

INSECTICIDAL EFFICACY OF KOLMOU (*Ipomeacarnea* L.) AGAINST BRUCHID (*Callosobruchus chinensis*)

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ABSTRACT

Aqueous extract of Kolmou (*Ipomea carnea* L.) was evaluated in the laboratory, Department of Entomology, Assam Agricultural University, Jorhat, to determine its effect on adult mortality of Bruchid (*Callosobruchus chinensis*). Residue film technique was carried out with different concentrations viz., 7.00, 5.00, 3.00, 2.00, 1.00 and 0.50 per cent. Among all the concentrations highest mortality was found at 7.00% with 94.73% mortality after 72 hours. The LC₅₀ value was found to be 0.45% after 72 hours of treatment. Thus, the *Ipomea carnea* extract has insecticidal potential against the target insect which can be the alternative for synthetic insecticides.

(Key words : *Ipomea carnea*, *Callosobruchus chinensis*, LC₅₀, Aqueous extract)

INTRODUCTION

Pulses are the edible seeds of the crops from legume family. They are rich in protein and helps in increasing soil fertility by fixing the atmospheric nitrogen in their legumes. Chick pea, Green gram, Black gram, Pigeon pea, Pea etc. are the major pulse crops grown in India. India is the largest producer (25% of global production), consumer (27% of world consumption) and importer (14%) of pulses in the world (Anonymous, 2020).

Most of the pulses are subjected to be attacked by different insect-pests in both field and storage condition. Post-harvest loss in pulses due to insect pests are the major problem faced by the developing countries in Agriculture. Among them pulse beetle *Callosobruchus* spp. is the most destructive pest of pulses (Bhalla *et al.*, 2008)

Legume crops suffers post-harvest loss in storage condition from Bruchids both qualitatively and quantitatively (Raghu *et al.*, 2016). It is seen that Pulse beetle, *Callosobruchus chinensis* caused about 40-50 per cent loss in pulses (Gosh and Durbey, 2003). Damage by the *Callosobruchus* may cause holes in the grain, loss of grain weight and reduction of the seed germination (Manju *et al.*, 2019).

Among different management practices of these insect pests, chemical control methods are found to be effective, but use of excessive chemical pesticides in storage condition harm the environment as well as hazardous to the human. Botanicals are the best alternative for the chemical pesticides. There are many species of plants, which have insecticidal activity as well as they are eco-friendly, bio-

degradable, non-toxic in nature (Kalita *et al.*, 2016). Thus, the present investigation was taken to study the efficacy of plant extract against *Callosobruchus chinensis*.

MATERIALS AND METHODS

Collection and preparation of extract

For preparation of extracts, matured leaves of *Ipomea carnea* were collected from different locations of Jorhat, Assam. The leaves were then shade dried and powdered by using an electric grinder and passed through a 20 mesh sieve and kept in container. Aqueous extraction of powdered material were done by mixing 100 g powdered material in 100 ml distilled water and kept it for 24 hrs. After that, by using double folded muslin cloth separate the crude extract to make 100% stock solution (Sarma *et al.*, 2019), which was further diluted serially to obtain desired concentration for subsequent use in the experiment, viz., 7%, 5%, 3%, 2%, 1% and 0.5% for subsequent use in the experiment.

Maintenance of *C. chinensis* culture

The *Callosobruchus chinensis* were collected from the storage of pulse and mass culture of the insects were done on chick pea in plastic containers, each with 200 g of seeds and some pairs of matured adults of *C. chinensis* were released. The containers were covered with muslin cloth and secured with rubber band and the cultures were maintained in room temperature. Ovipositions of adults were allowed in the container and after 25 to 30 days emerging adults were collected and transferred to another container for further maintenance of sub-cultures (Manju *et al.*, 2019).

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Bioassay against adult *C. chinensis*

In Petri-plates different concentrations of plant extract of *Ipomea carnea* were poured and let it dry. After that, from the stock culture, 10 number of healthy *C. chinensis* were released onto each Petri-plates. The number of live insects were counted at 24, 48 and 72 hr after treatments. Each treatment was replicated three times. The data on mortality were subjected Abbot's correction (Abbot, 1925) before angular transformation, whenever mortality in the control is obtained. Corrected per cent mortality was calculated using Abbott's formula as mentioned below.

$$\text{Corrected mortality (\%)} = [(S - K) / (100 - K)] \times 100$$

Where,

S- Per cent mortality in the treated group

K- Per cent mortality of the control group

Further, data on per cent mortality were subjected to probit analysis for calculation of LC₅₀ values by using SPSS computer software package (ver. 25.0).

RESULTS AND DISCUSSION

The present study revealed that the chloroform extracts of *Ipomea carnea* has lethal effect against *C. chinensis* under laboratory condition. Table 1 represents the data on effect of chloroform extracts of *Ipomea carnea* against *C. chinensis* and the data revealed that the extract cause highest of 94.73% adult mortality of *C. chinensis* 7% concentration after 72 hours of treatment as compared to the lowest of 11.53% mortality at 0.5% concentration after 24 hours of treatment. Khan *et al.* (2015) evaluated the effect of *Ipomea carnea* against bruchids in mung bean and found that it can drastically reduce the grain infestation as well as adult emergence of the pest. From the Table 2, the LC₅₀ value of *Ipomea carnea* was found to be 0.45% at 72 hours after treatment. The mortality of *C. chinensis* was found increased with an increase in concentration and exposure time. Same kind of results were also observed by Kumar *et al.* (2007), where *Ipomea carnea*, significant toxic effect against *Sitophilus oryzae*.

Table 1. Toxicity of solvent extracts of *Ipomea carnea* on adults of *Callosobruchus chinensis* compared to control

Concentrations	Mortality		
	24 Hr	48 Hr	72 Hr
0.5	11.53 (19.85)	18.18 (25.23)	31.57 (34.18)
1	19.23 (26.00)	22.72 (28.47)	47.36 (43.48)
2	23.07 (28.70)	36.36 (37.08)	57.89 (49.53)
3	34.61 (36.03)	40.90 (39.76)	68.42 (55.80)
5	46.15 (42.78)	54.54 (47.60)	89.47 (71.06)
7	53.84 (47.13)	68.18 (55.65)	94.73 (76.70)

Table 2. Insecticidal toxicity of *Ipomea carnea* on adults of *Callosobruchus chinensis*

HAT	LC ₅₀ (Per cent)	(Fiducial limits 95% confidence)	
		Lower	Upper
24	4.28	3.36	5.92
48	1.37	0.98	1.78
72	0.45	0.23	0.76

The present study revealed that among all the concentrations of *Ipomea carnea* the LC₅₀ value was found at 0.45% concentration after 72 hours of treatment. Thus, present investigation gives a way to reduce the toxic effect

of chemical by incorporating the plant extract which are found to be less hazardous and are the important component of the present eco-friendly environment.

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