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Effect of Ethanolic extract of Neem & Tulsi for repellency and insecticidal activity against the Adult of *Tenebrio molitor* (Tenebrionidae)

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Abstract
Tenebrio molitor Linnaeus (Coleoptera: Tenebrionidae) is a pest of stored products. This insect also infests stored food grains. According to researchers, T. Molitor motives losses up to 15% of grains and flour manufacturing globally. T. Molitor is controlled chiefly with chemical insecticides, but this approach has restrictions toward stored product insects due to residual toxicity and insect resistance. The study aimed to assess the potential of ethanolic extracts of Neem & Tulsi on different concentrations for their repellency and insecticidal activity against T. Molitor Average mortality share indicated that the extracts brought on large mortality and repellency on the treated insect and bioassays additionally indicated that the poisonous and repellent impact used to be once as soon as proportional to the concentration and higher concentration has a stronger effect. Observed mortality percentage expanded with an increase in time intervals after treatment. Mortality proportion at 0.50, 1.00, 1.50, 2.00, and 2.50 h after treatment indicated that 10% solution confirmed the absolute best mortality (57.5%) in T. Molitor at 2.50 hours after treatment. Mortality percentage confirmed parallel response to the level of concentration at distinct time intervals after treatment. 2.5% leaf extract of Neem & Tulsi showed the lowest repellency 16.38% in the case of T. Molitor. On the other side, 5% showed 23.33% and 10% showed 50% repellency respectively. The study establishes the insecticidal activity and repellency of Neem &Tulsi extract on the stored grain insect pest, T. Molitor.
Key words: *Neem & Tulsi, Tenebrio molitor, mortality, repellency.*

I. Introduction

Insect pests have often been managed with synthetic insecticides in the remaining eighty years. The protection of stored grains from insect injury is currently based on synthetic pesticides. Most insecticidal compounds fall inside four foremost classes, the organochlorines, organophosphates, carbamates and pyrethroids. There are problems of pesticide resistance and poor effects on non-target organisms along with man and the environment. The use of organochlorine insecticides have been banned in developed countries and alternative strategies of insect pest control are being investigated. Botanicals are a promising source of pest manipulate compounds. The pool of flora possessing insecticidal materials is enormous. These have generated incredible hobby in recent years as manageable sources of herbal insect manipulate agents. In the center of the seventeenth century, pyrethrum, nicotine, and rotenone had been recognized as fantastic insect-control agents (Silva-Aguayo, 2004). Many plant extracts are used in different forms such as essential oils and powders and they are proved to be used as stored products repellents that are economically important (Khan et al., 2013; Mondal et al., 2014)

Roy et al. (2005), set up leaf extracts of Shiyalmutra (Blumea lacera) as botanical pesticides towards lesser grain borrer and rice weevil. Kabaru and Gichia (2001) published that the insecticidal and antifeedant activity of extracts derived from special parts of the mangrove tree rhizophora mucronata (rhizophoraceae) Lam. Khan and Wasim (2001) published consequences that neem extract in benzene used to be most nice repellent of purple 380 pumpkin beetle, followed with the aid of Bakain extract in benzene. These two extracts were observed non-significantly distinct from every other. Hermal extract in ethanol used to be located drastically least effective, observed through Hermal extract in benzene, Bakain and Neem extracts in ethanol. All of these plants extracts were located appreciably tremendous in the repellency of crimson pumpkin beetles compared to control. Haque (2002) analyzed chemically Bankalmi, Polygonum hydropiper and evaluated towards rice hispa beetle. Hot water extracts of Bankalmi (Ipomoea sepiaria) and Bishkatali (Polygonum hydropiper) (1:10; W/V) can efficaciously be controlled by using the hispa beetle and Bankalmi leaf extract with 25-95% ethyl alcohol. Nadi (2001) showed the toxicity of aqueous, methanolic and acetonic extracts of three flora Rhazya stricta,, Azadirachta indica, and Heliotropium bacciferum to the khapra beetle (Trogoderma granarium Everts) larvae. All extracts showed remarkable toxicities. The present work is being carried out to study ethanolic extract of Neem & Tulsi () for repellency, insecticidal activity against T. molitor with emphasis on chemical investigation

