

Chemical and Biological Study of the Medicinal Rosmary and Effect of Some Vitamins on the Concentration of the Active Substances in it

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Abstract

The study was conducted in the laboratories of the department of biology , college of Science, university of Baghdad, during the period from March 2018 to June 2018 in order to study the effect of vitamins on the concentration of active substances of the rosmar (*Rosmarinus officinalis*) plant , rosmar seedling were collected from nurseries in Kirkik goverorate, and then pot experiment was conducted that included adding different concentration of vitamins B1, C and E at a concentration of 100, 200 and 300 mg/l for each vitamin separately to rosmar seedling, the experiment included 12 treatments with control treatment. The treatment were applied as a simple experiments in a completely randomized design with 3 replications, then the concentration of the active compounds was calculated, and the results was the effect of vitamin B1 in concentration 100 mg/l significantly in increasing the concentration of the active substance (rosmaric acid, carnosic acid and pienen) for rosmar plant , Rosmaric acid , Camphore and penen in rosmar plant were significantly affected by vitamin C at a concentration of 300 mg/l , Rosmaric acid , Carnosic and leutulen in rosmar plant were significantly affected by vitamin E at a concentration of 300 mg/l.

Keywords: *rosmaric acid, carrnosic acid, pienem.*

دراسة كيميائية وبيولوجية للروزماري الطبي (*Rosmarinus offisinalis*) واثـر بعض الفيتامينات في تركيز المواد الفعالة فيه

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الخلاصة

اجريت هذه الدراسة في مختبرات قسم علوم الحياه - كلية العلوم/ جامعه بغداد خلال الفتره من اذار 2018 الى حزيران من نفس السنه لغرض دراسه تاثير الفيتامينات على تركيز المواد الفعاله لنبات اكليل الجبل , تم جمع شتلات نبات اكليل الجبل من مشاتل محافظه كركوك , ثم طبقت تجربته سنادين تضمنت اضافته تراكيز مختلفه من فيتامينات B1 , C و E بتراكيز 100 , 200 و 300 ملغم/لتر لكل فيتامين على حده الى بادرات اكليل الجبل , تضمنت التجربه 12 معامله مع معاملات السيطره , المعاملات طبقت كتجربه بسيطه وفق التصميم العشوائي الكامل ب 3 مكررات , تم حساب تراكيز المواد الفعاله لنبات اكليل الجبل وكانت النتائج مايلي

اثر فيتامين B1 بتركيز 100 ملغم/ لتر بشكل معنوي على تراكيز المواد الفعالة لنبات اكليل الجبل (rosmarinic acid, caernosic acid and pienen) , المواد الفعالة لنبات اكليل الجبل (rosmarinic acid, camphor, pienen) تأثرت معنويا بفيتامين C بتركيز 300 ملغم/ لتر , كذلك تأثرت المواد الفعالة بشكل معنوي (rosmarinic acid, carnosic acid, leutulin) بفيتامين E بتركيز 300 ملغم/ لتر .

الكلمات المفتاحية: حامض الروزماريك, حامض الكارنوسيك, البابينين.

Introduction

Medical plants, also called medical herbs, have been discovered and used in medicine practice since prehistoric times. Plant make hundreds of chemical compounds for functions including defence against insects, fungi, diseases, and herbivorous mammals. [1]. numerous phytochemical with potential or established biological activity have been identified. However, since a single plant contains widely diverse phytochemicals, the effects of using a whole plant as medicine are uncertain. [2]. Rosmary (*Rosmarinus officinalis*) is one of the important medicinal plants, it is an aromatic evergreen shrub with leaves similar to hemlock needles, the flowers are pink, white and purple, native to the Mediterranean and asia region, the plant flowers in spring and summer in temperate climate, but the plant can be in constant bloom in warm climates. [3]

Rosmary (*Rosmarinus officinalis*) contains a number of phytochemicals, including rosmarinic acid, camphor, caffeic acid and carnosol. rosmarinic acid contains 10-20% camphor. [4]. Rosmary have many medical uses, antioxidant and anti-inflammatory compounds, improving digestion, enhancing memory and concentration, neural protection, prevent brain aging, protection against macular degeneration and prevent from cancer [5]. Studies have shown that some vitamins play a role in increasing the active substance in medical plants, including rosmarinic acid, vitamins are organic nutrients that are required in small quantities for many chemical functions. They are not usually manufactured in the body but are taken with food [6] most vitamins are transformed into coenzymes, especially water-soluble vitamins, as they participate in the catalytic process and are often described as regulators, as they regulate metabolic process in the body. And given that vitamins are organic compounds that function in small quantities, but are very necessary in metabolic process, as they are essential components of the enzyme systems [7] therefore, the effect of some vitamins such as vitamins B1, C and E was studied on the chemical properties of rosmarinic acid (*Rosmarinus officinalis*) and the concentration of the active substances in it.

