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Study of the effect of *Anastatica hierochuntica* L. extracts in aspects of the life performance of *Tribolium castaneum* with the diagnosis of active compounds using GC-MAS.

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Abstract

A series of tests were carried out to demonstrate the effectiveness of the extract of the crude turbines and the water extract (hot and cold) for the plant of the palm of Mary (*Anastatica hierochuntica* L) in some standards of life performance of red beetle (*Tribolium castaneum*). The results showed the superiority of the extract of crude turbines. On the hot and cold water extract in the occurrence of high mortality rate of the different roles and stages of the insect and different treatment methods as the results showed the sensitivity of these stages of the extracts and the results showed that the third larval stage more sensitive than the sixth larvae. With the highest mortality rate of the third larval stage when treated with the extract of the terabenic compounds in the manner of mixing the extract with the flour where the percentage of loss was 81.14% at the concentration 4 mg/ml. The results showed the sensitivity of the virgin phase to these extracts. The highest percentage of the treatment was treated with the extract of the crude turbent compounds at the concentration of 4 mg/ml at 72.29%. The results also showed deformation of the treated oats and the failure of adults to exit the casing. The effect of the different extracts on the adult insects was also shown, and high levels of loss of the roles and stages of the treatment. The active compounds were also diagnosed using GC-MAS for the extract of the crude turbent compounds of the plant as the most effective extracts. The technique showed ten effective compounds that appeared at different times of detention.

Keywords: Coleoptera, *Anastatica hierochuntica* L, *Tribolium castaneum*.

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Introduction

The Herbst *Tribolium castaneum* insect beetle belongs to the Tenebrionidae family of *Coleoptera* and is considered a major store insect. Where it lives and completes its life cycle in its larval and complete stages on infected grains and flour, affecting the quality and quantity of the product [1,2]. The infected flour gets a pungent smell due to the gas secretions produced by the insect. As the flour turns from white to pink, it also causes a decrease in the degree of viscosity of the dough and the reduction of its elasticity [3,4]. The difficulty of controlling this insect is its presence with food and the use of pesticides leads to the contamination of these food with poisonous pesticides and hence it has become necessary to search for alternatives to chemical pesticides, such as the use of plant extracts for lack of toxicity and residual effects where the use of extracts and plant powders as anti-feeding or toxic or inhibiting growth or attractants or repellent [5,6].

As the plants produce during the growth and development of a large number of chemical compounds and is believed to be one of the most important functions that are a means of defense against animals and insects that attack and is the plant of the palm of Mary (*A. hierochuntica* L). One of the most important medicinal plants used in the treatment of diseases as natural alternatives because it possesses many therapeutic properties [7]. This plant was selected in the present study because it is a common medicinal plant used in traditional medicine. The palm of Mary's plant is a beautiful tree with leaves falling up to a height of 6.7 m. It possesses drought resistance and grows quickly. Water is available [8]. The palm of Mary's plant contains several active ingredients, most important of which are turbines, flavonoids, and calcosides [9].

Daoowed and Al-Saeed et al. [10,11] indicated that this plant has a high percentage of alfalfa, fenolates, soap and volatile oils, approximately 1.5%, and contains a small percentage of essential oils, not exceeding 0.5.

The present study aims to study the effect of different concentrations of the extract of the crude turbines and the hot and cold water extract of *A. hierochuntica* plant in the life performance of this insect, namely the larvae (third and sixth), virgins and bugs, and the sensitivity of these stages and roles of the extracts using two methods of treatment to know which one

is better to use as well as the isolation and diagnosis of active compounds using GC-MASS.

Materials and Methods

The insect was obtained by Dr. Rafid Al-Eissa at the University of Karbala/Faculty of Agriculture using the distributive keys of the Tenebrionidae family mentioned in the Book of Insects of Stores. In order to preserve the colony of the insect, 250 g of bran was placed in a sterile glass bottle, 8 cm in diameter and 15 cm in height, and 20 pairs of insects aged between 48 h and 24 h after its separation. The bottle was covered with a plastic lid in the middle of the bottle with a diameter of 2 cm for the purpose of ventilation covered with tulle cloth. Then put in the temperature of 2+28 m and humidity of 5+70% inside the incubator, and take care of replenishment of the diet every two months to get young insects for subsequent tests.

