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EFFICACY OF FRUIT EXTRACT OF EMETIC NUT, *Randia spinosa* AGAINST RED PUMPKIN BEETLE INFESTING BITTER GOURD

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Abstract

The Red pumpkin beetle *Aulacophora toveicollis* (Lucas) causes a severe damage to cucurbits and considerable reduction in yield in India. The investigation was carried out during summer 2019 at the field and laboratory of Zoology Department, P.P.N. College, Kanpur. The use of conventional synthetic insecticides is costly and involve risk of hazards. To control this pest properly it is necessary to determine the extent of damage and to find out the accurate dose of insecticide, keeping in view the above facts and figures this study was conducted to equate the efficacy of botanical insecticides against Red pumpkin beetle in bitter gourd, 100 ml of the aqueous fruit extract of *Randia spinosa* was sprayed five times at weekly interval on 5m x 10m plot area (Total three plot) and compared with control. The mean number of beetles killed per plant in the treated plots ranged from 16.0 to 49.2 against control. The protection of the crop from beetle by spending Rs. 18.75/- per plot towards cost of botanical insecticides plus labour thus in 360 kg of more fruits of bottle gourd.
Keywords: *Aulacophora toveicollis* , *Randia spinosa*, bitter gourd

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Introduction

Bitter gourd (*Momordica charantia* (L) is a polyploidy vegetable and medicinal plant in the family Cucurbitaceae (Matsumura et al, 2020). Bitter gourd is a summer vegetable to all classes of people of India, as well as in Asia, (Khan et al, 2019; Beloin et al, 2005).Vernacular English name of *M. Charantia*, include bitter gourd, bitter melon, balsam pear bitter apple and bitter African or wild cucumber. Several different name in Asia and Africa exist. The most popular name is 'Karela'. Which is used both in India and in east Africa. In India and south-east Asia cultivated *M. Charantia* is divided in to two group, fruit with a diameter less than 5 cm and fruit larger than 5 cm in diameter (Reyes et al, 1994). Most studies have shown a blood glucose lowering effect of the fruit of bitter gourd when fed orally as a single dose. In earlier research it was recognized that viable β cells appeared to be essential for bitter gourd's hypoglycemic activity. The juice formulation of bitter gourd have proven to be more effective in lowering blood sugar and HbAa-c levels than its dried fruit products. Bitter melon has been used as a folk remedy for tumors, asthma, skin infections, GI problems and hypertension. Morphologically, the bitter gourd is an herbaceous vine which bears tendrils and it creeps along supports leaves are simple and alternate and flower are yellow. Male and female flowers grown on separate plant.

Red pumpkin beetle (*Aulacorphora foveicollis* L.) is a common and major part of a wide range of cucurbits. Specially sweet gourd, bottle gourd, bitter gourd, white gourd water Milon and musk melon. It is polyphagous in nature (Laila et al, 2015) Both larval and adult stages are injurious to the crop and cause severe damage. (Rahaman and Pradhan, 2007) The grubs feed on the roots while the adults make characteristic perforations on the leaves and flowers and cause considerable reduction in yield (Rajak, D.C. 2002).

Population of Red pumpkin beetle was found increase with the increase in temperature expressing significant correlation both with maximum and minimum. However the rainfall and relative humidity showed negative correlation with the population development of the pest (Ghule and Jha, 2012). The pest is controlled effectively with synthetic insecticides like carboxyl, endrin, phosphamidon, carbofuran, deltametrin and malathion. (Rahaman and Pradhan, 2007). The farmers also use these conventional insecticides indiscriminately with indefinite number of spray, which are costly and involve the risk of hazards. As on alternative plant derivatives serves as the means of efficient control of different insect pests (Atwal and Dhaliwal 2002).

Botanical pesticides are environmentally safer, unique with noval mode of action and rich source of biologically active compounds. Keeping all the points in view, the experiment was conducted to evaluate the efficacy of aqueous fruit extract of *Randia spinosa* against red pumpkin beetle, *Aulacophora foveicollis*.

Material and Methods

Studies were carried out to estimate the degree of damage to the foliage and the loss in fruit yield due to attack of the pest (*Aulacophora foveicollis*). Pots each measuring 5m x 10m with row to row and plant to plant distance of 3m x 1m respectively.

OBSERVATION:

Observation for beetle were recorded from the bagged plants starting weekly intervals during early hours of the day (7-9 A.M.).

