

## TOXIC EFFECT OF NEEM (*Azadirachta indica*) EXTRACTS AGAINST *Schistocerca gregaria* F. ADULTS UNDER LABORATORY CONDITIONS

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### ABSTRACT

Neem botanically known as *Azadirachta indica* belongs to the family Meliaceae and is an indigenous tree to India. The neem tree is also one such tree which has been revered by the Indians for its medicinal properties. Charaka (600B.C) the father of Indian system of medicine (Ayurveda) regarded the neem flowers, fruits, leaves bark and roots as the "panch amrit" or elixir medicine. During the present investigation, it is observed that *Schistocerca gregaria* F. adults were treated against different concentrations of Neem products viz. *Azadirachta indica* (Leaves), *Azadirachta indica* (Green neem seed coat), *Azadirachta indica* (Yellow neem seed coat) and *Azadirachta indica* (Neem seed kernel). The concentrations used to dip the maize leaves, upon which the insect feeds, were 0.005%, 0.01%, 0.025%, 0.05%, 0.1%, 0.25%, 0.5% and 1.0% (v/v) respectively. Our results showed that the *Schistocerca gregaria* F. adults indicated the highest mortality 73.00% at 1.0% concentration of *Azadirachta indica* (Neem seed kernel). The mortality decreases with decrease in the concentration of Neem products. Least mortality response is noted against *Azadirachta indica* (Yellow neem seed coat), which is zero.

**Key Words :** Neem, *Azadirachta indica*, *Schistocerca gregaria* F., Neem seed kernel.

### INTRODUCTION

Insecticides of plant origin have been used for centuries but only neem holds out the promise of providing a highly effective, non-toxic and environmentally harmless means of controlling or eliminating insects pests which inflict losses in agricultural production<sup>7</sup>. Many workers have reported that mixing of plant products with grains repels insects<sup>2,6,9,13,16</sup>. However, insecticides of plant origin have not come into large-scale use because of lack of technology to produce them in sufficient quantity and the time consuming and labour intensive procedures to prepare them. Efforts, were, therefore, made for production of dry and liquid formulations of insecticides of plant

origin at rural level.

Food is of primary importance to man because of population pressure, the task of increased food production is a top priority of our country. Uttar Pradesh is primarily an agricultural State more than 75% of land area of this state is under agricultural practices. *Schistocerca gregaria* F. is commonly known as the "Desert Locust".

Maize is the major cultivated host of *Schistocerca gregaria* F. and its both stages (nymphs and adults) feed on maize leaves. This is the most destructive of all locusts. The adults locusts attack the maize crop. It invades 30 million square kilometer area as spreading over 60 countries from the west and north of Africa

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to Assam in India and in 50 percent of this area, breeding can occur. Maize borer, *Schistocerca gregaria* F. is noticed as a pest, wherever this crop is grown, but usually high damage is observed in some localities. The damage caused to hybrid maize always appeared to be more serious.)

