Study of hormonal & chemical composition of petroselinum hortense L. and the possibility to use in the applied field.

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Abstract

Experiments designed to study the effects of 3 concentrations of each of indole butyric acid (25,50 and 100 ppm)and Mepiquat chloride (125,250 and 500 ppm) on Petroselinum hortense L. extracts.

The experiments were designed according to RCBD method and each treatment was replicated 3 times. Dunken test at level of 0.05 was used to compare the effect of treatments.

Result showed that the percentage of active ingredients of the plant extracts (essential oil , coumarin, flavonoids,were significantly increase with increasing indole butyric acid compare with control treatment. However, application of Mepiquat chloride decreased them compare with control treatment.

Indole butyric acid increased endogenous gibbereline acid and indole acetic acid while Mepiquat decreased them. This study proved that growth regulators of the plant as a natural tool to increase active ingredients for their medical value.

دراسة المحتوى الهرموني والكيميائي لنبات البقدونس وأمكانيه أستخدامه في المجال التطبيقي

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أجري البحث لدراسة تأثيرثلاثة تراكيز لكل من حمض الأندول بيوترك (25,50,100 جزء في المليون) والمبيكويت كلوريد (125,250,500 جزء في المليون) في مستخلصات نبات البقدونس.

صممت التجربه بطريقة القطاعات العشوائيه الكامله (RCBD) وبثلاث مكررات وتم تحليل النتائج على وفق التصميم المتبع، وتم مقارنة متوسطات المعاملات بأتباع طريقة أقل فرق معنوي L.S.D على مستوى 5 %.

أوضحت النتائج أن النسبه المئويه للمواد الفعاله في مستخلصات نبات البقدونس كالزيوت الأساسيه، الكومارينات ، والفلافونيدات قد أزدادت معنوياً بزيادة تركيز حمض الأندول بيوترك مقارنه بمعاملة المقارنه بينما كان للمبيكوبت كلوريد تأثير عكسي .

ان حمض الأندول بيوترك له تأثير مشجع على زيادة محتوى النبات الهرموني من أندول حمض الخليك وكذلك الجبرلينات ، في حين أدى المبيكويت كلوريد الى تقليله مقارنه بمعاملة المقارنه.

أثبتت هذه الدراسه أمكانية أستخدام منظمات النمو كوسيله طبيعيه لزيادة انتاج المواد الفعاله في النبات لأستخدامها في أغراض طبيه وعلاجيه مختلفه.

Introduction

Petroselinum hortense L. plant belongs to Umbellifera Family and regarded as one of the well-known medical plants which consist of essential oils , Coumarina , Terpinene and rarely ,they are beneficial in digestive , nervous and urinary systems diseases (7).

Scientific studies as well as applied researches referred to the importance of this plant in the industries of nutrition and medicine(12) , where the effective medical material of the plant are concentrated in leaves , seeds and roots as they are chemical materials of great vitality and use due to it's physiological effect and healing activity for humans and animals(7)

For the purpose of achieving an increment in producing the active ingredient of this plant it is necessary to follow modern scientific techniques to do so. The using of growth regulators which encourage the growth of the plant became as one of the recent common methods , and represents one of the fundamental trends of scientific researches for academic and categorization purposes due to the capability of these materials via their effects on various Physiological operations inside plant tissues(1) . In a study on Petroselinum hortense L. plant , essential oil extracted from it was used in medical fields as medicines for respiratory system congestion and anti-Bacterial (3) . Also (5) conducted an experiment on Prangos asperula fruit available in (Keshmir) in which he used Mepiquat Chloride with concentrations of 0 , 50 , 100 , 150 ppm where results exposed that Mepiquat Chloride did not affect the rate of essential oil and Coumarin . (6) also studied the influence of Gibbereline acid on growth and chemical components of Apium graveolens plant (from the same vegetal family) where they discovered that Gibbereline acid leaded to a significant increment in some of the chemical components as the Flavonoids rate in plant's leaves was increased , (2) also noticed the effect of some growth regulators such as GA , NAA on the plant of Lupinus Termis L. and discovered that those materials lead to increment in endognous growth regulators. 30 compound of Coumarina were isolated frpm the plant P.pabularia after treating with growth regulator (IAA) , 16 of these compounds were chosen due to it's effect against Bacteria (4)

Due to the rare studies on growth regulators effect IBA (Indole butyric acid) & MC (Mepiquat Chloride) to adjust Physiological relations of Petroselinum hortense L. plant which is a plant of economical and medical vitality and due to the not-Knowing of the effects growth regulators (IBA & MC) in producing active ingredients of the plant , the objective of our research is to know the effects of growth regulators in increasing the growth of active ingredients of Petroselinum hortense L.

