

Effect of Different Plant Products as Protect Gram Seeds *Callosobruchus Machulatus* Fab.

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Received 19 Mar. 2016, accepted on 26 April. 2016

Abstract

Experiments were conducted to study the different plant products that affect the development of the gram seeds, *Callosobruchus machulatus* Fab. on Gram seeds. Plant extract, seed kernel (15g) and leaves from *Mesva ferrea* (Nageswer), *Leucas linifolia* (Halkusha), *Saraca asoca* (Ashok), *Mentha pipertia* (Pippermint), *Eucalyptus dives* (Eucalyptus), *Terminalia chebula*(Harida), *Aristolochia braceata* (Ketamer), *Beta vulgaris* (Sugarbeet), *Marina laongi folid* (Vishkandra), *Asparagus racemosus* (Satavari) were evaluated for their Ovipositional behavior of the pest on treated seeds. Fecundity and Incubation period on *C. maculates*. The results showed that plant leaves powder were effective in checking insect infestation. The powdered Kernel seeds and leaves extracts at a 15g.provided good protection for gram seeds by reducing insect Oviposition, f_1 progeny, Adult emergence, and grain infestation rates. The germination capability of seeds even after 120 months of treatment.

Keywords - Pest control, Plant products protectant.

Introduction

The pulse beetle *Callosobruchus machulatus* Fab. is a major pest of economically important leguminous grains, such as cowpeas, lentils, green gram and black gram (*Mulatu 2000, Raja et al. 2000*). The larvae bore in to pulse grain which become unsuitable for human consumption, viability for replanting or for the production of sprouts. They are important pests of pulse crops in Asia and Africa under storage condition (*Ajayi 2001*).

The average Indian diet is highly imbalanced mainly due to a lack of protein source. Most of the people are vegetarian by habit and others can hardly use animal proteins in their diets because of its high cost the major source of

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Protein in their diet is pulses of various types. Which cover a total estimated area of 22.4 million hectares producing on an average 11.57 million tons of grain per year. This per capita consumption of pulse in India has been worked out to be 65g.

The present research was carried out to determine the Oviposition, Fecundity and Incubation period effect of some local plants the pulse beetle, *C. machulatus* fed on gram seeds. Effects of treatment on the viability of gram seeds was also determined.

Material & methods:

The present investigation were carried out on the Biological studies of pulse beetle, *Callosobruchus maculatus* Fab. in gram varieties with their physical, chemical parameters and its management by Nutritional plant products 6 August 2012. Department of Zoology, D.A.V. College, Kanpur. Different techniques employed for conducting the experiments in recording the observation and in analysis data:

Efficacy of seed protectants against *C. maculatus*

Seed protectants :

Vegetable oils viz., Nageswar, Harida, Satavari, Holkusha, Vish kandara, Sugarbeet, Eucalyptus, Ketamer, Piperment and Asgok were collected from local market Kanpur to use as seed protectant against pulse beetle (*C.maculatus*) and leaves of plant for extraction were collected from the surroundings of Kanpur were purchased from local market. Plant extract, seed kernel (15g) and leaves from *Mesva ferrea* (Nageswer), *Leucas linifolia* (Halkusha), *Saraca asoca* (Ashok), *Mentha pipertia* (Pippermint), *Eucalyptus dives* (Eucalyptus), *Terminalia chebula* (Harida), *Aristolochia braceata* (Ketamer), *Beta vulgaris* (Sugarbeet), *Marina laongi folid* (Vishkandra), *Asparagus racemosus* (Satavari).

Preparation of leaf extract:

Seed and leaves of plants (listed in table) were procured locality. They were then thoroughly washed under tap water, followed by distilled water to remove all the dust and dirt particles. There leaves were than dried in shade and further they were grinded in a mixer. The extracts of these were prepared by soxhlet extraction method using acetone as solvent (**Deshmukh and Borle, 1975**). 30 grams of leaf powder and 300 ml of solvent were taken for the extraction keeping the ratio of 1:10. After 8 hours of extraction, the extracts were filtered using whattmans filter paper and kept in the refrigerator as stock solution. Further dilution was done with the solvent to get the desired doses for the experiments.

Assessment of efficacy of seed protectant:

The seed protectant in extract and oil forms were thoroughly mixed separately with seeds/grains of susceptible gram variety as per treatment in cylindrical jars of 1 kg capacity by manual shaking. Fifty g of seeds/grains treated with different grain protectant were kept in glass tubes to study the efficacy of protectant on the *C. maculatus*. Five pairs of 24 hrs old adults of pulse beetle were released in all the three & replications to find out their effect on growth and development of the pest for which observations on fecundity, hatching per cent, population parent, adult emergence and developmental period were recorded.

Effect of protectant on the weight loss of seeds:

To assess the losses in different protectant after completion of one generation the weight of damaged seeds was recorded after removing all dusts and insects. The difference between initial and final weights was recorded to find out the loss of weight in seeds percentage of damaged seeds was also recorded by counting damaged and undamaged grains in the 100 seeds of whole samples of each replication wise. The comparison was made with the untreated (control).

