Environment Conservation Journal 16 (SE) 417-422 , 2015
ISSN 0972-3099 (Print) 2278-5124 (Online)
Abstracted and Indexed

Application of Gibberellic Acid, Humic Acid on Yield of Essential Oil Menthapiperita

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Received:20.08.2015 Revised:25.08.2015 Accepted: 30.09.2015

ABSTRACT

The research for pot cultivation under greenhouse conditions in Central Province, Arak and Arak Islamic Azad University in crop year 1393 was conducted. The effects of humic acid and gibberellic acid on growth and production of Menthapiperita essential oil in order to reduce the consumption of chemical fertilizers were used.

According to the analysis of variance and simple effects and interactions of humic acid treatments and gibberellic acid in Menthapiperita, Was determined using the above treatments increase the growth and biomass and oil yields compared to the control H1 G1 has a Menthapiperita plant And it can be concluded that the best treatments G4 G3 but with regard to performance and Near the results of treatments H3 G3 H4 G2 and the results of the above treatments H4 G3 can be used as a complement to chemical fertilizers in the cultivation of this plant. The results of this testing demonstrate the use of humic acid and gibberellic acid on key attributes such as biomass and Menthapiperita essential oil yield good effects and Were reasonable. In comparison with other projects that have different levels of fertilizer use, is almost identical functionality. Which indicates that the cultivation of Menthapiperita can be reduced by 30 to 50 percent of the fertilizer from humic acid used gibberellic.

Keywords: *humic acid and gibberellic acid, Menthapiperita, essential oil*

Introduction

One of the problems of modern man due to the lack of peace far away from the spirit and nature lay at the heart of nature. Refer this could be the key to the spirit of openness and to achieve human happiness today. Medicinal plants refer to a wide range of plants containing active ingredients are found in the treatment or prevention of it is used.

In a deeper sense it can be said that word herbal medicine is not applied only to plants that are soothing pains, But these food groups (as flavorings, beverages, sweeteners, natural colors and preservatives) and Also, as a raw material in the production of cosmetic products are used extensively (Omidbeygi, 1384. Momeni, 1377.NaghdiBadi, 1391) climate variability and different ecological conditions, the diversity and richness of medicinal plants across Iran, the need for comprehensive research and proper utilization of these plants, especially at a time when the world of medicinal plants in the pharmaceutical, cosmetic, health and Food was so fast that we, as individuals having surpassed Avicenna have been pioneers in this science, is essential (Fatemeh, Sefidkan, 1387). The most important factors affecting the quality and quantity of essential oils from medicinal plants, therefore, determine the type of soil nutrients, the exact amount and the correct use of fertilizer and increase the active ingredients will have a significant impact on production. Today, reduce the use of chemical fertilizers on crop production using biological fertilizers and plant hormones widely used as an alternative or supplement chemical fertilizers, Ecological and economic aspects, advantages follows (Moradi, 1388). Indiscriminate use of chemical fertilizers Apart from the high costs imposed on farmers and destructive effects in the wake of the devastating poisoning caused by too much nitrogen in the nitrate form elements, especially the environmental impact and Groundwater pollution has caused are also nutrient balance. (Kader, 2000).

The use of organic fertilizers is increasing. Humic substances are a mixture of different organic compounds that remained of plants and animals, humic acid derived Important advantages include humic acid chelate ability nutrients such as sodium, potassium, magnesium, zinc, calcium, iron, copper, Other elements to overcome nutrient deficiency pointed out that the increased length and weight of roots and the initiation of lateral roots (Aflatuni, 2005)