Processing, diagnosis and storage of plant samples

The samples were collected from the local markets in Karbala governorate and were sprayed with a clean mill (mixer) to store the vegetable powder in clean, sterile and dry containers, taking into account the registration and the date of collection of the samples on those containers until the use was brought from the plant under study to Life Sciences at Karbala College of Science and was diagnosed by the teacher Dr. Khansa Abdul-Ali Shahid as A.hierochuntica from the Brassicaceae family.

Preparation of the extracts of turbine compounds of the plant of the palm of Mary A. hierochuntica

The crude extract of the aerobic compounds of Mary *A. hierochuntica* was obtained according to the Harborne method [7]. For the purpose of estimating the biological efficacy of the extract of the crude soil compounds of the plant of the palm of Mary 2 g of dry extract was dissolved in a mixture of 1.5 ml chloroform with 1.5 ml of ethyl alcohol and supplemented to 100 ml by adding distilled water. The concentration of the solution was 2% or 20 mg/ml and the concentrations were concentrated (1, 2 and 4 mg/ml), control treatment was 1.5 ml of chloroform with 1.5 ml of ethyl alcohol and supplemented to 100 ml by adding distilled water.

Preparation of the water extract of the plant of the palm of Mary A. hierochuntica

In order to estimate the effect of the hot and cold water extract of the palm of Mary plant on the red beetle, take 10 g of dried dill from each extract separately and in 100 ml distilled water The concentration of the solution was 10% and the concentrations were prepared (1, 2.4%). The control treatment was done using distilled water only.

Effect of Raw and Aquatic Turbine Extracts of A.hierochuntica Plant in the Drainage Ratios (Third, Sixth and Adult Larvae) of the Castaneam T [5] larvae/replicates of the larvae (third and sixth) of the *T. castaneum* insect, which were identified by their sizes and skins, and by three replicates for each concentration of concentrations prepared for each extract and placed in single-use petri dishes using two methods of treatment: The treatment of natural food (1 g flour) before the introduction of larvae (infectious effect) and the treatment of larvae directly (local effect).

The treatment was done with the above concentrations using a small machine gun. Each treatment was sprayed with extracts from about 25 cm high. The treatments were placed at 28 ± 2°C and 70 ± 5% relative humidity. The mortality rates were recorded 24 h after the treatment and the results were corrected according to the Abbott equation. The following steps were repeated except for the replacement of larvae with adults. The different treatment methods were also followed: direct spraying (local effect) and treatment of food (gastrointestinal effect). The percentage of mortality was calculated 24 h after the treatment and the results were corrected according to the Abbott equation [12].

Effect of raw and aquatic turbine extracts on the plant of Mary A. hierochuntica in the prostitution of virgins

Took (five) virgins for each repeater (newly formed) and by (three) replicates for each concentration and each extract, and placed in the dishes of Petri container on the center of food 1 g flour. Then treated by spray method of the extract on the virgin using concentrations of extract 41.2 mg/ml. Directly dishes were placed at 28 ± 2°C and 70 ± 5% relative humidity. The mortality rates were recorded after 24 h of treatment and the results were corrected according to the Abbott equation [12]. The corrected death percentages were calculated according to the following equation:

% of the corrected depreciation="\\"Percentage of depreciation in transaction-percentage of depreciation in control transaction \""/"\\"Percentage of depreciation in control transaction\" -100" × 100

The percentages of corrected depreciation were converted to angle values for inclusion in the statistical analysis.

And the diagnosis of active compounds of the extract of the crude turbid compounds of the *A. hierochuntica* plant using the technique of gas chromatography-mass spectrometry (GC-MS).