Evaluation of Bioefficacy of *Randia Spinosa* against Red Pumpkin Beetle:

A field was conducted during summer 2019 to evaluate the bio efficacy of eco-friendly pesticide against pest and economically suitable for farmers. The crop protected from the beetles by spraying at weekly intervals with 100.0 ml (obtained from 25g of dry fruit powder of *R. spinosa*) per plot area, depending upon the stage of the crop starting from first appearance of beetles up to a week before the maturity of the crop and compared with untreated (control). The five sprays were carried out in the treated crop during this period.

Estimating the Losses:

For estimating the losses, observations for the mortality of adults from 5 plants per plot were recorded at beetles killed per plant was worked out. Weekly record of leaf perforation on these plant was also maintained by grading 25 leaves per plot (5 top leaves /plant) and giving them index number as zero = free, 1 = 25% damage, 2=50% damage, 3=75% damage, 4=100% damage, observation on the number of branches and leaves and maximum length of the vines were taken from 3 full grown plants/plot and mean number of leaves, branches and length was worked out.

Fruit Yield of Bitter Gourd:

The fruit yield was recorded picking wise from each plot in kg. To determine the increase in yield and avoidable losses.

Increase in Yield over control (%)=

$$\frac{\text{Yield in treatment} - \text{Yield in control}}{\text{Yield in control}} \times 100$$

Loss (%) in yield =

$$\frac{\text{Highest yield in treated plot} - \text{Yield in treated plot}}{\text{Highest yield in treated plot}} \times 100$$

Result and Discussion

By the application of *Randia spinosa* the population and damage of red pumpkin beetle was reduced. The mean number of beetles killed per plant in the treated plots ranged from 16.0 to 49.2 as compared to no mortality in control (Table-1) lead perforation in the sprayed 1.33 and 7.39 to 20%, respectively. Hussain et al (2011) evaluated the efficacy of different botanical/plant extracts against red pumpkin beetle (*Aulacophora foveicollis* Lucas). Rathod et al. (2009) conducted an experiment and record maximum mortality in neem based commercial formulation against red pumpkin beetle.

Table 1 : Effect of aqueous botanical fruit extract of *R. spinosa* on *A. foveicolis* mortality and damages.

S.No.	Mean Number of beetles killed (per plant)/ control	Percent damage (per leaf) Aqueous fruit extract of *R. spiosa* spray 100ml	Control
1st Day	16.0/c = 0	1.33 (6.6)	22.0 (25.0)
7th Day	30.5/c = 0	0.26 (2.9)	16.73 (24.10)
14th Day	49.2/c = 0	0.26 (2.9)	16.73 (22.8)
21th Day	44.6/c = 0	0.26 (2.9)	9.76 (18.2)
28th Day	23.0/c = 0	00	7.39 (15.8)
SD	14.068	0.436	5.787
SE (m) ±	1.101	0.275	0.687
+ test	2.238	0.947	1.29
C Dat 5%	13.91	9.05	10.56

Total C.D. at 5%: 6.83, F-test : 25.75 at 5% : 6.39 at 0.1% : 16.0, significant at 0.1 level of significance (Figures in parenthesis are angular transformed values).

Red pumpkin beetle is a key pest of bitter gourd and it has been reported as a destructive insect pest of cucurbitaceous vegetables cucumber and melon. Red pumpkin beetle is injurious to the crops in both larva and adult stages. In experiment there was 16.73 to 22.0 times more damage to the foliage in the unprotected crop as compared with the protected significant increase in the growth and yield of the crop in the treated crop over the control was recorded (Table

2). The mean number of branches, leaves, length of vine and yield in the protected plots worked out to be 1.83, 1.92, 1.77, 2.5, 8.75/plot times more than control. The protection of the crop from the beetle by spending Rs. 18.75/plot towards cost of botanical insecticides plus labour thus, resulted in 360 kg more fruit of bitter gourd.

Table 2 : Effect of aqueous botanical fruit extract of *R. spinosa* on growth and yield of Bitter gourd.

Treatment	Mean number of Branches per plant	Mean number of leaves per plant	Mean length of stem per plant (m)	Yield per plot (kg)
R. spinosa Aqueous fruit extract	7.43	90.40	2.24	600
Control	4.06	47.02	1.26	240

On application of Aqueous fruit extract the population and damage of red pumpkin beetle was reduced and it is also understood that botanicals over biodegradable and environmentally friendly than synthetic insecticides. It is also recommended that botanicals have great extent of repellence for long term It may be evaluated for the controlling of red pumpkin beetle for small stock holders.

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