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Effect of Biofertilizers on Leaf Hormonal Content in Peach Trees

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Abstract: *This study was conducted in the Department of Biology, Al-Rasheed University College- Baghdad during 2017 growing season to investigate the influence of some microbial inoculants on 1 year's old trees of "Peento" peach cultivar.The biofertilizers treatments was control treatment (B_1), Azotobacter chroococcum (B_2), Azospirillum brasilense (B_3), Bacillusmegatherium (B_4), Azotobacter chroococcum+ Azospirillum brasilense (B_5), Azotobacter chroococcum+ Bacillusmegatherium (B_6), Azospirillum brasilense + Bacillusmegatherium (B_7),Azotobacter chroococcum+ Azospirillum brasilense + Bacillusmegatheriumto the soil (B_8).The experimental design adapted in this experiment was RCBD. The number of transplant used was 24 transplants.The results indicate that theAzotobacter chroococcum+ Azospirillum brasilense + Bacillusmegatheriumto the soil (B_8) treatment has significantly exceeded other treatments by giving them the highest leaf IAA, GA_3 and Zeatin content of 68.40, 189.68 and 50.12 Micrograms.gm^{-1} fresh weight respectively, While the control treatment (B_1)gave less content of leaf IAA, GA_3 and Zeatin, which was 38.18, 114.16 and 38.12 Micrograms.gm^{-1} fresh weight respectively.*

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I. Introduction

Peaches (*Prunus persica* L.) are native to family Rosaceae. They were early cultivated in China since approximately 4000 years ago from it speeded world wide. The acreage of peach in the world reached about 1499872 hectare, with production of 21083151 tons,the main producing countries are China then Italy, United States of America, Greece, Spain (FAO, 2013). The estimated number of peach fruit trees in Iraq, including nearly 152273 tree produces up to 2451 tons, and the average production per tree about 16.1 kg (PCBS, 2013). It is well known that peach fruit contains carbohydrates, organic acids, pigments, phenolic compounds, volatile compounds, antioxidants and trace amounts of proteins and lipids. It is a rich source of potassium, iron, fiber, vitamin A, vitamin C and other vitamins (Crisosto and Valero, 2008; Hancock, 2008).

Microbial inoculants, such as PGPR, can alter root architecture and promote plant development via the production or degradation of the major groups of plant hormones (Bhattacharyya and Jha, 2012; Dodd et al.2010; Idris et al. 2007). Microbial inoculants can alsomodify plant hormone status (Belimovet al.2009).Phytohormones, like auxins, cytokinins (CKs), gibberellins (GAs), and ethylene (ET), can be synthesizedby beneficial microorganisms. These plant hormonesregulate multiple physiological processes, includingroot initiation, root elongation, and root hair formation. They typically operate in complex networksinvolving cross-talk and feedback (Dodd et al. 2010). Microbial production of the auxins indole-3-aceticacid (IAA) has been extensively reported (Ali et al.2009).The capacity of microorganisms to producecytokinins as onemechanismof plant growth promotionwas confirmed using bacterial mutants (García deSalamoneet al.2001). Gibberellins (GA) are mainly involved in regulating plant cell division and elongation and hence, they influence almost all stages of plant growth, including seed germination, stem and leaf growth, floral induction, and fruit growth (Spaepen et al.2009). As with auxins and cytokinins, GAs mainly act in combination with other Phytohormones. Frankenberger and Arshad (1995) reported that bacteria are able to release GA into the rhizosphere. Several Azospirillum species produce different GAs that is responsible for plant growth promotion that occurs upon inoculation onto plants. Previous studies emphasized the beneficial effects of using biofertilizers on leaf hormonal content of fruit trees, Bashan et al (2004) found the addition Azospirillum lead to increased in leaf auxin, gibberellin and cytokinin content, Al-Hadethi (2015) found that"Zanjelli" apricot trees were fertilized with Nitrobeine and Phosphorene and interaction between them led to the increasedendogenous hormone (IAA, GA_3 and Zeatin)content. The aim of this study was to assess the effect of biofertilizers of *Azotobacter chroococcum, Azospirillum brasilense*and*Bacillusmegatherium*on leaf hormonal content of Peentopeachtransplant.

