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# EVALUATION OF ALLELOPATHICPOTENTIAL FOR PLANT AQUEOUS EXTRACTS OF SOME PLANTS ON GROWTH AND DIVIDION OF SOME PLANTS ON OF CHEIRANTHUS CHEIRI AND CORN FLOWER

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## ABSTRACT

The study included study the effect of the aqueous extracts for (Myrtle, Ment, Eucalyptus, Rosemary) on the germination and growth of two types of flowers. Where an aqueous extract of dry (Myrtle, Ment, Eucalyptus, Rosemary) leaves was prepared in concentrations (2.5, 5%) in addition to distilled water (compared), to study their effect on the germination and growth of Cheiranthus cheiri and corn Flower plants. The results showed a significant decrease in the germination percentage, as well as a decrease in Seedlings Vigor Index , as the results indicated a decrease in the root length of a plant. corn Flower Show the highest rate of decrease (76.92%) caused by the aqueous extracts of Myrtle at 5%. The results showed that the treatment with aqueous extracts (Myrtle, Mint, Eucalyptus, Rosemary) caused a variation in the phase factor and cleavage index of the studied plants.

The results showed that the treatment with aqueous extracts (Myrtle, Mint, Eucalyptus, Rosemary) caused a variation in the coefficient of division and coefficient of phase at the root tip for all plants in studied.

Most of the aqueous extracts caused a decrease in the coefficient of division at the root tip of the *Cheiranthus cheiri*, and corn Flower was observed that the coefficient of division increased with the effect of most of the aqueous extracts except the decrease by aqueous extracts of Eucalyptus and mint at 2.5% and Myrtle aqueous extract at 5%. This study showed that the Eucalyptus, mint, and rosemary plants contain most of the active compounds such as Terpenes

,steroids, saponins, flavonoids, resins, and Glycosides ,while Myrtle gave a negative result in detecting terpenes, and saponins.

**KEYWORDS**: Allelopathy, Eucalyptus, mint, Myrtle, rosemary, *Cheiranthus cheiri*.

## INTRODUCTION

God created the plants on the earth before it was created for the human being, and became the reasons for his living and other organism on the earth dependent of what plants produce , so the human being used the plants as food until he began planted them and sometimes used them as medicine for treatment .

The medicinal plants differ in their contents of chemicals as well as the stages of their growth, as they have a large and important role in the life of human and the plant that for its abundance, And the many of its types, and the expansion of their uses.

The medicinal plant extracts contain many compounds including organic acids, aromatic acids, coumarines, flavonoids, Tannins, alkaloids, glycosides, terpenes and steroids, as well as some toxic gases Abd-Al Hussein (2016).And the ability of plants to inhibit or stimulate the growth of other plants in the environment through the release of chemicals that release them to the environment directly or indirectly (Yang *et al*., 2011).These secondary compounds that are built inside the plant during its growth period, such as alkaloids, phenols, flavonoids and terpenes are known as Allelochemicals (Einhellig ,1996, Duke *et al*. 2000). Which is released to the environment by Leaching, Volatilization, Root exudates Decomposition, and allelopathic compounds begin to influence other organisms within the biological system plants, insects, and fungi as well as microorganisms ( Narwal & Sampietro; 2009, Putnam & Tang 1986). This effect may be beneficial Or harmful and known as the phenomenon of allelopathi, which is known as "Effect of allelopathic compounds that released from plants on other plants that grow with them or that follow them in agriculture," and that these compounds have an acidic property that can alter the soil surrounding it or affected by it, thereby gaining it the inhibition mechanism (Al-Humaid & Warrag,1998). Other studies have attributed the cause of allelopathic effects to plant-released compounds Which are in the form of phenolic compounds released to the soil, and cause a reduction in the growth of other plants. Phenolic compounds are chemical compounds containing an **OH** group linked to an aromatic hydrocarbon group that may be natural defenses of the plant against herbivores.

So the purpose of this study was to assess the Allelopathic potential of aqueous extracts of medicinal plants with a different concentrations on the germination, growth and cell dividing in roots tip cells of two types of flowers.

