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IPM of *Galerucella birmanica* (Jacoby) by Plant Extract

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Abstract:

Galerucella birmanica is a very serious Pest of *Trapa bispinosa*'s leaves. Which is a stable food and a rich source of starch. In present study it is clear that use of plant extract (bio pesticide) will be suitable for IPM, than harmful synthetic pesticide for control of the serious pest. Alcoholic as well as Acetonic leaf extract of *Nicotina plumbiginifolia* has used as biopesticide on leaves of *T. bispinosa*. for study of feeding behaviours (crop damaging) and oviposition of *G. birmanica*. The consumption of treated food (leaves of *trapa bispinosa*) was very poor. The deterrent action of *Nicotiana plumbiginifolia* remained high and egg deposition ranged **10-18 in 48** hours and **111-149 in 72** hours of exposure on treated leaf of *Trapa bispinosa*. In control egg deposition was **29-40 in 48** hours and **295-350 in 72** hours respectively. Low emergence of *Galerucella birmanica* on treated, plant inhibition effect of the extract on adult emergence. The adult emergence in control were significantly higher on treated leaves of *Trapa bispinosa*.

The antifidant property of *N. Plumbiginifolia* in both alcoholic as well as acetonic extract showed that it is more effective in acetonic solvent. The ratio of acetonic and alcoholic 1% solution of *N. plumbiginifolia* for food consumption showed approximately 1:2.

Keywords: Biopesticides, Feeding, *Trapa bispinosa*.

Introduction:

Trapa bispinosa is a rich source of starch, it is mostly taken as stable food by many persons. *Trapa bispinosa* (Singhara) is primarily a warm season crop.

Galerucella is a genus of leaf beetle in the family Chrysomelidae of order coleoptera, *G. birmanica* (Jacoby, 1889) observed as a very serious pest on the leaves of chestnut (Singhara), Entomologists try to reduce the crop losses from *G. birmanica* not only by spray of synthetic chemicals alone but also by biological control and developing innovative, eco-friendly practices of pest management.

According to Barr et al. (1975) about 800 species of insect pests are known, which are injurious.

In India *G. birmanica* causes considerable damage as male and female adult feed the green tissues of leaves, the photosynthetic part of plant. Phytopathologists try to reduce the crop losses not only by spray of chemicals alone, but using high yielding disease resistance varieties, biological control and by developing innovated, eco-friendly method of different plant extracts. Entomologists have isolated and identified many chemical compounds, isolate from leaves and seeds of various tropical plants and screened out as insect feeding deterrents and growth inhibitors.

Nicotiana plumbiginifolia of family *Solanaceae* is cultivated in India for its leaves, which furnish the tobacco. Extract of its leaves is tested to assess its effectiveness against growth, development, and egg laying of *G. birmanica*.

Material and Methods:

Alcoholic and Acetonic leaves extract of *Nicotiana plumbiginifolia* were prepared in laboratory and tested in the same month on *G. birmanica* reared on *Trapa bispinosa* cultivars in glass house.

Observation:

Observations were made on feeding and oviposition of this pest in treated and untreated *Trapa* seedlings. Statistical calculation was done as per Finney (1971).

The leaves of *Nicotiana plumbiginifolia* in dry condition were grinded as fine powder and prepared Alcoholic and Acetonic leaves extract of *N. plumbiginifolia* in laboratory and were tested in the same month on *G. birmanica* reared on *Trapa bispinosa* cultivars in glass house.

The *Galerucella birmanica* (Jacoby) were reared in the laboratory from a stock culture. The pest was reared on susceptible germinating plants in pot culture.

The consumption of leaves as food (mm²) were measured with the help of section paper and recorded after 48 hrs. and 72 hrs. of exposure in treated and untreated germinating plants.