II. Materials and Methods

This study was conducted in the Department of Biology, Al-Rasheed University College- Baghdad during 2017 growing season to investigate the influence of some microbial inoculants on 1 year's old trees of

"Peento" peach cultivar. Transplants were cultivated in plastic bags with a diameter of 25 cm. Transplants were healthy, similar in vigor and subjected to the same horticultural practices adapted in the region.The biofertilizers treatments were as follows:

1. The control treatment (**B_1**).
2. Added the *Azotobacter chroococcum* to the soil (**B_2**).
3. Added the *Azospirillum brasilense*to the soil (**B_3**).
4. Added the*Bacillusmegatherium*to the soil (**B_4**).
5. Added the *Azotobacter chroococcum+Azospirillum brasilense*to the soil (**B_5**).
6. Added the *Azotobacter chroococcum+Bacillusmegatherium* to the soil (**B_6**).
7. Added the *Azospirillum brasilense +Bacillusmegatherium* to the soil (**B_7**).
8. Added the *Azotobacter chroococcum+ Azospirillum brasilense +Bacillusmegatherium* to the soil (**B_8**).

The experimental unit included one transplant and the number of treatment was eight and replicated three times. The experimental design adapted in this experiment was RCBD. The number of transplant used was 24 transplants. The obtained results were subjected to analysis of variance according to (Elsahookie and Wuhaib, 1990) using L.S.D 0.05 for comparing differences between various treatment means.

Quantitative and qualitative assessment of growth regulators:

Standard solutions for PGRs were injected with 25 µg concentration. The sample samples to be evaluated and all treatments were then injected into the HPLC and 20 microliters in the same conditions used in injecting the standard models and by the concentration of the hormones by comparing the results of the quantitative estimation in the sample samples For the time of detention, the package area of the models with the time of detention and the package areas of the standard models according to the following equation:
Sample concentration = (sample area / area of standard solution) x concentration of standard solution x number of dilution times

Extraction method:

Samples were collected in the early morning on 25/5, where the modern leaves were taken and placed in transparent polythene bags. The bags were marked and placed directly in a cool box containing ice to keep samples of wilt as much as possible. The samples were transferred directly to the laboratories of the Ministry of Science and Technology - Baghdad and stored at 4 ° C until the samples were analyzed. The extraction was performed according to the method recorded byUnyayar et al. (1999), which was adapted to the FLAC Quick Column and summarized as follows:

1. Weight 2 g of leaves then crushed to a soft paste.
2. Add 60 mL solution consisting of methanol: ammonia: chloroform and 12: 5: 3 (V / V / V) to paste.
3. Filter the sample and transfer the solution to the centrifuge at 6000 minutes^{-1} for 15 minutes to obtain a clear solution.
4. Fill the solution with 25 mL water with deionized water.
5. The chloroform phase is neglected and the methanol phase is placed in rotary evaporator and at 30 ° C to reduce dehydration.
6. The remaining material evaporated from evaporation to a specified volume of 1 ml (1000 µl), pH modified water stage to 2.5 and then 20 µl of this extract was withdrawn and injected into the HPLC system under separation conditions for the same standard solutions.

III. Results and Discussion

The results in Table (1) indicate that the*Azotobacter chroococcum+ Azospirillum brasilense +Bacillusmegatherium* to the soil(B_8) treatmenthas significantly exceeded other treatments by giving them the highest leaf IAA, GA_3 and Zeatin of 68.40, 189.68 and 50.12 Micrograms.gm^{-1} fresh weight respectively, While the control treatment(B_1)gave less content of leaf IAA, GA_3 and Zeatin, which was 38.18, 114.16 and 38.12Micrograms.gm^{-1} fresh weight respectively. As for the content of the leaves of theabscisic acid (ABA), the results of Table (1) indicated that the comparison treatment gave the highest content of the leaves, which reached 8.12 Micrograms.gm^{-1} fresh weightsand a significant difference from the other treatments,while the *Azotobacter chroococcum+ Azospirillum brasilense +Bacillusmegatherium* to the soil(B_8)treatment was given less content for the leaves of the abscisic acid (ABA) it was 4.68 Micrograms.gm^{-1} fresh weights. The reason for this is due to the role played by microorganisms in increasing the readiness of elements, especially nitrogen, in the soil. This is a confirmation of what a number of researchers have indicated about the ability of these organisms to secrete growth regulators that have increased their content in leaves and increase the absorption of nutrients in the plant (Cakmakc et al., 2006).