# MATERIAL AND METHODS

***Study of the allelopathic effects of plant residues***

The study included conducting laboratory experiments in the laboratories of the Department of Life Sciences / College of Science / University of Mosul to study the Allelopathic effects of plant residues of four types of medicinal plants are( Myrtle, Eucalyptus, Rosemary, Mint) in germination and growth of two types of flower plants are *Cheiranthus cheiri* and corn Flower.

***Collection of plant samples***

The botanical residues collected medicinal plants are ( Myrtle, Eucalyptus, Rosemary, Mint) from some private gardens in Mosul / Iraq. The residues were cut into small pieces, dried and crushed in a device, and kept in plastic bags until use.

***Preparation of aqueous extracts for residues of ( Myrtle ,Eucalyptus, Rosemary, Mint)***

The extracts were prepared in 5 ,2.5% concentrations by taking 5,2.5 g of plant residues and mixed with 100 ml distilled water by blender for 10 minutes, then filtered using Buchner funnel with WhatmanNo.1 filter paper and collecting the filter for each concentration (El-Khawas & Shehata, 2005).

***Biological test of plant extracts***

To study the effect of aqueous extracts of plant residues of four types of medicinal plants are (Myrtle, Eucalyptus, Rosemary, Mint) on germination and growth of two types of flowere (*Cheiranthus cheiri* and corn Flower), the following method was used: Petri dishes used with a diameter of 13.8 cm, and put in each Petri dish 25 seeds (from seeds species tested) between two filter paper the whatman No. 1 with four replications, add 5 ml of the prepared extract at 2.5,5 % concentrations (in each dish according to the experiment), use distilled water for control, and place the Petri dishes in a Gallenkhamp incubator at a temperature of 25 ° ± 2, and after 15 days of planting the root and plumule lengths were measured and then dried in the oven at a temperature of 70 ° C. for 72 hours and the dry weight of the seedlings was recorded.

***Parameters***

1. Germination percentage = $\frac{\text{Number of natural seedlings}}{\text{The total number of seeds}} \times 100$ Saied, (1984).
2. Seedling Vigor Index: SVI=Gr × MSH/100

   Gr: Germination%.

   MSH: Mean of Plant length (Root length+ Shoot length) (Sabari et al, 2013).

   3. The length of plumule:
   4. Root length
   5. Dry weight

6. Coefficient of division: After germination of flower seeds treated with the aqueous extract of four types of medicinal plants are Myrtle, eucalyptus, rosemary, mint with concentrations of (2.5,5% V: W) and seedling growth mitosis index was estimated to the root tip cells, According to the method (Al-Makdmi, 2010), the slides were examined using a 40X optical microscope to view the cells (Hussain *et al*., 2018).The division coefficient and phase coefficient were calculated according to the equations:

*Dividing coefficient = (number of dividing cells / total number of cells) × 100* Al-Saadawi *et.al* (2001).

*Phase coefficient = (The number of cells divided into a specific phase / total number of cells divided) ×100* Al-Makdmi, (2010)

***Detection of some active compounds in plant residues:***

a) Detection of flavones: (Al Shaker, 2007).

b) Detection of saponins: Roopashree *et al*. 2008.

c) Detection of cyclosides: (Al Shaker, 2007).

d) Detection of Alkaloids: According to the method (Harborne, 1973)

e) Disclosure of tannins: followed by Mohammad *et al.* (2009)

f) Detection of turbines and steroids: (Abbas *et al*. 2012) method was adopted.

The experiments were carried out according to the design of the complete randomized sectors (R.C.B.D.) as a global experiment and conducted the statistical analysis of the data according to the SAS program, and the Dunkin multi-range test was used at a 5% probability to distinguish between the mean of the coefficients (Antar, 2010).