II. Materials And Methods

Plant material

Leaves of Neem & Tulsi were collected from a village of Gorapur under Begusarai district, India. The fresh leaves were taken to the laboratory of the department of zoology, Patna University and cut into small pieces and dried. The air-dried materials were then further dried in an oven at 40°C. The dried leaves were powdered in blender machine and macerated for 3 days. 100 g of the dried powders of Neem & Tulsi extracted with 80% ethanol and distilled water of 300 ml for three consecutive terms. The extracts were concentrated using a rotary evaporator at a maximum temperature of 45°C. The crude extract was then dissolved in distilled water to prepare solutions of different concentrations (2.5, 5, and 10%)..

Method for toxicity test

Direct toxicity test with *T. Molitor* was done following the method of Talukder and Howse (1993). Insects were chilled for a period of 10 min.

The immobilized insects were individually picked up and 1ml solutions of different concentrations (0.0, 2.5, 5.0 and 10.0% w/v) were applied to the dorsal surface of the thorax of each insect by using a micro capillary tube. Ten insects per replication were treated. The insects were then transferred into petri-dishes containing food. Insect mortality rate was recorded aafter 0.50, 1.0, 1.5, 2, 2.5 h after treatment (HAT). All the experiments were conducted in completely randomized design with four replications and turned to statistical analysis. Finally, the mean values were compared using DMRT, Duncun (1957).

Method for repellency test

Repellency test was conducted following the method of Talukdar and Howse (1993), Amin et al. (2000). The dried extracts were dissolved in distilled water to make solutions of different concentrations. For the experiment, we prepared solutions of three different concentrations as 2.5, 5 and 10% (w/v).Nine centimeter diameter filter papers were marked into two portions. One-milliliter solution of each extract was applied to one half of the filter paper (treated half) and on the other half one milliliter of distilled water was applied (controlled half). The treated disks were then air-dried and placed in a petridish. Twenty (20) insects were placed there, 10 on the controlled half and 10 on the treated half. Number of insects on each side was counted at 30 min intervals up to the second hour after treatment. Percent repellency was calculated by using the following formula from Abbott (1925):

$$\text{Percent Repellency} = \frac{A - B}{A} \quad X\ 100$$

Here,

= Average number of insects present on untreated portion.
= Average Number of insects present on treated portion.

The percentages of repellency were then categorized according to the following scale by the method of B. Roy et al (2005) and R.Amin et al. (2000).

Class	Repellency Rate (%)
0	>0.01-0.10
I	0.10 to 20.00
II	20.10 to 40.00
III	40.10 to 60.00
IV	60.10 to 80.00
V	80.10 to 100.00

III. Results & Discussion

Toxicity test

With the ethanol extract of Neem & Tulsi average mortality percentage indicated that 10 % concentration resulted in the higher toxicity 57.5% in *T. Molitor*. It is also notable that 2.5% showed a toxicity of 14% whereas 5% showed the average toxicity of 30.5% in *T. Molitor* . The order of toxicity of three different

concentrations were 10 > 5 > 2.5 percentage. Observed mortality percentage increased with increase in time intervals after treatment. The comparison of mortality on different concentration of the extract solution is shown in Figure 1**.** Mortality percentage at 0.50, 1.00, 1.50, 2.00, and 2.50 HAT indicated that 10% solution showed the highest mortality (%) in *T. Molitor* at 1.50 HAT. Mortality percentage showed parallel response to the level of concentration at different time intervals after treatment. Mortality after 1.00 HAT to 1.50 showed that the effect of the extracts does not fall within 1.50 h interval of time. Thus, the extract may show long time effect on the receptor insects. The experimental results tabulated on Table 1. Amin et al (2000), reported the direct toxicity of the three plant extract on the following biskatali > neem > akand in lesser grain borer. Talukder and Howse (1993) also noted similar direct toxicity effect of pithraj on red flower beetle. Recently Roy et al. (2005), reported the direct toxicity of leaf extracts of shyialmutra on rice weevil by following order of toxicity 3>2>1%

