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Effect of Treatment with Extract of Hibiscus Plant in Phenotypic Traits Calendula Officianalis L.

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Abstract: This study was conducted in the Agriculture nursery in AlKhalis town from September 2022 to April 2023, to estimated plant height, number of leaves, fresh and dry weight of vegetative plant. Whereas the chlorophyll content of leaves were in labs of Science College, University of Diyala, Baquba. The aim of this study was to conducted the effect of spraying with water extract of hibiscus plant Hibiscus sabdariffa L. on chrysanthemum plant Calendula officinalis L, in concentrations 0, 50 and 100 mg/L. by taking 50 grams of powder of the calyx of hibiscus plant, and dissolving it in 500 ml of distilled water, then in a shaking device for 30 minute, and then left for another 30 minute to settle, then filtered with gauze to remove suspended materials, then centrifuge it at 300 cycles/minute for 15 minutes, then filtrate was taken and concentrated using a rotary evaporator. The results show that the treatment of 100 mg/L gave insignificant values for plant length (10.7, 18.0, and 27.7 respectively). Whereas the number of leaves were (4.3, 7.0, 27.7), and chlorophyll content, which reached (15.8, 27.5, and 36.1) ml/L significant values. The fresh weight of plant (8.8, 19.7, and 27.7) g/L, and the dry weight were (5.5, 10.6 and 16.3) were significant. This study addressed an important topic in biological applications in the process of stimulating the growth and productivity of medicinal economic and ornamental plants by using environmentally friendly plant extracts available in local environment, which reduced dependence on the use of chemical fertilizers and other manufactured materials.

Keywords: Hibiscus, Calendula officianales, chrysanthemum, plant length, number of leaves, Chlorophyll content, fresh and dry weight of plant.

ملخص: أجريت هذه الدراسة في المشتل الزراعي في مدينة الخالص للفترة من أيلول 2022 إلى نيسان 2023، لتقدير ارتفاع النبات، عدد الأوراق، الوزن الرطب والجاف للنبات الخضري. بينما تم فحص محتوى الكلوروفيل في الأوراق في مختبرات كلية العلوم، جامعة ديالى، بعقوبة. هدفت هذه الدراسة إلى معرفة تأثير الرش بالمستخلص المائي لنبات الكركديه Hibiscus sabdariffa L. على نبات الأقحوان Calendula officinalis L بالتراكيز 0، 50 و100 ملغم/لتر. وذلك عن طريق أخذ 50 جراماً من مسحوق كأس نبات الكركديه، وتذويبه في 500 مل من الماء المقطر، ثم في جهاز الرج لمدة 30 دقيقة، ثم يترك لمدة 30 دقيقة أخرى حتى يستقر، ثم يصفى بالشاش لإزالة المواد العالقة. ، ثم طرده بسرعة 300 دورة / دقيقة لمدة 15 دقيقة، ثم أخذ الترشيح وتركيزه باستخدام المبخر الدوار. أظهرت النتائج أن معاملة 100 ملغم/لتر أعطت قيم غير معنوية لطول النبات (10.7، 18.0، 27.7 على التوالي). بينما بلغ عدد الأوراق (4.3، 7.0، 27.7)، ومحتوى الكلوروفيل بلغ (15.8، 27.5، 36.1) مل/لتر قيم معنوية. وكان الوزن الطازج للنبات (8.8، 19.7، 27.7) جرام/لتر، والوزن الجاف (5.5، 10.6، 16.3) معنوياً. تناولت هذه الدراسة موضوعا مهما في التطبيقات البيولوجية في عملية تحفيز نمو وإنتاجية

النباتات الطبية الاقتصادية ونباتات الزينة باستخدام المستخلصات النباتية الصديقة للبيئة المتوفرة في البيئة المحلية والتي قلل المصنعة الاعتماد على استخدام الأسمدة الكيماوية وغيرها من المواد.

Introduction

The chrysanthemum plant Calendula officianalis L. is one of the plants of the Asteraceae family, it is herbaceous winter annual plant, (picture 1 and 2), its used in manufacture medicines, agriculture chemicals, flavours, and pesticides,[1]; [2]; [3]. The plant extract is used an antioxidant, treatment for asthma, expectorant and laxative, because it contains polysaccharides of a viscous nature [4]; [5]; [6].