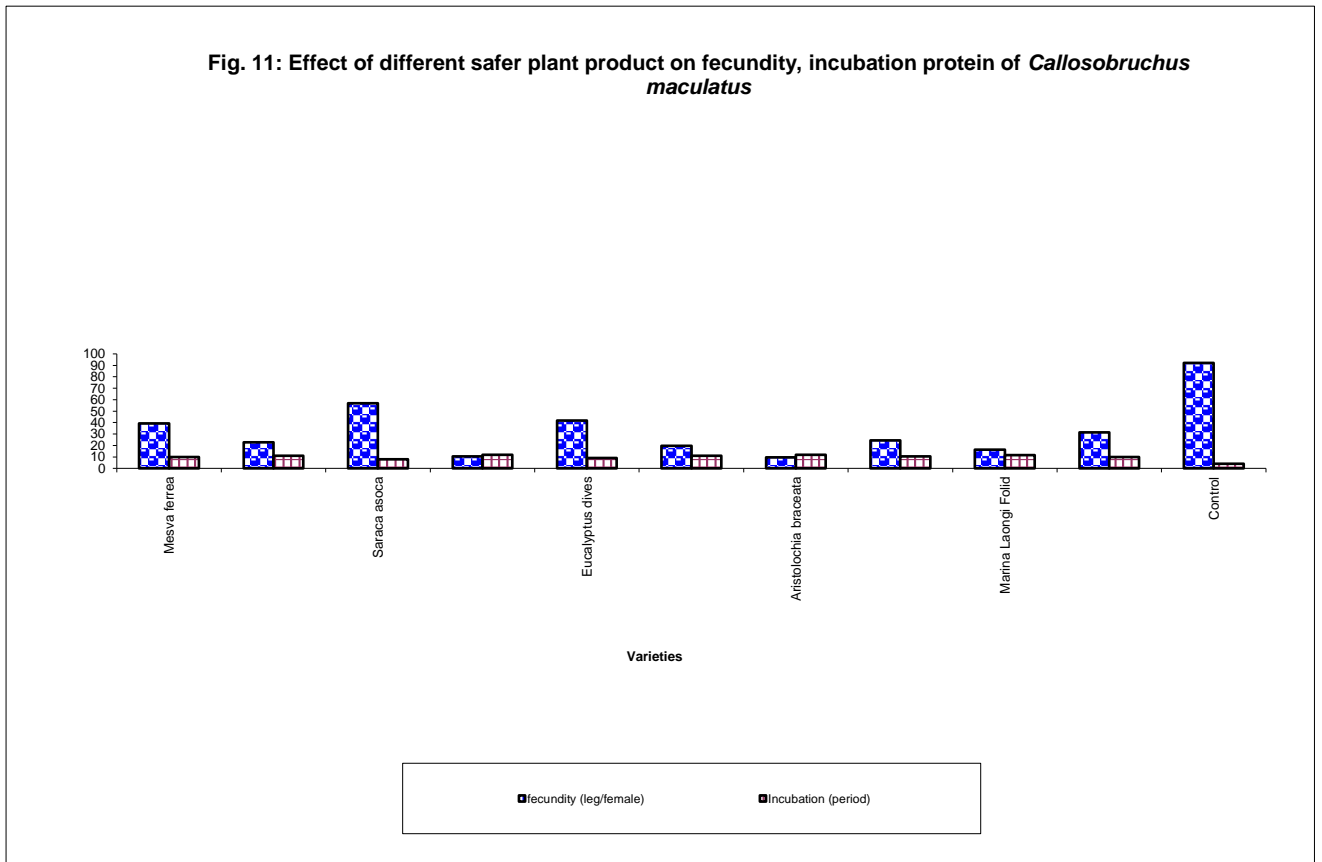
Statistical analysis:

All the experiments were kept under Completely Randomized Design with three replications. The data were computed by emplaning recommended statistical model and protocol (Chohen, 1963 and Mandal and Numbir, 1991).

Result and Discussion

Table 15: Effect of different safer plant product on fecundity, incubation protein of *Callosobruchus maculatus*

S. No.	Treatment	Common name	Dosage ml/kg	fecundity (leg/female)	Incubation (period)
1.	Mesva ferrea	Nageswer	Seed kernal 15g	39.33 (38.82)	9.78
2.	Leucas Linifolia	Halkusha	seed 15/	22.66 (28.39)	10.89
3.	Saraca asoca	Ashok	seed 15/	57.00	8.03
4.	Mentha Pipertia	Peppermint	Leaves 15/	1033 (18.72)	11.89
5.	Eucalyptus dives	Eucalyptus	Leaves 15/	41.66 (40.16)	9.06
6.	Terminalia chebula	Harida	Seed 15/	19.66 (26.28)	11.08
7.	Aristolochia braceata	Ketamer	Seed 15/	9.66 (18.05)	11.97
8.	Beta Vulgaris	Sugarbeet	Leaves 15/	24.33 (29.52)	10.45
9.	Marina Laongi Folid	Vish Kandra	Seed 15/	16.33 (23.81)	11.65
10.	Asparagus racemosus	Satavari	Seed 15/	31.33 (24.02)	10.03
11.	Control			92.07 (74.32)	4.02
	S.E. ± (d)			1.1179	
	C.D. (5%)			2.3327	