The total leaves consumption statistically analyzed to determine the significant damage of leaves. For determination the deterrent action of the leaf extract (Alcoholic & Acetonic) on oviposition of *G. birmanica*, 4 to 5 days old, two pair adults were allowed to feed on treated and untreated *Singhara* plant's leaves.

Result and Discussion:

After release of 4 to 5 days old *G. birmanica* on both treated as well as untreated leaves of *T. bispinosa*, these adult beetle started feeding very fast. However, *G. birmanica* on untreated leaves food normally. However, the consumption of food on treated leaves with 1.0% as well as 0.5% *N. plumbiginifolia* in alcoholic as well as acetonic solvent were significantly lower.

These findings are in agreement with those of **Dwivedi and Bhati (2006)** who studied antifeedent property of selected four plant extracts (*Ricinus communis* (seeds), *Tagetes erecta* (flower), *Zinnia angustifolia* (leaf) and *Embllica officinalis* (fruits) and reported that *Ricinus communis* was most effective antifeedent for *Callosobruchus chinensis*.

The acetonic plant extract of *Nicotiana plumbiginifolia* was found to be more effective than alcoholic plant extract. 1% concentration for both acetonic and alcoholic plant extract of *N. plumbiginifolia* provided satisfactory results. Ratio reported of treated acetonic and alcoholic 1% concentration for food consumption after 48 hrs. was 1:2.

Experimental findings indicate that leaves of *N. plumbiginifolia* contain probably some antifeedent agents. Adult *G. birmanica* fed on leaves of *T. bispinosa*, treated with 1.0% and 0.5% extract of *Nicotiana plumbiginifolia* (alcoholic and acetonic) laid significantly lesser number of eggs than those fed on untreated leaves.

The deterrent action of *G. birmanica* against both alcoholic and acetonic leaf extract of *N. plumbiginifolia* seen high and egg laying ranged from 10 to 18 during 48 hrs. and 111 to 149 in 72 hrs during exposure to treated leaves as against egg deposition ranged from 27 to 40 in 48 hrs and 300 to 350 in 72 hrs. respectively in control.

When 4 to 5 days old *G. birmanica* female were released on new germinated leaves of *T. bispinosa* treated with 1.0 and 0.5% alcoholic and acetonic extract, they spent more time in searching for oviposition and feeding sites on young leaves.

The deposition of eggs on controls was more than those on treated leaves. This pest management experiment supports the findings of Hellpap (1983) who experimented on *S. frugiperda* with Neem Kernel extracts.

Above experimental findings represent that biopesticide like plant extract of various family can be used as an approach of IPM as it is relatively safer for environment.

Table 1 : Consumption of Food (leaves of *T. bispinosa*) by *G. birmanica* (Jacoby) on treated and untreated *Trapabispinosa* leaves

Plant extract	Concentration (%)	No. of <i>G. birmanica</i> /replication	Consumption of food / pair of adult (mm ²)	
			48 hrs.	72 hrs.
N. plumbiginifolia (Alcoholic)	1.0%	4	52.0	58.2
	0.5%	4	64.5	79.46
N. plumbiginifolia (Acetonic)	1.0%	4	27.2	25.8
	0.5%	4	45.16	56.36
Alcohol	0.0	4	442.6	480.53
Acetonic	0.0	4	365.75	450.02
Water	0.0	4	446.26	471.70

Table 2 : Oviposition by *G. birmanica* (Jacoby) on treated and untreated *T. bispinosa* plant

Plant extract	Concentration (%)	No. of <i>G. birmanica</i> /replication	Consumption of food / pair of adult (mm ²)	
			48 hrs.	72 hrs.
N. plumbiginifolia (Alcoholic)	1.0%	4	10.0	111.0
	0.5%	4	16.0	129.0
N. plumbiginifolia (Acetonic)	1.0%	4	12.0	130.0
	0.5%	4	18.0	149.0
Alcohol	0.0	4	29.0	300.0
Acetonic	0.0	4	27.0	295.0
Water	0.0	4	40.0	350.0

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