

Effect of leaf extract of *Annona squamosa* on *Tribolium castaneum*

¹Chetankumar Sharma, ²Manoj Patil, ²Shubhangi Naiknaware and ³Geeta Patil

¹Assistant Professor, Department of Zoology, Arts, Commerce & Science college, Bodwad Dist.- Jalgaon

²Department of Zoology, Arts, Commerce & Science college, Bodwad Dist.- Jalgaon

³Assistant Professor, Department of Botany, Arts, Commerce & Science college, Bodwad Dist.- Jalgaon

Email: cssharmachetan@gmail.com

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ABSTRACT

Store grain pests are damaging our economy by infecting agriculture stored product. Present investigations evaluated the mortality of *Tribolium castaneum* (Herbst) after the treatment of Leaves extract of *Annona squamosa* in aqueous solvent. After treatment of 96 hrs. leaf extract of *Annona squamosa* show the insecticidal effect in aqueous extract show LD₁₀ and LD₅₀ Values at 1.416 and 3,951 ml/kg respectively.

Key words: Agriculture, *Tribolium castaneum*, Aqueous, *Annona squamosa*, Insecticidal.

INTRODUCTION

Tribolium castaneum (Herbst) is a most serious pest of stored products and also known as Red flour beetle. It included in the family Tenebrionidae i.e. darkling beetles. Both the adults and grubs cause serious damage to some kinds of grains including broken grains, stored and dried fruits. This pest generally found in granaries, mills, warehouse etc. and attacks stored grain and other food product including flour, cereals, etc. (Kota and Pulin, 2017). Their damage to stored grains and grain products may amount of 5-10% in the temperate zone and 20-30% in the tropical zone (Nakakita, 1998). Insect pests cause damage to stored grains and processed products by reducing their dry weight and nutritional value (Sinha and Watters, 1985).

Chemical pesticides are largely used as pesticides in crop protection could be environmental pollutants and have undesirable effects on animals and human beings. Therefore, the development of bioinsecticides has been focused as a viable pest control strategy in recent years (Khambay *et al.*, 2002; Gonzalez *et al.*, 1999; Meena *et al.*, 2006; Hashim and Devi, 2003). Biopesticides play a vital role in grain protection due to its insecticidal properties. The plant kingdom can be rich source of a variety of chemicals with the potential for development as successful pest control agents (Arnason *et al.*, 1989 and Rahman *et al.*, 1999). Many plants have been reported due to their insecticidal properties and attack on its target pests without damaging other useful insects. The seed of *Annona squamosa* contain 42-45% fat, annonain and skuosin (belonging to the asetogenin groups) which are toxic (Contact or stomach poison) to insects (Londershausen *et al.*, 1991; Kardinan 2000; Leatemia and Isman, 2004).

MATERIAL METHODS

Research is carried out at Department of Zoology. Insect were collected from grains godown near local market. The insect was tested in glass beaker under the laboratory condition. A beaker is closed with muslin cloth and tied with rubber band to avoid the discharge of insect.

Preparation of Plant Extract:

The fresh leaves of *Annona squamosa* were collected from the field near Bodwad and were dried in the shade and then in the oven. The dried leaves were powder in the grinder and stored in polyethylene bags. The powder was packed in filter paper and extract was extracted in soxhlet apparatus at the ratio of 1:10 in water i.e. aqueous solvent. After eight hours of extraction extract was kept in evaporate for 48 hrs. Prepare various concentration of extract for testing the biopesticidal properties. Recorded, mortality rate at various concentration and it compared with the control.

RESULTS & DISCUSSION

A toxic effect of leaf extract *Annona squamosa* in aqueous solvent was evaluated against *Tribolium castaneum*. Therefore, lethal and sublethal doses were

calculated for the extract. The range of statistical calculations and determination of LD₁₀, and LD₅₀ values are done as per Finney's (1971).

Table 1. shows comparison of LD₁₀ and LD₅₀ value of the aqueous extract of Leaves of *Annona squamosa* after calculating regression equation i.e. LD₁₀=1.416mg/ml and LD₅₀=3.951mg/ml.

The Figure 2. shows the empirical and Improved expected probit against the log of concentration, given in figure for Regression and Provisional lines for LD₁₀, and LD₅₀ values after exposure of 96 hours.

Photographs Show the experimental setup of the present investigation at various concentration is seen at photo A. Photo B. Observation of the results and obtaining result is compared with control. Evaporation of solvent into the extract at room temperature is seen at photo C. Photo D. Show the Extraction of plant by using Soxhlet apparatus at 1:10 ratio in aqueous solvent.

Present investigation shows that, the aqueous extract of leaves of *Annona squamosa* were effective to control the *Tribolium castaneum*. 40% repellency was reported by Khin (2019) after the treatment of aqueous extract of *Annona squamosa* on *Tribolium castaneum* at 96 hrs.

