



Inhibitory Activity Evaluation of Two Medicinal Plant Extracts (*Rosmarinus officinalis* & *Alhagi maurorum*) against Adult of *Tribolium Castaneum*

Muna Hashim Ghazzay¹, Meison Abdulbary^{*2}

¹Department of Clinical Laboratory Sciences.

²Department of Pharmacognosy and Medicinal Plant / Faculty of Pharmacy /University of Kufa, Republic of Iraq.

*Corresponding Author: Meison Abdulbary

Abstract

Medicinal plants (*Rosmarinus officinalis* and *Alhagi maurorum*) alcoholic extracts inhibitory effect against *Tribolium castaneum* adults were examined with concentrations 50, 75 and 100 mg/ml through 24, 48 and 72 hours respectively. The total results indicate that the two plants can be used as insecticides for *T. castaneum*. However, The results indicated a significant difference between the two plants in the adult mortality rate, where were adults mortality rate of treatment with plant extract *Alhagi maurorum* (2.37) in contrast to the plant *Rosmarinus officinalis* which amounted to (1.19) after 72 hours of treatment. The results showed non-significant differences between concentrations of the plant extract *Rosmarinus officinalis* in the adult mortality *Tribolium castaneum* in 24 and 48 hours, while there was a significant difference between concentrations in 72 hours where was the adult mortality rate 5.67 with concentration 100 mg/ml and 1 with concentration 50 and 75 mg/ml respectively. In addition, there were significant differences with extract of *Alhagi maurorum* between the concentrations in the adult mortality rate at 24 and 48 hours, but the results showed significant differences between the concentrations of the extract in 72 hours reaching 1.33, 4.33 and 5.67 respectively with the concentrations 50, 75 and 100 mg/ml respectively.

Keywords: *Rosmarinus officinalis*, *Alhagi maurorum*, *Tribolium castaneum*.

Introduction

The plants have many benefits to human since ancient times that ancient Iraqis (Sumerians and Akkadian) had been recorded as the first nation that used plants for treatment, feeding, cooking and religion ceremonies [1].

There are many plants used for these purposes and rosemary is one of herbs which is related with birth, marriage and death ceremonies and in the cooking as flavoring agent as well as for its pharmaceutical properties [2]. Rosemary (*Rosmarinus officinalis*), Lamiaceae family, is inborn herb in the Mediterranean and found as cultured herb in many regions around the world [3].

Its contribution in the acetylcholine collapse

that it used to treat pain, the immune and memory enhancement also help in circulatory system, decrease hair failure and head dandruff since it stimulate hair growth[4, 5]. Nowadays, the plant considers as an antioxidant, fungicidal and antibacterial agent, because it is reported that it is rich with phenolic compounds [6].

The plant (*Alhagi maurorum*) is used also for treatment and many cosmetic that the genus *Hedysarum alhagi* was well-known by Linnaeus in 1753 then the name *Alhagi maurorum*, replacing Linnaeus name by Friedrich Kashmir Medikus [7]. It's generally termed by a common name camel thorn which is inborn in the region between the

Mediterranean and Russia, and it's grown well in the Middle East area [8].

The plant contain carbohydrate thus manitol sugar is extracted from it to use in tablets made in drugs industry [9] also glycosides as anthraquinone, and hall plant has volatile oil with the exception of for the roots [10]. The plant used in pharmaceutical productions as it used to manufacturing laxatives, diuretics and sweeteners [11].

In addition the plant parts may enhance the treat of rheumatism and kidney stones [12]. Nowadays, the plant consider as antioxidant, anti-inflammation and antibacterial agent [13]. *Tribolium castaneum* is a store insect also known as (red flour beetle) which attacks stored grain products such as flour, cereals and stored medicinal plants product or drugs which cause damage to crude drugs [14].

It could be grow generally in the highly temperature regions, but in the cold weather on winter it will be survive in protected places, particularly if the warm is found [15]. It frequently presents in great number in infected stored powdery materials and grains causing undesirable odor with color changing to grey [16] with losing the quantity and quality of the product [17].

