

EFFECTIVENESS OF ALDICARB AGAINST INSECT PESTS OF BRINJAL ALONGWITH ITS UPTAKE AND RESIDUES

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ABSTRACT

Side dressing of aldicarb granules @ 0.5, 1.0 and 1.5 kg ai/ha not only protected the brinjal crop against jassids and fruit borer but also stimulated the crop growth. Cost : benefit ratios obtained for the three doses were 1:13, 1:7 and 1:5, respectively. The application of aldicarb at the three levels of active ingredient, correspondingly gave deposits in soil to the tune of 8, 12 and 17 ppm, respectively, more than 55% of which was lost in 7 days, about 75% in 15 days and almost cent per cent disipation took place in 30 days. The Translocation of the insecticide from soil to leaves and fruits of brinjal was observed to occur between 3 and 7 days. At the final harvest, aldicarb residues in fruits were above the tolerance limit of 0.2 ppm except in the lowest treatment dosage of 0.5 kg ai/ha.

INTRODUCTION

The brinjal crop is severely infested by a large number of insect pests. Singh (1976) reported jassid (*Amrasca biguttula biguttula* Ishida) and fruit borer (*Leucinodes orbonalis* Guen, as the major insect pests causing economic damage to brinjal crop in Rajasthan. Practically no work has been done to evaluate aldicarb residues for the effective, economic and safe treatment dose against these pests on brinjal. The present investigations were, therefore, undertaken to deal these aspects in detail.

MATERIAL AND METHODS

The experiments were carried out at the Agronomy Farm of College of Agriculture, Udaipur during kharif, 1979. Three treatment doses (0.5, 1.0 and 1.5 kg ai/ha) of aldicarb were slected resulting in 4 treatments including control and each was replicated thrice. One month old seedlings of brinjal cv 'Pusa Kranti' were transplanted in the plots 4x3 m² maintaining 0.9 m row to row and 0.6 m plant to

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plant distance. Aldicarb granules (Temik 10G) were side dressed in the soil (a clay loam) near the root zones of plants.

Observations were taken on general growth of the brinjal plants and the fruit yield per plot. The population of jassids (*Amrasca biguttula biguttula* Ishida) was recorded on 3 leaves each of the five randomly selected and tagged plants. The percentage of borer (*Leucinodes orbonalis* Guen) damaged fruits was recorded from the total fruits collected.

The samples of soils (upto a depth of 10 cm), leaves (three per plant) and fruits (two per plant) from five randomly selected spots/plants per plot were drawn at definite time interval. The extraction was done using chloroform as solvent. Soil samples were tumbled (3 ml solvent/g soil) on a motorised shaker for half an hour, and the chopped leaves and fruits were blended for 2 minutes (3 ml/g sample). The extract was filtered through Whatman filter paper No. 1 containing a thin layer of anhydrous sodium sulphate.

The extract was freed from interfering substances by passing under pressure, through a column containing the layers of activated charcoal and hyflo-supercel (1:2) sandwiched between anhydrous sodium sulphate. Aldicarb residues were determined by the method of Johnson and Stanburry (1966).

RESULTS AND DISCUSSION

Bioefficacy of aldicarb

Side dressing of aldicarb 10 G @ 0.5, 1.0 and 1.5 kg ai/ha provided protection to brinjal crop against jassids as there was continuous reduction in population upto 30 days from all the doses (Table 1). All the doses, statistically on a par, were significantly better than control. These results corroborate the findings of Singh (1976) and Uthamasamy et al. (1973) who reported aldicarb as the most effective against sucking pests of brinjal.