In addition to fact that chrysanthemum flowers and leaves contain essential oils that are characterized by their killing properties for viruses and as antibiotics for poisoning and inflammatory causes. This plant are the among the main parts that are used to treat diseases because they contain a wide range of chemical components that include terrines, flavonoids, steroids, tannins, carotenoids, amino acids. [7]; [8]; [9]. Medically effective used to inhibit cancer cells, [10], [11]; [12]; [13], mentioned that the chrysanthemum plant has wide used to measles, smallpox, jaundice and constipation, as well as its role in reducing menstrual bleeding, [14].

The plant extracts are important in germination and growth of many plant species. Among those plant extracts of Hibiscus sabdorifa, which is unimportant resource of vitamins, mineral elements, compound and amino acids, essential and volatile oils, and phenolic compounds [15]; [16]; [17].

This extract stimulates functional processes such as photosynthesis, respiration and formation of chlorophyll, which encouraging cell division, tissue growth, and stimulating plant hormones, [18]; [12]..

The chrysanthemum plants are used as anti-bacterial, fungal, viral, and analgesic for pain. So is used in various countries where it is traditionally used for treatment for ulcer and for different disease for gastrointestinal tract, [19]; [20]; [21]; [12].

The medical importance of the Hibiscus plant or Roselle is one of the herbal plants that are widely spread in tropical and subtropical regions, and it has been used since ancient times as one of the most important, because of its multiple therapeutic properties, [8]; [12]..

The benefits of hibiscus can be obtained by using the various parts of the plant, such as leaves, flowers, and liquid extracts that are extracted is used for bacterial infections, high blood pressure, and others, and it is also used as one of the ingredients in many nutritional supplement, [11]..

It strengthens the heartbeat and kills microbes, which makes it useful in treating fevers, microbial infections and cholera, as it is acidic in nature and among its properties is that is a stimulant for digestion [20].

pharmaceuticals, cosmetics, candy and soap factories began to use coloured materials extracted from Hibiscus flowers in their products, it’s also used as a natural dye for medicines, food, and cosmetics that women use every day, such as lipsticks, hair shampoos, and bath soaps, [5]..

This plant is grown in various regions of Iraq, as this plant is one of the important plants in various applications and has important medical and economic benefits. Therefore this study attempted to find the best ways to stimulate it’s grown and increase its productivity, using techniques and plant extracts available in local evidence.

Material and Methods

The pots were selected at on month old, with three replicates in the Khaalis nursery for the effect of spraying water extract of hibiscus plant on chrysanthemum plant, to estimate plant height, number of leaves, fresh and dry weight of vegetative plant. Whereas the chlorophyll content of leaves were in the labs of Science College, University of Diyala, Baquba, as following:

1- preparation of the aqueous extract. The extract was prepared according to the method of [22]; [23], by taking 50 grams of powder of the calyx of hibiscus plant, and dissolving it in 500 ml of distilled water, then in a shaking device for 30 minute, and then left for another 30 minute to settle, then filtered with gauze to remove plankton, then centrifuge it at 300 cycles/minute for 15 minutes, then filtrate was taken and concentrated using a rotary evaporator.

2- Vegetative traits. The chlorophyll content of the leaves for fresh weight chlorophyll was estimated in the liberties of the College of Science, University of Diyala, where the content of fresh leaves of A, B and total were estimated by taking a known weight of the leaves to the chrysanthemum plant,[24]; [25], and they cut into several pieces by scissor, then mash it in a ceramic mortar with an amount of acetone 5-10 mil at concentration of 80% a according to the weight of the sample, then the filter is separated from the sediment by using a centrifuge at speed of 1600g for 10 minutes, until the colour of the sediment becomes free of green dye, then collected the extract into 10-25 ml tubes, then covered opaque paper to block the light from chlorophyll preventing the dye from being oxidized by light, and complete the volume by adding acetone, Then the optical density of the filter was measured using a shimadzo UV-1700 spectrophotometer at wavelengths of 663.64 nm.

