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Insecticidal Activity of Ethanolic Extract of Leaves of *Annona squamosa*

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ABSTRACT

*The objective of the present study is to investigate Insecticidal activity of ethanolic extract of *Annona squamosa*. The preliminary phytochemical investigation was carried out to identify the various constituents present in the extract. It was found that the *Annona squamosa* contain alkaloids, protein, amino acid, carbohydrate, glycosides, phytosterols, tannins and phenolic compounds. The ethanol extract of *Annona squamosa* produced significant "Knockdown" (KD_{50}) in the concentration 1% w/v and 5% w/v tested 23.1 min and 11.4 min for respectively. The mortality(100%) was achieved at 39.6 ± 1.4 and 14.5 ± 1.1 min for 1% w/v and 5% w/v concentration respectively. No mortality of the insects was found in any of the controls up to 100 hours. The ethanolic *Annona squamosa* extract showed potent activity against *Sitophilus oryzae* pest. The finding of new insecticidal activity is of great economic importance both from the agronomic and preventive medicine point of view. The reason for using new natural insecticides is that these are active at highly acceptable levels, biodegradable and do not leave toxic residues while the commonly used phosphorous and chlorinated insecticides contaminate the environment.*

Key words: *Annona squamosa, Sitophilus oryzae, Insecticides, Mortality.*

INTRODUCTION

Annona squamosa (Annonacea) a large evergreen, straggling shrub or small tree, commonly occurring in India. In English it is known as Custard apple; other common

names include Seethapalam (Tamil), Sharith (Hindi), Seetapandu (Telugu) and Sirpha (Malayalam)[1],[2],[3]. It has a renewed position in Indian system of medicine and is used as antitumour, wound healing, diuretic and the leaves are anthelmintic. The powdered unripe and dried fruits in the form of paste with water are taken internally for diarrhea and dysentery.[4],[5].

The herbal drugs have been used throughout the world have received greater attention in recent times, because of its diversity of curing diseases safety and well tolerated remedies compared to the conventional medicines[6]. A rational approach is being developed to use medicinal plants as a insecticide. The insecticidal activity is due to the presence of active molecules.[7],[8]. Thus, the object of this work was to assess the insecticidal activity against the storage pest *Sitophilus oryzae*.

EXPERIMENTAL SECTION

Collection and Identification

The fresh leaves of the plant *Annona squamosa* were collected from the local area of Tiruchirappalli, Tamilnadu, Identification and authentication of the crude drug was carried out by Botony Department, Bharathidasan University, Tiruchirappalli, India.

Extraction

The leaves was dried under shade, reduced to moderately coarse powder, loaded into Soxhlet extractor and was subjected to successive extraction with ethanol. Then the ethanolic extract was concentrated under reduced pressure. The ethanol free semisolid mass thus obtained was used for the experiment.

Preliminary Phytochemical Studies

The ethanolic extract was then subjected to qualitative phytochemical screening for the identification of the phytoconstituents. However ethanolic extract showed positive test for presence of alkaloids, protein, amino acid, carbohydrate, glycosides, phytosterols, tannins and phenolic compounds[9].

Insecticidal Testing

The ethanol free semisolid extract mass was dissolved in acetone at two different concentrations(1% w/v and 5% w/v) is being reported here.

i) Insect assayed: *Sitophilus oryzae* were provided by the research department of zoology, American college, Madurai, Tamilnadu, India. The adult insects were fed with maize and incubated under controlled conditions of temperature.

ii) Contact bioassay: A contact bioassay by modified method[10] was used to test the toxicity of the extract. Each concentration of the extract was applied on a glass Petri dish (9 cm diameter). After evaporation of the solvent, fifteen adults of *Sitophilus oryzae* were for introduced in to the dish. Four replicates for each concentration were made, knocked down insects (i.e. those that no longer maintained normal posture and were unable to move or were on their backs) were recorded at 1min intervals up to 3hours or until total

mortality was achieved. The insects were observed under an optical microscope and mortality was determined when they did not respond to mechanical stimulation. Control dishes with acetone, methanol and without solvent were performed separately up to 100hours. Knockdowns (KD₅₀) as the minutes needed to produce mortality of 50% of insects were determined by the probit analysis.

RESULTS AND DISCUSSION

The ethanol extract of *Annona squamosa* produced significant “Knockdown” (KD₅₀) in the concentration tested 23.1min and 11.4 min for 1% w/v and 5% w/v respectively (Table-1). The mortality (100%) was achieved at 39.6±1.4 and 14.5±1.1min for 1% w/v and 5% w/v concentration respectively. No mortality of the insects was found in any of the controls up to 100hours. The finding of new insecticides is of great economic importance both from the agronomic and preventive medicine point of view. The reason for using new natural pesticides is that these are active at highly acceptable levels, biodegradable and do not leave toxic residues while the commonly used phosphorous and chlorinated insecticides contaminate the environment. The extract of *Annona squamosa* being a contact poison for insects can penetrate the body wall and tracheal system bringing about death probably lending the extract the insecticidal activity against *Sitophilus oryzae*.

The leaf of *Annona squamosa* has been reported to contain essential oil, terpenes, alkaloids-anonaine, roemerine, corydine, norcorydine, isocorydine and norisocorydine. The insecticidal activity appears to be due to the presence of its active principles. The use of plant derived toxicants as insecticides may allow a reduction in the health hazards of synthetic pesticides and the high degree of insecticidal activity of *Annona squamosa* seems to confirm the traditional claims for this herb. This present study establishes the insecticidal activity. It was found that the ethanolic extract at the concentration 5% w/v showed a significant knockdown and mortality rate

Statistical Analysis

Four replicates of experimental sets were carried out (KD₅₀) Knockdown (min) of 50% of insects determined by Finney’s probate analysis and confidential limits 95% in parentheses [11]. The results are summarized in the table given below.

Table 1. Insecticidal activity of *Annona squamosa* against *Sitophilus oryzae*

S.No	Groups	Knockdown(KD ₅₀)(min)	Mortality(100%)(min)
01	<i>Annona squamosa</i> extract (1% w/v)	23.1 (22.1-23.9)	39.6±1.4*
02	<i>Annona squamosa</i> extract (5% w/v)	11.4(10.7-12.2)	14.5±1.1*
03	Control 1 (Acetone)	0.0**	-
04	Control 2 (Methanol)	0.0**	-
05	Control 3 (Without solvent)	0.0**	-

Values are expressed as mean ±S.D.(n=4); *Mortality(100%); ** No mortality of insects was observed in the 100hours (Controls).

CONCLUSION

Phytochemical observation of the *Annona squamosa* plant extract showed the presence of alkaloids, protein, amino acid, carbohydrate, glycosides, phytosterols, tannins and phenolic compounds. The ethanolic extract of *Annona squamosa* showed the potent insecticidal activity against the storage pest *Sitophilus oryzae*.

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