

EFFECT OF ORANG PEEL (*CITRUS SINENSIS*) L. POWDER ON GERMINATION AND GROWTH OF SOME ORNAMENTAL PLANT

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Abstract

The research was conducted to study the effect of orange peel powder *Citrus Sinensis* L. in seed germination and growth of three types of ornamental plants white flower of thinking. *Viola tricolor maxima*, *Petunia Petonia hibrida*, The balsam *Impatiens holstii*, The results showed that adding orange peel powder at a ratio of 10 and 20 gm/kg soil caused a significant increase in seed germination and seedling growth for the three types of ornamental plants compared to the control plants (without addition), and the highest percentage of increase in seedling germination was recorded when adding 20 gm/kg soil in the three species of ornamental plants, the highest increase in root and vegetative length was recorded at the same addition, while the results showed a difference in the response of the three types, where balsam and petunia showed distinction over the third type, which is the white flower of thinking. The research also included preliminary qualitative disclosures about some active compounds in orange peels, which are flavonoids, glycosides, tannins, which are secondary metabolites that are chemical compounds with antagonistic activity. The results showed the presence of these compounds in orange peel powder.

Keywords: allelopathic, ornamental plants, orange *Citrus Sinensis*

Introduction

Since ancient times, man has been interested in ornamental plants in general and flowers in particular, and this interest has increased with the development of civilization. People tended to establish gardens with their plants during the different seasons of the year for the purposes of beautification and landscaping in gardens, parks, streets, squares, squares and indoors, Rasul (1984) one of these plants is the white thinking flower (Pansa) or the triple flower, *Viola tricolor maxima*, It is from the violet family and is three-petaled and multicolored. It is one of the most common ornamental plants in public gardens. It is considered one of the winter annuals, and the petunia *Petonia hibrida* plant. It is an aromatic winter annual plant of the family Solanaceae, and the third type is the balsam flower of the family Blsaminaceae, The seeds of these plants are planted in late summer and early autumn and bloom in late winter and spring. These plants are considered to be widely cultivated in parks, public and home gardens, near trees, shrubs, citrus fruits, especially oranges, and citrus trees, including oranges, have allelopathic effects on other plant species and their effect may return Allelopathic to containing organic acids, amino acids and pectin, which were diagnosed as allelopathic compounds. Al-Taie, (1995) orange plant of the family Rutaceae Alkatb, (1988) Orange peels contain many compounds, especially flavonoids, vitamin C, essential oils, carotenoids, pectin and a number of acids. Chevalier (2010), It also contains turbines Sahoo *etal* (2015),

Many researches stated that these compounds found in most plants, especially in oranges, are allopathic (phenolic) compounds and are found in different parts, including fruits, Rise, (1984). These compounds may be harmful or beneficial to the growth of the plant receiving them or treating them when liberated. This phenomenon is called allelopathic, which has become one of the scientific phenomena at the present time and has been observed in many plants that have the ability to produce chemical compounds and put them to the environment in several ways, including washing, volatilization and secretions. Roots and the decomposition of plant residues in the soil by living organisms and due to the large number of ornamental plants cultivation in public and home gardens,

The research was conducted to find out the allelopathic effect of orange peel powder on the germination and growth of ornamental plants, which are the white thinking flower, petunia and balsam, as well as investigating the reasons that showed the allelopathic effects through the detection of some effective allelopathic compounds found in orange peels.

Materials and methods of work

The research included conducting an experiment in a greenhouse for the winter season 2021-2022 to find out the effect of crushing orange peels on the germination and growth of some ornamental plants, which are white thinking flower, petunia and balsam, where 10 gm and 20 gm/kg soil of orange peel powder were incubated for two weeks in a mixed soil that was not previously cultivated. Then it was placed in plastic pots with a capacity of 2 kg, and the seeds of the three ornamental plants used in the study were planted in it, at a rate of 10 seeds in each pot.

Detection of some effective compounds in orange peels

1-Detection of flavones: Detection according to the method Jaffer *etal*(1983) if 1 gm of the dry plant part powder was soaked in orange peels in 10 ml of ethyl alcohol 95%, filtered after 6 hours and counting Solution A. Add 10 ml of 50% ethyl alcohol to 10 ml of 50% potassium hydroxide solution. The solution B was counted, equal amounts of the two solutions were mixed, A and the test was counted as positive when yellow appears

2-Detection of glycosides: 1 ml of aqueous extract of orange peel was boiled at a concentration of 5% by weight: volume with 5 ml of Benedict's reagent until appearancered-brown precipitate (rust color)Henrickson *eta*(1997)

3-Detection of tannins: followed the method of Dali and Al-Hakim (1987), by boiling 5 g of powder of orange peels with 50 ml of distilled water, filter the mixture and leave to cool and add to some drops of it from solution of lead acetate (CH₃COO)₂Pb solution at a concentration of 1%, Infer the positivity of detection when a white, gelatinous precipitate appears.