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Improve soil properties such as density and compactness, ventilation, increased permeability(Aiken et al., 1985), The availability of nutrients and humic substances are characterized (Dursun, 2002). In a study of humic acid increased plant height and diameter was Arugula(Liu. 1998). Hormone word refers to certain materials that are part of a living organism made and after the transfer of significant physiological effects in other parts of the leaves and are active at very low concentrations relatively large category of plant hormones gibberellins that in the years around 1940 ware identified. In an experiment to study the effects of different doses of triple superphosphate fertilizer, bio-fertilizer phosphorus and gibberellic acid on growth, yield, value and performance of essential oil of Menthapiperita Analysis of variance showed that the number of leaves, plant height, stem diameter, number of lateral branches, Essential oil content and yield of essential oil with the use of gibberellic acid, respectively by 1% and the number of leaves, stem diameter, Essential oil content and yield of essential oil with bio-phosphorus fertilizer was significant at the 5% statistical level (Pakpour and et al, 1391)

The dark mint herbs such as mint, badashabi, savory, oregano, sage and noted Mexican goal. It contains 160 genera and over 3,000 species of plants dark, very different life forms and ecological needs in almost all parts of the world, especially in developed regions of the Mediterranean. These plants are mainly active ingredient dark essence that is stored in secretory trachoma's. In different parts of the plants, mucilage, tannins and bitter substances as well. These plants are herbaceous, woody and a one-year, two-year or a few years. Flowers generally irregular and cups with two lower lips and above (Omidbeygi, 1384). Menthapiperita L One of the most popular and most widely used medicinal plants. Mintis a perennial herb plant. Long leaves 3 to 9 and a width of 1 to 3 cm, oval, flat, jagged edges and dark green are observed. Mint with square legs Due to the presence of anthocyanins in purple observed. (Omid beygi, 1384, NaghdiBadi, 1381) At the beginning of growing mint essential oil, the plant configuration and stored. The growth rate increased synthesis of essential oils. The leaves and flowers of 4 to 6% 2 to 7.2 percent essential oil, the stems are usually free of essential oil. The average value of 1 to 1.5 essential oilpercent has been reported in the biologic. Composition of the essential oils more than 20 types of the most important is menthol (40 to 60%), respectively. The highest amount of menthol, the essential oil is extracted from young leaves.

Material and methods

The research for pot cultivation under greenhouse conditions in Central Province, Arak, Arak Islamic Azad University with coordinates, Latitude 34 degrees 5 minutes and longitude 49 degrees 42 minutes and a height of 1757 meters above sea level was in the crop year 1393 was conducted. The effects of humic acid and gibberellic acid on growth and production of Menthapiperita essential oil in order to reduce the consumption of chemical fertilizers were used. The study included 12 treatment is to be repeated every 3 to 4 treatments including pot is a total of 48 pots per treatment and repeated a total of 3 144 pots in the greenhouse were studied. University of farm soil preparation and soil testing of ingredients and textures were used. The trial was watered every 5 days and the water was the same for all containers.

Note factors such as

Plant height, No leaf, No stem, leaf fresh weight, leaf dry weight, shoot fresh weigh, shoot dry weight, root fresh weight, root dry weight, biologic yield, root length, essential oil percent and essential oil yield

Table(1) Accredited Laboratory testing of the soil of Environment and the Ministry of Health

Soil texture	sand	silt	clay	Organic carbon(cc)	N	Absorbable K	Absorbable P	Saturated mud acidity	electrical conductivity (Ec)	City name	Depth (cm)	Sample specifications	Lab number
	(percent)				%	ppm							
loam-clay loam	40-50	30-40	20-30	>3	> 0.3	200-300	12	6.5-7	< 2	Optimum limit			
Sand clay loam	51	26	23	0.8	0.08	205.0	8.9	7.3	0.57	Arak	0-30	Khandab county	1

Results and discussions

According to the results of analysis of variance showed Menthapiperita plant height per plant the effect of humic acid and gibberellic acid on plant height at 1percentandhumicacid and gibberellic acid interaction on plant height was significant at the 1% level (Table 1.1)

Table1.1Analysis of variance Menthapiperita affected by different levels of gibberellic acidand humic acid