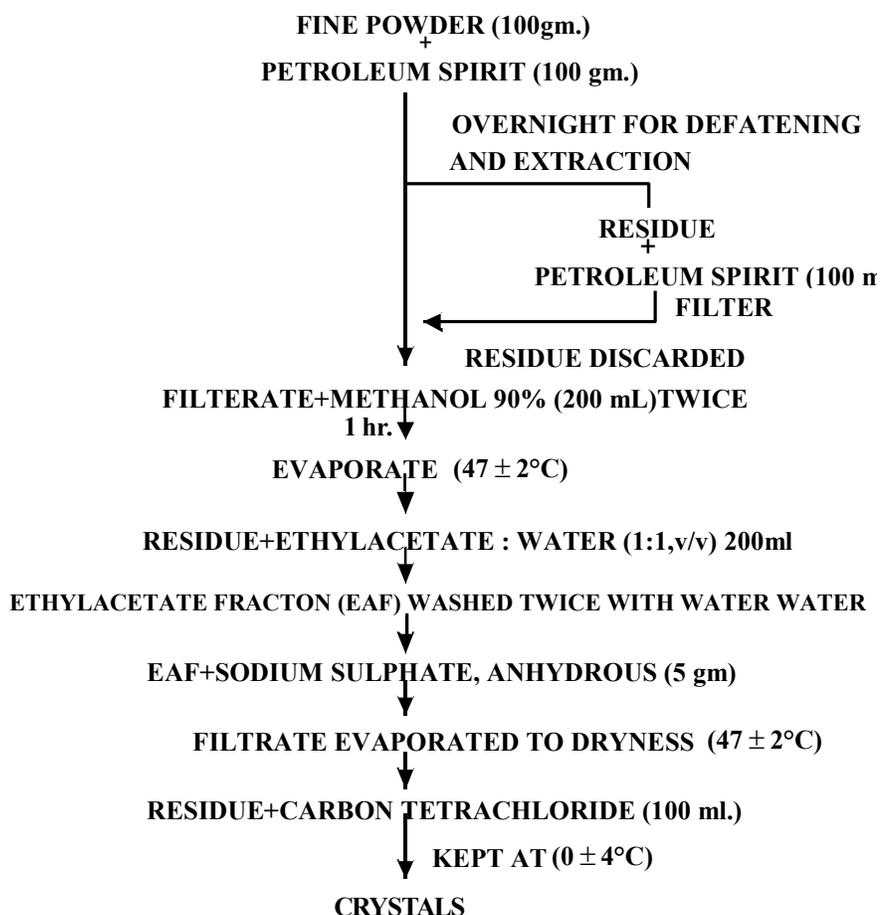
In order to improve the maize production, work on effects on Neem products like *Azadirachta indica* (leaves), *Azadirachta indica* (Green Neem seed coat), *Azadirachta indica* (Yellow neem seed coat) and *Azadirachta indica* (Neem seed kernel), have been done. Now it is accepted that the above neem products have some interesting effects on the *Schistocerca gregaria* F.

However certain other plant products have been used by a number of workers<sup>8,14,20</sup>. In comparison to the previous work, present study deals with the control methods using some commercially available neem products.

#### MATERIAL AND METHODS

Maintenance of the *Schistocerca gregaria* F. Stock culture Adults and nymphs of *Schistocerca gregaria* F. were collected from the Aligarh Muslim University Fort, Jawahar Park and agricultural farm of Aligarh Muslim University, Aligarh. The culture of this pest was maintained in the insectary under controlled conditions, at 35°C and 60-70% relative humidity. They were maintained in glass rearing jars measuring approximately, 20 cm

**Table 1 : Diagrammatic representation of Neem extract**



× 15 cm, containing a layer of 5 cm thick, moist and coarse sand, which was previously sterilized at high temperature. The mouth of these jars was covered with a piece of muslin cloth fixed with rubber band. All the stages were fed on the fresh maize leaves, and over crowding was avoided.

#### Preparation of Neem Extracts

The neem leaves, Neem seed kernel and Neem seed coat were collected from the university premises during spring seasons. The identification of these collected plants was confirmed by the plant taxonomist of Department of Botany, Aligarh Muslim University, Aligarh. For screening the material for this biocidal activity only neem plant was selected which were known for medicinal properties. From the freshly collected plant leaves, neem seed kernel and neem seed coat were separated and shade dried. After drying they were ground powder in an electric grinder. The residue so obtained was again subjected to same treatment as described by N. Bano<sup>1</sup>.

The maize leaves were dipped in different concentrations (0.005%, 0.01%, 0.025%, 0.05%, 0.1%, 0.25%, 0.5% and 1.0%) of Neem products. The insects were allowed to feed and mortality was counted during

feeding period in case of *Schistocerca gregaria* F. adults.

### RESULTS AND DISCUSSION

The observation made on comparative response on adult desert locust, *Schistocerca gregaria* F. of four neem products namely viz. *Azadirachta indica* (leaves), *Azadirachta indica* (Green neem seed coat), *Azadirachta indica* (Yellow neem seed coat) and *Azadirachta indica* (Neem seed kernel).