## RESULTS AND DISCUSSION

1. ***Germination percentage (%):***
   Table (1) and Table (2) show that there is a reduction in the average germination percentage% with different types of aqueous extracts of the plants used, we find that the highest reduction value 92.30% and 88.09 in the percentage of germination of *Cheiranthus cheiri* and corn Flower seeds respectively when treated with Eucalyptus extract at 5%, that may be due to the eucalyptus containing the quantity and quality of chemicals such as alkaloids, tannins and phenol compounds affecting the embryo and inhibit the germination percentage, as studies found that it contains saponins, cyclosides, alkaloids and flavonoids (Ishag and Sahadi 2014).
2. ***Seedling Vigor Index***
   Table (1) and Table (2) show the presence of a reduction in Seedling Vigor Index with different types of transactions. Eucalyptus extracts with a concentration of 5% gave the highest reduction value of 88.48 and 99.51 for both *Cheiranthus cheiri* and corn Flower, and the reason for giving them the highest reduction rate may be because they gave higher Reduction value in germination percentage.
3. ***Root length (cm)***
   The results in Table (1) showed that there is an increase in the average root length (cm) with different types of treatments for the *Cheiranthus cheiri* . The highest rate of increase in the length of the root was 78.54% With the effect of the Myrtle extract at 5%, while we find a decrease in the average root length in Table (2) of the corn flower, the highest decrease was (76.92%) Caused by the aqueous extracts of Mtrtle at a 5%, the reason for the decrease is due to the plant's sensitivity to the compounds released from the extract of

the Myrtle, which may be inhibited by the increase in the radical total or possibly related to the formation enzymes of oxine, which leads to obstruction of its formation or composition by a small percentage that is not sufficient to elongate the root (Jumaa and Ibrahim, 2011).

***4. The length of the plumule***

The results of Table (1) and Table (2) indicated that there is an inhibitory effect on the length of the plumule (cm) in most treatments. The highest rate of inhibition was 87.53% in Cheiranthus cheiri seedlings Treatment with rosemary extract 5%,and as Eucalyptus extract 2.5% gave the highest percentage of inhibition of 97.05% for corn flower seedlings.

Perhaps the reason for the inhibitory effect is the presence of some active compounds such as alkaloids and Glycosides, tannins that may be inhibit cell division and elongation, and then reduce the length of the plumule, Or it is due to the plant's sensitivity to these compounds and to the genetic differences between the varieties (Hussain, 2010).

***5. Dry weight of seedlings (mg)***

The results of Table (1) showed an increase in the average dry weight of the seedlings for all treatments. The mint extract caused The highest percentage increase was 76.04% at 2.5%. this increase in the dry weight *Cheiranthus cheiri* seedlings indicates may be due that they are strong seeds that have the ability to form materials. New and quickly results in an increase in the accumulation of dry matter for seedlings (Jadoua *et .al*. 2012). From the results of Table (2), we find a decrease in the dry weight of seedlings at most treatment , as the highest percentage decrease in the dry weight of corn flower seedlings reached 59.09% when treated with an myrtle extract 2.5 % Because it contains gallic acid and ellegic acide– along with flavonoids with inhibitory activity, while we find an increase in the dry weight of seedlings when treated with eucalyptus extract and rosemary extract at a concentration of 2.5%, and the reason for the different effect may be due to the different type of material and active substances in each A treatment that can act in motivationally or inhibitively (Jumah and Saadoun, 2011).

**Table 1** Effect of plant extracts (Myrtle, Ment, Eucalyptus, Rosemary) on some characteristics of germination of *Cheiranthus cheiri* seeds.

| **Aqueous extracts** | **Conc.** | **Parameters** | | | | |
|---|---|---|---|---|---|---|
| | | Gr% | SVI | Pl | Rl | Dw |
| Myrtle | Control | 84a | 3.04a | 3.13a | 0.5c | 3.11c |
| | %2.5 | 62b | 2.99ab | 2.0 9bc | 2.33b | 6.50b |
| | %5 | 64c | 2.68c | 2.00b | 2.59a | 7.11a |
| Aqueous extracts effect | | | 70a | 2.90a | 2.40c | 1.80a |

