

Effect of *Catharanthus roseus* (L.) (Apocynaceae) extract on developmental stages of *Erias favia* stall

Sunil Kumar Dubey, R. C. Saxena, P. K. Mishra, Ashutosh Gautam * and M. L. Khare

Pest Control Research Laboratory S. S. L.Jain College, Vidisha (M.P.).

* India Glycols Ltd., Bazpur Road, Kashipur 244 713 (Utranchal),

Abstract

Developmental defect in *Erias favia* was investigated due to aqueous extract of *Catharanthus roseus*. The extract caused significant reduction in adult emergence as well as in percentage of egg hatch in *Erias favia*.

Key Words: *Catharanthus roseus*, *Growth inhibition*, *Erias favia toxicity*.

Introduction

Botanical compounds particularly those with acute properties have been used as insecticides for many years (Jacobson and Crossby, 1971 and Rajendran and Gopalan, 1978). Some plants are excellent sources of substances disruptive of growth and behaviour (Kubo *et al*, 1983 and Kaur *et al*. 1989) Kalyansundrum and Das 1985 and Despande *et al*. (1988) reported the larvicidal and enzymatic activity of *Catharanthus roseus* extract on mosquito larvae and on *Spodoptera litura*.

The number of other plants whose extract caused juvenile and anti-juvenile hormone activity in dipteran and lepidopteran larvae (Saxena *et al*., 1992 and Kubo *et al*. 1983). *Catharanthus roseus* (L)

(Apocynaceae) is sturdy perennial herb with known diverse biological activity. *Catharanthus roseus* showed developmental defects on larval stages of a Cotton pest of lepidoptera, *Erias favia* which is also pest on *Hibiscus esculentus*.

Plant description and Identification

The plant, *Catharanthus roseus* (L.) Apocynaceae was found distributed through out the country. The perennial herb collected from botanical garden at the College campus, after identification in the P.G Department of Botany of the College. A voucher specimen was deposited in the herbarium of the laboratory at No. 15.

The structure of the plant was supported earlier by Rastogi and Mehrotra (1991) to contain Catharanthine. Phytochemical study with the leaves at *Catharanthus roseus* was found to possess “Catharanthine”

2. Material and Methods

2.1 Plant Material

Fresh leaves of *Catharanthus roseus* collected in large quantities were thoroughly washed in tap water, shades dried and powdered (40 to 60 mesh). The powdered materials were extracted with water using the cold percolation methods of Harborne (1984). The extract was concentrated using a vacuum evaporator and the residue was dissolved in acetone to make the desired concentrations.

2.2 Bioassays

Erias favia (Lepidoptera : Noctuidae) was cultured in glass jars capped with muslin cloth and rubber band in the insectary maintained at temp. + 1°C, RH 75% and 14:10 hr. L:D Photoperiod. Insects were fed on fresh seeds of *Hibiscus esculentus* soaked in drinking water. A piece of Whatman filter paper was kept in each jar for egg laying, eggs and pupae from the laboratory culture stock were used for experimental bioassays.

2.3 Treatment of eggs

The freshly laid eggs (0-12 hr) were treated using in contact method. A film of extract was prepared by spreading 0.5 µl of different concentrations 1.0, 0.5, 0.25 and 0.05% on petridish. The solvent was allowed to evaporate by rotating the petridishes. There were three replicates for each treatment. Percentage corrected mortality was calculated by Abbott's formula (1925).

2.4 Treatment of pupae

Freshly ecdysed pupae (0-24 hr old) were treated with the different concentration of the extract topically by a Hamilton microlitre syringe in 5/ml doses. A control with acetone alone was also run separately. The pest performance parameters studied included the hatching success of eggs pupa period, adult emergence and mortality.

3. Results and Discussion

Hatch was considerably reduced when caped in contact with different concentration at the water extract of *Catharanthus roseus* (Table 1). No egg hatched was recorded at the higher concentration, and at lower concentration it got reduced to 46, 22 and 6% respectively. The delayed pupation and the longevity of adults also found to be 3.1 days against 7.3 days in control as reported by Garcia and Rambold (1984) who observed delayed pupation in *Rhodnius prolixus* by the treatment of Azadirachtin. The inhibited egg development in female *Locusta migratoria* was also reported by Rambold & Siebr (1980) is quite similar as noticed in the egg of *Erias favia*. Tischler *et al.* (1989) described the effect of ecdysteroid on the growth of the flight muscles in *Manduca sexta*. They have mentioned that growth, development and sexual maturation largely regulated by ecdysome and JH. The results of present study also suggest that *Catharanthus roseus* could be a new success of biopesticidal compound for suppressing best population at an early stage of their development.

