

ANTI BACTERIAL ACTIVITY OF INSECT EXTRACT OF *DYSDERCUS CINGULATUS* (COTTON BUG)

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ABSTRACT

Dysdercus cingulatus, is commonly known as cotton bug or the red cotton stainer, belongs to *Pyrrhocoridae*, family of Insecta. It is a serious pest of cotton crop, but also known to infest other plant species such as okra (*Abelmoschus esculentus*) and egg plant (*Solanum melongena*). Majority of studies on these insects, have focussed upon the destructive aspect of the insect, however for the first time, in the present study a different and useful aspect has been attempted. Insects were collected from my college campus and an insect extract was prepared using hexane as a solvent. The extract was then used to test for its antibacterial activity. Well diffusion method was used to test the antibacterial activity of the extract. The insect extract at a concentration of 150µl (100mg/ml) showed antibacterial effect against the bacterial species, *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumonia*, and *Pseudomonas aeruginosa*. From these observations, for the first time, it is quite interesting to note and suggest that an insect which has attained a pest status can be of great value, as it is known to have antibacterial activity.

Keywords: *Dysdercus cingulatus*, antibacterial activity, *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumonia*, and *Pseudomonas aeruginosa*

INTRODUCTION

Red cotton bug, or red bodied bug, is the common name for *Dysdercus cingulatus*, which is the common pest of cotton crop. This is an Hemipteran insect, belonging to family *Pyrrhocoridae*. *Dysdercus*, is frequently referred to as cotton stainer, as it discolours the cotton lint (Ciesla, 2016) thereby degrading the quality of cotton pods. The adults and nymphs, are known to suck the sap of the cotton pods and cause huge damage and low yield (Ambayeba Muimba-Kankolongo 2018). It is not just the pest of the cotton crop, but also known to affect other crops such as *Abelmoschus esculentus* (lady’s fingers) and *Phaseolus mungo* (black gram) (Sahayaraj *et.al*, 2008). Majority of studies by various authors (Shaheed *et.al*, 2017) have focussed upon the damages caused by the adults and nymphs. However in recent times, certain studies, by MaGuangqiang (2019) on various insects, has revealed that certain insect extracts can be used as antimicrobial agents against certain resistant bacteria and fungi. These authors, studied, eleven different species of insect extracts on multidrug resistant bacteria and fungi. Their study showed that certain insect extract can be effective antibacterial and antifungal agents. Based upon these studies and conclusions, the present study was attempted to test the antibacterial property of *Dysdercus cingulatus*.

MATERIALS AND METHODS

Dysdercus cingulatus, commonly known as the cotton bug, was frequently found in the vast greenery of my college campus (Fig-III) Telangana Mahila Viswavidyalayam Koti, Hyderabad. The male and female insects are often found attached together at their anal ends (Fig-I and II) These insects were found in large groups. They were carefully picked using a hand net and collected into a plastic container. Approximately 50-75 insects were collected (Fig-IV) These insects were later brought to the laboratory and washed with cold water followed by warm water. This water treatment caused the death of the insects. After the water treatment the insects were mildly dried using paper napkin. Later

they were placed in the petridish and transferred to an incubator for a period of one hour. Later they were removed for preparation of the insect extract.

Preparation of Insect Extract

2.20 g of the insect sample was soaked in 50 ml of hexane for overnight 7- 8 hours.

The extract was filtered into a pre weighed beaker and concentrated over a water bath using rotary evaporation under reduced pressure (100 mbar) and reduced temperature 55°C.

The obtained extract is used for further antibacterial activity.

Disk diffusion Method: Disk diffusion test is a test of the antibiotic sensitivity of bacteria. Firstly, bacteria strains were inoculated on the whole plate, each disc were added with different concentrations of insect extracts (one of them was added nothing as a blank control). Then, the zone diameter of inhibition were tested after 24 hours culture at the corresponding temperature to observe the growth rate.

RESULTS AND DISCUSSION

The present *in vitro* study revealed, that the crude extract of *Dysdercus cingulatus*, showed anti bacterial activity against the following bacterial species, *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumonia*, and *Pseudomonas aeruginosa*. (table 1) At 150 µL the crude extract was quite effective against all the bacterial species studied, suggesting that this extract may be recommended as a natural antibacterial agent against certain bacterial species.

In the present study, the antibacterial activity of crude extract of *Dysdercus cingulatus* was tested. The insect extract was tested for the antibacterial activity, using well diffusion method. The extract showed antibacterial activity at different concentration and on certain bacterial species, viz: *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumonia*, and *Pseudomonas aeruginosa*. These results coincide with that of Kyu-Shik Lee *et.al*, (2020), who have reported antibacterial effect of insect extract upon *Salmonella* species. In another study, by Hwang Doseon *et.al*, (2022), have also showed the anti bacterial property of *Trenbrio molitor larvae extract*, against *Escherichia coli*, *Bacillus cereus*, and *Staphylococcus aureus*. As their study, showed effective antibacterial effect, of the insect larval extract (*Trenbrio molitor*) it was suggested that, it can be used as a natural food preservative against the food poisoning bacteria. Quite a number of studies by authors, like Amin H Basma *et.al*, (2022) Rasooly *et. al*, (2017) and Park *et.al*, (2015) have also reported the antibacterial effect of various insect extracts. These studies, clearly indicate that, majority of commonly found insects, seem to posses antibacterial properties. Similarly in the present study, the crude extract of *Dysdercus cingulatus*, which is often considered as pest has shown effective anti bacterial property

Table 1: Antibacterial effect of *Dysdercus* extract on different bacteria

Organism name	150 µl (100 mg/ml)	200µl (100 mg/ml)	Standard cefepime disc -30mcg
<i>Staphylococcus aureus</i>	12 mm	15 mm	22 mm
<i>Enterococcus</i>	11 mm	13mm	14 mm
<i>Escherichia coli</i>	12 mm	14 mm	27 mm
<i>Klebsiella pneuinoniae</i>	12 mm	18 mm	28 mm
<i>Pseudomonas acruginosa</i>	13 mm	16 mm	27 mm

and therefore may be considered to be used as a natural antibiotic. In conclusion it may be said that the crude extract of the cotton bug seems to be quite an effective antibiotic against certain pathogenic

bacteria, and further studies, may be conducted to ascertain, validate and declare its utility as an effective natural antibiotic.



Fig-I Male and Female insects



Fig-II Insect collected in the lab



Fig-III Insect in the wild



Fig-IV Insects after being dried

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