Lesson features

1-The percentage of germination after 20 days of sowing

2- Plant height cm The length of three plants was measured in each replicate for periods of 10,8,6,4,2 weeks after germination,

3- After the end of the experiment period, the plants were uprooted and the vegetative part was separated from the root and measured The length of each part was then dried in an electric oven at 70 °C for 72 hours and their weights were recorded Ibrahim&Saeed(2008). The experiment was

carried out according to a complete random design (CRD) and statistical analysis of the data was carried out according to the (SAS) program. Duncan's test was used to distinguish between averages (Steel & Torrie, 1980).

Results and discussion

The results in the table below, which include the study of the percentage of germination, the length of shoot and root system, and their dry weight for three types of ornamental plants, namely, white thinking flower, petunia and balsam, indicate a significant increase in the percentage of germination of seeds of the three ornamental plants when adding 20 g/kg soil of orange peel powder compared to control plants. (Without addition) As for the growth of plants, the results indicate an increase in the length of the vegetative and root system of the studied plants, as the highest length of the root system of petunia plants reached 7.7 cm when 20 g/kg was added, and the highest length of the vegetative total of the balsam plant was 6.8 cm at the same addition and in White Thinking flower plant 5.5 cm when added 20 g / kg soil of orange peel powder . As for the length of the root system, the highest length reached 6.4, 6.1 and 5.4 in petunia, balsam and white thinking flower, respectively, when 20 g / kg soil was added. An increase in the dry balance of the vegetative and root of the studied plants was recorded, where the highest dry weight of the vegetative group was recorded in petunia plant 0.56 g when added 20 g / kg compared to the two types of balsam and white thinking flower. The highest dry weight of the root was 0.41 g in petunia and balsam plants when added 20 g / kg soil. Thus, we can conclude that the seeds of the petunia plant are more responsive to the effect of orange peel powder than the seeds Balsam plant and white thinking flower.

Table of the effect of orange peel powder on seed germination and seedling growth of three types of ornamental plants

Types	Percentage Addition	Percentage For germination	the length of the vegetative part is cm,	the length of the root is cm	the dry weight of the vegetative part is g	the dry weight of the root g
white thinking flower <i>Viola tricolor maxima</i>	Compare	70c	4.16c	4.0c	0.11c	0.09a
	10	80a	6.0a	5.7a	0.50a	0.08a
	20	80a	5.5b	5.4b	0.44b	0.07a
Petunia <i>Petonia hybrida</i>	Compare	90b	6.4b	4.3b	0.06c	0.09c
	10	90b	6.2b	4.3b	0.20b	0.15b
	20	95a	7.7a	6.4a	0.56a	0.41a
The balsam <i>Impatiens holstii</i>	Compare	95a	2.2c	3.2c	0.02b	0.05c
	10	90b	4.1b	4.0b	0.01c	0.11b
	20	90b	6.8a	6.1a	0.40a	0.41a

*Similar letters mean that there are no significant differences between the averages according to Duncan's test

The peels of orange fruits contain many compounds, including flavonoids, carotene, vitamin C and citric acid, They are water-soluble chemical compounds that are released into the soil by volatilization or washing Chevalier (2010). Where these compounds can be released to the soil to accumulate in it and its effect appears on the plants grown in those soils to show an allelopathic effect (stimulating or inhibiting) Rise (1984). In this study, the results indicated a significant increase in the studied features (germination percentage, length of vegetative and root groups, and their dry weight) with adding 10 and 20 g/kg soil of orange peel powder because the peels contain allelopathic compounds with a stimulating effect. The results of the research agree with the study of Al-Rawi and Yaqoub, (2012) Where the study showed the effect of water washes for rice seeds to a significant increase in the growth of zinnia and cosmos plants when treated with washes at a concentration of 9%. The variation in the plants' response to the addition rate is due to the variation of plant species as well as the sensitivity of the plant part, as some allelopathic compounds may affect the growth of the vegetative part without affecting the growth of the root system., Saeed (1999). The results of the research also agree with the study of Al-Qaisi et al. 2015 where the results showed that orange peel extract with concentrations 10 and 20% caused a significant increase in seed germination and some growth characteristics in barley plant, that the chemical compounds and acids present in Orange peels overcome free radicals and form a protective barrier with other antioxidants and antioxidants (OH⁻, O⁺, H₂O₂, ONNO, ROO), Where it attacks the important cellular components and works on the oxidation of fats, chlorophyll, proteins and cell membranes, which causes aging and death of the plant Moller,(2012). Exposing the plant to inappropriate conditions such as heat, cold, lighting, radiation and others is one of the factors of environmental stress that affect the physiological activities of the plant. Therefore, antioxidants intervene to protect plant tissues from oxidative processes resulting from Ros, Saqr,(2006). The orange peels contributed to improving some growth characteristics of the studied ornamental plants and increased some growth indicators through their effect on protecting the plant from oxidative factors and harmful effects on the plant, The increase in the percentage of germination, as well as some growth characteristics of the studied plants, may be attributed to the compounds present in the peels of orange fruits, which have a high stimulating capacity. This was confirmed by the detection of secondary metabolic compounds in the peels of orange fruits, which are tannins, glycosides and flavones, also agree with the study of Goli and McKee 2019 study on the diagnosis of some phenolic acids, tannins, alkaloids, glycosides, flavonoids, saponins, carotenoids and vitamin C, which are chemically active secondary metabolites.