Materials and methods**pot experience**

Seedling for rosmarin (*Rosmarinus officinalis*) of approximately the same size and age , with length of 35 cm, were collected from the fields of Kirkuk governorate from the 2018 agricultural season, where these seedlings were uprooted with the root system and washed well to remove impurities, then pot experiment was applied in the botanical garden of the faculty of science, Baghdad university, in which large plastic bags for cows 24 cm and 26 cm high were used, they were filled with clean mixed soil, then the seedling were placed in pots, with 3 replications for each spraying treatment

Preparation of spray treatments with vitamins

Weigh 100, 200, 300 mg of each of vitamin B1, vitamin C and vitamin E, then dissolve each separately in liter of distilled water. The treatments that were applied in the experiment were as follows:

The first group

T1=100mg/l Vit.B1

T2=200mg/l Vit.B1

T3=300mg/l Vit.B1

T4=zero control

The second group*

T1=100mg/l Vit.C

T2=200mg/l Vit.C

T3=300mg/l Vit.C

T4=zero control

The third group

T1=100mg/l Vit.E

T2=200mg/l Vit.E

T3=300mg/l Vit.E

T4=zero control

Thus, the number of treatments reached 12 treatments with zero controls, after that, the anvels were sprayed with the aforementioned treatments weekly for two months, and then the seedling were uprooted to calculate the concentration of the active substances in them.

Determination of the active compounds in the volatile oil of rosmaray by GC device

The volatile oil of rosmaray was extracted by distillation method described in the british pharmacopoeia of 1958by using Clevenger devise and access to conical flask with capacity of 1 liter , then put 100 gof rosmaray leaves in the beaker and add 250 ml of distilled water to it and boil it at atemperature of 100 c using tissue heater minter , the process took 1.5-2 hours for each sample ,separation of distilledoil by separating funnel and put 100 ml of distilled water and add 40 ml of diethyl ether to it throughtwo stages , the mixture was shaken and left until settling, as it separates into two layers, the lower layer of water and the upper layer of ether oil, the layer containing the volatile oil was taken and the lower was reextracted as asecond stage in order to ensure that the oil was completely extracted , samples were collected 2-3 g of mg so4 anhydrous then the ether was evaporated by Rotary Vacuum Evaporation RVE under pickling pressure and at temperature 25-30c .The effective compounds (pinen , leutolin, camphor, carnosic acid , rosmaric acid) were diagnosed by GC system by using acapillary column type (DM-SMS) with length 0.25 mm, 0.25, 30m), where the temperature in the injection area was (280, 340c) , while the separation column temperature starts from (100 - 300c) at arate of 10 degrees / min by using carier nitrogengas at arate of 100 Kpa , the examination was conducted in the laboratories of the ministry of science and technology.

Statistical analysis

The experiment was conducted according to acompletely randomized design using analysis of variance ANOVA, the differences betwee n the arithmetic averages were tested at aprobability level 0.05 by using Dancan polynomial test [8].

Results and discussion

Results of the effect of vitamin B1 on Rosmary

The results showed that vitamin B1 at concentration of 100 mg / l had asignificant effect on increasing the concentration of the active substance for both rosmaric acid, carnosic acid and peinen

where all of them reached (0.423, 0.321, 0.401 mg / m) compare with the control treatment (0.125, 0.049, 0.088 mg / m) this corresponds to Samar 2010 whereas vitamin B1 in concentration 1g / l had asignificant effect on growth and content of date palm seedling compare to other concentration 5 and 10 g/l [9]. While the effect of vitamin B1 with all concentration was not significant on camphor and leutulin (table 1). As vitamin B1 has arole in stimulating and regulating growth inside the plant, it also oxides glucose to produce useful metabolic energy in thefrom of ATP. the enzymatic helper plays of arole in removing the carboxy groups from the pyruvic acid, leaving the acetylcholenethat gives lipoic acid, which converts the acetyl group into coenzyme that enters at the beginning of the krebs cycle [10].

