



EFFECT OF SOME WATER PLANT EXTRACTS IN MORTALITY OF CONFUSED FLOUR BEETLE ADULTS *TRIBOLIUM CONFUSUM*

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Abstract

Recently research targeted studying effect of tree types of crud leaves plant extracts (*Trigonella foenum-graecum*-Fenugreek, *Anethum graveolens*-Dill & *Thymus vulgaris*-Thyme) with four concentrations for each extract and detect effect of then in adult of confused flour beetle *Tribolium confusum* after (48, 96 and 168) hour. Results show that the thymus extract is the most effect in mortality of beetle adults then dill & fenugreek. the mortality was increased with increase of concentrations and increase of time of exposer. So mortality after 48 h was with fenugreek extract 0% at concentration 1%, then increased to 7% with concentration 15% until reach 13% after 168h with concentration 15%. With dill extract mortality was 0% with concentration 1% at 48 h, to reach 20% with concentration 15% after 168 h. with thymus leave extract the mortality was 13% with concentration 1% then reach to 60% at concentration 15% after (48,168) h respectively. The LC₅₀ value run to 57.7% with *Trigonella foenum-graecum*, 37.5% with *Anethum graveolens* & 12.5% with *Thymus vulgaris*.

Keywords : Water Plant, Flour Beetle, *Tribolium Confusum*.

Introduction

Nearly one-third of the world's total food products annually is destroyed by more than 2000 types of field and storage pests and 43% of potential products losses have occurred in developing countries in Asia (Ahmed & Grainge, 1986). *Tribolium* sp. It is one of the most common and destructive pests of stored materials around the world and is often found in stored grain stores and factories. Larvae and adults of these insects do not feed on fresh grains only but are fed on grains affected by other insects too (Sharaby, 1988).

The presence of these pests in the stored products leads to pollution and economic damage resulting in a reduction in nutritional value (Barkholder & Faustini, 1991).

Freeman (1973) wrote that 5-10% of the world's agricultural production is affected by insects, while 25-10% post-harvest losses are due to insects, microbes and other factors (Avesi, 1983; Matthews, 1993).

At present, chemical pesticides are the most widely used stored grain pods, but with repeated use these pesticides have caused the emergence of resistant strains against chemical pesticides (Subramanyam & Hagstrum, 1995). Chemical pesticides most commonly used in crop protection can be polluted to the environment and may have harmful effects in humans and animals (Meena *et al.*, 2006; Hashim & Davi, 2003). Phosphine fumigation has become increasingly limited in its use because of resistance developed in stored-grain insects to this fumigant, which is now reported from more than 45 countries (Bell & Wilson, 1995; Chaudhry, 1995).

As a large number of stored-grain pests have been reported to develop resistance against synthetic pesticides now there is need to develop some safe methods for the control of these pests. Insecticidal effect of many plants against pests of stored grain has been demonstrated Abubakar *et al.*, 2000; Boussalis *et al.*, 1999; Fields *et al.*, 2001). Several products of floral species have been evaluated to act as repellents, toxicants against a number of coleopteran species that attack stored grain and their products (Papachristos & Stamopoulos, 2002; Taponjyou *et al.*, 2002).

Material & Methods

Collection of Insects

The adults of confused flour beetle, *Tribolium confusum* were collected from local market located in Holy Karbala City and diagnosed as *Tribolium confusum* by Assist prof. Dr. Rafid Abbas Al-Essa Head of Environmental Health Department / College of Applied Medical Sciences / Karbala University.

Preparation of water plant extracts

The dry leaves of plant were : (*Anethum graveolens*, *Trigonella foenum-graecum* , *Thymus vulgaris*), 50 g of each plant type was added and 500 ml of distilled water was added separately. The flasks were left for 24 hours and then filtered through several layers of medical gauze and then filter papers with Buechner funnel. The liquids were then spread over Plastic bags at room temperature until drying Completely, the extracts were collected in dark glass bottles and kept in the refrigerator until use (AL-Mansour, 1995) modified of (Harborne, 1984).

Prepare the following concentrations of plant extracts 1, 5, 10 and 15% by taking 5 g of dry matter for each extract and solvent in 50 ml of distilled water to obtain stock solution 10%, where the rest concentrations made from stock solution. The treatment of control was represented from distilled water only (Al- Hadidi , 2013).

Effect of water plant extract in adult of Confused flour beetle :

This method made by steeping filter paper 8 cm diameter with a solution of the water extracts of the plants separately for one minute then left until drying and broke up in 9 cm diameter Petri dishes and covered, with making 10 small holes for ventilation and prevented from leaking out of the dish then add 5 g of wheat which are placed in frozen to make sure they are free from infection (Chaubey, 2007).

This process was repeated by three replicates for each concentration with a control treatment using distilled water rather than extract . The mortality were calculated after (48,

96, 168) hours and the mortality were calculated according to Abbott equation (Abbott, 1925).

$$\text{Mortality}\% = \frac{\text{Living organisms number of treatment}}{\text{Living organisms number of control}} \times 100$$

The statistical analysis was done by T-Test and then the least significant difference L.S.D. was calculated between the coefficients .

