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Efficacy of Certain Insecticides on Groundnut Pod bruchid, *Caryedon serratus* (Olivier) as Surface Spray on Jute Bags

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ABSTRACT

Efficacy of different insecticides as surface spray was studied on jute bags against *C. serratus* for six months. Deltamethrin @ 30 mg a.i/m^2, malathion @ 150 mg a.i/m^2 and spinosad @ 100, 300 and 500 mg a.i./m^2 caused cent per cent mortality of *C. serratus* at 24 hours after treatment. Deltamethrin and malathion found to be effective up to 180 DAT with 56.67 and 13.33 per cent mortality. Abamectin recorded 3.33 per cent mortality of *C. serratus* at 24 HAT and the mortality increased to 16.67 and 30 per cent at 30 and 60 DAT and then decreased to 16.67 and 6.67 per cent at 90 and 120 DAT. Neem @ 0.75 ppm and 1 ppm caused 53.33 and 93.33 per cent mortality of *C. serratus* respectively at 24 hours after treatment and did not show any mortality from 30 days onwards.

Key words : Abamectin, *Caryedon serratus,* Deltamethrin, Malathion, Spinosad.

Groundnut is susceptible to the attack of many insect pests during storage. Out of 100 species of insect pests attacking the stored groundnut, pod bruchid *Caryedon serratus* (Olivier) is a major cosmopolitan pest of economic importance (Singh and Ansari, 1991). It is the only pest which infests both pods and kernels of groundnut. *C. serratus* causes heavy loss in quality and quantity of stored groundnut. This pest caused 20% loss in a period of five months of storage of groundnut pods in Andhra Pradesh (Dick, 1987).

The continuous usage of chemicals on stored produce not only contaminates the produce but also leads to serious health hazards and environmental problems.Prophylactic spraying of storage surfaces with insecticides has been found efficient and safer for the protection of stored products against insects. This method is adoptable since it will not contaminate the content of bag.

In view of this the present investigation was conducted to test the effect of insecticides as surface spray on mortality of *C. serratus* at monthly interval up to six months.

MATERIAL AND METHODS

The test insect, *C. serratus* collected from the laboratory of Post Harvest Technology Centre, Agricultural College, Bapatla, Guntur district were transferred into 250g of disinfested groundnut kernels and about 20 pairs of *C. serratus* adults were released into it for oviposition. Adults were removed after ten days and released into another jar containing groundnut kernels, thus a succession of the insects were maintained for utilizing the eggs laid staggeredly to ensure constant supply of test insects of known age. The newly emerged adults were changed into fresh kernels and used for the multiplication of culture and also for conducting the experiment.

Insecticides used for the study were malathion 50 EC @ 150 mg a.i./m^2,deltamethrin 2.8 EC @ 30 mg a.i./m^2, spinosad 45 SC @ 100, 300 and 500 mg a.i./m^2, abamectin 1.8 EC @ 5 mg a.i./m^2 and neem 10,000 ppm @ 0.75 and 1 ppm.

Jute bags of 22 x 15 cm size were filled with 500 g of groundnut pods in three replications and 20 ml of spray fluid was found sufficient to moisten the outer surface of each bag. The pre starved test insect population of *C. serratus* of one day old was released on the surface of each treated bag @ 10 pairs at monthly interval up to six months after treatment to know the effect of surface spray of insecticides on the mortality of *C. serratus*. The treated bags of respective concentration were enclosed in a polythene bags to the presence of test insects on treated bag and then the open end of polythene cover was closed. The test insects were allowed to get exposed on treated bags for

24 hrs. The mortality data were recorded at 24 hours after release and the same procedure was repeated at monthly interval upto six months *i.e.,* at 30 DAT to 180 DAT.

RESULTS AND DISCUSSIONS

Malathion @ 150 mg a.i./m^2, deltamethrin @ 30 mg a.i./m^2 and spinosad @ 0.01 mg a.i./cm^2 (100 mg a.i./m^2), spinosad @ 0.03 mg a.i./cm^2 (300 mg a.i./m^2) and spinosad @ 0.05 mg a.i./cm^2 (500 mg a.i./m^2) caused cent per cent mortality of *C. serratus* at 24 HAT and were on par with neem @ 1ppm which recorded 93.33 per cent mortality and significantly different from remaining treatments. Neem @ 0.75 ppm/m^2 showed the 53.33 per cent mortality of *C. serratus* and was significantly different from control and abamectin @ 5 mg a.i./ m^2 which caused zero and 3.33 per cent kill of *C. serratus*.

During second release of the test insect on treated gunny bags at 30 DAT, neem @ 0.75 ppm and 1.0 ppm did not show any mortality of *C. serratus*. Among the remaining insecticides, malathion @ 150 mg a.i./m^2 was found to be the best with cent per cent mortality which was significantly different from all other treatments. The next effective treatment was deltamethrin which recorded 95 per cent mortality and on par with spinosad @ 500 mg a.i./m^2 which caused 91.67 per cent kill of *C. serratus*. Spinosad @ 100 mg a.i./m^2 and 300 mg a.i./m^2 recorded 46.67 and 48.33 per cent mortality respectively. Abamectin @ 5 mg a.i./ m^2 which recorded the lowest percent of mortality (16.67) of *C. serratus* at 30 DAT was on par with treatments *viz.* neem @ 0.75 ppm/ m^2, neem @ 1 ppm/ m^2 and control.