Efficacy of various plant products on *C. maculatus* fab

Effect of various grain protectants viz. seed and leaves powder *Garaca asoca* (Ashok), *Eucalyptus dives* (Eucalyptus), *Mesva ferrea* (Nageswer), *Asparagys racemosus* (Satavari), *Betavulgaris* (Sugarbect), *Leucas linifalia* (Halkusha), *Terminalia-chebula* (Harida), *Marina Longifolia* (Vish Kandara), *mentha-pipertia* (Peppermint), *Aristolochia bracteata* (Ketamer) leaves and seeds extract farther experiments were conducted to the seed and leaves extract action in controlling pulse beetle *Callosobruchus maculatus*.

Ovipositional behaviour of the pest on treated seeds

Fecundity:

The observation recorded in Table 15 and Fig 11 clearly show that all the untreated check. The female laid the minimum number of eggs 9.66 on grain treated with *A. bracteata* was at par with *M. Pipertia* (10.33). The maximum fecundity of the pest was recorded *S. asoca* (57.00) per cent the grain treated *M. Longifolia*, *T. Chebula*, *L. Linifolia*, *B. Vulgaris*, *A. Racemosus*, *M. ferrea* and *E. dives* being 16.33, 19.66, 22.66, 24.33, 31.33, 39.33 and 41.66 percent respectively.

Incubation period:

The data presented in Table 15 and Fig.11 that the *A. bractieata* seed powder provide the incubation period 11.97 at par with *M. Pipertia*, *M. Longifolia* and *T. Chebula* being 11.89, 11.65 and 11.08 day's respectively. The maximum incubation period *S. Asoca* 8.03 days the incubation period obtain from the grain treated with *L. Linifolia*, *B. vulgaris*, *A. racemosus*, *M. ferred* and *E. dives* having 10.89, 10.45, 10.03, 9.78 and 9.06 day's respectively. All the grain protectants manifested their superiority over control (4.02) in incubation period.

Table 18: Effect of safer plant product on adult emergence and f_1 progeny *Callosobruchus _ernel_es*

S. No.	Treatment	Common name	Dosage ml/kg	Adult emergence	f_1 progeny
1.	<i>Mesva ferrea</i>	Nageswer	Seed Kernel 15g	34.26 (35.79)	59.02 (18.20)
2.	<i>Leucas Linifolia</i>	Halkusha	seed 15/	7.53 (15.89)	25.03 (50.18)
3.	<i>Saraca asoca</i>	Ashok	seed 15/	51.63 (145392)	62.16 (30.02)

4.	<i>Mentha Pipertia</i>	Peppermint	Leaves 15/	14.96 (22.71)	10.11 (52.00)
5.	<i>Eucalyptus dives</i>	Eucalyptus	Leaves 15/	42.14 (40.45)	59.11 (18.53)
6.	<i>Terminalia chebula</i>	Harida	Seed 15/	4.70 (12.52)	25.00 (50.24)
7.	<i>Aristolochia bracteata</i>	Ketamer	Seed 15/	12.73 (20.88)	9.06 (17.46)
8.	<i>Beta Vulgaris</i>	Sugarbeet	Leaves 15/	28.76 (32.39)	32.06 (34.45)
9.	<i>Marina Laongi Folid</i>	Vish Kandra	Seed 15/	19.46 (05.91)	19.07 (25.84)
10.	<i>Asparagus racemosus</i>	Satavari	Seed 15/	9.73 (18.15)	95.12 (42.19)
11.	Control			86.53	141.06
	S.E. \pm (d)			0.5240	
	C.D. (5%)			1.0936	

Adult emergence:

The observation recorded on adult emergence in Table 18 and Fig. 14 the minimum adult emergence was found *A. bracteata* (13.73) at par with *M. Pipertia* (14.96) percent. The maximum adult emergence *S. asoca* (51.63) the treatments of *E. dives*, *M. ferrea*, *A. racemosus*, *B. vulgaris*, *L. Unifolia*, *T. Chebula*, and *M. Longifolia* having 42.14, 34.26, 29.73, 28.76, 26.53, 24.70 and 19.16 percent respectively.

f₁ progeny:

It is seen from the Table 18 and Fig. 14 that significantly more f_1 progeny (141.06%) was found in control in comparison to the grain treated with various plant products. The minimum f_1 progeny *A. bracteata* (9.06) at par *M. Pipertia* (10.11). The maximum f_1 progeny was found in *S. asoca* (62.16) at par *E. dives* and *M. ferrea* being 59.11 and 59.02 per cent in various plant products, number of adult varied from 45.12 to 19.07 by let was 141.06 adult in untreated check. The treatment *A. racemosus*, *B. vulgaris*, *L. Linifolia*, *T. chebula* and *M. Longifolia* leaves and seed powder was prove to the effective to reducing f_1 population.

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