GC-MS analysis method

The GC-MS analysis was performed using the GC clarus 500 Perkin Elmer system, which includes the AOC-20i auto sampler for vehicles, the gas chromatography bound to the mass spectrometer and the use of the following conditions:

GC-mass condition

GC-MS analysis was carried out on a GC-mass 5977A Series Agilent system auto sampler and gas chromatograph interfaced to a mass spectrometer (GC-MS) instrument employing the following conditions: Column Elite-1 fused silica capillary

column HP-5MS (30 mm × 0.25 mm I.D) operating in electron impact mode at 70 eV; helium (99.999%) was used as carrier gas at a constant flow of 1 ml/min and an injection volume of 0.5 µl was employed (split ratio of 10:1) injector temperature 250°C; ion-source temperature 280°C. The oven temperature was programmed from 60°C (isothermal for 2 min), with an increase of 10°C/min, to 270°C, then 5°C/min to 290°C, ending with a 9 min isothermal at 310°C. Mass spectra were taken at 70 eV; a scan interval of 0.5 s and fragments from 45 to 450 Da. Total GC running time is 60 min [13].

The components were determined according to the GC-MS mass spectrometry using a database of the National Institute of Standardization and Technology (NIST) with more than 62,000 known patterns and comparing the resulting spectrum of the unknown component with a range of known and stored components in the NIST library to ascertain the name, molecular weight and structure of the components of the test materials. This test was conducted at the Ministry of Science and Technology.

Results and Discussion

Effect of raw and hydroponic turbine (Warm and cold) extracts of A. hierochuntica plant in the destruction of larval (III and VI) of the T. castaneum

Table 1 shows a significant effect on the treatment method of the extract of the crude turbid compounds, the hot and cold water extract of the palm of the palm of Mary and the concentrations used and their overlap in the percentage of the third larval phase of the *T. castaneum*. The results indicated a significant effect of the treatment method. The results showed that the method of mixing the extract with the flour gave the highest percentage of the larvae of the third larvae which reached 34.37% and the lowest percentage of the larvae in the treatment by spraying the extract on the larva at 23.39%.

As for the type of extract used in the treatment, where the results showed that the extract of the compounds of the turbines of the plant of the palm of Mary on the hot and cold water extract, where the highest rate of larvae 34.54% and by using different methods compared to the use of water extract (hot and cold) the rate of loss where (32.54% and 20.10%), respectively. The results showed significant differences.

The results showed that the effect of the concentrate concentration factor was significant, with all concentrations significantly affecting the control treatment. The results showed that the highest loss of *T. castaneum* was the third larval stage at 4 mg/ml, which was 74.91% and the lowest rate of destruction of the larval stage at the treatment of 1 mg/ml and was 26.34% compared to control treatment, which had a loss rate of 1.77%.

The interaction between the method of addition of different extracts of the palm of the palm of Mary and the concentrations and the method used in the treatment indicates a significant effect on the third larval phase of the insect. The highest mortality rate was achieved in the third larval stage when mixing the mixing of the extract with the flour. The highest percentage of loss was recorded in the treatment with the extract of the crude turbocharged compounds (81.14%) and the concentration of 4 mg/ml. The lowest phase loss of the treatment was obtained by spraying the extract on the larva and at the concentration of 1 mg/ml when treated with cold water extract, with a loss rate of 8.44%.

Table 1. *Effect of various extracts of A. hierochuntica plant, concentrations, method and interaction between them on the destruction of larvae of the third stage of T. castaneum.*

Abstract rate	Nutrition	Spray method	Method concentrate mg/ml	Abstract type
34.54	81.14	33.93	4	Extract of crude turbines
	59.21	29.63	2	
	43.07	25.33	1	
	2	2	0	
32.54	49.92	50.4	4	Hot water extract
	50.4	42.62	2	
	34.32	30.02	1	
	1.33	1.33	0	
20.1	42.39	29.71	4	Cold water extract
	34.09	25.33	2	
	16.88	8.44	1	
	2	2	0	
	34.73	23.39	Method rate	

0.00 mg/ml	1.00 mg/ml	2.00 mg/ml	4.00 mg/ml	Concentration rate
1.77	26.34	40.21	74.91	
Interference	Method	Concentration	Abstract	L.S.D α0.05
12.416	3.5841	5.0687	4.3896	

Table 2 shows a significant effect on the treatment method of the extract of the crude turbines and the hot and cold water extracts of *A. hierochuntica* plant and the concentrations used and their overlap in the percentage of the sixth larval phase loss of the thymus beetle *T. castaneum*, The results showed a significant effect of the method of treatment of different extracts and achieved the results of way mixing extracts with flour (feeding method) the highest rate for the destruction of the developed larval sixth, which amounted to 28.83% and the lowest rate of loss of developed larval when treated in a way spray different extracts plant the palm of Mary on the larva directly reaching 13.59%.