All the treatment doses aldicarb proved effective against fruit bores as well. Against 14% infestation of fruits in control, only 3.4 per cent damage was recorded in treated plots at 7 days after treatment. The fruits harvested from treated plots on 30th day of application had little (0.4-1.8%) infestation (Table 2). Singh (1976) and Upadhyay et al. (1975) recommended 2.5 kg aldicarb ai/ha against the fruit borer. Uthamasamy et al. (1973), however, reported aldicarb as not able to protect the brinjal crop against borers,

Table 1. Efficacy of different doses (kg ai/ha) of aldicarb 10 G against jassids on brinjal crop

Days after application	0.5 kg		1.0 kg		1.5 kg		Av. population in control
	Av. population	Reduction (%)	Av. population	Reduction (%)	Av. population	Reduction (%)	
Pre treatment	8.66	—	8.33	—	9.00	—	7.66
1	4.00 (2.11)	53.8	3.33 (1.93)	60.0	4.00 (1.94)	55.6	5.33 (2.25)
3	3.33 (1.93)	61.5	3.33 (1.89)	60.0	1.66 (1.43)	81.6	5.33 (2.40)
7	1.33 (1.34)	84.6	0.33 (0.88)	96.0	0.66 (1.05)	92.7	7.33 (2.72)
10	0.66 (1.05)	92.4	0.33 (0.78)	96.0	0.00 (0.71)	100.0	8.33 (2.96)
15	0.33 (0.88)	96.2	0.66 (1.05)	96.0	0.33 (0.88)	96.3	7.00 (2.72)
21	1.00 (1.27)	88.5	0.66 (1.09)	92.0	0.66 (1.00)	92.7	6.00 (2.50)
30	2.00 (1.55)	76.9	1.33 (1.26)	84.0	1.33 (1.34)	85.2	6.33 (2.56)

Figures in parentheses are $\sqrt{n + 0.5}$

CD (5%) Treatment=0.261; Time interval=0.3533 and

Interaction between treatment and time interval 0.7067

Table 2. Efficacy of aldicarb 10 G against brinjal fruit borer infestation (%).

Days after application	Aldicarb (kg ai/ha)			Control
	0.5	1.0	1.5	
1	3.33 (6.14)	10.00 (15.00)	8.33 (10.00)	11.66 (16.14)
3	6.66 (8.85)	8.33 (10.00)	10.00 (15.00)	18.33 (25.00)
7	4.30 (11.90)	4.43 (12.12)	3.16 (9.89)	14.26 (22.08)
10	2.10 (8.27)	1.20 (5.13)	0.81 (5.04)	11.10 (19.37)
15	1.93 (7.93)	1.33 (5.48)	0.64 (4.40)	11.20 (18.97)
21	1.86 (7.81)	0.05 (2.34)	0.40 (3.50)	9.36 (17.74)
30	1.76 (6.18)	0.53 (3.35)	0.41 (3.68)	9.23 (17.68)

Figures in parentheses are angular transformed values

CD (5%): Treatment 4.5209; Time interval ns;

Interaction between treatment and time interval = 11,9613

No phytotoxic symptoms were seen even with aldicarb 1.5 kg ai/ha. Instead, the growth was comparatively vigorous in aldicarb treated plants. Similar observations were recorded by Singh (1976). Uthamasamy et al. (1973) also observed increased growth of brinjal plants treated with aldicarb. Due to vigorous growth and protection of crop against insect pests about 23 to 28 q/ha increase in yield over control was recorded, amounting to a net profit of about Rs. 2500 to 2800 (Table 3). Cost : benefit ratio from the three corresponding doses was about 1: 13, 1: 7 and 1: 5. Thus application of 0.5 kg ai aldicarb/ha as side dressing proved bioeffective, yielding a good profit to the growers.

