about 121.8 million rupees per annum.

The yield loss figures arrived at on the basis of the survey compare favourably with earlier data⁴ on increase in yield due to fensulfothion application.

The resistant cultivar Kufri Swarna has field resistance to the cyst nematodes. Since it is derived from the clone 62.33.3 ex *S. vernei*, resistance to pathotypes Ro 1, 2, 3 and 4 of *G. rostochiensis* and pa 1 and 2 of *G. pallida* could be expected. Infestation of this cultivar by both the species in 61.5% of the holdings surveyed indicates the presence of the pathotypes Ro5 and pa3 or others not yet identified. The immediate need for identification of pathotypes prevalent in different localities in the Nilgiris and evolving nematode management practices for Kufri Swarna are indicated.