Materials and methods

This research was conducted in a private farm south of Baghdad in the year 2009 , where Petroselinum hortense L. plants were sprayed By the following treatments :

1- Indole Butyric acid (IBA) 25 , 50 , 100 PPM
2- Mepiquat Chloride (MC) 125 , 250 , 500 PPM
In addition to control treatment

Growth regulators were used on the form of watery solution with the adding of Tween-100 material as an adhesive substance and were sprayed on Petroselinum hortense L. seedling prior to the planting in the phases of second and forth leaf until completely wet . And the experiment was planned according to randomized complete blocks and with three replications .

For determination of endogenous Hormones activity , the plant material (leaves) was frozen in liquid Nitrogen immediately after sampling and kept at -20 degree till extraction . The extraction procedure of Indoles was similar to the described by (9) . However the extraction procedure of GA was similar to that described by (8)

The following chemical characteristics were assessed :

Essential oil analysis , Essential oil extracted from leaves and seeds was analyzed and components were determined using GC system and GC-MS system

Determining of total Phenolic :

Parts of plant (leaves and seeds) were weighed accurately then Methanol was extracted with the equipment of Soxhlet for a period of six hours (14) , then the extracted was vaporized using rotating evaporator and volume was completed to 25 mL , 0.1 ML of the extraction was taken , *Voline* detector was added and absorbance was measured and total Phenolics were measured on the chain of Gallic acid (10)

Determining of total Flavonoid :

Parts of the plant of leaves and seeds were weighed , Soxhlet was extracted , the extracted was vaporized by rotating evaporator and volume completed to 25 m L , I mL was taken from the extract and expanded to 10 mL , then 1 mL was taken from it and Flavonoid rate was determined in the vegetarian extraction by the method of agitation and Soxhlet method (13)

Extracting Coumarin and determining the concentrations of Scopoletin and Psoralen compounds:-

Parts of plant (leaves & seeds) were weighed then hexan, ethyl acetate and methanol was extracted with equipment of soxhlet(11).

Results and discussion

Table (1) shows the effect of growth regulators on percentage of oils in the extraction of Petroselinum hortense L. plant . From the table it is clear that treatment IBA with concentrations 25 , 50 , 100 PPM leaded to significant increment in percentage of oils in the extraction of Petroselinum hortense L. plant leaves and seeds from ((R)- (+) limonene & 1,8- Cineole-2 and Linalyl Acetate-3 & β-Thujone-4), where the best oil percentage obtained as a result of treatment with IBA was 500 PPM . these results agrees with those obtained by (7) , in the same time the table showed that treatment with Mepiquat resulted diminishing of oils percentages compared with control treatment and this identical with the results obtained by (11).

Table (2) shows the effect of growth regulators on percentage of Phenolic & Flavonoids In the extraction of Petroselinum hortense L. plant . The table shows that the use of growth regulators IBA leaded to significant increment in percentage of Phenolic & Flavonoids Specially those resulted from the adding of IBA 100 PPM compared with control treatment . The reason may be is that IBA enhances plant growth in terms of leaves number and area causing efficiency enhancement in photosynthesis process and it's products with the increase of active ingredients fabrication causing an increment of it's concentration in leaves and seeds of the plant(13) , also the same table showed that treatment with Mepiquat leaded to diminishing the percentage of Phenolic & Flavonoids in a significant manner , these results agrees with those of (5) .

From the above data it can be concluded that IBA had a favorable effect on growth characters of Petroselinum hortense L. compared with MC which caused a reduction effect .

Table(3) shows the effect of growth regulators on percentage of Coumarins ,Scopoletin and Psoralen in the extraction of Petroselinum hortense L. leaves and seeds . It is obvious from this table that the adding of IBA with it's three concentrations resulted an increment in percentage of Scopoletin and Psoralen compared with control treatment and decreased significantly than control treatment by using Mepiquat Chloride (MC) specially the concentration 500 PPM , and the reason perhaps is that (MC) may result decrement in respiration process then diminishing and assembling of those materials .

Table (4) shows the effect of growth regulators on endogenous Indole acetic acid(IAA) and Gibbereline (GA) inside Petroselinum hortense L. plant. From the table it is noticed that the use of IBA leaded to significant increment in plant Hormone contents of IAA and GA compared with control treatment , and decreased significantly of the control treatment using Mepiquat and this agrees with (2).

MC treatment reduce vegetative growth . the inhibition action of MC may be due to reduce GA biosunthesis . so , MC may inhibit the formation of Kaurene which is an intermediate in Gibbereline formation from mevalonate .

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