There are many ways used to protect the stored materials from insects such synthetic insecticides which may be lead to harm the environment by many side effects as it carry many dangerous compounds effects on other non-target organisms besides toxicity and rising the rate of insecticidal resistant[18,19].

Thus insecticides which made from plant materials appear as a substitute to the synthetic insecticides since it have no toxic or side effects on environment, organisms and nature [20]. The aim of this study to investigate for Inhibitory activity of two medicinal plants extracts (*Rosmarinus officinalis* and *Alhagi maurorum*) against adult *Tribolium castaneum*.

Materials and Methods

Extraction of Plant Material

The leaves of plant (*Rosmarinus officinalis*) were obtained from Al - Najaf city markets, while the whole plant (*Alhagi maurorum*) was collected from Al-Najaf desert wiped from dust then yield powder by mixer

grinder. Soxhlet was used to extract plants by adding 250 ml of solvent (methanol 95%) to 25gm of plant powder for 24 hours, filtration, and concentration and dried then stored in refrigerator until used [21].

Insects

The adult insects of *T. castaneum* obtained from flour stores in Al - Najaf city.

Inhibitory Activity Evaluation

Methanol extracts for each of (*Rosmarinus officinalis* and *Alhagi maurorum*) with concentrations 50, 75 and 100 mg/ml respectively were prepared to investigate about the Inhibitory activity and for three petri dishes then added a (1.50 gm) from flour mixed with yeast (10:1) w: w and good mixed with 1ml from methanol extract and the dishes left to dry.

After that, 10 adult from *T. castaneum* have been added in each dish in triple work. A control group was preparing with petri dish content flour with distil water only. Then they were placed in an incubator at (2±27) °C and moisture (5±70) %, the adults was counted mortality after 24, 48 and 72 hour after treatment [22].

Statistical Analysis

Data were analyzed with using LSD with P < 0.05 for explanation of statistically significant between concentrations plants extracts in the adult's mortality, using T-Table for activity evaluation of two plants extracts.

Results and Discussion

The bioactivity of medicinal plants against the store insects has more important nowadays [23, 24], The results showed that *Rosmarinus officinalis* and *Alhagi maurorum* have insecticidal effect which may be because of presence of secondary metabolites like alkaloids, glycosides, tannins and phenols compounds in its extract [25, 26], that is revealed in the Figure (1) which showed that the upper mortalities for plant extract (*Rosmarinus officinalis* in 72 hours were 1, 1 and 5.67 respectively in concentrations 50, 75 and 100 mg/ml respectively, with significant differences between concentrations at 72 hours from treatment whereas lowest in 24 and 48 hours in all concentration if it compare to control group, and this denoted non-

significant differences between concentrations plant extract and these declared that mortality rate will be elevate

with the more time of contact with plant extract (*Rosmarinus officinalis*) [27].