| | | | | | | |
|---|---|---|---|---|---|---|
| Eucalyptus | Control | 84a | 3.04a | 3.13a | 0.5c | 3.11c |
| | %2.5 | 31b | 1.07b | 2.66c | 0.81a | 7.70b |
| | %5 | c10 | 0.35c | 2.73b | 0.8b | 9.12a |
| Aqueous extracts effect | | | 41c | 1.48d | 2.84a | 0.70d |
| Mint | Control | 84a | 3.04a | 3.13ab | 0.5c | 3.11c |
| | %2.5 | 60c | 2.45b | 3.16a | 0.93b | a12.98 |
| | %5 | 64b | 2.01c | 2.15c | 1.0a | 12.80b |
| Aqueous extracts effect | | | 69a | 2.5b | 2.81ab | 0.81bc |
| Rosemary | Control | 84a | 3.04a | 3.13a | 0.5c | 3.11c |
| | %2.5 | 73b | 3.01ab | 3.02ab | 1.13a | 8.01a |
| | %5 | 42c | 0.58c | 0.39c | 1.0b | 6.02b |
| Aqueous extracts effect | | 66b | 2.21c | 2.18d | 0.87b | 5.71c |

*Gr%= Germination percentage , SVI=Seed Vigor Index, Pl= Plumule length, Rl=Root length, Dw= Dry weight

**Table 2** Effect of plant extracts (Myrtle, Ment, Eucalyptus, Rosemary) on some characteristics of germination of corn flower seeds.

| **Aqueous extracts** | **Conc.** | **Parameters** | | | | |
|---|---|---|---|---|---|---|
| | | Gr% | SVI | Pl | Rl | Dw |
| Myrtle | Control | 91a | 14.3a | 15.3a | 0.52a | 2.20a |
| | %2.5 | 27b | 0.31c | 0.9c | 0.25b | 0.9bc |
| | %5 | 27b | 0.45b | 1.56b | 0.12c | 1.0b |
| Aqueous extracts effect | | 48d | 5.02c | 5.92c | 0.29d | 1.36c |
| Eucalyptus | Control | 91a | 14.3a | 15.3a | 0.52a | 2.20b |
| | %2.5 | 60b | 0.55b | 0.46bc | 0.46b | 4.0a |
| | %5 | 7c | 0.07c | 0.75b | 0.3c | 1.0c |
| Aqueous extracts effect | | 52c | 4.9d | 5.50d | 0.42b | 2.4a |
| Mint | Control | 91a | 14.3a | 15.3a | 0.52a | 2.20a |
| | %2.5 | 64c | 0.76c | 0.88c | 0.31b | 1.3b |
| | %5 | 67b | 1.07b | 1.3b | 0.3b | 1.0bc |
| Aqueous extracts effect | | 74a | 5.37ab | 5.82b | 0.37c | 1.5d |
| Rosemary | Control | 91a | 14.3a | 15.3a | 0.52b | 2.20a |
| | %2.5 | 33c | 0.811b | 1.81b | 0.65a | 2.4b |
| | %5 | 57b | 1.10b | 1.5c | 0.0o44b | 1.0c |
| Aqueous extracts effect | | 60b | 5.40a | 6.20a | 0.53a | 1.86b |

*Gr%= Germination percentage , SVI=Seed Vigor Index, Pl= Plumule length, Rl=Root length, Dw= Dry weight

Notes from Table (3) aqueous extracts of Myrtle, Eucalyptus, Mint, Rosemary caused a variation in the phase coefficient and the division coefficient for the studied plants. Most of the aqueous extracts have caused a decrease in the division coefficient of the *Cheiranthus cheiri* plant, except for the increase caused by the aqueous extracts of Mint at 5,2.5% and Rosemary at 2.5%.And from observing the values of the Anaphase coefficient, an increase in all treatments was found While all treatment caused a decrease in the Telophase coefficient, the reason for this decrease in the Telophase coefficient, It is that plant residues contain allelopathic compounds that affect the life cycle of the cellular (AL-Jehaishy ,2017), as studies have shown that alkaloids affect cell division as well as flavonoids affect on plant hormones (Yusuf & Ekanem, 2010), as they also affect chromosome division in the Anaphase and Telophase .