Malathion @ 150 mg a.i/m^2 recorded cent per cent mortality at 60 DAT which was significantly different from remaining insecticides. Deltamethrin caused 91.67 per cent mortality of *C. serratus* and was significantly different from all treatments. Spinosad @ 100 mg a.i./m^2 and 300 mg a.i./m^2 which recorded lowest mortality with 26.67 per cent kill of *C. serratus* was on par with spinosad @ 500 mg a.i./m^2 (33.33) and abamectin (30) but significantly different from control.

During the fourth release of the test insect *C. serratus* on treated gunny bags at 90 DAT, malathion @ 150 mg a.i./m^2 caused 100 per cent mortality of *C. serratus* and was significantly different from other treatments. Deltamethrin recorded 90 per cent of mortality and was significant. Spinosad @ 300 mg a.i./m^2 and spinosad @ 500 mg a.i./m^2 were on par to each other by recording 18.33 and 20 per cent mortality respectively. Spinosad @ 100 mg a.i/m^2 showed the lowest per cent (3.33) of mortality which was on par with control.

Deltamethrin @ 30 mg a.i./m^2 caused the highest per cent mortality *i.e.,* 71.67 at 120 DAT, which was significantly different from other treatments. Malathion @ 150 mg a.i./m^2 caused 36.67 per cent mortality of *C. serratus* and was significantly different. Spinosad @ 500 mg a.i./m^2 recorded 16.67 per cent mortality was on par with control and with remaining treatments *viz.,* spinosad @ 300 mg a.i./ m^2 (10 per cent), spinosad @ 100 mg a.i./m^2 (3.33 per cent) and abamectin @ 5 mg a.i/m^2 (6.67 per cent).

Spinosad @ 100 mg a.i./m^2 and abamectin @ 5 mg a.i./m^2 did not show any mortality of *C. serratus* when released on treated gunny bags at 150 DAT where as deltamethrin @ 30 mg a.i./m^2 recorded 63.33 per cent mortality which was significantly different from remaining insecticides. Malathion @ 150 mg a.i./m^2 caused 25 per cent mortality was on par with spinosad @ 500 mg a.i./ m^2 with 10 and spinosad @ 300 mg a.i./m^2 with 6.67 per cent mortality of *C. serratus* and with the control.

During last release of the test insect *C. serratus* on treated bags at 180 DAT, spinosad @ 300 mg a.i./m^2 did not show any mortality of *C. serratus*. Deltamethrin caused 56.67 per cent mortality and was significantly different from remaining treatments. Malathion with 13.33 per cent and spinosad 500 mg a.i./m^2 with 3.33 per cent mortality were on par to each other and also with the control.

It is evident from the results that deltamethrin @ 30mg a.i/m^2 showed residual toxicity upto 180 DAT with 56.67 per cent mortality of *C. serratus.* Similarly Lal *et al.* (1989) found that deltamethrin 2.5 WP @ 30 mg a.i./m^2 resulted in 80 to 100 per cent mortality of *R. dominica* crawling on surface of grain bags, walls, floor and alleyways of godown. Sandeep (2005) also recorded that deltamethrin @ 0.2% as gunny bag

Table 1. Bio-efficacy of insecticides as surface spray on gunny bags against *C. serratus*.

Sl.No.	Insecticides and Dose	Per cent mortality of *C. serratus*						
		1 DAT	30 DAT	60 DAT	90 DAT	120 DAT	150 DAT	180 DAT
1	Malathion 50 EC @ 150 mg a.i./m^2	100 (90)^a	100 (90)^a	100 (90)^a	100 (90)^a	36.67 (21.54)^b	25 (14.49)^b	13.33 (7.67)^b
2	Deltamethrin 2.8 EC @ 30 mg a.i./m^2	100 (90)^a	95 (75.32)^b	91.67 (66.71)^b	90 (64.15)^b	71.67 (46.50)^a	63.33 (41.53)^a	56.67 (35.82)^a
3	Spinosad 45 SC @ 100 mg a.i./m^2	100 (90)^a	46.67 (27.89)^c	26.67 (15.76)^c	3.33 (1.91)^d	3.33 (1.91)^{cd}	0 (0.00)^b	0 (0.00)^b
4	Spinosad 45 SC @ 300 mg a.i./m^2	100 (90)^a	48.33 (28.98)^c	26.67 (15.76)^c	18.33 (10.61)^c	10 (5.74)^{cd}	6.67 (3.83)^b	0 (0.00)^b
5	Spinosad 45 SC @ 500 mg a.i./m^2	100 (90)^a	91.67 (71.64)^b	33.33 (19.98)^c	20 (11.53)^c	16.67 (9.65)^c	10 (5.74)^b	3.33 (1.91)^b
6	Abamectin 1.8 EC @ 5 mg a.i./m^2	3.33 (1.91)^c	16.67 (9.60)^d	30 (17.61)^c	16.67 (9.60)^c	6.67 (3.83)^{cd}	0 (0.00)^b	0 (0.00)^b
7	Neem 10,000 ppm @ 0.75 ppm/m^2	53.33 (32.92)^b	0 (0.00)^d	0 (0.00)^d	0 (0.00)^d	0 (0.00)^d	0 (0.00)^b	0 (0.00)^b
8	Neem10,000 ppm @ 1ppm ppm/m^2	93.33 (77.71)^a	0 (0.00)^d	0 (0.00)^d	0 (0.00)^d	0 (0.00)^d	0 (0.00)^b	0 (0.00)^b
9	Control	0 (0.00)^c	0 (0.00)^d	0 (0.00)^d	0 (0.00)^d	0 (0.00)^d	0 (0.00)^b	0 (0.00)^b
	SEm±	4.94	4.62	4.55	1.48	2.70	3.48	3.48
	CD	14.66	13.73	13.51	4.40	8.03	10.36	10.36