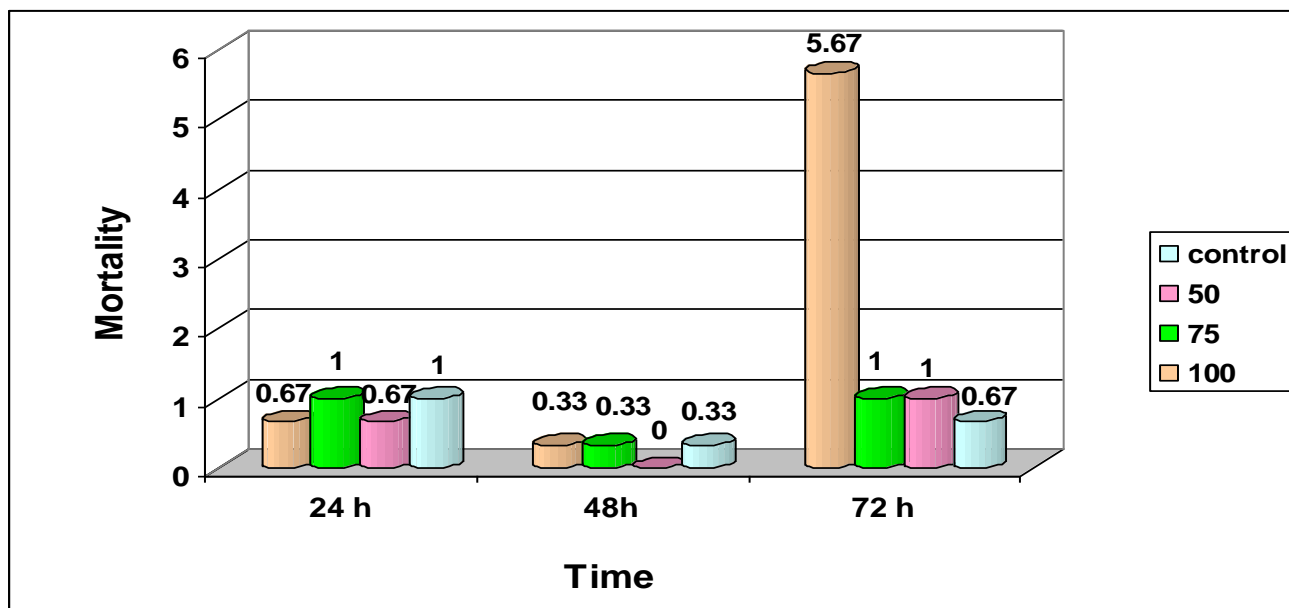


Figure 1: The effect of plant extract concentrations (*Rosmarinus officinalis*) in adults mortality (*T. castaneum*) after 24,48 and 72 hours from treatment

The Figure (2) cited that significant differences between concentrations of plant extract (*Alhagi maurorum*) in (*T. castaneum*) adults mortality after 24, 48 and 72 hours from treatment, while in 24 hours 0.67 , 1.33 and 0.33 respectively, and in 48 hours were 2.67, 1 and 4 respectively also , either in 72 hours were 1.33, 4.33 and 5.67 respectively also if compare with control and at concentrations 50,75 and 100 mg/ml. Since these results, it can be cited also the mount and the type of active compounds in plant extract beside the effective methods to work will lead to high insecticidal effect of different extracts against *T. castaneum* [28, 30].

In our study, *Alhagi maurorum* was highly effective inhibition activity when it applied on ,since mortality of adults of *T. castaneum* 2.37 while *Rosmarinus officinalis* caused less mortality 1.19 for adults of *T. castaneum* (Figure 3). This indicates a significant difference between the two plants. Results of this study emphasized that the two plants extracts *Rosmarinus officinalis* and *Alhagi maurorum* might be helpful as a powerful insect control agents. This confirms the findings of several studies pointed to the highly mortal repugnant effect of plants extracts against stored-product beetles [31, 32].

