

Effect of *Balanites aegyptiaca* on Bran Bugs

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Abstract. *Balanites aegyptiaca* Family Zygophyllaceae, commonly known as Ingudi, Hingot, Hingun, Zacum oil plant having Saponin as main active component was evaluated for its biopesticidal value against *Tribolium castaneum* (Red flour beetle or Bran bugs). *Tribolium castaneum* is a serious pest of stored grains and causing about 8-10% post harvest damage in godowns. The saponin from the *Balanites* leaf was extracted using Soxhlet and maceration extraction method with aqueous and different solvents. Extracts were studied in different concentrations lower 1-5% and higher 2.5-17.5%. Results were found dose dependent. In 5% concentration 100% mortality was achieved on 8 days after treatment while in 17.5% concentration 100% mortality achieved in 24 hours after

Keywords: *Balanites aegyptiaca*, *Tribolium castaneum*, Soxhlet extract, Maceration

1. Introduction

The problem of pest is so wide all over the world that these super exceed the population of human. Throughout its history the world population has constantly been facing a challenge of providing itself with safe food. It has been reported that about 9% of the world's grain production lost to post harvest insect infestation (Tooba 2005, Rehman et al 2009). Bran bugs are also responsible for severe economic loss to farmers and consumers in India (Frenmore and Prakash 1992), (Hag et al 2005). The unbalanced unscientific and extensive use of pesticides has resulted in ecological and health hazards along with development of resistance in insect pests. Although numerous pesticides have been used to control insect pest their impact on the environment is alarming (Farauqe 1989, Markowitz 1992, Rajas Karan and Baker 1999, Gupta et al 2001). In this regard that is an urgent need to explore this possibility of using botanicals and other ecologically safe solution to get rid of this problem. The active components present in botanicals are biodegradable, environmentally compatible and less toxic to non-target organism. The present study was carried out to evaluate the adulticidal, repellent and larvicidal activity of Petroleum ether, Ethanol, Methanol, Chloroform and aqueous extracts of *Balanites aegyptiaca*

2. Material and Method

2.1. Plant Material Collection

Balanites aegyptiaca was collected from the villages in Jodhpur district of Western Rajasthan India.

2.2. Preparation of Extracts

Maceration

The fine powdered Leaves of *B.aegyptiaca* (50g) were infused in 200ml distilled water control and in solvents i.e Methanol, Ethanol, Chloroform, Aqueous, Petroleum Ether for 24 h. The extract was then filtered using Whatman No.1 filter paper and the filtrate was then evaporated using rotary evaporator at 60°C. The final dried material was stored in sterile bottles and kept in a freezer for further use.

Soxhlet Extract

The crude saponin from the leaves was extracted by the method given by (Ahmed and Beg 2003) and (Predreg et al 2005) with little modifications. The 50g powdered leaf was used for extraction using water, petroleum ether, methanol ethanol and chloroform.

Test Organism

The Adults and Larvae of *Tribolium castaneum* also known as “Red flour beetle “and “Bran bugs.” were tested in the experiment. These were taken from a culture which is being maintained under an incubator at 70+ _2RH and 30+ _1°C on whole wheat flour mixed with brewer’s yeast (10:1g) in Biomass laboratory of CRDT.

Bioassay

All test were carried out in B.O.D incubator at 30+ _°C and 70+_RH. A fixed quantity (1g) of commodity (wheat flour) was mixed with fixed quantity of extract (1ml) of each solution with lower and higher concentration of dozes viz .lower concentration (1%, 2%,3%, 4%,5%) and higher concentration (2.5% to 17.5%). Also there was control experiments on the solvents and the commodity .Experiments were conducted in Triplicates in Petri-plates. Two types of experiments i.e one with blotting paper treated with extract and in another the extracts ware mixed with food (commodity).Dead adults and larvae were counted after 24,48, 72hours and 5TH day and 8day after treatment and Mortality percent was calculated.