Changes sources	Degree of freedom	Plant height	Number of stems	Number of leaves per plant	leaves fresh weight
Replication	2	10.5278 **	3.02778ns	512.694ns	48.4675ns
humicacid(H)	3	136.074 **	103.435**	8614.25**	708.852**
gibberellic acid(G)	2	377.861 **	105.194**	16261.2**	1324.34**
(G)×(H)	6	3.60185 **	6.82407ns	222.194ns	24.4863ns
Error	22	0.80051	0.99747	314.936	27.8651
Coefficient	% cv	2.86	5.64	6.32	6.66

*significant difference in 5% level
**significant difference in 1% level
ns = no significant difference

Review the comparison table showed the average Plant height is affected by different levels of humic acid consumption of210mg(the biologic) 35.67cmwith a maximum Plant heightof140mg(the biologic) With32.56cmPlant heightand70mg(the biologic) 30.22cmofPlant height and lack of humic acid with Plant height26.44showed.A significant difference was observed between themandtaking210mg of humic acid is therefore recommended to plant height. Check Table of average Plant height under different levels of gibberellic acid showed that gibberellic acid (20 ppm) 35.67cm high plant with more than gibberellic acid (10 ppm) and avoiding the use of gibberellic acid showed. Also, the use of gibberellic acid(10 ppm) with gibberellic acidat24.92cm33.08cmanda lack of significant difference were observed. Thus, the application of gibberellic acid(20 ppm)is recommended for this plant height (Table 1.1 and Table 1.2)

According to the results of the data analysis of the number of stems per plant Menthapiperita plant was found that the effect of humic acid and gibberellic acid on the number of stems per plant at 1percentandhumic acid interaction and gibberellic acid on the number of stems per plant were significant at the 1% level (Table 1.1) Check by comparing the average of the number of stems per plant under different levels of humic acid showed that taking 210 milligrams(the biologic) 21.78withthe highest number of stems per plant compared to140mg(the biologic)With19.00stems per plantand70mg(the biologic)The number of stems per plant and a lack of humic15.89to14.11showed the number of branches per plant. Check by comparing the average of the number of stems per plant under different levels of gibberellic acid showed that gibberellic acid (20 ppm) 19.92more than the number of branches per plant with gibberellic acid(ppm 10)with18.83stems per plant and avoiding the use of gibberellic acidat14.33stems per plant showed. Also, the use of gibberellic acid(10 ppm)with18.83stems per plant and avoiding the use of gibberellic acidat14.33stems per plant were significantly different. Check the comparison of the mean number of leaves per plant under different levels of humic acid showed that taking 210 milligrams(the biologic) With317.78highest number of leaves per plant compared to140mg(the biologic) With290.00leaves per plantand70mg(to biologic) The lack of humicwith244.33 and271.33leaves per plant and number of leaves per plant showed. And significant differences were observed between them.

Check the comparison of the mean number of leaves per plant under different levels of gibberellic acid showed that gibberellic acid (20 ppm) 305.08leaves per plant with more than gibberellic acid(10ppm) With299.00 and238.50leaves per plant and the Number leaves per plant, avoiding the use of gibberellic acid showed. Also, these of gibberellic acid (20 ppm)with305.08leaves per plant and the use of gibberellic acid(10 ppm) No significant

differences were found with 299.00leaves per plant. Also, the use of gibberellic acid (ppm 10) with 299.00 leaves per plant and the use of gibberellic acid at 238.50leaves per plant were significantly different. (Table 1.1 and Table 1.2)
According to the results of the data analysis shoot fresh weight was found in Menthapiperita plant the effect of humic acid and gibberellic acid on dry leaf traits at 1% and also the interaction of humic acid and gibberellic acid on shoot fresh weight were not significant (Table 1.3) Check shoot fresh weight average comparison is affected by different levels of humic acid showed that taking 210 milligrams (the biologic) Hot191.04shoot with the most weight to140 mg (the biologic) Shoot freshweight171.93gand70mg (to biologic) withfreshshoot165.13gfresh weight and avoiding the use of humic acid with Air144.22 was hot And significant differences were observed between them. As well as the treatment of 140mg (the biologic) with shoot fresh weight 171.93 gr and 70 mg (to biologic) 165.13 gr dry weights were not significantly different. Check Table of average weight in shoot under different levels of gibberellic acid showed that gibberellic acid (ppm 20) 182.37shoot with more weight than the use of gibberellic acid(10ppm) 178.48 g fresh weight with air and non-use of gibberellic acid at 143.41 g fresh weight showed air. Also, the use of gibberellic acid (10ppm) with 178.48 gr fresh weight shoot and use of gibberellic acid (20 ppm) 182.37gr fresh weights shoot with significant differences were observed.

