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Efficacy of black pepper (*Piper nigrum*) as pesticide against *Callosobruchus maculatus* (F) in stored gram

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Abstract : Gram beetle *Callosobruchus maculatus* is a serious pest of stored legumes with polyphagous & polyvoltine biological features. Control of the pest is a big challenge to curtail the average annual loss of post harvested legumes upto 250 crores in India (FAO). In the present investigation, effect of black pepper powder (*Piper nigrum*) in controlling the pest in the form of sprinkle & emulsifier pesticide has been studied on the gram host experimentally subjected to the *Callosobruchus maculatus* infestation. Very satisfactory result has been obtained which was found statistically significant at both 1% and 5% levels of significance.

Keywords: Stored gram pest, *Callosobruchus maculatus*, *Piper nigrum* powder, control efficacy

INTRODUCTION

Black pepper, commonly known as “Golmirch” or Kalimirch in Hindi is generally used as spices and flavouring agent by people. It consists of dried unripe fruits of *Piper nigrum* Linn. it belongs to family Piperaceae. Piperine (2.5%) a pungent alkaloid is the major chemical constituent of Black Pepper.^{1,2} The insecticidal role of black pepper has been reported by many workers.

Insect pest (*Callosobruchus maculatus*) – Bean beetles, *Callosobruchus maculatus* (F) are insect pest of Africa and Asia that Probable rang throughout the tropical and subtropical world. This species is also known as ‘Southern Cowpea Weevil’. The larvae of this species feed and develop exclusively on the seed of legumes (Fabaceae). Hence the name “bean beetle” The adults do not require food or water and spend their limited life span (one - two weeks) mating and laying eggs on gram bean etc. Black pepper was obtained from the local market. It was washed thoroughly, dried and then put into incubator for 8 hours

at 60°C to make it free from any organism. The dried black pepper was ground into powder by a high speed rotary mill. The powder was again dried and then collected into dry bottle for experimental work.³

In this experiment pesticidal role of Black Pepper Powder (BPP) against *C. maculatus* infesting stored gram was tested.

MATERIAL & METHODS

BPP was taken from the laboratory stock maintained for this experiment. 8 doses of BPP i.e. 0.5gm, 1gm, 1.5gm, 2gm, 3gm, 3.5gm and 4 gm were taken each container containing gram was treated with a particular doses of BPP. Containers with BPP treated gram were tightly closed and shaken vigorously for 10 minutes for optimum coverage of the grain surface. Five pairs of freshly emerged test insect, *C. maculatus* from the laboratory culture were then released in each container. The same numbers of insects were also released in the control also. Adult mortality oviposition and emergence of insects was recorded, tabulated.

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RESULT & DISCUSSION

Black Pepper Powder treatment showed clear cut effect on adult mortality, egg laying and population growth of insect pest. *Callosobruchus maculatus* infesting stored gram. In the highest dose i.e. 4gm. Treatment 100% adult mortality was observed on 10 DAI. Whereas it control it was on 16 DAI. In the lowest does i.e. 0.5gm treatment adult mortality was observed from 2 DAI but in achieving 100% mortality it was similar to control i.e. on 16 DAI. 1gm, and 1.5gm, treatment lowered down this period i.e. on 14th day. In 2gm, 2.5gm, 3gm and 3.5 gm treatment 100% mortality was observed on 12 DAI. 1 gm, 1.5gm and 2gm showed 73% to 80% mortality upto 8 DAI. It was noticed that BPP started death of insect pests from the very beginning i.e. 2 DAI in all the treatments. In 2.5gm and 3gm. BPP treatments 83% to 86% mortality was observed on 8 DAI and 93% on DAI.

Oviposition was observed only in 0.5gm and 1gm treatment. In 0.5gm treatment there was no reduction in egg laying in comparison to the control. In 1gm treatment there was 31.2% reduction in egg laying than the control. In 1.5gm, 2 gm, 2.5 gm, 3 gm, 3.5 gm and 4 gm, treatment there was no egg laying.

The observation for population growth on 45th day revealed that it was similar to the control (400) in 0.5gm, treatment, whereas it was reduced to 56.25% in 1gm treatment. In 1.5gm, 2gm, 2.5gm, 3gm, 3.5gm and 4gm treatment there was no growth at all.

Effect of Black Pepper Powder (BPP) Treatment

BPP/ 100 gm. of gram	Adult Mortality Percentage							
	2 DAI	4 DAI	6 DAI	8 DAI	10 DAI	12 DAI	14 DAI	16 DAI
Control					30	63	80	100
0.5 gm.	20	20	26	30	30	80	90	100
1 gm.	50	53	70	73	76	86	100	
1.5 gm.	50	60	70	80	80	90	100	
2 gm.	60	60	70	80	80	100		
2.5 gm.	60	66	70	83	93	100		
3 gm.	70	70	83	86	93	100		
3.5 gm.	70	70	80	88	95	100		
4 gm.	70	80	80	93	100			

DAI = Days After Infestation

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