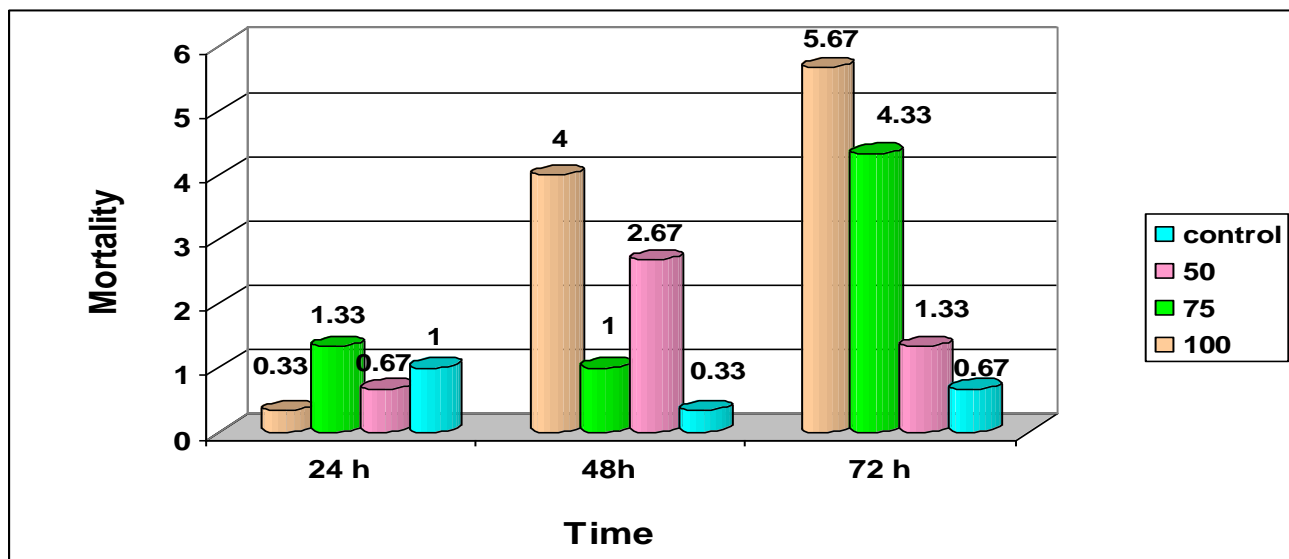


Figure 2: The effect of plant extract concentrations (*Alhagi maurorum*) in adults mortality (*T. castaneum*) after 24,48 and 72 hours from treatment

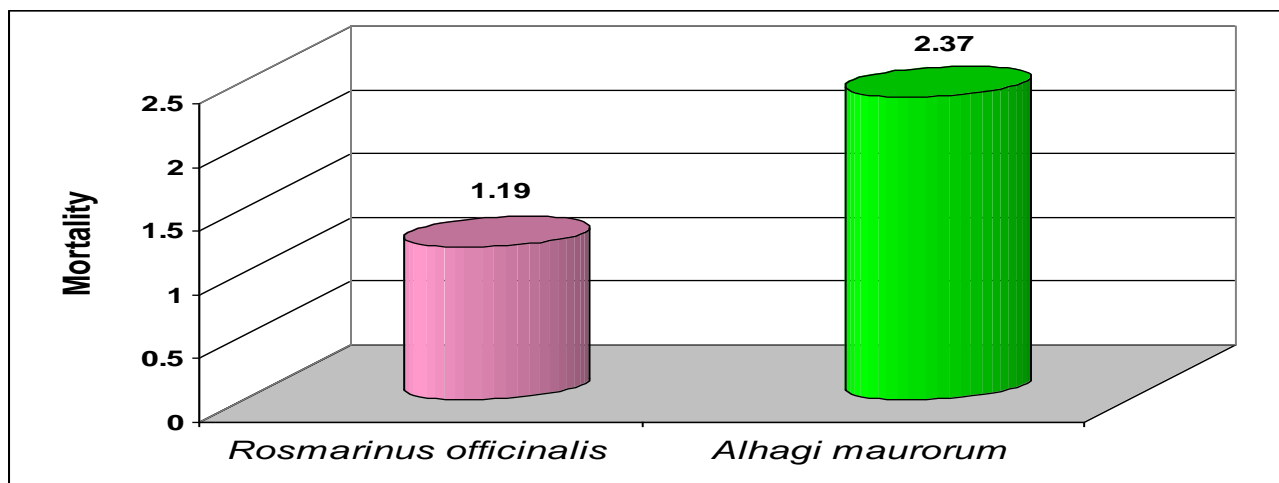


Figure 3: The mention to activity two plants extracts (*Rosmarinus officinalis* and *Alhagi maurorum*) in adults mortality (*T. castaneum*) after 72 hours from treatment.