DAT- Days after treatment
Values in parentheses are angular transformed values
In each column values with similar alphabet do not vary significantly at P=0.05

treatment controlled oviposition and pod damage by *C. serratus* upto 180 days after treatment. Singh and Yadav (1995) also found that deltamethrin was highly persistent on all surfaces *viz.*, jute, polypropylene, polyethylene, aluminium and ply wood with gross persistency value of 450.0. Sujatha (2010) also reported that deltamethrin @ 30mg a.i/ m^2 caused 88.33, 83.33, 83.33, 78.33, 75, 71.66, 58.33, 56.66, 51.66, 46.66, 46.66 per cent mortality of *R. dominica* on jute cloth disc surface at 24 HAT to 180 DAT at 15 days interval.

Malathion 150 mg a.i./m^2 though gave cent per cent mortality of *C. serratus* upto 90 DAT, declined suddenly to 36.67, 25 and 13.33 at 120, 150 and 180 DAT. Raghu ram (2010) also reported the efficiency of malathion @ 150 mg a.i./m^2 which caused 100, 82.50, 63.75, 60.00, 56.20, 50.00 and 47.5 per cent mortality of *S. oryzae* at 24 HAT to 180 DAT at monthly interval on jute cloth disc.

Spinosad @ 100 and 300 mg a.i./m^2 found to be toxic up to 120 and 150 days after treatment, respectively with 3.33 and 6.67 per cent mortality whereas spinosad @ 500 mg a.i./m^2 was toxic up to 180 days after treatment with 3.33 per cent mortality and proved to be best among the three concentrations. Fang *et al.* (2002) reported 100, 60 and 25 per cent mortality of *S. oryzae*, *Oryzaephilus surinamensis* (L.) and *T. castaneum* adults respectively, after 14 days of exposure to wheat treated with spinosad 1.0 mg/ kg of seed.

Neem @ 0.75 ppm and 1 ppm caused 53.33 and 93.33 per cent mortality of *C. serratus* respectively at 24 hours after treatment and did not show any mortality from 30 days onwards. Raghuram (2010) who reported 20 per cent mortality caused by neem @ 0.75 ppm at 24 hours after treatment on jute cloth disc and zero per cent mortality from 30 days after treatment onwards.

LITERATURE CITED

Dick K M 1987 Pest management in stored groundnuts. *Information Bulletin No. 22.* International Crop Research Institute for Semi – Arid Tropics, Pattancheru. A.P.

Fang L Subramanyam, B and Arthur F H 2002 Effectiveness of spinosad on four classes of wheat against five stored-product insects. *Journal of Economic Entomology.* 95(3): 640 – 650.

Lal S R, Doharey R B, Goyal R K and Singh D V 1989 Efficacy and residual toxicity of deltamethrin flow 25 as compared to malathion 50% EC against stored grain insect pests in commercial warehouses. Bulletin of Grain Technology 27: 79-84.

Raghuram K 2010 Studies on losses caused by rice weevil, *Sitophilus oryzae* (Linn.) (Curculionidae : Coleoptera) on rice, wheat, maize and its management. M. Sc. (Ag.) Thesis submitted to Acharya N. G. Ranga Agricultural University, Hyderabad.

Sandeep R S 2005 Biology and management of groundnut pod borer *Caryedon serratus* (Olivier) in groundnut pods. *M. Sc. (Ag.) Thesis* Acharya N. G. Ranga Agricultural University, Hyderabad.

Singh V and Ansari S U 1991 Farmers level survey on insects and mites on stored groundnut in Andhra Pradesh. *Bulletin of Grain Technology,*29(1): 14 – 21.

Singh D and Yadav T D 1995 Persistence of deltamethrin, chlorpyriphos-methyl, etrimfos, malathion and fluvalinate on five surfaces. *Indian Journal of Entomology*, 57 (3): 206-212.

Sujatha T 2010 Studies on development of lesser grain borer, *Rhyzopertha dominica* (Fabricius) (Bostrichidae: Coleoptera) and efficacy of insecticides in its management. *M. Sc. (Ag.) Thesis* submitted to Acharya N. G. Ranga Agricultural University, Hyderabad.

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