Acknowledgement

Financial assistance received from MAPCOST (Project No. B/50/91, Bhopal) (M.P) India is greatly acknowledged. Thanks are due to Dr. R.C. Saxena for guidance and correcting the manuscript.

References

- Abbot's S, W.S. 1952. A method of computing the effectiveness of an insecticide. **Journal of Economic entomology**, 18,265-270.
- Deshpande, S.G. Joseph, M. and Sharma, P.N., 1988. Insect growth and development inhibition properties of *Catharanthus roseus*. **International Tropical Agriculture**, 6, 287-290.
- Garcia, E.S., and Rembold, H., 1984. Effects of Azadirachtin on ecdysis of *Rhodnius prolixus*
- Harborne, J.B., 1984. **Phytochemical methods** 2nd edition (John Willey and Sons, London), pp. 257.

- Jacobson, M and Crossby, D.G., 1971. **Naturally occurring insecticides**. (Marcel Dekker Inc., New York) pp. 585.
- Kalyansundrum, M. and Das, P.K., 1985. Larvicidal and synergistic activity of a extract for mosquito. **Indian journal of Medical Research**. 82, 19-23.
- Kaur, A., Thakur, S.S. and Sabitaraja, S., 1989. *Chrysanthemum indicum* an effective growth and development inhibitor of *Dysdercus similis*. **Journal of Environment Biology**, 10(40), 373-377.
- Kubo, I.J., Klocke, A. and Assano, S. 1983. Effect of ingested phytoecdysperiod on the growth and development of two lepidopteroid larvae. **Journal of Insect Physiology**, 29(4), 307-316.
- Rajendran, B. and Gopalan, M., 1978. Note on the insecticidal properties of certain plant extracts. **Indian Journal of Agriculture Science**, 9, 295-297.
- Rembold H. and Sieber, K.P., 1980 Effects of Azadirachtin on oocyte development in *Locusta migratoria migratorioides*. Max planck Institute fur Biochemie, Martinsried federal Republic of Germany prec; 1st Int. Neem Conf. Rottach Engern. Pp. 75-80.
- Rastogi and Mehrotra. 1991 Phytochemical study with the leaves of *Catharanthus-roseus* was found to posses "Catharantine" Indian Medicinal plant PID, CSIR New Delhi India. pp. 90-91.
- Saxena, R.C., Dixit, O.P. and Sukumaran, P. 1992. Laboratory assessment of indigenous plant extracts for anti-juvenile hormone activity in *Culex quinquefasciatus*. **Indian Journal of Medical Research** 95, 204-206.
- Tischler, E., Mark Paul, Clock, Shirley Hodsolen, Susan Mcready and Minwu 1989 Ecdysteroids influence growth of the dorsolongitudinal flight muscles in the tobacco horn worm (*Manduca sexta*). **J. Insect. Physiol.** Vol. 35 No. 12: pp. 1017-1022

Table-1: Effect of water extract of *Catharanthus roseus* on inactive development stages (egg) of *Erias favia* Stall.

Dose in Percent	No. of egg treated	Percent egg Hatching	Incubation Period (in days)	Percent Mortality	Percent Corrected Mortality
1.0	100	-	-	100	100.0
0.5	100	-	-	100	100.0
0.25	100	-	-	100	100.0
0.01	100	6	4-5	90	92.0
0.05	100	22	4-5	72	75.0
0.025	100	46	4-6	54	50.0
Control	100	92	4-6	8	-

0.5 wg. Dose of each concentration was used.
First three concentration caused 100% mortality of the eggs (0-12 hr).

Table -2 : Effect of water extract of *Catharanthus roseus* on inactive development stages (egg) of *Erias favia* on topical application.

Dose mg/pupa	Conc. N (%)	No. of Pupa treated	Percent in death within population (a)	Percent died out in the puparium (b)	Percent mortality at pupal stage (a+b)	Percent corrected mortality	Percent adult emergence	Adult longevity (days)	Pupal period (days)
5	1.0	25	100.0	-	100.0	100	-	-	-
5	0.5	25	90.0	10.0	100.0	100	-	-	-
5	0.25	25	72.3	24.6	97.0	100	3.0	3.7	6.5
5	0.85	25	64.0	26.0	90.0	100	10.0	3.7	6.5
5	Control acetone alone	25	4.0	-	4.0	100	94.0	7.1	4.5

Adult longevity and pupal period is mentioned for living adult only.-