Results and Discussion

The results in table (1) show that, the mortality effect of *Trigonella foenum-graecum* in Confused flour beetle adults was 7% after 48h with all concentrations, after 96h the mortality stayed 7% with concentrations (1,5) % increased to 13% with concentrations (10,15)%. Then after 168h the mortality was 7% with concentrations (1,5)%, increased to reached 13% with concentrations (10,15)%.

Table 1 : Effect of *Trigonella foenum-graecum* water plant extract in mortality of adult Confused flour beetle :

Concentration %		0	1	5	10	15	LC ₅₀
Mortality %							
<i>Trigonella foenum-graecum</i>	48h	0	7	7	7	7	57.7
	96h	0	7	7	13	13	
	168h	0	7	7	13	13	
L.S.D.		3.96					

As show in table (2), the *Anethum graveolens* leave water plant extract has low mortality effect in Confused flour beetles adult, the mortality after 48h was 0% with (1&5)% concentration then increased to 7% with concentration (10,15)%. after 96h the mortality stayed 0% with concentration 1% and increased to 13% with concentrations (5,10,15)%. then after 168h the mortality reach to 20% with all concentrations.

Table 2 : Effect of *Anethum graveolens* water plant extract in mortality of adult Confused flour beetle :

Concentration %		0	1	5	10	15	LC ₅₀
Mortality %							
<i>Anethum graveolens</i>	48h	0	0	0	7	7	37.5
	96h	0	0	13	13	13	
	168h	0	20	20	20	20	
L.S.D.		14.57					

Table (3) show the mortality effect of *Thymus vulgaris* leaves water plant extract in Confused flour beetle adults, the mortality with Thyme was the most effect in the beetle, at 48h of exposer the mortality was 13% with all concentrations, after 96h the mortality stayed 13% with concentrations (1,5)% then increased to 20% with concentration 20% and to 47% with concentration 15%, after 168h the mortality reach 20% with concentration 1%, 33% with concentration 5%, 47% with concentration 10% and reached highest value 60% with concentration 15%.

Table 3 : Effect of *Thymus vulgaris* water plant extract in mortality of adult Confused flour beetle.

Concentration %		0	1	5	10	15	LC ₅₀
Mortality %							
<i>Thymus vulgaris</i>	48h	0	13	13	13	13	12.5
	96h	0	13	13	20	47	
	168h	0	20	33	47	60	
L.S.D		26.49					

The results in this study same with many of research results in the effect of plant extract (crude or oil) and powder in insect as found (Khalifa, 2014) effect of some powder, aqueous and ethanolic plant extracts which cause significantly higher mortality percentage with all concentrations of all tested plants after 24 h of exposure. Besides toxic effects of many essential oil constituents have also been determined against many insect pests (Weaver *et al.*, 1991; Weaver *et al.*, 1995).

Also Regnault-Roger (1997) pointed out that insects vary enormously in their responses to secondary plant products and it is well known that the sensitivity of different insect species could be quite different for the same substance.

The result same too with Padín *et al.* (2013) how used nine of aqueous and methanolic plant extracts and show mortality effect in Confused flour beetle adults.

As same as Jbilou *et al.* (2006) how study the Insecticidal activity of four methanolic plant extracts against *Tribolium castaneum* and found that the naturally plant extracts could be useful for managing populations of it.

Chaubey (2007) found that essential oils from the dried fruits of three common spices one of them *Anethum graveolens*, The three essential oils repelled the adults of *T. castaneum* at low concentrations in the filter paper repellency assay, The LC₅₀ of *A. graveolens* oil was found 16.66 ml.

But this results different with Karabörklü *et al.* (2010) where they tested fumigant toxicity of ten aromatic plant essential oils one of them leaves of thyme in red flour beetle adults, they found there are no effect mortality in beetles.

The contrast in the mortality percentage by deferent extracts because the diversity in chemical compound which contain and that cause damage to protoplasm, deposition the protein and formation complex salts in middle cells layer for gastrointestinal (Gerges & Ameen, 1987).

There are generally two types of effects, The physiological effects of toxic plant compounds of insect tissues are the indirect toxic effect that occurs Dysfunction of the nervous system of the secretions of the insect, and the direct effect of the correct action of toxic compounds on tissues (Sukumar *et al.*, 1991) and because of the presence of toxic compounds that inhibit, The effectiveness of protein-digesting enzymes in the insect and because some compounds are associated with proteins are complex with protein and therefore difficult to digest, thus affecting the efficiency of food conversion and then the death of insects (Kolock *et al.*, 1986).

Conclusions

The current study concluded that the raw water extracts of the three plants under study have mortality effect in the adult of confused flour beetle *Tribolium confusum*. The water extract of the *Thymus vulgaris* -Thyme plant was the most important in the mortality of adults followed by the *Anethum graveolens* - Dill and *Trigonella foenum-graecum* - Fenugreek extract.

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