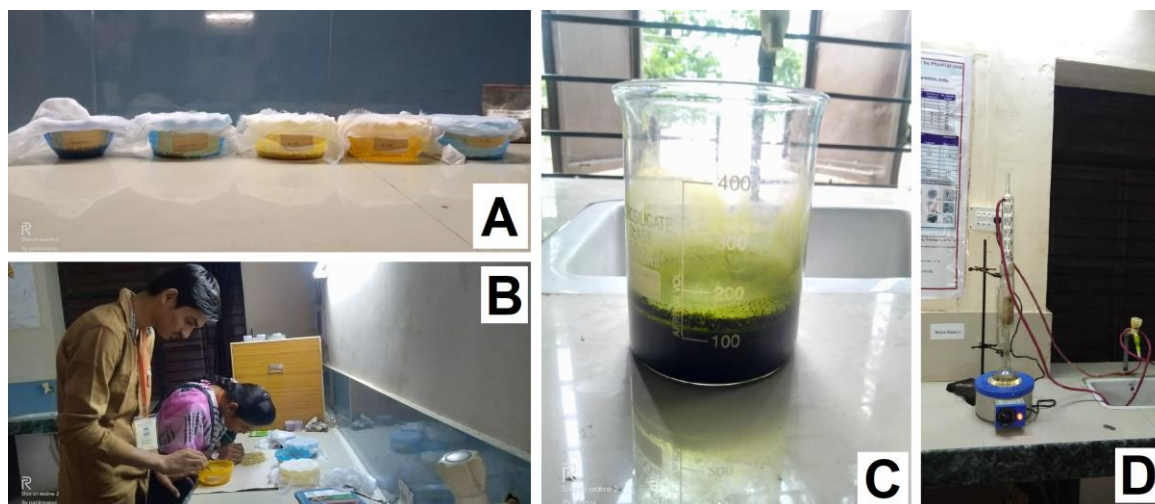


Figure 1: A. Experimental setup, B. Observation of the experiment, C. Evaporation of Extract, D. Extraction of Plant

Table 1. Comparison of LD₁₀ and LD₅₀ value of leaf extract of *Annona squamosa* to *Tribolium castaneum*.

Sr.No.	Plant Name	Time of exposure	Regression equation $Y = a + b (\log_{10} x)$	LD ₁₀ value in ml/kg	LD ₅₀ value in ml/kg
1	Annona squamosa in Aqueous	96 Hrs	$Y = 2.8750x + 3.2843$	1.416	3.951

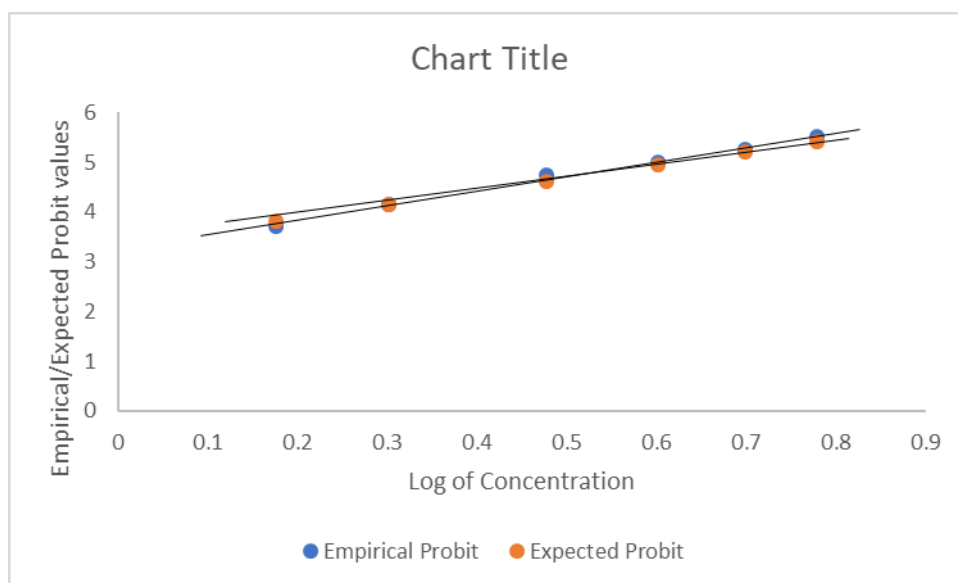


Figure 2: shows Provisional lines of Empirical and Improved expected probit against log of concentration.

Sonkamble *et al.*, (2000) recorded seed extract at 1.5 % concentration show highest mortality in *H. armigera* (43.33%) and 36.66% mortality at 1% Concentration in *S. litura*.

The insecticidal properties of leaves and seeds of sugar apple (*Annona species*), demonstrated by the alkaloid group of linear fatty acids of the C-32 and C-34 which called acetogenin (Dharmasena *et al.*, 2001), which acts as an insecticide, an inhibitor of eating and a rejection of a number of major pests of agriculture both in the field and in storage/warehouse (Prakash & Rao 1997). These compounds have been reported as insecticides, acaricides, antiparasitic and bactericidal (Guadano *et al.*, 2000). Mohiuddin *et al.*, (1987) who observed 75% repellency of *Momordica charantia* against *Tribolium castaneum*.

CONCLUSION

In present investigation insecticidal properties of leaves extract in aqueous solvent of *Annona squamosa* was studied to control *Tribolium castaneum* (Herbst). LD₁₀ and LD₅₀ values are also calculated at 96 hrs. of exposure and it show 1.416 and 3.951 respectively.

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Conflicts of interest: The authors stated that no conflicts of interest.

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