The results also showed that the factor extract used in the treatment significant effect type in the destruction of larval phase VI and different depending on treatment method and concentrations where results showed superiority extract compounds of crude turbine on the aqueous extract (hot and cold) to plant the palm of Mary, where the rate was when using crude turbine vehicles extract 28.38% The ratio of crude turbent extract was 28.38% compared to 17.0 and 17.60% when treated with hot and cold water extract respectively.

The results showed that there was a significant effect on the concentration factor of the extracts used. All concentrations significantly affected the control treatment. The results showed the highest loss of the sixth larval stage of the *T. castaneum* beetle at 4 mg/ml at 39.86%. 1 mg/ml with a ratio of 14.55%.

The interaction between the method of adding the different extracts of the palm of Mary and the concentrations showed a significant effect on the percentage of the sixth larval phase loss of the falciparum beetle with the highest percentage of loss in the treatment of the mixing of the extract of the crude turberic compounds of the palm of Mary plant with the flour at 81.02% and the concentration 4 mg/ml, and the lowest loss rate of the sixth larvae was treated with the effect of the spray funnel on the sixth larval stage and at 1 mg/ml concentration for each of the hot and cold water extract of the palm of the palm of Mary, with a loss rate of 0.0% and both extracts.

Table 2. *Effect of different extracts of A. hierochuntica plant, concentrations, method and interaction between them on the destruction of the sixth larval stage of T. castaneum.*

Abstract rate	**%% of consumption in the feeding method**	**% of the damage in the treatment by spraying**	**Method concentrate (mg/ml)**	**Abstract type**
28.38	81.02	35	4	Extract of crude turbines
	50.24	30.78	2	
	21.15	8.85	1	
	0	0	0	
17.07	35	26.56	4	Hot water abstract
	30.78	17.7	2	
	26.56	0	1	
	0	0	0	
17.605	35	56.26	4	Cold water abstract
	30.78	17.7	2	
	30.78	0	1	
	0	0	0	
	28.44	13.59	Method rate	
0.00 mg/ml	1.00 mg/ml	2.00 mg/ml	4.00 mg/ml	Concentration rate
0	14.55	29.66	39.86	
Interference	method	Concentration	abstract	L.S.D α0.05

13.814	3.9879	5.6397	4.8841

The results above shows the effect of extracts of crude turbine and water (hot and cold) to plant the palm of Mary *A. hierochuntica* used to influence a larvae of the red beetle flour Alsdiah by following the different treatment methods, the results showed superiority extract turbine compounds of crude on the aqueous extract of both types of hot and cold in terms of influence. The loss of larvae in their third and sixth stages may be due to the damage caused by the extracts used in the middle larvae tissue, where the muscle layer of the middle eye is affected by the extract, thus losing its ability to function because of its separation and inability to benefit from food for the decay and decay of the epithelial tissue itself. Wigglesworth [14] reported that the epithelial cells of the digestive tract of insects contain a group of enzymes called microsomal oxidase. These enzymes act to remove the cytotoxic effect of the natural compounds in the plant on which the insect feeds and affect these enzymes leading to the poisoning of the gut tissues of the insect, and may be caused by the association of active substances, i.e. the secondary metabolites present in the extract with the fatty substances present in the digestive system of the insect, thus subtracting the fatty substances without benefit and the recent death of the larvae [15]. Or toxic compounds may have the ability to affect the nervous system of larvae and thus its paralysis and then failure to continue to grow [16]. The third larval stage is more sensitive than the sixth larval stage of the act of extracts. This may be due to the small thickness of the kyotele covering the larvae at the beginning of formation, which is thicker with the larval age of the insect [17] or may be due to the higher rate of third-cyclic loss to be very sensitive to any substance or chemical compound, its bodies and organs are thin [18].