Sources

- Alkatb, Youssef Mansour (1988) Classification of seed plants, first edition, Dar Al-Kutub for Printing and Publishing, University of Mosul, pp. 211-324
- Al-Qaisi, Wafaq Amjad and Al-Hayani, Iman Hussein and Mahmoud, Rahaf Wael,(2015), Effect of orange peel extract and artificial lemon on the growth and yield of barley plant *Hordum vulgare* L. Journal of the College of Basic Education 'Volume 21, Issue 88.

- Al-Rawi, Iman Reda and Yaqoub Hala Muzhir,(2012), Effect of water washes for Rice seeds on the germination and growth of three types of ornamental plants Al-Qadisiyah Journal of Pure Sciences Volume 17 Issue 3 .
- Al-Taie, Salah Muhammad Saeed (1995), “The Life Contradiction” and the Ministry of Higher Education and Research Scientific, University of Mosul, Iraq.
- Chevalier Andrew (2010) Alternative Medicine Medicinal Herbs and Medicinal Plants Translated by Omar Al-Ayoubi Beirut Lebanon pp. 188-189
- Dalali, Basil Kamel and Al-Hakim, Sadiq Hassan (1987.) Food Analysis. Directorate of Dar Al-Kutub for Printing Publication / University of Mosul
- Ghouli, Iman and Makki Aisha (2019) Biological activity study of orange peel extracts Citrus reticulata , Citrus senensis and lemon Citrus Limon .Ministry of Higher Education and Scientific Research, Master's thesis, University of Martyr Hama, Lakhdar Al-Wadi, College of Technology.
- Henrickson,C.H.;Byrd,L.C.and Hunter,N.W.(1997).Laboratory for general ,organicand biochemistry,2nded.WCB/McGraw Hill Press,Boston :407pp.
- Ibraheem Fatin K.. Sa'eed Janan A,(2008).The Effect of Eucalyptus and Orange Leaves Added to the Soil on Germination and Growth of Four Ornamental Plants, Rafidian journal of science.,19(1),page15-25.
- Jaffer,H.J.;Mahmod,M.J.;Jawad,A.M.;Naji,A.andALNaib,A.(1983).phytochemical and biological screening of some Iraqi plant .fitoterapia,LIX.299
- Moller, I. M. (2012) . Reactive oxygen species (ROS) and plant respiration a companion to plant physiology. Ed. by Taiz & Zeiger, Firth Ed. Aarhus University, Tjele, Denmark
- Rasul, Rasul Hamza (1984). (Ornamental plants). Ministry of Higher Education and Scientific Research, Salahaddin University
- Rice, E.L. (1984). Allelopathy. 2nd Ed., Academic Press, NewYork, USA.
- Saeed, Janan Abdel-Khaleq, 1999. Allelopathic effect of rice and tomato in the germination and growth of cultivars of wheat aestivum Triticum L. and some leguminous plants. PhD thesis, Faculty of Science,University of Al Mosul
- Sahoo,U.K.,Jeejeelee L.,Lallinrwna S. and Muthuku maram R.B.(2015).effect of Citrus reticulata Blanco leaf extract on seed germination and intial seedling growth parameters of five home garden crops.Jornal of experimental Biology and agrigultural science V3(6).
- Saqr, Moheb Taha (2006) Basics of Biochemistry and Plant Physiology, Faculty of Agriculture, Mansoura University, Arab Republic of Egypt, p. 1-5
- Steel, R.G.D.and Torrie, J.H., (1980). Principle and procedures of ststistics.2nd. ., MC-Graw Hill company, Inc., London