Research Paper :

Effect of seed treatments on *Caryedon serratus* (Olivier) in stored groundnut and on germination

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SUMMARY

In evaluation of different five pesticide chemicals as seed protecant, seed treatment with thiram @ 3 and 5 g and imidacloprid @ 3 g/kg seeds were found the most effective against *Caryedon serratus* adults as it achieved 90.40, 97.50 and 93.00 per cent mortality, respectively after first day of seed treatment. None of these chemicals tested at doses, hampered the germination of groundnut kernels during the storage of 180 days.

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The Saurashtra region of the Gujarat state of India is one of the most important zones of groundnut production and export contributing and about 40 per cent of the total production in the country. In Gujarat the only primary pest, *C. serratus* of stored pods has become a major problem in 1990s. Now, due to bruchid, farmers are unable to store their produce. In particular, the discovery of insect resistance to methyl bromide and phosphine, the most common fumigants, has intensified the pressure to minimize the use of conventional insecticides against post-harvest pests. Though approach like seed treatment with insecticides and fungicides has come up into vogue. Keeping in view the above facts, the present study was undertaken to find out the best chemical pesticide.

MATERIALS AND METHODS

Three insecticides and two fungicides *viz*., Carbendazim, Imidacloprid, Tebuconazole, Thiamethoxam and Thiram were tested as kernel protectant against *C. serratus* @ 2 and 4, 2 and 3, 1.25 and 2.50, 1 and 1.50, 3 and 5 g/kg of seeds. Known quantity (750 g) of kernels were kept in plastic container of 1.5 kg capacity and treated with respective treatments. Plastic containers were shaken manually to maintain the uniformity. The plastic containers were covered with lid and stored in laboratory for experimental purpose. A control was run simultaneously. Three samples, each of 50 g kernels were drawn from each treatment as well as control (untreated seeds) and kept separately in wide mouth cylindrical glass jar (7.0 cm × 5.5 cm). Five pairs of 1 to 2 days old adults were released in each glass jar. These were then kept in BOD incubator at 30 ± 1ºC temperature. Observations on mortality of adults, eggs laid by females and hatching of eggs were recorded at 1, 3, 7, 15 days after treatment in first set. In second set, 30 days after treatment observations on formation of pupa and adult emergence were recorded. In third set, 60 days after treatment observations on adult emergence, eggs laid by second generation females and hatching of eggs were recorded. The germination test of groundnut kernels was carried out 30, 60, 120 and 180 days after treatment under laboratory as well as under field conditions.

RESULTS AND DISCUSSION

The results obtained from the present

investigation are summarized below :

Protection after first day:

The data presented in Table 1 reveal that thiram used @ 5 g/kg seeds was proved significantly superior than the rest of the treatments as it achieved 97.50 per cent mortality of *C. serratus* adults, and also imidacloprid and thiram both used @ 3 g/kg seeds proved significantly superior as it achieved 93 and 90.40 per cent mortality, respectively which was at par with thiram @ 5 g/kg seeds. Reddy *et al.* (1988) reported that, seed treatment with thiram @ 2.5 g/kg seeds was the most effective in reducing the oviposition by *C. chinensis* in stored red gram.

Table 1 : Percentage mortality of *C. serratus* adults in seed treatments with pesticide chemicals first day after treatment

Treatments	Doses (g/ kg seeds)	Adult mortality (%)
Carbendazim 50% WP	2.00	09.09* (02.50) **
	4.00	17.12 (08.70)
Imidacloprid 70 WS	2.00	20.74 (12.50)
	3.00	74.64 (93.00)
Tebuconazole 2% DS	1.25	28.76 (23.20)
	2.50	44.98 (50.00)
Thiamethoxam 70 WS	1.00	22.94 (15.20)
	1.50	34.20 (31.60)
Thiram 75% DS	3.00	71.93 (90.40)
	5.00	80.87 (97.50)
Untreated control	-	09.09 (2.50)
S.E. ±	-	02.57
C.D. (P=0.05)	-	07.54
C.V. %	-	22.61