References

1. Kaur R, Kapoor K, Kaur H (2011) Plants as a source of anticancer agents. *J. Nat. Prod. Plant Resour.*, 1(1): 119-124.
2. Orhan I, Aslan S, Kartal M, Şener B, Başer KHC (2008) Inhibitory effect of Turkish *Rosmarinus officinalis* L. on acetylcholinesterase and butyrylcholinesterase enzymes. *Food Chemistry* 108(2): 663-668.
3. Pérez MB, Calderón NL, Croci CA (2007) Radiation-induced enhancement of antioxidant activity in extracts of rosemary (*Rosmarinus officinalis* L.). *Food Chemistry* 104: 585-592.
4. Abdel-Monaim MF, Abo-Elyousr KAM, Morsy KM (2011) Effectiveness of plant extracts on suppression of damping off wilt disease on Lupine (*Lupinus termis* Foik). *Crop Prot.*, 30(2):185-191.
5. Ozarowski M, Mikolajczak PL, Bogacz A, Gryszczyńska A, Kujawska M, Jodynis-Liebert J, Piasecka A, Napieczynska H, Szulc M, Kujawski R, Bartkowiak-Wieczorek J, Cichocka J, Bobkiewicz-Kozłowska T, Czerny B, Mroziakiewicz PM (2013) *Rosmarinus officinalis* L. leaf extract improves memory impairment and affects acetylcholinesterase and butyrylcholinesterase activities in rat brain. *Fitoterapia*. 91:261-271.
6. Kennedy DO, Scholey AB (2006) The psychopharmacology of European herbs with Cognition-enhancing properties. *Curr. Pharm.*, 12:4613-4623.
7. Liu P, Wen J, Duan L, Arslan E, Ertuğrul K, Chang Z (2017) *Hedysarum L.* (Fabaceae: Hedysareae) Is Not Monophyletic-Evidence from Phylogenetic Analyses Based on Five Nuclear and Five Plastid Sequences. *Plos One journal*. 1- 14.
8. Shakiba Y, Rezaatofghi SE, Nejad SMS, Ardakan MR (2016) Antiviral Activity of *Alhagi maurorum* Medik's Methanolic Extract on Foot and Mouth Disease Virus (FMDV) in Cell Cultures. *Jundishapur J. Nat. Pharm. Prod.*, 11(3):1-5.
9. Goncharov M Yu, Yakovlev GP, Vitovskaya GA (2001) Composition of polysaccharides from above-ground part of *Alhagi maurorum* Medic. *Rastitel'nye Resursy.*, 37:60-63.
10. Amani ASA, Maitland DJ, Soliman GA (2006) Antiulcerogenic Activity of *Alhagi maurorum*. *Pharmaceutical Biology*. 44(4): 292-296.
11. Nedhal A, Al-Douri L, Al-Essa Y (2010) A Survey of Plants Used in Iraqi Traditional Medicine". *Jordan Journal of Pharmaceutical Sciences*, 3(2): 100-108.
12. Zain MA, Awaad AS, Al-Outhman MR, El-Meligy MR (2012) "Antimicrobial activities of Saudi Arabian desert plants". *Phytopharmacology*, 2(1): 106-113.
13. Neamah NF (2012) A Pharmacological Evaluation of Aqueous Extract of *Alhagi maurorum*. *Global Journal of Pharmacology*. 6 (1): 41-46.
14. Shafique M, Ahmed M, Chaudry MA (2006) Feeding preference and development of *Tribolium castaneum* (Herbst.) in wheat products. *Pakistan J. Zool.*, 38: 27-31.
15. Tripathi AK, Prajapati V, Agarwal KK, Kumar S (2001) Toxicity, feeding deterrence, and effect of activity of 1,8-Cineole from *Artemisia annual* on progeny production of *Tribolium castaneum* (Coleoptera: Tenebrionidae). *J. Econ. Ent.*, 94: 979-983.
16. Ahmad M, Ahmad A (2002) Storage of food grains. *Farm out l.* 1: 32-36.
17. Sagheer M, Mansoor-ul-Hasan, Latif MA, Iqbal J (2011) Evaluation of some indigenous medicinal plants as a source of toxicant,