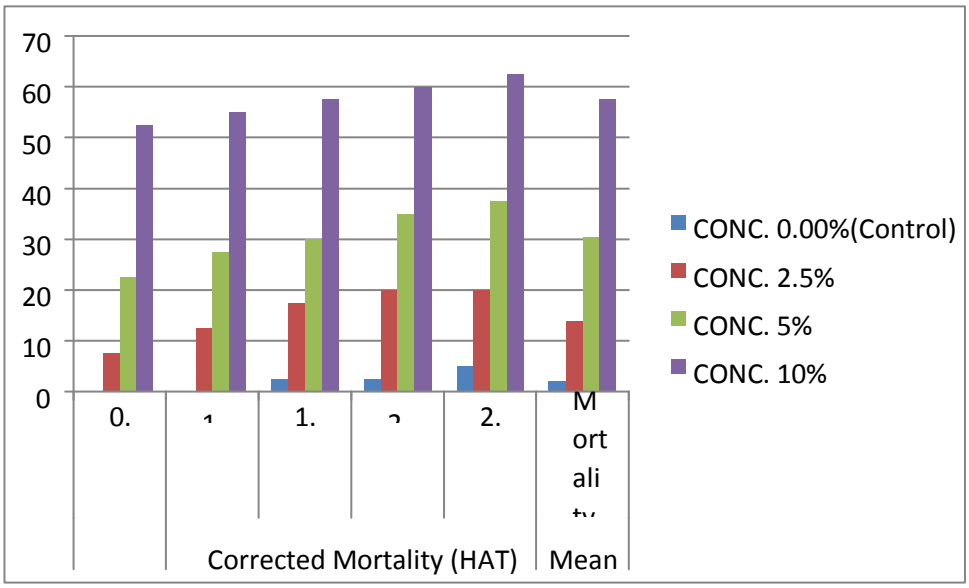

Figure 1. Corrected mortality with ethanol extract of Neem & Tulsi on *T. Molitor*.

Concentration	**Corrected Mortality (HAT)**					**Mean Mortality**
	0.5	**1**	**1.5**	**2**	**2.5**	
0.00% (Control)	0	0	2.5	2.5	5	2
2.5	7.5	12.5	17.5	20	20	14
5	22.5	27.5	30	35	37.5	30.5
10	52.5	55	57.5	60	62.5	57.5

Table 1. Corrected mortality with ethanol extract of Neem & Tulsi) on *Tenebrio molitor.*

Repellency test

Among the extracts 2.5% leaf extract of Neem & Tulsi showed the lowest repellency 16.38% in case of T. Molitor. On other side 5%, showed 23.33%, and 10% showed 50% (Table 2). The highest repellency in *T. Molitor* observed with 10% extract. The repellent action increased with increase in concentrations of the extract applied. The comparison is plotted on Figure 2. Roy et al. (2005) reported repellent effect of shyialmutra in rice weevil with 3% leaf extract. The biological activity of plant extracts is due to the various compounds present in the extracts. These compounds may independently or jointly contribute to cause toxic and repellent action against *T. Molitor*. Our experiments proved a significant impact of plant extracts on the test insect that cause damage to processed and stored commodities. The study establishes the insecticidal activity and repellency of Neem &Tulsi extract on the stored grain insect pest, *T. Molitor*. Increase in the concentration and time interval caused more death. Data suggest that result varies directly proportional to the concentration and time interval. Our experiment also supports that the potential of the plant extracts to cause repellency increases with concentration. Field trials are required to examine the practical applicability of Neem & Tulsi extract. Biosafety studies should be carried out to verify their toxicity to humans . The identification of novel compounds or modes of action determined in the botanicals ought to lead to the development of new commercial products for the

broader improvement in stored pest management. Field trials are required to assess the practical applicability of the botanical pesticides.