Our results showed that the *Schistocerca gregaria* F. adults indicated the highest mortality 73.00 at 1.0% concentration of *Azadirachta indica* (Neem seed kernel). The data on mortality percentage from the laboratory trial is presented in **Table 2**. Similar performance of certain neem products has been reported by Dina<sup>3</sup>, EL-Ghar et al<sup>4</sup>. Koul<sup>10</sup> observed that *Azadirachtin* in the dose range 1-8 µg/gm caused, a reduction in body weight of first nymphal instar of desert locust *Schistocerca gregaria*. He further observed, *Azadirachtin* when applied to various stages of development of red cotton bug *Dysdecus koenigii* caused non-plasticisation of wing lobes and developments of wingless adult. Singh<sup>22</sup> found *Azadirachtin* to affect

**Table 2 : Toxic effect of different concentrations of Neem Extracts on *Schistocerca gregaria* F.**

Name of Neem Products	Percent Morality at various concentrations							
	0.005%	0.01%	0.025%	0.05%	0.1%	0.25%	0.5%	1.0%
<i>Azadirachta indica</i> (Leaves)	12.00 ±0.707	17.00 ±0.829	28.00 ±1.870	38.00 ±1.50	45.00 ±2.586	69.00 ±3.960	71.00 ±3.491	72.00 ±3.741
<i>Azadirachta indica</i> (Green Neem seed coat)	4.00 ±1.0	9.00± 0.829	13.00 ±0.829	15.00 ±1.299	19.00 ±1.299	24.00 ±1.581	47.00 ±5.356	62.00 ±6.837
<i>Azadirachta indica</i> (Yellow Neem seed coat)	0.0 ±0.0	12.00 ±1.224	16.00 ±1.224	21.00 ±1.229	33.00 ±1.479	42.00 ±3.354	54.00 ±4.716	71.00 ±5.244
<i>Azadirachta indica</i> (Neem seed kernel)	8.00 ±0.707	28.00 ±2.549	31.00 ±2.277	35.00 ±2.586	47.00 ±3.491	49.00 ±3.112	69.00 ±1.299	73.00 ±2.046

vitilogenesis a process in which maturing adult insects synthesize specific protein which are incorporated into the oocytes leading to their mortality. *Locusta migratoria* had a smaller ovaries and a number of oocytes become less. He further studied that injection of 1 µgm of *Azadirachtin* in red cotton bug caused 50% of mortality by seventh day of treatment and showed significant effect on reproduction behaviours.

*Azadirachtin* (Az) is found to be the most insecticidal compound is neem tree *Azadirachta indica* A. Juss. Neem leaves have been used for centuries in India for pest control<sup>18</sup>, neem extracts have been studied since the early 1960'S for use in modern agriculture<sup>15</sup>. Only recently, however, formulations of neem have become commercially available in North America. Neem extracts containing *Azadirachtin* have both antifeedant and growth inhibitory effects on >200 species of arthropods<sup>18,19</sup>. The mortality decreases with decrease in the concentration of Neem products. Least mortality response is noted against *Azadirachta indica* (Yellow neem seed coat), which is zero.

In the last two decades researches have been working on neem products and obtained interesting results<sup>11,12,21,25</sup>. These neem products are safe to be pest control and may prevent several adverse effects caused due to synthetic insecticidal applications.

Fakhri and Murad<sup>5</sup> conducted an experiment to know the efficacy of neem product (Multineem 8 EC) against red cotton bug *Dysdercus koenigii* (Fab.) nymphy by ingestion method. Sharma *et al.* (2004) reported the due to insecticidas action, *Dysdercus cingulatus* (Fab.) adults were treated against various plant extract *A. indica* (leaves), *A. indica* (Green neem seed coat) , *A. indica* (Yellow neem seed coat), *A. indica* (neem seed kernel), *L. camara* (leaves), *Hevea brasiliensis* (Leaves). *D. cingulatus* adults indicated the highest mortality of 75%

at 1.0% concentration of *A. indica* (Neem seed kernel). The least mortality was noted around 3.0% against extracted leaves of *A. indica* (Neem seed kernel). Sharma *et al.*<sup>24</sup> also studied the toxicity of different concentrations of Neem products on *Acrida exaltata* as a production enhancement measure.

### CONCLUSION

It is clear from the free going account that Neem Products used in the present investigation have been observed to promising properties. The study of mode of action of Neem products, used in progress in our laboratory and will contribute to their use in future pest control programme.

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