3- Plant height (cm)

The height of treated plants was measured using a tape measured graduated from the soil surface to the top of the plant, and the four treatments were extracted.

4- Fresh and dry weight of plant phytocomplex, The fresh weight of the vegetative mass of the plant in the experimental unit was taken and the same plants were deride in an electronic oven at 70 C containing a vacuum until the weight was calculated using a sensitive scale.

5- Number of leaves

The average number of leaves for each plant of the experimental unit was calculated.

Result and Discussion

The results showed that among the three groups of Calendula officinalis L. the mean number of leaves was 4.33 ± 0.33, 7.00, ± 0.57, 10.66 ± 176, leaves, respectively, while the mean length of steam was (10.66 ± 1.20, 18.00 ± 2.08, 27.66 ±6.17 cm respectively); and mean concentration of chlorophyll was 15.83 ± 2.45, 27.46 ± 0.29, 36.10 ±1.55 ml/L, respectively. The result showed that the different in the number of leaves and concentration of chlorophyll between the three groups was statically significant (P=0.018 and 0.001). Whereas the difference in the stem length was statistically insignificant (p=0.053) Table 1

. In conclusion, the number of leaves and concentration of chlorophyll increased significantly with an increased concentration of aqueous extract of hibiscus plant, [25].

Picture 1: Chrysanthemum plant, Calendula officinalis.

Picture 2: Hibiscus plant or Roselle

Picture 3. Concentration zero

Picture 4. Concentration 50% of the extract

Picture 5. Concentration 100% of the extract

Table 1: Shows the number of leaves, length of stem, and chlorophyll's concentration of plants among different concentrations of aqueous extract of hibiscus plant.

Groups		N (9)	Number of leave (Leave) (Mean ± SE)*	Length of plant (cm) (Mean ± SE)*	Chlorophyll (ml/L) (Mean ± SE)*
1-Concentration(0)		**3**	**4.33±0.33**	**10.66±1.20**	**15.83±2.45**
2-Concentration(50)		**3**	**7.00±0.57**	**18.00±2.08**	**27.46±0.29**
3.Concentration(100)		**3**	**10.66±1.76**	**27.66±6.17**	**36.10±1.55**
P-Value*	**Cos (0) vs cos(50)**		**0.134**	**0.224**	**0.003**
	Cos (0) vs cos(100)		**0.006**	**0.020**	**0.001**
	Cos (50) vs cos(100)		**0.055**	**0.124**	**0.011**
	Difference Between Groups		**0.018**	**0.053**	**0.001**

Table 2: Shows the fresh weight and dry weight of Calendula officianalis plants in different concentrations of aqueous extract of hibiscus plant.

Groups		N (9)	Fresh Weight (g/L) (Mean ± SE)*	Dry Weight (g/L) (Mean ± SE)*
1-Concentration(0)		**3**	**8.80± 2.48**	**5.5± 1.74**
2-Concentration(50)		**3**	**19.66± 1.32**	**10.56± 1.10**
3.Concentration(100)		**3**	**35.13± 1.48**	**16.30± 1.65**
P-Value*	**Cos (0) vs cos(50)**		**0.006**	**0.0224**
	Cos (0) vs cos(100)		**0.001**	**0.020**
	Cos (50) vs cos(100)		**0.001**	**0.124**
	Difference Between Groups		**0.001**	**0.007**
P Value 0.05 *Values are expressed as median ± standard error				***One – way ANOVA**

As the results showed in Table 2 that the mean fresh weight and dry weight among the three groups of Calendula officinalis L. plant was 8.80 ±2.48, 19.66 ±1.32 ml/L, 35.13 ±1.48ml/L respectively; and mean length of stem was 5.50 ±1.74, 10.56 ±1.10, 16.30 ±1.65 ml/L,

respectively, and the difference in the fresh weight and dry weight between the three groups was statistically significant (P=0.001 and 0.007).

In conclusion, the fresh weight and dry weight increase significantly with an increased concentration of aqueous extract of hibiscus plant. [26]; [27]; [28]..

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