Table (1) Influence of biofertilizers on leaf hormonal content of peach transplants (Micrograms.gm^{-1} fresh weight).

Treatments	IAA	GA_3	Zeatin	ABA
B_1	38.18	114.16	38.12	8.12
B_2	50.22	122.98	42.88	6.66
B_3	47.12	150.21	43.15	5.99
B_4	46.40	144.63	43.87	5.80
B_5	53.55	163.88	47.20	5.60
B_6	56.87	167.94	46.84	5.22
B_7	59.13	159.26	46.70	5.00
B_8	68.40	189.68	50.12	4.68
L.S.D 0.05	**5.68**	**22.87**	**2.94**	**1.24**

References

[1]. Al-Hadethi, Mustafa. E.A. 2015.Effect of Different Fertilization sources and the growth regulator (Brassinosteroids) on growth and yield of Apricot trees. Ph.D. Dissertation, Coll. of Agric., Univ. of Baghdad. pp. 153.

[2]. Ali B, Sabri AN, Ljung K, Hasnain S .2009. Auxin production byplant associated bacteria: impact on endogenous IAA contentand growth of*Triticumaestivum* L. Lett. ApplMicrobiol 48: 542-547.

[3]. Bashan,Y, G. Holguin and L. E, Bashan.2004. Azospirillum-plant relationships: physiological, molecular, agricultural, and environmental advances (1997-2003). Canadian Journal of Microbiology. 50(8): 521-577.

[4]. Belimov AA, Dodd IC, Hontzeas N et al .2009. Rhizospherebacteria containing 1-aminocyclopropane-1-carboxylate de-aminase increase yield of plants grown in drying soil via bothlocal and systemic hormone signaling. New Phytol. 18:413-423.

[5]. Bhattacharyya P.N and D.K,Jha.2012. Plant growth-promotionrhizobacteria (PGPR): emergence in agriculture. World JMicrobiolBiotechnol. 28:1327–1350.

[6]. Cakmakc, R; F.Donmez; A.Aydin and F. Sahin. 2006. Growth promotion of plants by growth promoting rhizobacteria under greenhouse and two different field soil conditions. Soil Biol. And Biochem. 38:1482- 1487.

[7]. Central Organization for Statistics and Information Technology (PCBS). The Ministry of Planning and Development Cooperation. Report production of summer fruit trees for the year 2013. Baghdad. Iraq.

[8]. Crisosto, CH and Valero D. 2008. Pre-harvest factors affecting peach quality. In The peach, Botany, Production and uses, Ed. DR. Layne, London, UK: CAB International, pp. 536-550.

[9]. Dodd IC, Zinovkina NY, Safronova VI, Belimov AA .2010. Rhizobacterial mediation of plant hormone status. AnnAppl Biol. 157:361–379.

[10]. Elsahookie,M.M and Wuhaib , K.M . 1990. Design and Analysis of experiments. Univ. Of Bagh. Dar al hekma.

[11]. FAO. 2012. FAO. Statistics Division 2013. Available at :(http://faostat.fao.org/site/339/default.aspx) 20 July 2013.

[12]. Frankenberger JWT, Arshad M.1995. Phytohormones in soils.Dekker, New York.

[13]. García de Salamone IE, Hynes RK, Nelson LM .2001. Cytokininproduction by plant growth promoting rhizobacteria andselected mutants. Can J Microbiol.47:404–411.

[14]. Hancock J, Scorza R. 2008. Peach In Temperate Tree Fruit Breeding, Ed. J. Hancock, New York, USA: Springer, pp. 265-298.

[15]. Idris EE, Iglesias EJ, Talon M, Borriss R .2007. Tryptophandependent production of indole-3-acetic acid (IAA) affectslevel of plant growth promotion by *Bacillusamyloliquefaciens* FZB42. Mol Plant-Microbe Interact. 20:619-626.

[16]. Spaepen S, Vanderleyden J, Okon Y .2009. Plant growthpromoting actions of rhizobacteria. Advances Bot Res 51:283-320.

[17]. Unyayar , S ; F. Totcuogh and Al-Unyayar .1996. A modified method extraction and identification of IAA, GA, ABA and Zeatin produced by Chryoprium chrysosporium. J. plant physiology, 22 (3) 105-110.

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