Table 3. Economics of aldicarb 10 G application brinjal cv 'Pusa kranti' (yield in control 72.16 q/ha)

Particulars	Aldicarb (kg ai/ha)		
	0.5	1.0	1.5
Returns			
Yield (q/ha)	94.77	95.73	99.50
Increase in yield over control (q/ha)	22.61	23.57	27.37
Returns from increased yield (Rs.)	2713.20	2828.40	3280.80
Expenditure			
Cost of insecticide (Rs.)	170.00	340.00	510.00
Labour charges (Rs.)	21.00	21.00	21.00
Total expenditure (Rs.)	191.00	361.00	531.00
Net returns			
Net profit per hectare (Rs.)	2522.20	2467.40	2749.80
Cost benefit ratio	1:13.2	1:6.8	1:5.1

Note : 1. Cost of aldicarb 10 G @ Rs. 34/kg

2. Cost of brinjal fruits @ 120/Q

3. Labour charges @ Rs. 7/Labour (3 labours per hectare)

Aldicarb residues in soil

The data presented in Table 4 reveal the deposits of 7.37, 12.06 and 17.22 ppm of aldicarb in soil. Pareek et al. (1978) also found that side dressing of aldicarb @ 1.5 kg ai/ha after 5 days of transplanting of cauliflower seedlings gave deposits of 15.4 ppm. Aldicarb was lost by 41.92, 36.89 and 34.61 per cent in 3 days; by 55% in 7 days; 75% in 15 days and 100% in 30 days. The persistence of aldicarb was reported to be 90 days under the cover of cauliflower (Pareek et al., 1978) and cumin (Jain et al., 1988), 80 days under pea (Dikshit et al., 1976) and 60 days under cotton (Malik and Yadav, 1978). During present investigations there was a rainfall of 24 mm at 21 days interval of sampling. This might have caused aldicarb residues leach down in subsoil.

Aldicarb residues in leaves

The sample of leaves collected at 3 days after treatment in soils contained no residue from the lower treatment doses while 0.12 ppm of aldicarb was detected in the leaves of plants from plots treated with 1.5 kg dose. Thus, translocation of aldicarb from soil to leaves was evident within 3 days in case of the highest dose and within 7 days in case of the lower doses. Maximum uptake was at 15-day interval for the higher doses (Table 4). On 30th day, the leaf samples respectively contained 0.15, 0.21 and 0.29 ppm of aldicarb residues.

Table 4. Residues and uptake of aldicarb in brinjal

Time interval (days)	Mean aldicarb residues (ppm)		
	Soil	Leaves	Fruits
Aldicarb 0.5 kg ai/ha			
0	7.37	—	—
3	4.28	—	—
7	3.29	0.18	0.20
10	2.97	0.36	0.37
15	1.86	0.42	0.50
21	1.66	0.41	0.29
30	BDL	0.15	0.17
Aldicarb 1.0 kg ai/ha			
0	12.06	—	—
3	7.61	—	—
7	4.99	0.66	0.26
10	3.80	0.99	0.43
15	3.01	0.77	0.53
21	1.75	0.55	0.28
30	BDL	0.21	0.20
Aldicarb 1.5 kg ai/ha			
0	17.22	—	—
3	11.26	0.12	—
7	6.94	1.47	0.53
10	4.83	1.68	0.75
15	3.61	0.78	0.71
21	1.86	0.57	0.63
30	BDL	0.29	0.42

Fruits

The brinjal fruits contained 0.2, 0.26 and 0.53 ppm aldicarb after 7 days of treatment with 0.5, 1.0 and 1.5 kg doses, respectively (Table 4). In fruits also, the uptake of residues was maximum upto 15 days in case of the highest dose. The samples collected upto 30th day of treatment showed the presence of aldicarb. The present findings confirm those of Pareek et al. (1978) the translocation of residues of

aldicarb in edible part of some crops. At the final harvest, the fruits contained 0.17 ppm aldicarb residue in plots treated with 0.5 kg aldicarb, 0.20 ppm in plots treated with 1.0 kg aldicarb and 0.42 ppm in plots given 1.5 kg dose of aldicarb. The residues were above the tolerance limit of 0.2 ppm in brinjal fruits at all the sampling intervals except final harvest in 0.5 kg and 1.0 kg doses.

It is concluded that aldicarb granular can safely and economically be applied in soil at 0.5 ai/ha in brinjal crop against jassids and fruit borers, respectively, without residue hazards at 30 days of the treatment.

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