The results showed that larvae differed according to different treatment methods. The results showed a significant effect and increased mortality rates when larvae were treated in a feeding manner (mixing the extract with flour) compared to the direct spray (local). The reason is that the larvae need large quantities of food to grow, and complete their life cycle. The larvae's body and its nutritional components. Al-Khafaji [19] reported that the larvae cannot secrete unless they eat enough food to grow and produce a new wall. The results of the present study showed that the ability of larvae to tolerate the toxicity of the extract increased with the age of larvae, as it was found that the larvae last (sixth) less sensitive than the larval first (third). This can be attributed to the ability of recent or large larval larvae to convert the toxic substances present in the extracts into non-toxic compounds (Detoxication).

Compared to the first larval age, which cannot do so for the lack of this enzymatic system. Some studies have also shown a correlation with the current study in terms of the effect of extracts. The results of the study of Kouniki et al. [20] the volatile oils compounds of xylopaethiopica and *Ocimum gratissium* affected contact and feeding on the first larval age and the complete insects of *T. astaneum* beetle. The study by Alessi [21] about the lawnsiainermis, the shaving of *Adhatoda vasica* and nicotianatobacum using some spectroscopic methods and some chemical tests and their effect on some insects, including *Castaneum. T,* showed that their deadly effect on the first larval stage. For all treatments and for appearance defects in larvae treated with lengthening in the number of thoracic days.

AL-Hadidi et al. [22] showed significant differences for different concentrations of *Cinnamomum zeylancium*, ginger (*Zingiber officinale*), *Myristica fragrans* and *Coriandrum sativum* in the loss of larvae and larvae of the beetle insect. The results of the present study also agree with the results of the Samurai study [23] that the first larval stages are more sensitive than the last larval age of the beetle when treated with the *Trichonella foenumgraecum.* These results are also consistent with the findings of Shindoukh et al. [24] when treating the larvae and adults of this insect with the extract of the *Albizia lebbeck.*

As for the effect of water extracts, the study showed that the hot water extract had a higher effect than the cold water extract, but the effect of the two was less on the larvae than the extract of the crude turbid compounds due to the difference of secondary chemicals in the plant depending on the type of solvent used in extraction. Some studies have verified the validity of these results through their compatibility in terms of effect. The results of Moussawi [25] showed that the boiling water extract of the tobacco plant was superior in its effectiveness and effect on the performance parameters of a peach insect *Myzus persicae* compared with the cold water extract of that plant as shown in the study [26], the extract of cold boiled water leaves of the castor plant in the destruction of *Tgoderma granareum* and the beetle *Triblik castaneum*.

Effect on the loss of virgins after 24 h of treatment

Table 3 shows a significant effect of *A. hierochuntica* extracts and the concentrations used and their overlap in the percentage of the virulence phase of the beetle T. The results showed that there were significant differences for the type of extract used in the treatment and the different concentrations. The results showed that the extract of the oregano compounds was higher than the water extract (hot and cold). Where the rate of use of the extract of the compounds of raw turbines was 43.55% compared to (23.94%) when treated with hot water extract and cold, respectively.

The results showed that there was a significant effect on the concentrations of the extracts used. All concentrations were significant in relation to the control treatment. The results showed the highest percentage of the loss of *T. castaneum* for the stage of the virgin at the concentration of 4 mg/ml reaching 51.53% and the lowest rate of loss of this phase at the concentration 1 mg/ml, where the ratio stood at 24.49% compared to control treatment, which amounted to 0.00%.

The overlap between the different extracts of the plant of the palm of Mary and the concentrations showed a significant effect on the mortality rate of the virgin phase of the mollusc *falciparum* beetle, with the highest percentage of loss in the treatment of the extract of the soil extract of the plant of the palm of Mary and the concentration of 4 mg/ml at 72.29%. And the lowest phase loss rate when treated with cold water extract at concentration of 1 mg/ml with a loss rate of 39.23%.

