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MORPHOGENETIC EFFECTS OF A BOTANICAL, *TAGETES ERECTA* (MARIGOLD) ON RED COTTON BUG *DYSDERCUS CINGULATUS* FAB. (HEMIPTERA: PYRHOCORIDAE).

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ABSTRACT
The morphogenetic effects of *Tagetes erecta* was evaluated against fourth instar larva of *Dysdercus cingulatus* by seed dip method. The deformities like, complete absence of wings, curling up of wings and disorientation of wings were observed. Thus the extract of *Tagetes erecta* has a potentiality to serve as botanical against *Dysdercus cingulatus.*

KEY WORDS: *Dysdercus cingulatus*, morphogenetic defects, *Tagetes erecta*.

INTRODUCTION

The red cotton bug, *Dysdercus cingulatus* (Pyrrhocoridae) is a most important damaging pest of cotton and okra. Both the adults and nymphs feed on the developing fruits, feeding as such on the developing fruit seriously affect the crop yield and quality of fruits thereby reducing its market value. Chemical control of the pest using the insecticides of common use is done many times, which leaves residues that remain viable for noticeable period. Therefore, development and use of alternative plant protection technology based on neem and other plant based products which have been found to be effective against wide range of pests of important crops (Schmutterer, 1990; Schmutterer and Singh, 1995; Parmar, 1995), become imperative. The present investigation was conducted with a view to evaluate the toxicity of marigold- *Tagetes erecta* and its morphogenetic effects on fourth instar nymphs of red cotton bug *D. cingulatus* under laboratory conditions by seed dip method.

MATERIALS AND METHODS

Collection of insects: *Dysdercus cingulatus* were collected from the cotton field in Nasik and were reared in pet jars in laboratory. The jars contained a layer of moist and course soil and were covered with muslin cloth by rubber band. The adult males and females were separated by observing the size as males are smaller in size as compared to females. Each insect jar contained 4 pairs of adult insects. All the stages from Nymph to adults were fed on the healthy soaked cotton seeds and overcrowding was avoided. The females after mating, laid eggs three times during a period of 3 to 4 days.

Preparation of plant extract: Marigold leaves were collected from the garden. The leaves were washed with water to remove dust from them. One Kg of leaves was crushed in one liter of water and then by using muslin cloth the extract was filtered. This filtrate was called as stock solution. (Katsvanga & Chigwaza, 2004).

Test of Marigold extract against Nymph: In the view of specificity of morphogenetic defect inducer, the *Tagetes erecta* extracts was used against the fourth instar nymph of *Dysdercus cingulatus*. Newly moulted fourth instar nymph were fed on the seeds soaked in the 1:5 dilution of marigold stock extract and continued till the adult emerged.

RESULTS

When IV th instar nymph of *D. cingulatus* were treated with sub lethal concentration of marigold extract (1:5) various types of wing deformities were observed in moulted adults. The deformities were like, complete absence of wings, curling up of wings and disorientation of wings, which made the insects unable to fly (Figure 1).

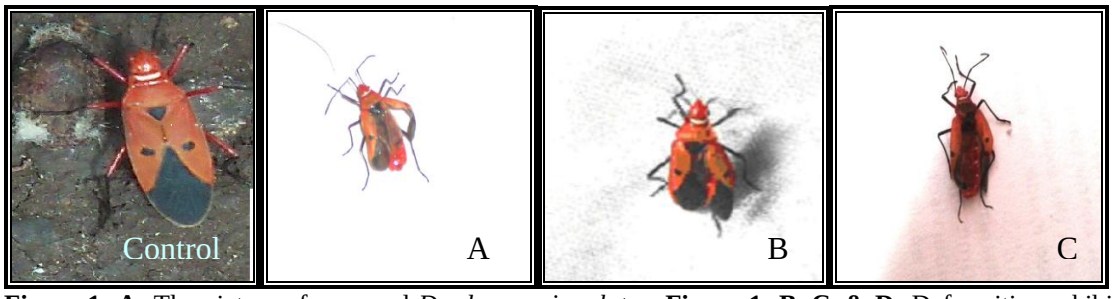

Figure 1: A: The picture of a normal *Dysdercus cingulatus*. **Figure 1: B, C, & D-** Deformities exhibited by marigold extract treated *Dysdercus cingulatus* **B:** The curling up of wings. **C:** disorientation of wings. **D:** shows deformed wings and legs.

DISCUSSION

Now a days, plant derived product are increasingly being used to combat crop pest because they are natural and often assume to be safe to the environment (Kumar et al., 2000). These natural herbs as botanical insecticides have usually been regarded as a part of plant's defense against plant feeding insects and other herbivores (Rosental and Janzen, 1979). Bazwa and Schaefers (1998), the chances of pests developing resistance to such substances are less likely as the biocides contain an array of chemical repellents that affect insect behavioral and physiological processes. The delayed metamorphosis and morphogenetic defects were observed in marigold-*Tagetes erecta* treated IVth instar nymph. While in control, nymphs moulted into normal adults. The result showed that the action of this botanical insecticide causes physiological disturbances leading to growth abnormalities like incomplete metamorphosis and deformed nymphs and adults. All these could be due to disturbances in the normal functions of juvenile hormone in the treated insects (Schmutterer, 1990). Kodandaram *et al.,* (2008) noted the morphogenetic defects caused by different formulations of botanicals *viz*, neem, karanjin and anonin. Similarly, Tiwari *et al.,* (2006) noted that topical application of neem based insecticides on *D koenigii* caused prolongation of nymphal period, ecdysialstasis and development of adultoids and imagoes with varied degree of deformities. Azadirachtin treated by contact and topical application methods evoked various specific and nonspecific effects during the course of development in various stages of red cotton bugs (Opender Koul, 1984). RD-9 Repelin at higher concentration prolonged the nymphal period and affected the emergence of adults of *D. koenigii* (Gupta *et al.,* 1997). Various solvent extracts of *Annona squamosa* are reported to be good toxicants, growth inhibitors and feeding deterrents against many insects (Grainge and Ahmed, 1988). Thus, the toxicity levels and morphogenetic effects of various botanicals evaluated would serve as ready reckoner for the selection of various plant based products for the management of red cotton bugs on okra and other crops in the NEH region. Thus it can be concluded that marigold has a potentiality to be used as biopesticide, but further investigations are required to see its working mechanism.

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