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PESTICIDE RESIDUES ON SORGHUM LEAVES

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Oligonychus indicus Hirst (Acarina: Tetranychidae) is one of the serious spider mite pests of sorghum [*Sorghum bicolor* (L.) Moench]. Pesticides viz., tetradifon, dicofol, ethion are known to be effective on sorghum mite even beyond 15 days of application. Malathion, endosulfan, fenpropathrin, cypermethrin and decamethrin were tested against the sorghum mite (Manjunatha, 1988). The present work was aimed to analyse the residue levels, half lives and effective lives of above eight pesticides on sorghum leaves.

The residues were analysed, following bioassay method as described by Sun et al. (1965), after application during rabi 1985-86 at the Department of Entomology, University of Agricultural Sciences, Dharwad (15°26′ N and 70°70′ E). Applications were made @ 375 l per hectare on 40-day old potted sorghum (CSH-1) plants in the greenhouse. The treated leaves were collected in equal numbers from top, middle and bottom of the plants at 0, 3, 6, 9, 15, 25 days after the pesticide application. For analysis, a composite sample (10 g) was drawn from each lot, chopped into small pieces and ground in a Waring blender for five minutes after adding 20 ml of respective solvent : aceto nitrile for dicofol, ethion and tetradifon; isopropyl alcohol for endosulfan, carbon tetra chloride for malathion, and acetone : hexane (1 : 1) mixture for cypermethrin, fenpropathrin and decamethrin. The supernatent liquid was transferred to clean glass tube. The contents of the tubes were filtered through a cheese cloth and the clear filterate was collected in another clean glass tube. The bioassay was carried out using one day old *Drosophila melanogaster* Meig. adults as test insects (Sun et al., 1965). Regression equations were worked out for dosage mortality relationship (Finney, 1952) and from the equations the residues in ppm were obtained.

Half life and effective life of all the pesticides were calculated as per the method of Hoskins (1961) :

Half life=log 2/b
where b=slope or regression coefficient from a plot of log (x 1000) ppm residue (y) against number of elapsed days (x).
Effective life=log (x 1000) A/b

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where b=regression coefficient and A=initial deposit of residue.

The dissipation of pesticide residues in sorghum leaves is graphically represented. Results of the residue levels, half life and effective life values obtained are presented in (Table 1). Of the pesticides tried, endosulfan registered the highest initial deposit (3.79 ppm), followed by cypermethrin (2.23 ppm), tetradifon (2.13 ppm), dicofol (1.58 ppm), malathion (1.27 ppm), ethion (0.98 ppm), decamethrin (0.85 ppm) and fenpropathrin (0.49 ppm). The half life was the highest for dicofol (7.15 days) followed by decamethrin (5.68 days), tetradifon (5.57 days), malathion (3.41 days), ethion (2.75 days), endosulfan (1.33 days), fenpropathrin (0.77 days) and cypermethrin (0.33 days). The effective life of the chemicals was the highest in case of tetradifon (81.25 days), followed subsequently by dicofol, ethion, decemethrin, fenpropathrin, malathion, endosulfan and cypermethrin with values 79.50, 70.00, 65.45, 60.50, 59.40, 55.83 and 43.86 days, respectively.

Tetradifon, dicofol and ethion, each at 0.05%, proved to be effective on sorghum which although had moderate initial deposits but their further reduction was slower with higher half life and effective life. Initial deposits of tetradifon of 2.13 ppm dissipated to 0.27 ppm after 25 days. Cassil and Fullmer (1958) reported similar findings with teteradifon spray on bean, peach, lemon and orange.

Saivaraj et al. (1976) observed an initial deposit of 0.32 ppm on grain and 0.02 ppm in straw at harvest, while spray of panicle resulted in 0.08 ppm on grain and 0.06 ppm on straw with spray of 0.07% endosulfan at 20 and 40 days after spray, which closely agree with 0.08 ppm deposits of endosulfan (0.07%) on 25th day on sorghum leaves in the present study.

The initial spray deposit of malathion (0.1%) was very low (1.27 ppm) as against its high values on wheat, maize, paddy and barley (Prasad and Sexena, 1975, Kavadia et al., 1977, Srivatsava et al., 1975, Singh and Sexena, 1976) The reduction of initial deposit was fast with an half life of 3.41 days on sorghum leaves (Table 1). The half life values for cypermethrin (0.33 days) and fenpropathrin (0.77 days) were far below (except decamethrin with 5.68) days the values of tetradifon, dicofol and decamethrin. Brun et al. (1982) found a rapid dissipation of cypermethrin, fenvalerate and permethrin (0.08 kg/ha each) on both celery and lettuce. Further the residues fell below 0.1 mg/kg with in 8-14 days on celery and with in 3-7 days on lettuce which resembled the residue deposits of pyrethroids in the present study on sorghum leaves.

Table 1. Residue dissipation and persistence of different pesticides on sorghum leaves

Treatment	Dosage (g ai/ha)	Residue (ppm) on days after spray						Time deposit regression equation*	Half life (days)	Effective life (days)
		0	3	6	9	15	25			
Tetradifon	312.50	2.13	1.17 (45.05)	0 99 (53.35)	0.65 (69.79)	0.35 (83.32)	0.27 (87.34)	Y=3.25-0.04 x	5.57	81.25
Dicofol	312.50	1.58	0.92 (39.87)	0.84 (46.83)	0.69 (56.32)	0.43 (72.78)	0.18 (88.64)	Y=3.18-0.04 x	7.12	79 60
Ethion	312.50	0.98	0.45 (54.08)	0.43 (56.12)	0.28 (71.42)	0.09 (90.81)	0.08 (91.83)	Y=2.80-0.04 x	2.75	70.00
Decamethrin	87.50	0.85	0.69 (18.82)	0.40 (52.92)	0.19 (77.64)	0.17 (80.00)	0.07 (91.76)	Y=2.88-0.04 x	5.68	65.45
Cypermethrin	156.25	2.23	0.62 (72.42)	0.29 (86.99)	0.18 (91.92)	0.15 (93.27)	0.02 (99.10)	Y=3.07-0.07 x	0.33	43.86
Fenpropathrin	62.50	0.49	0.34 (30.61)	0.26 (46.93)	0.14 (71.42)	0.10 (79.59)	0.03 (93.87)	Y=2.42-0.04 x	0.77	60.50
Endosulfan	437.50	3.79	1.51 (60.15)	0.51 (90.23)	0.37 (90.24)	03.23 (90.93)	0.12 (96.83)	Y=3.35-0.06 x	1.33	55.83
Malathion	625.00	1.27	0.79 (37.59)	0.32 (74.72)	0.25 (80.25)	0.13 (89.73)	0.08 (93.68)	Y=2.97-0.05 x	3.41	59.40

*Days corresponding to log deposit (Y) x 10^3; values in parantheses are per cent reduction of residues

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