* Arcsin transformation
** Figures in parentheses are retransformed values

Protection after third day:

The data in Table 2 indicat that carbendazim @ 4 g/ kg seeds gave significantly highest *i.e.* 95.5 per cent mortality of groundnut bruchid beetles and tebuconazole @ 2.50 g/kg seeds gave 90.4 per cent mortality which was statistically at par with carbendazim @ 4 g/kg seeds. On fifth day, cent per cent mortality was recorded in the treatments of carbendazim and tebuconazole used at 4 and 2.5 g/kg seeds, respectively.

Protection after seventh day:

The data in Table 3 indicat that the highest bruchid mortality *i.e.* 97.5 per cent was observed in the treatments imidacloprid at 2 and thiamethoxam at 1 and 1.5 g/kg seeds, and in tebuconazole at 1.25 g/kg seeds mortality was 91.3 per cent, which was at par with imidacloprid at 2 and thiamethoxam at 1 and 1.5 g/kg seeds. Devi and Rao (2005) reported that the pod protectant with imidacloprid (1 ml litre^{-1}) gave complete control of *C. serratus* by preventing egg laying and minimizing adult development in the treated pods.

Table 2 : Percentage mortality of *C. serratus* adults in pesticides seed treatments third day after treatment

Treatments	Doses (g/ kg seeds)	Adult mortality (%)
Carbendazim 50% WP	2.00	15.31* (07.0) **
	4.00	77.75 (95.5)
Imidacloprid 70 WS	2.00	59.68 (74.5)
Tebuconazole 2% DS	1.25	39.13 (39.8)
	2.50	71.93 (90.4)
Thiamethoxam 70 WS	1.00	48.91 (56.8)
	1.50	61.89 (77.8)
Untreated control	-	09.09 (02.5)
S. E. ±	-	02.62
C.D. (P=0.05)	-	07.68
C.V. %	-	15.45

* Arcsin transformation
** Figures in parentheses are retransformed values
N.B.: Imidacloprid 70 WS @ 3 g/kg seeds and thirum 75% DS @ 3 and 5 g/kg seeds were removed from analysis because 100 per cent mortality was achieved before third day of seed treatment.

Table 3 : Percentage mortality of *C. serratus* adults in seed treatments with pesticide chemicals seventh day after treatment

Treatments	Doses (g/ kg seeds)	Adult mortality (%)
Carbendazim 50% WP	2.00	46.90 * (53.3) **
Imidacloprid 70 WS	2.00	80.87 (97.5)
Tebuconazole 2% DS	1.25	72.83 (91.3)
Thiamethoxam 70 WS	1.00	80.87 (97.5)
Thiamethoxam 70 WS	1.50	80.87 (97.5)
Untreated control	-	26.06 (19.3)
S. E. ±	-	02.85
C.D. (P=0.05)	-	08.36
C.V. %	-	10.79

* Arcsin transformation
** Figures in parentheses are retransformed values
N.B.: Remaining treatments were removed from analysis because 100 per cent mortality was achieved before seventh days of seed treatment.

Protection after 30 and 60 days:

As the eggs were not laid or not hatched there was

no pupal and adult formation. Therefore, there was no infestation of second generation of bruchids in stored groundnut kernels. Thus, all the pesticide chemicals proved to be effective in providing apparent protection against the groundnut bruchid damage even up to two months after treatment.

The data on percentage germination showed that there was no significant difference in germination among the treatments including untreated control. The percentage germination in different treatments varied from 87.0 to 95.5, 83.6 to 87.4, 83.6 to 87.0, 73.4 to 76.8 and 83.6 to 91.3, 83.6 to 86.9, 76.8 to 80.6, 73.4 to 76.8 per cent at 30, 60, 120, 180 days after storage in laboratory and under field conditions, respectively. Thus, all the chemical treatments had no adverse effect on germination of groundnut seeds.

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