- repellent and growth inhibitors against *Tribolium castaneum* (Coleoptera: Tenebrionidae). Pak. J. Entomol., 33: 87-91.
18. Robinson WH (2005) Urban Insects and Arachnids. A Handbook of Urban Entomology. Cambridge University Press, Cambridge, UK.
 19. Islam MS, Zahan R, Nahar L, Alam MB, Naznin GC, Sarkar MA, Mosaddik MA, Haque ME (2011) Antibacterial, insecticidal and in vivo cytotoxicity activities of *Salix Tetrasperma*. IJPSR.2: 2103-8.
 20. Farhana K, Islam H, Emran EH, Islam N (2006) Toxicity and repellent activity of three spice materials on *Tribolium castaneum* (Herbst) adult. J. Bio-sci., 14: 127-30.
 21. Harborne JB (1984) Phytochemical methods; A guide to modern techniques of plant analysis, 2nd ed. Chapman and Hall, London, 307.
 22. Islam H, Farhana K, Islam N (2004) Screening of spices for biological activity against *Tribolium castaneum* (Herbst) adults. University Journal of Zoology, Rajshahi University.23: 65-8.
 23. Dubey NK, Srivastava B, Kumar A (2008) Current status of plant products as botanical pesticides in storage pest management. - Journal of Biopesticides, 1: 182-186.
 24. Benzi V, Stefanazzin Ferrero AA (2009) Biological activity of essential oils from leaves and fruits of pepper tree (*Schinus molle* L.) to control rice weevil (*Sitophilus oryzae* L.).- Chilean Journal of Agricultural Research, 69: 154-159.
 25. Mena, P Cirlini M, Tassotti M, Herrlinger KA, Dall'Asta C, Del Rio D (2016) Phytochemical Profiling of Flavonoids, Phenolic Acids, Terpenoids, and Volatile Fraction of a Rosemary (*Rosmarinus officinalis* L.) Extract. Molecules. 21: 1576
 26. Salih SM, Alobaidi KH, Alobaidi ZF (2015) Cytotoxic Effect of *Rosmarinus officinalis* L. Leaf Extracts on Tumor Cell Line. Journal of Al-Nahrain University, 18 (4): 98-102. Science.
 27. Osman MA, Aziz MA, Habib MR, Karim MR (2011) Pesticidal Evaluation of *Manilkara zapota* (L.) against *Tribolium castaneum* (Herbst). Agr. Cons. Sci., 76: 143-6.
 28. Obeng-Ofori D, Reichmuth CH (1997) Bioactivity of eugenol, a major component of essential oil of *Ocimum suave* (Wild.) against four species of stored-product. Coleoptera.- International Journal of Pest Management. 43: 89-94.
 29. Tripathi AK, Prajapati V, Khanuja SPS, Kumar S (2003) Effect of d-Limonene on three stored-product beetles.- Journal of Economic Entomology, 96: 990-995.
 30. Suthisut D, Fields PG, Chandrapatya A (2011) Contact toxicity, feeding reduction, and repellency of essential oils from three plants from the ginger family (Zingiberaceae) and their major components against *Sitophilus zeamais* and *Tribolium castaneum*.- Journal of Economic Entomology, 104: 1445-1454.
 31. Alok-Krishna, Veena-Prajapati, Bhasney S, Tripathi AK (2005) Potential toxicity of new genotypes of *Tagetes* (Asteraceae) species against stored grain insect pests.- International Journal of Tropical Insect Science, 25: 122-128.
 32. Zia A, Aslam M, Naz F, Ilyas M (2011) Bio-efficacy of some plant extracts against chickpea beetle, *Callosobruchus chinensis* Linnaeus (Coleoptera: Bruchidae) atta.