3. Result and Discussion

Table 1: Effect of Soxhlet Petroleum ether extract of *B. ageyiaca* on Adults of *T. castaneum*

Dose concentration	MORTALITY %				
	24HAT	48HAT	72HAT	5DA	8DAT
1%	—	—	—	—	25%
2%	—	—	—	—	30%
3%	—	—	—	—	40%
4%	—	—	—	—	55%
5%	—	—	—	75%	100%
Control	—	—	—	—	—

HAT-HOUR AFTER TREATMENT, NIL - , DAT- DAY AFTER TRATMENT

Table 3: Effect of Maceration of *B. ageyiaca* with different solvents Conc. on Adult of *T. castaneum*

Dose concentration	Mortality %									
	24HAT	P.E		M.E		E.E		A.E		C.E
		72HAT	24HAT	72HAT	24HAT	72HAT	24HAT	72HAT	24HAT	72HAT
.5g/20ml	—	—	—	—	—	—	—	—	—	—
.7g/20ml	—	—	—	—	—	—	—	—	—	—
1.5g/20ml	—	—	—	—	—	—	—	—	—	—
2.5g/20ml	—	—	—	—	—	—	—	—	—	—
3.5g/20ml	—	30%	100%	—	—	50%	—	50%	75%	100%
Control	—	—	—	—	—	—	—	—	—	—

P.E-Petroleum ether Extract, M.E-MethanolicExtract, E.E-Ethanolic Extract, CE-Chlroform Extract, A.E-Aqueous Extract.

Table 4: Effect of Maceration Extract of *B.aegytiaca* with different solvents on Larva of *T. castaneum*

Dose Conc.	Mortality%									
	<i>P.E</i>		<i>M.E</i>		<i>C.E</i>		<i>E.E</i>		<i>A.E</i>	
	<i>24HAT</i>	<i>72HAT</i>	<i>24HAT</i>	<i>72HAT</i>	<i>24HAT</i>	<i>72HAT</i>	<i>24HAT</i>	<i>72HAT</i>	<i>24HAT</i>	<i>72HAT</i>
.5g/20ml	-	-	-	-	-	-	-	-	-	-
.7g/20ml	-	-	-	-	-	-	-	-	-	-
1.5g/20ml	-	-	-	-	-	-	-	-	-	-
2.5g/20ml	-	-	-	-	-	-	-	-	-	-
3.5g/20ml	-	30%	100%	-	100%	-	-	50%	-	25%
Control	-	-	-	-	-	-	-	-	-	-

P.E-Petroleum ether extract, M.E-Methanol Extract,E.E-Ethanol Extract,C.E-Chloroform Extract, A.E-Aqueous Extract, H.AT-Hours After Treatment.

Table2: Effect of Soxhlet Petroleum ether extract of *B.aegytiaca* on Larvae of *T. castaneum*

Dose concentration	MORTALITY %				
	24HAT	48HAT	72HAT	5DAT	8DA
1%	-	-	-	-	30%
2%	-	-	-	-	35%
3%	-	-	-	-	45%
4%	-	-	-	-	55%
5%	-	-	-	100%	-
CONTROL	-	-	-	-	-

HAT-Hours After Treatment, DAT-Days After Treatment , NIL -

The results on the mortality of *Tribolium castaneum* with different concentration of different extracts (water and organic solvents) are depicted in tables 1-4. It was observed that when 1percent soxhlet petroleum ether extract of *balanites* applied on *Tribolium* adults then only 25 percent adults were died whereas with 5percent of extract 100 percent mortality is achieved on 8th day with adults and Larva 100 percent mortality achieved on 5th day. With higher concentrations of different solvent extracts 100 percent mortality was seen with methanolic macerated extract and chloroform macerated extract within 24 hours of treatment This can be concluded that mortality was doze dependent.

4. Conclusion

B.aegyptiaca have shown the insecticidal properties against *Tribolium castaneum*. Increased concentrations of these extracts showed subsequent reduction of time to 100% mortality. So, the use of

higher concentration would be useful to control post harvest damage by stored grain pest *Tribolium castaneum*.

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6. References

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