Table 3. *Effect of different extracts of A. hierochuntica plant and the concentrations and interferences between them on the destruction of the virgin phase of the red beetle T. castaneum.*

Abstract rate	0 mg/ml	1 mg/ml	2 mg/ml	4 mg/ml	Concentrations/Abstracts
43.55	0	46.92	54.99	72.29	Extract of crude turbines
23.94	0	17.7	35	43.07	Hot water extract
19.71	0	8.85	30.78	39.23	cold water extract
	0	24.49	40.26	51.53	Concentration rate
Interference	Concentration		abstract		
15.031	8.6783		7.5156		L.S.D α0.05

The reason may be attributed to what they contain different extracts, especially from chemical compounds turbine effective have done entomological growth regulators, or counter to do young hormones Anti-JH [27]. The virgins of the closed type, not having the ability to move or feed, were affected by the contact method [28]. It may also be attributed to the failure of adults to get out of the casing of the failure to the presence of effective compounds affected in the control of successive processes of formation through the impact on the nervous system and thus inhibit the effectiveness of hormone stimulating the secretion of the hormone Alanslakh (PTTH). Which resulted in the deficiency or slow production of the hormone Aloslakh (Kuusik and his group [29]. The results showed the superiority of the extract of the compounds terabini crude on the rest of the extracts, due to the action of the toxic and corrosive effect on the effective compounds that led to the destruction of virgins. The results of the study of Obeid [1] showed the effect of the extract of the crude alkaloids compounds of the leaves of the brush of the heroist *Callistemon rugolosus* in the lower weights of the virgins of the beetle as a result of treatment with this extract. The results are also consistent with the study of al-Ta'i [30]. It was found that the boiling water extract of the *N. oleander* plant was more effective than the cold water extract in the loss of *C. cipiens.* The proportion of the loss of 0 rates were almost to 51% and from 0 to 71.6%, respectively, at concentrations 10 mg/ml respectively as consistent results with the results of the Samurai study, the appearance of deformation cases and the proportion of the loss of high virgins insect flour beetle *Alsdiah castaneam* T. When treated with different extracts of the ring plant.

Effect of adult mortality 24 h after treatment

Table 4 shows a significant effect in the treatment method of the extract of the crude turbines, the hot and cold water extract of the palm of the Mary plant and the concentrations used and their overlap in the percentage of the phagocytosis. As the results showed no significant effect of the method of treatment extract vehicles raw turbine and aqueous extract of hot and cold, and the results showed that mixing the extract with flour method gave the highest percentage of the loss of the adult insect, which amounted to 30.06% and the lowest rate of loss of adult when treated in a manner extracted on the insect spray reached 21.92%.

The results indicate the effect of the type of extract used in the treatment, where the results showed that the extract of the compounds of the turbines of the plant of the palm of Mary on the hot and cold water extract, with the highest rate of adult mortality 38.89%. When using the extract of raw turbine compounds and different treatment methods compared to the use of water extract (hot and cold) where the rate of loss (25.39% and 13.70%), respectively, and the results of the statistical analysis on the significance of differences.

The results showed a significant effect on the concentrations of the extracts used. All concentrations were significant in comparison with the control treatment. The results showed that the highest percentage of *T. castaneum* was killed at 4 mg/ml which was 40.98%. And the lowest rate of loss at the treatment of 1 mg/ml and was 23.28% compared to control treatment, where the percentage of loss 0.00%.

The interaction between the method of adding the different extracts of the palm of the palm of Mary and the concentrations and the method used in the treatment indicates a significant effect on the percentage of adult mortality of the insect. The highest mortality rate was achieved in the treatment of mixing of extracted extract with flour in the treatment with the extract of the crude turbines 72.29%. With a concentration of 4 mg/ml, and the lowest percentage of treatment loss by spraying the extract on the adult and at the concentration of 1 mg/ml when treated with cold water extract where the percentage of loss 0.00%.

Table 4. *Effect of different extracts of A. hierochuntica plant, concentrations, method and interaction between them on the destruction of an Agrarian T. castaneum.*

Abstract rate	Nutrition	Spray method	Method concentration mg/ml	Abstract type
38.89	72.29	50.77	4	Extract of crude turbines
	63.44	46.92	2	
	46.92	30.78	1	
	0	0	0	
25.39	72.29	46.92	4	Hot water extract
	35.007	26.15	2	
	26.56	17.7	1	
	0	0	0	
13.7	26.15	35	4	Cold water extract
	21.93	8.85	2	
	17.7	0	1	
	0	0	0	
	30.06	21.92	Method rate	
0.00 mg/ml	1.00 mg/ml	2.00 mg/ml	4.00 mg/l	Concentration rate
0	23.28	33.71	40.98	
Interaction	Method	Concentration	Abstract	L.S.D α0.05
17.287	4.9902	7.05753	6.1118	