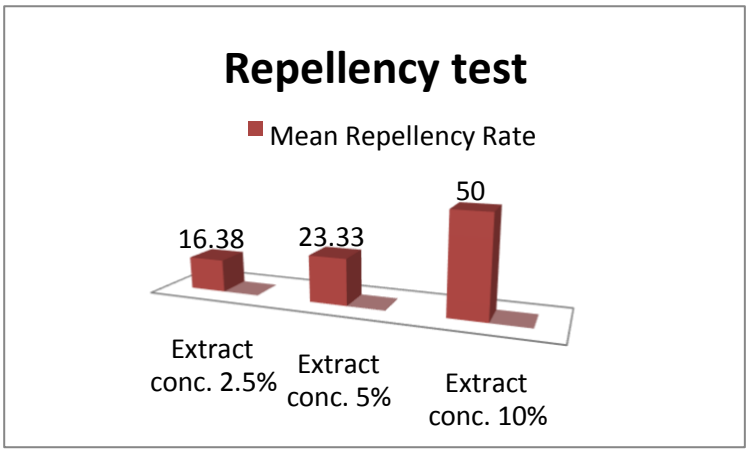

Figure 2. Repellency of different concentration of dried ethanol extracts Neem & tulsi on *T. molitor*.

Extract Concentration (%)	After treatment				**Mean Repellency Rate**	**Repellency Class**
	30 min	**60 min**	**90 min**	**120 min**		
2.5	11.11	22.22	10	22.22	16.38	I
5	22.22	30	30	11.11	23.33	II
10	40	50	50	60	50	III

Table 2. Repellency of different concentration of dried ethanol extracts of Neem & Tulsi on T. Molitor

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References

[1]. Abbott WS (1925). A method of computing the effectiveness of an insecticide. J. Econ. Entomol., 18: 266-267.
[2]. Amin MR, Shahjahan M, Eltaj HF, Iqbal TMT, Alamgir M, Hossain (2000). Bangladesh J. Entomol, 10 (1 & 2): 1-13.
[3]. Duncun DB (1957). A significance test for differences between ranked treatments in an analysis of variance. Virgina J. Sci. 2: 171-189.
[4]. Haque (2002). Chemical Methods of Leaf Extraction of Bankalmi, Polygonum hydropiper for Controlling Rice Hispa Beetles, Dicladispa armiger (Olivier) (Coleoptera: Chrysomelidae) in Bangladesh. J. Biol. Sci. 2 (12): 782-784.
[5]. Kabaru JM, Gichia L, (2001). Insecticidal activity of extracts derived from different parts of the mangrove tree rhizophora Mucronata (rhizophoraceae) Lam. against three arthropods; Afr. J. Sci. Tech. (AJST), Sci. & Eng. Series Vol. 2, No. 2, pp. 44-49AJST.
[6]. Khan, Wasim (2001) Repellency of red pumpkin beetle against some plant extracts. J. Biol. Sci. 1(4): 198-200.
[7]. Nadi (2001). Toxicity of plant extracts to T. granarium. Pak. J. Biol. Sci. 4(12): 1503-1505.
[8]. Roy B, Amin R, Uddin MN (2005), Leaf extracts of Shiyalmutra (Blumea lacera) as botanical insecticides against lesser grain borrer and rice weevil. J. Biol. Sci. 5 (2): 201-204.
[9]. Talukdar FA, Howse PE (1993). Deterrent and insecticidal effect of extract of pithraj, Aphanamixis polystacha against Tribolium Castaneum. J. Chem. Ecel. 19:2463-2471
[10]. Gonzalo Silva-Aguayo (2004). Agronomist, MS,Facultad de Agronomía, Universidad de Concepción, ,Avenida Vicente Méndez 595, Chillán CHILE,gosilva@udec.cl. Botanical insecticides; Radcliffe's IPM World Textbook.
[11]. Khan FZA, Sagheer M, Hasan M, Saeed S, Ali K, Gul HT et al.(2013) Toxicological and repellent potential of some plant extracts against stored product insect pest, Tribolium castaneum (Herbst.) (Coleoptera: Tenebrionidae). International Journal of Biosciences ; 3(9):280-286.
[12]. Mondal OA, Haque J, Haque E, Khan AR(2014) Repellent activity of Abroma augusta extracts against Tribolium castaneum (Herbst) adults. Journal of Bio-Science 20:49-55.