Table1.3Analysis of variance Menthapiperita affected by different levels of gibberellic acid and humic acid

Changes sources	Degree of freedom	leaves dry weight(gr)	fresh weights shoot(gr)	Dry weights shoot(gr)	Canopy(cm)
Replication	2	4.20333ns	224.440ns	26.2975ns	505.194**
Humic acid(H)	3	81.5763**	3360.27**	628.251ns	7430.11**
gibberellic acid(G)	2	164.436**	5525.14**	1138.12**	6992.36**
(G)×(H)	6	3.98352ns	66.4400ns	77.9459ns	328.194**
Error	22	3.84484	140.783	64.5784	85.9823
Coefficient	% cv	7.09	7.06	11.60	6.03

* Significant difference in 5% level (α=0.05)
** Significant difference in 1% level (α=0.01)
ns = no significant difference

Check Table of average shoot dry weight was affected by different levels of humic acid consumption of 210mg (the biologic) 80.88grams maximum shoot dry weight with respect to 140mg (the biologic) 68.52g and70mg dry weight(to biologic) Shoot dry weight 66.52 grams and lack of humic acid by dry weight61.11grams, respectively. And significant differences were observed between them. As well as the treatment of 140mg (the biologic) 68.52 grand 70 mg dry weight (to biologic) shoot dry weight was observed significant hot 66.52. Check Table of average shoot dry weight under different levels of gibberellic acid showed that gibberellic acid (20ppm) With75.99 gr dry weight than the use of gibberellic acid(10ppm) With 73.69gr dry weight and avoiding the use of gibberellic acid at 58.09 gr dry weights, respectively. Also, the use of gibberellic acid (ppm 10) with 73.69 gr dry weights and gibberellic acid(20ppm)With 75.99 gr dry weight was not significantly different. (Table 1.3 and Table 1.4)
Between mean that at least one letter in common, Duncan5% in the test were not significantly different. Review the comparison table cover under different levels of humic acid showed an average consumption of 210 mg (the biologic) 186.11 cm with a maximum cover of 140 mg (the biologic) Cover with 167.56 cm and 70 mg (the biologic) with canopy139.78cmand 121.44 cm showed a lack of humic acid canopy. And significant differences were observed between them. As well as the treatment of 140 mg (the biologic) with canopy 167.56cm and 70mg (to biologic) 139.78cm with cover significant difference was observed. Check Table of average canopy under different levels of gibberellic acid showed that gibberellic acid (20ppm) 170.67cm with canopy over the use of gibberellic acid (10ppm) 164.42cm with canopy and avoiding the use of gibberellic acid at 126.08 cm canopy showed. Also, the use of gibberellic acid(10ppm)

with164.42 cm canopy and gibberellic acid (20ppm) with 170.67 cover a significant difference was observed. Thus, the application of 4) gibberellic acid (10ppm) to tighten the canopy is recommended (Table 1.3 and Table 1.