In the corn flower plant, it was observed that the division coefficient increased with the effect of most of the aqueous extracts Except for the decrease by Eucalyptus And Mint aqueous extracts at 2.5%, and Myrtle extract at 5%,The results are consistent with the findings of Dragoeva *et.al* (2010), as it was found that the treatment of onion root cells with hot aqueous extracts of *Hyssopus officinalis* L. affected onion cell division and a decrease in the Anaphase coefficient, due this to the incomplete division of the stages The end and deformation of the chromosomes in the Telophase also distortions in the spindle filaments in the equator phase.

**Table 3** The effect of plant extracts (Myrtle, Eucalyptus, Mint, and Rosemary) on the division of cypress and dry rose cells.

| **Aqueous extracts** | **Conc.** | ***Cheiranthus cheiri*** | | | | | | **Corn flower** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | No. cell division | Division coefficient | coefficient phase P | coefficient phase M | coefficient phase A | coefficient phase T | No. cell division | Division coefficient | coefficient phase P | coefficient phase M | coefficient phase A | coefficient phase T |
| Myrtle | Control | 25 | 73 | 20 | 20 | 20 | 40 | 66 | 79 | 30 | 18 | 22 | 28 |
| | %2.5 | 19 | 55 | 26 | 36 | 21 | 15 | 59 | 81 | 28 | 23 | 15 | 20 |
| | %5 | 35 | 58 | 31 | 20 | 31 | 17 | 37 | 64 | 32 | 21 | 18 | 27 |
| Eucalyptus | Control | 25 | 73 | 20 | 20 | 20 | 40 | 66 | 79 | 30 | 18 | 22 | 28 |
| | %2.5 | 20 | 51 | 20 | 25 | 35 | 20 | 43 | 63 | 16 | 23 | 32 | 27 |
| | %5 | 25 | 80 | 28 | 24 | 36 | 12 | 25 | 86 | 28 | 24 | 36 | 10 |
| Mint | Control | 25 | 73 | 20 | 20 | 20 | 40 | 66 | 79 | 30 | 18 | 22 | 28 |
| | %2.5 | 30 | 93 | 13 | 26 | 26 | 33 | 42 | 73 | 33 | 23 | 26 | 16 |
| | %5 | 16 | 80 | 12 | 18 | 37 | 31 | 13 | 86 | 30 | 21 | 30 | 15 |
| Rosemary | Control | 25 | 73 | 20 | 20 | 20 | 40 | 66 | 79 | 30 | 18 | 22 | 28 |
| | %2.5 | 13 | 86 | 30 | 21 | 30 | 15 | 16 | 88 | 31 | 31 | 25 | 12 |
| | %5 | 22 | 66 | 36 | 22 | 27 | 13 | 32 | 82 | 31 | 34 | 21 | 12 |

The practical study of the qualitative chemical detecting of (Myrtus, Eucalyptus, Peppermint, Rosemary) extracts proved Table (4), as this study showed that the Eucalyptus, Mint, and Rosemary plants contain most of the active compounds such as terpenes, steroids, saponins, flavonoids, resins and Glycoside and came This is in line with what he mentioned (Jassem, 2005), as he mentioned that the aqueous extract of eucalyptus contained - turbines, steroids, saponins, flavonoids, resins and Glycosides. We also note that Myrtle gave a negative result in detecting turbines and saponins, which indicates that the plants are free of turbines and saponins.

**Table 4** The results of the Detection on some of the active compounds present in the extracts of (Myrtle, Eucalyptus, Mint and Rosemary).

| **Compound Type** | **Detector index** | **Detection guide** | **Detection Result** | | | |
|---|---|---|---|---|---|---|
| | | | Myrtle | Eucalyptus | Mint | Rosemary |
| Terpenes | Chloroform + anhydrous acetic acid + concentrated sulfuric acid | Brown color | - | + | + | + |
| Steroids | Chloroform + anhydrous acetic acid + concentrated sulfuric acid | Dark blue | + | + | + | + |
| Saponins | Shake the extract | The appearance of thick foam for a long time | - | + | + | + |
| Flavones | Ethyl alcohol concentration (50)% | Yellow color appears | + | + | + | + |
| Resins | Distilled water+hydrochloric Acid (4%) | The appearance of turbidity | + | + | + | + |
| Glycoside | Benedict detector | Red color appears | + | + | + | + |



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