The results of this study, a significant effect of the extracts crude turbine and high efficiency in the destruction of the insect under study, and perhaps this is due to the active compounds in plants may be dissolved in chloroform or perhaps due to the containment of the extract Alkruforma compounds its susceptibility proliferation and influence in living tissue, compared with pesticides. This is in line with what the Sultani study [31] showed with the superiority of the crude soil compounds of the *Crozphora tinctoria* plant on the rest of the extracts in the life performance of the domestic fly insect *Musca domestica.* The study of Shindouk [24] showed the effect of the extract of *Albizia lebbeck* plant in the destruction of the beetle with the highest percentage of killing 33.33% at the concentration of 10%. The study of Nazeefullah et al. [32] showed the effect of the aquatic extracts of *Acacia modesta* and *Glycyrrhiza glabra* against the red eel flour beetle that the extracts were effective in the destruction of the adult insect. The results of the Mohammed study [33] showed the toxic effect of the water extracts of *Myristica fragrans* seeds and *Nerium oleander* leaf leaves on the percentage of gram loss. The results showed a significant efficacy against insect larvae. The percentage of adult mortality at the concentration was 1.5 mg/ml in both treatments (peanut seed extract and *Fabella* leaves) with 78.58% and 60.7% respectively.

Diagnosis of the active compounds of the extract of the raw soil compounds of the plant of A. maryhuntica using the GC -MS technique

Table 5 shows the turbines of *A. hierochuntica* which were diagnosed using GC-MS. The discovery revealed that 10 different terpenic compounds were present at different retention times, including dodecanoic acid and undecanoic acid, which appeared at 10.748 min where the first compounds were visible while the Ergost-5-en-3-ol and dimethylmalonic acid compounds, which appeared at the time of the arrest of 28,961 compounds. Turbine compounds act as inhibitors of the central nervous system of the insect by inhibiting the enzyme cholinesterase [34]. In this area Hussien [35] used GC-mas technology to diagnose the compounds of the *Indoneesiella echioids* with a 1.8 Cineole compound at a time of 116 min. This compound is a monoclonal compound of medical importance which is used as an anti-inflammatory and microbial and also used as an anti-tumor tumor. As demonstrated by the study of Abidi [36] when using the technique GC-MS to detect the compounds. Turbine extracts of leaves and flowers of the plant Dawoodi *C. cinariaefolium.* The presence of 12 compound of the extract of leaves while there were 41 compounds of flower extract and these compounds varied in the time of appearance in both extracts.

Table 5. *Diagnosis of the active compounds of the extract of the crude turbid compounds of the plant of Mary Mariam A. hierochuntica using GC-MS.*

S.no	Time of detention (min)	Chemical compound name	Chemical formula	Molecular weight
1	10.748	Dodecanoic acid-	$C_{13}H_{26}O_2$	214.349
		Undecanoic acid-	$C_{11}H_{22}O_2$	186.295
2	12.964	Methyl tetradecanoate-	$C_{15}H_{30}O_2$	242.403
		-Tridecanoic acid	$C_{13}H_{26}O_2$	214.349
3	14.975	Hexadecanoic acid	$C_{16}H_{32}O_2$	256.43
4	15.97	1,2 Benzisothiazole-	C_7H_5NS	135.184
		Heptadecanoic acid-	$C_{17}H_{34}O_2$	270.45
5	16.663	9-Octadecenoic acid	$C_{18}H_{34}O_2$	282.468

6	16.874	Methyl stearate	$C_{19}H_{38}O_2$	298.511
7	17.485	Trans-13-Octadecenoic acid	$C_{18}H_{34}O_2$	282.468
8	20.461	Phthalic acid-	$C_8H_6O_4$	166.14
		Bis(2-ethylhexyl)phthalate-	$C_{24}H_{38}O_4$	390.56
9	21.531	Eicosane	$C_{20}H_{42}$	282.554
		Nonadecane	$C_{19}H_{40}$	268.518
		Heptadecane	$C_{17}H_{36}$	240.48
10	28.961	Ergost-5-en-3-ol-	$C_{28}H_{48}O$	400.691
		Dimethylmalonic acid-	$C_5H_8O_4$	132.11

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