Table1.5 Analysis of variance Menthapiperita affected by different levels of gibberellic acid and humic acid

Changes sources	Degree of freedom	root length (cm)	ratio of root to shoot	essential oil percent %	essential oil yield
Replication	2	6.08333**	0.00498*	0.00101ns	0/00193ns
Humic acid(H)	3	32.5185**	0.00772**	0.12803**	0.07738**
gibberellic acid(G)	2	67.0000**	0.00214ns	0.30564**	0.15473**
(G)×(H)	6	9.51852**	0.01330**	0.00695**	0.00414ns
Error	22	0.7803	0.00088	0.00098	0.00162
Coefficient	% cv	6.16	6.44	1.63	7.43

* Significant difference in 5% level (α=0.05)
** Significant difference in 1% level (α=0.01)
ns = no significant difference

Check the mean percentage ofessential oilis affected by different levels of humic acid showed that taking 210 milligrams (the biologic) 2.069 with the highest percentage of essential oil to 140mg (the biologic) with1.988per cent of oil and 70mg (to biologic) By 1.852 percent to 1.812 essential oil percent and avoiding the use of humic acid showed. And significant differences were observed between them.

Check the mean percentage ofessential oilis affected by different levels of gibberellic acid showed that gibberellic acid (ppm 20) with more than 2.058 essential oil percent consumption gibberellic acid (10ppm) with 1.982 per cent of the essential oil and avoiding the use of gibberellicacid1.752 essential oil percent was. Also, the use of gibberellic acid (10ppm) 1.982 percent of oil consumption with gibberellic acid (20ppm) with 2.058 essential oils percentsignificant difference was observed (Table 1.5 and Table 1.6)

Review the comparison table showed average essential oil yield under different levels of humic acid consumption of 210mg(the biologic) the highest essential oil yield compared with 0.657 to 140 mg (the biologic) By 0.567 essential oil percent and70mg(to biologic) with essential oil yield and avoiding the use of humic acid. 496 and 0.443 performance was essential. And significant differences were observed between them. Check Table of average essential oil yield under different levels of gibberellic acid showed that gibberellic acid (ppm20) with0.623oil yield than the use of gibberellic acid(10ppm) by0.588essential oil percent and avoiding the use of gibberellic acid1.752 essential oil yield showed. Also, the use of gibberellic acid(10 ppm) with 0.588 essential oil yield and the use of gibberellic acid(20ppm) 0.623 significant differences were observed with the essential oil. Thus, the application of gibberellic acid (ppm 20) to tighten the recommended essential oil (Table 1.5 and Table 1.6).

Conclusions

The effect of humic acid on traits such as plant height, No secondary stem, No leaf, root length in plant, leaf fresh weight, leaf dry weight, root fresh weight, root dry weight, biologic fresh weight, biologic dry weight, Biological yield per hectare, essential oil percent and essential oil yield per hectare were significant at the 1% level. Humic acid(spraying) has the highest plant height (42.0 cm), No secondary stem (23.4 Branch), No leaf (363.4 Leaf), root length in plant (23.92 cm), leaf fresh weight (68.81gr), leaf dry weight (17.59gr), root fresh weight (27.44gr), root dry weight (10.15gr), biologic fresh weight (268.71gr), biologic dry weight (86.97gr), Biological yield (5798.1per hectare), essential oil percent (1.97%) and essential oil yield per hectare (23.15 per hectare).

Study results showed the effect of gibberellic acid on traits such asplant height, No secondary stem, No leaf, leaf fresh weight, leaf dry weight, root fresh weight, root dry weight, biologic fresh weight, biologic dry weight, Biological yield per hectare, essential oil percent and essential oil yield per hectare were significant at the 1% level on traits such as root length to height ratio was

not significant. Application of Gibberellic acid (20 parts per million) (20ppm) has the most effect on traits like the most plant height (35.67), Number of branches(19.92 branches), leaf number (305.08), leaf fresh weight (86.44), leaf dry weight (30.12), biologic fresh weight (182.37), biologic dry weight (75.99), crown canopy (170.67), root length (16.17), root length to height (0.472), Essential oil percent(2.058%), essential oil yield (0.623) Gibberellic acid were compared ton on-consumers.

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