International Journal of Entomology Research
ISSN: 2455-4758; Impact Factor: RJIF 5.24
Received: 09-05-2020; Accepted: 21-05-2020; Published: 11-06-2020
www.entomologyjournals.com
Volume 5; Issue 3; 2020; Page No. 145-146

Fruit extracts of *Cleistanthaus collinus* (Roxb.) Benth. Against *Plutella xylostella* (L.)

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Abstract
Studies were carried out to determine the effect of *Cleistanthus collinus* L. fruit extracts on the third instar *Plutella xylostella* using leaf disc bioassay method. Seven different concentrations (1, 3, 5, 7, 9 and 11%) along with untreated control were tested. The extracts showed divers anti insect properties such as insecticidal and insects growth regulatory at different concentrations. Among the hot water and water extracts of leaves, hot water extract showed maximum larval mortality activity of 80%per cent in higher concentration. When concentration increased the larval mortality was also found to be increased.

Keywords: *Plutella xylostella, Cleistanthus collinus*, fruit extract

1. Introduction
The Diamond back moth *Plutella xylostella* L. was most important pest of crucifer vegetable grown around the world [1, 4]. The pest have been most difficult to control because of they have developed resistance to a rage of synthetic insecticides [5]. Botanical insecticides can help to avoid such problems because they act specifically as oviposition and feeding deterrents [6]. *Clistanthus collinus* (Roxb.) Benth. (Euphorbiaceae) is known as a toxic plant and found in dry hills in India. *C. collinus* is a small deciduous wild tree possessing dark brown to black exfoliating, rough bark and alternate ovate leaves. All the parts of plant are reported to be toxic and used by tribal people for homicidal, fish poison and for inducing criminal abortion. Few traditional farmers in Andhra Pradesh reported the insecticidal property of the plant extract and used the extract in the management of rice pest [2]. Thus, the present study was carried out to validate the water extract for its anti-insect properties.

2. Materials and methods
2.1 Collection of samples
Cleistanthus collinus fruits were collected from kolli hills on Namakkal District (Tamil Nadu), India in the longitude and latitude of 78.36 E' & 11.28 N' respectively. Fruits brought to the laboratory were shade dried for fifteen days and powdered using wiley mill.

2.2 Preparation of plant extract
Then powder was weighed and made in to 20g thimble using what man no. 40 filter paper. Water and hot water (60^0 C) extraction made using the thimbles. Distilled water was used in extraction. Concentrations followed in the bioassay were 1, 3, 5, 7, 9 and 11%.

2.3 Mass culturing of test insect, *Plutella xylostella* (L.)
The pupae of *Plutella xylostella* (L.) collected from cabbage and cauliflower fields from Metupalayam, Tamil Nadu were brought to the Entomology laboratory at Annamalai University and reared for establishing homologous population. Seven days old mustard seedling grow in plastic cups of 200ml capacity were placed in adult rearing cage (1.5 X 1.5 X 1.5') @ 4cups / cage and maintained under controlled conditions of 25 ± 2^0 C and 70 ± 5% relative humidity. Pupae of *P. xylostella* collected from the field were kept in the adult cage @ 50 / cage. Adult emerged were fed with fifty per cent honey solutions kept in the adult cage. Once in three days the seedling were withdrawn from the cage and were maintained separately for the emergence of larvae and then reared continuously on frees mustard seedling.

2.4 *Plutella xylostells* bioassay
Leaf disc (3 cm dia.) were made from healthy cabbage leaf and treated with the above-mentioned concentrations of water and hot water extracts. Third instar larvae were taken from the culture and used in the bioassay. Five third instar larvae were used per treatments and all the treatments were replicated three times. Observation on larval mortality was done at 6h interval up to 24h. Then untreated food was given to exposed larvae and repeated till adult emergence.

3. Result and Discursion
Nine per cent concentration of hot water extract was found to cause 50% larval mortality. The maximum of 80% larval mortality was observed at 11 % concentrations, the exerted mortality was ranged from 20 to 35%. The highest (55%) pupal mortality and malformation was caused by 11%. In one and nine per cent concentrations 20 % pupal mortality and malformation were noted. Three and seven per cent concentrations showed 30 % pupal mortality and malformation. Larval mortality was noted in water extract at 9% concentration. The maximum of 40.00% larval mortality was shown in 11% concentration. Regarding insecticidal action our results are partially in accordance with the findings of some author who recorded per cent mortality of the larvae at 10 and 100 ppm concentrations after 96 and 48h of exposure respectively when poison food technique was followed [2]. Our findings are partially in accordance with the findings of another author [3] who reported that the leaf extract (methanol as solvent) was effective against *P. xylostella*. Water extract was not effective against *P. xylostella* in exerting insecticidal and juvenomimice activity. The hot water and water extracts of *C. collinus* tested against *P. xylostella*, the hot water extract of fruit in

higher concentration showed maximum larval mortality, the water extract of fruit showed insect growth regulatory activity [7].

Table 1: Effect of *C. collinus* extract on *P. xylostella*

Treatment no.	Percent concentration of leaf extract (%)	leaf powder - Hot water		leaf powder - water	
		Larval mortality	pupal mortality & malformation	Larval mortality	pupal mortality & malformation
T_1	1	20.00 (26.56) [d]	20.00 (26.56)	30.00 (26.56) [a]	20.00 (26.56) [c]
T_2	3	25.00 (29.74) [cd]	20.00 (26.56)	30.00 (26.56) [a]	20.00 (26.56) [c]
T_3	5	30.00 (32.89) [cd]	30.00 (32.89)	30.00 (32.89) [ab]	20.00 (26.56) [c]
T_4	7	35.00 (36.07) [c]	35.00 (36.07)	30.00 (32.89) [ab]	30.00 (32.89) [bc]
T_5	9	50.00 (45.00) [b]	30.00 (32.89)	35.00 (36.07)	35.00 (36.07) [b]
T_6	11	80.00 (63.44) [a]	20.00 (26.56)	40.00 (39.23)	50.00 (45.00) [a]
CD (0.05):		8.577		7.462	6.667

4. Conclusion

The present study revealed presence of multifarious anti insect properties of *C. collinus*, which provides scope for further product development after in-depth in-depth mode of action and toxicological studies.

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