Table (1): effect vitamin B1 on substances in rosmarary.

Pinen mg/m	Leutolin(mg/m)	Camphore mg/m	Carnosic acid (mg/m)	Rosmaric acid mg/m	Concentration mg/l	substance	Sequence
0.401a	0.061a	0.185a	0.321a	0.423a	100	Vit.B1	1
0.250b	0.065a	0.189a	0.059b	0.212b	200	Vit.B1	2
0.243b	0.063a	0.183a	0.050b	0.202b	300	Vit.B1	3
0.088b	0.058a	0.181a	0.049b	0.125b	Zero	control	4

Results of the effect of vitamin C on Rosmary

The results showed that Rosmaric acid, Camphore and penen were significantly affected by vitamin C at aconcentration of 300 mg / l which led to (0.412, 0.405, 0.322 mg / m) compare with the control treatment that reached (0.125, 0.181, 0.088 mg / m) this corresponds to Al-hilfi and Zabon 2016 whereas, spraying with vitamin C led to amoral effect on the yield of grains and its components, reaching 6.820, 6.879 mecagram compare with control treatment that reached4.882, 4.906 megagram [11]. While the effect of vitamin C with all concentration was not significant on carnosic and leutulin (table 2) Vitamin C or escorpic acid is found in all parts of the plant, especially the leaves and fruits, ascorpic acid quickly oxides to dihydroascorpic acid , which in turn can be reduced again by enzymes in the plant, the enzyme ascorbic acid oxide is found in the plant because of its ability to oxidaze and reduce the opposite ascorbic acid, the role lies in that it is acofactor in the phosphorousprocesses in phosphosynthesis and an important regular of oxidation and reduction statesof the protoplasmand as apolymer in the caseof oxidation and the activity of som important within the plant [12].

Table (2): effect vitamin C On substances in rosmar.

Pinen mg/m	Leutolin mg/m	Camphore mg/m	Carnosic acid mg/m	Rosmaric acid mg/m	Concentration mg/l	Substance	sequence
0.117b	0.077a	0.185b	0.052a	0.201b	100	Vit.C	1
0.119b	0.072a	0.184b	0.055a	0.129b	200	Vit.C	2
0.322a	0.061a	0.405a	0.051a	0.412a	300	Vit.C	3
0.088b	0.058a	0.181a	0.049a	0.125b	Zero	control	4

Results of the effect of vitamin E on Rosmary

The results showed that Rosmaric acid , Carnosic and leutulen were significantly affected by vitamin E at aconcentration of 300 mg/l which led to (0.431, 0.422, 0.421 mg / m) compare with the control treatment that reached (0.125, 0.049, 0.058 mg/m) this corresponds to Jassim 2017 whereas spraying with vitamin E had asignificant effect on plant height, 1000-seed weight and the number of poods of mung bean plant , reaching 87.12 cm , 55.06 g , 24.22 pods compare with control treatment that reached 70.99cm , 34.87g and 19.67 pods [13]. While the effect of vitamin E with all concentration was not significant on camphor and peinen (table3)

Table (3): effect vitamin E On substances in rosmar.

Pinen mg/m	Leutolin mg/m	Camphore mg/m	Carnosic acid mg/m	Rosmaric acid mg/m	Concentration mg/l	substance	sequence
0.135a	0.197b	0.212a	0.171b	0.130b	100	Vit.E	1
0.129a	0.123b	0.223a	0.123b	0.138b	200	Vit.E	2
0.122a	0.421a	0.289a	0.422a	0.431a	300	Vit.E	3
0.088a	0.058b	0.181a	0.049b	0.125b	zero	control	4

Conclusions

- 1) spraying the rosmar plant with vitamin B1 at aconcentration of 100 mg/l for its effect on increasing the active substances (rosmaric acid, caernosic acid and pienen) in it.
- 2) spraying the rosmar plant with vitamin C at aconcentration of 300 mg/l for its effect on increasing the active substances (rosmaric acid, camphor, pienen) in it.
- 3) spraying the rosmar plant with vitamin E at aconcentration of 300 mg/l for its effect on increasing the active substances (rosmaric acid, carnosic acid, leutulin) in it.

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