



Effectiveness of Indigenous Plant Powders against Pulse Beetle, *Callosobruchus chinensis* (L.) in Stored Chickpea

Key words : *Callosobruchus chinensis* (L.), Mortality, Plant powders.

Pulse beetle, *C. chinensis* is a major pest of stored pulses and causes serious damage to pulses. Nearly 8.5% of pulses are lost during post harvest handling and storage (Agarwal *et al.*, 1988). Use of chemical insecticides to control this stored grain pest are causing hazards to mammals and also result in the development of high degree of resistance in insects. In recent times, the use of indigenous plant materials has acquired an important position in modern approach of pest control as they are comparatively safer to mammals due to their bio degradable nature. So the present study is done to know the effectiveness of plant powders in controlling the pest.

The leaf powders of Seetaphal (*Annona squamosa* L.), Neem (*Azadirachta indica* Ajuss.), Tulasi (*Ocimum sanctum* L.) Lantana (*Lantana camara* L), Karanja (*Pongamia pinnata* L) and Eucalyptus (*Eucalyptus globus* Labill.), Rhizome Powder of Sweet Flag (*Acorus calamus* L) and Peel Powder of Citrus (*Citrus limon* L) were tested against pulse beetle in chickpea. The leaves, rhizomes and peels of respective plants were collected, shade dried and powdered with the help of mortar and pestle.

The chickpea seeds were thoroughly cleaned to remove disinfestations by using Aluminum phosphide 3G tables @ 3 tablets / ton for 7 days and later aerated for 2 days. The powders were mixed with the chickpea seeds @ 10 gm kg⁻¹ seeds in 20 x 15 cm plastic bottles. To evaluate the efficacy of plant powders monthly samples of 25 gms of seeds of each treatment were drawn separately into small plastic bottles of 10 x 6 cm into which 10 adults of one day old were released. The observations on mortality were taken at 24, 48 and 72 hours after treatment (HAT).

The data revealed that all the treatments were significantly superior ever control. Among the treatments at 72 HAT sweet flag rhizome powder was found to be most effective grain protectant as it offered 96.67, 100, 93.33, 83.33, 96.67, 93.99 and 100.00 per cent insect mortality at 1, 30, 60, 90, 120, 150 and 180 days after treatment (DAT), respectively. Anand *et al.* (1981) reported that *A. calamus* rhizome powder and rhizome extract as a grain protectant against *S. cerealella*, *S. oryzae* and

C. chinensis. Reddy and Reddy (1987) reported that sweet flag rhizome powder applied as one percent and two percent dust offered best protection against pulse beetle *C. chinensis*. Shivanna *et al.* (1994) reported that sweet flag rhizome powder applied at 0.5, 1.5 and 2.5 g offered maximum protection against pulse beetle.

Seetaphal leaf powder caused 83.33% mortality at one day after treatment and its effectiveness reduced to 70.00% at 30 days after treatment which declined to 43.33% at 60 days after treatment. Rajapakse (1996) recorded 40% mortality of *C. maculatus* in mungbean treated with *A. reticulata*

Neem leaf powder showed 80.00 per cent insect mortality at one day after treatment which declined to 56.67 per cent at 30 days after treatment

Dayakar and Ray (1999) studied the effectiveness of leaf powders on population build up of *C. chinensis* and reported that neem leaf powder was effective in regulating the population of beetles up to 75 DAT. Chiranjeevi (1991) indicated that 100 per cent protection was obtained against *C. chinensis* in greengram when treated with neem seed powder.

Citrus peel powder at one per cent concentration caused 73.33 per cent mortality of *C. chinensis*. Its effectiveness decreased to 43.33 at 30 days after treatment.

Lantana leaf powder at the rate of one per cent caused 70.00 per cent mortality of *C. chinensis* at one day after treatment. Its effectiveness decreased to 66.67 and 43.33 per cent at 30 and 60 days after treatment. Tripathy *et al.* (2001) reported that *L. camara* at two and four per cent concentration recorded 75.00 and 80.00 per cent mortality at one day after treatment.

Karanja leaf powder used at one per cent caused 66.67 per cent insect mortality after one day of treatment and its effectiveness remained same upto 60 days after treatment.

Tulasi leaf powder tested against *C. chinensis* at one per cent concentration gave 63.33 per cent insect mortality at one day after treatment. It declined to 56.67 and 46.67 per cent at 30 and 60 days after treatment, respectively. Rajapakse (1996)

Table. Effect of plant powdera against *Callosobruchus chinensis* (L.) in stored chickpea (72 hours exposure)

S.No.	Plant powders	Concent ration	% Mortality						
			1 DAT	30 DAT	60 DAT	90 DAT	120 DAT	150 DAT	180 DAT
1.	Seetaphal leaf powder	1%	83.33 (66.15)	70.00 (57.00)	43.33 (41.07)	13.33 (21.15)	6.67 (12.29)	10.00 (18.43)	6.67 (12.29)
2.	Neem leaf powder	1%	80.00 (64.63)	56.57 (48.93)	30.00 (33.33)	16.67 (23.86)	16.67 (23.86)	20.00 (26.57)	20.00 (26.57)
3.	Tulasi leaf powder	1%	63.33 (52.78)	56.67 (48.93)	46.67 (43.08)	13.33 (21.15)	10.00 (18.43)	16.67 (23.86)	16.67 (23.86)
4.	Lantana leaf powder	1%	70.00 (57.00)	66.67 (54.99)	43.33 (41.07)	10.00 (15.00)	20.00 (26.07)	20.00 (26.57)	20.00 (26.57)
5.	Karanja leaf powder	1%	66.67 (54.78)	66.67 (55.78)	66.67 (55.07)	13.33 (21.15)	6.67 (12.29)	10.00 (18.43)	6.67 (12.29)
6.	Eucalyptus leaf powder	1%	63.33 (52.78)	60.00 (50.85)	33.33 (35.22)	13.33 (17.71)	6.67 (12.29)	10.00 (18.43)	10.00 (18.43)
7.	Sweet flag rhizome powder	1%	96.67 (83.86)	100.00 (90.00)	93.33 (77.71)	83.33 (66.15)	96.67 (83.86)	93.33 (77.71)	100.00 (90.00)
8.	Citrus peel powder	1%	73.33 (59.21)	43.33 (41.15)	33.33 (35.02)	6.67 (12.29)	6.67 (12.29)	10.00 (15.00)	10.00 (18.43)
9.	Control	1%	6.67 (12.29)	16.67 (23.86)	20.00 (26.07)	6.67 (8.86)	6.67 (12.29)	3.33 (6.15)	3.33 (6.15)
	F test		Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
	SEm		4.40	4.08	4.44	5.87	5.29	4.01	3.66
	CD (0.05%)		13.07	12.12	13.18	17.43	15.72	11.90	10.87

- The values in brackets are angular transformed values
- Sig : Significant
- Mean values of three replications

reported 46 per cent mortality of *C. maculatus* in mungbean treated with *O. sanctum* at 0.1%.

Eucalyptus leaf powder at one per cent caused 63.33 and 60.00 per cent insect mortality at one and 30 days after treatment, respectively. Subramanya *et al.* (1994) reported that *E. citroidora* was effective against the bruchid in decreasing the adult emergence.

During the present study sweet flag rhizome powder was effective upto 180 days after treatment and the remaining treatments were not effective in causing insect mortality upto 180 days after treatment. The effectiveness of most of the plant products declined with the storage period.

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(Received on 16.10.2007 and revised on 06.04.2008)