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The Effect of Nitrogenous and Phosphate Fertilizers of the Properties on the Vegetative Growth and Aromatical Oil Yield of Local Mint (*Mentha Spicata* L.)

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ABSTRACT

A field experiment was carried out the season 2005-2006 in private farm in Najaf province to investigate four mixture of nitrogenous and phosphate fertilizers i.e. (0, 100 kg N/ha, 150 kg P_2O_5/ha, and 100 kg N/ha + 150 kg P_2O_5/ha) on vegetative growth properties and oil yield of local mint. A simple experiment was performed through Completely Randomized Design (C.R.D.) with three replicates. The mean results compared according to L.S.D. (Least significant Difference) with 5% probability level. The results showed that the nitrogenous and phosphate fertilizers has improved the vegetative growth properties (plant height, number of leaves and branches, vegetative yield (ton/ha) and total chlorophyll content in leaves). Oil yield increased significantly compared with non-fertilized plants. So, the fertilized plant with (100 kg N/ha + 150 kg P_2O_5/ha) gave the highest parameters, since the plant height (64.26 cm), number of branches (8.36 branch/plant), vegetative yield (10.44 ton/ha) and total chlorophyll (7.01 mg/100 g fresh weight). In addition there is significant increase in oil yield to (53.72 kg/ha) as compared non-fertilized which gave the least vegetative parameters and less oil yield (46.71 kg/ha). The conclusion of this experiment is that using nitrogenous and phosphate fertilizers together have improved the vegetative growth, oil yield of the local mint plant.

Key words: Mint, Phosphate fertilizers, Vegetative growth.

Introduction

After two centuries of continuous decline in the use of herbal medicines, Interest in them started again. Medicinal herbs, which were the final form of medicine in developing countries, have become used again in the developed world where people do their utmost to stay recuperating in challenging environmental pollution. And resort to consulting herbal medical specialist trainees (herbalists). Started widely used medicinal herbs that were used by parents and grandparents. Herbal drug sales rose in Europe and went to 10% in England and 35% in Spain (Hovalier, 2005).

Mint plants are medicinal plants used by the task since the old time, as dried leaves are found in the Pyramids of Egypt (3000 BC).

The Municipal mint (*Mentha spicata* L.)is one of the important species of Labiatae family in Iraq. The crop is used as necessary medical sedative of nerves, and useful in the treatment of asthma, bronchitis used to treat intestinal disorders and infectious live and renal colic and to prepare toothpaste (Hussein, 1981). Mint Included in the industry of perfume, soap and some food products such as sweets and biscuits (Abu Zeid, 1992).

Mint is a green plant with a particular smell aromatic, perennial, with height of 30-155 cm. The green leaves is picked and dried in the shade, crushed, sifted and used until needed. The leaves contain aromatic oil with Menthol. Mint is used in salads to open appetite. Syrup made from mint has a good taste. The powdered dried mint is added to certain foods to exceed the flavor and alleviate the impact of acidity (Abu Zeid, 1992).

Because of the importance of high medical mint and for the purpose of improving the growth of vegetation

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and increased the sum of aromatic oils its necessary to use many agricultural operations, including the fertilization, which help to increase the sum and improve the quality and affect the growth of different genus of Mentha. Also the aromatic mint needs to mineral fertilization during long periods of growth. Nitrogen fertilization leads to increase vegetation growth and content of the oil of pepper mint (Abu Zeid, 1992).

Studies show that nitrogen fertilization effects increasing the growth and the vegetation yield of mint. Shrubis(1964) shows that the quantity of oil had increased as a result of nitrogen and phosphate fertilization. Jaskonis (1967) was found that the harvest of dry matter for the growth of vegetation has increased at the composting plant with nitrogenous and phosphate fertilizers together by 21%. Duhan, et al (1975) was found that the green yield of Japanese mint (*Mentha arvensis* L.)has increased significantly by increasing the amount of nitrogen fertilizer up to 90 kg N / ha with significantly increasing in oil production by increased levels of fertilization of 26.3, 57.6, 86.3% of nitrogen fertilizer levels 30, 60, 90 kg N / Ha respectively +.

As also it's founded that Japanese mint (*Mentha arvesnsi* L.) has responded to the level of nitrogen fertilization of (75 kg N / ha) and gave significant increase in green production by (7%) compared with treatment of(50 kg N / ha) (Khera and others, 1986). Chang and others 1987, found that the addition of nitrogen fertilizer for the two types of mint led to increased growth representative (at the plant and the number of branches), dry matter and oil. Praszna (1992) noted that the nitrogen added to the pepper mint led to a rise in plant and increase the length of leaves seven times, and the green yield six-fold compared with no addition.

Ihsan (1999) shows that increasing levels of nitrogen fertilization from 0 to 150 kg N / ha led to an increase in the quantity of dry matter and the quantity of oil. since fertilization at 150 kg N / ha increased oil to 55.64 in the local mint plants (*Mentha spicata* L.). Munsi (2002) explained that fertilization with 100 kg N / ha and 60 kg P2O5 / ha increased growth and green yield of Japanese mint (*Mentha arvensis* L.).

Based on the foregoing, and lack of papers in Iraq of studies dealing with the impact of chemical fertilizers and their effect on vegetation growth and oil quantity of the local mint grown in Iraq, this study was done to demonstrate the impact of nitrogen and phosphate fertilization on the growth and oil quantity of the local mint (*Mentha spicata* L.).

Materials and methods

Experiment was conducted in private farm in the province of Najaf - Iraq, The land was tilled, adjusted, settled and divided into 12 panels (1 × 1.2 m^2) contains three lines with 30CM between them. Local mint was planted on 20/11/2005. Seven plants were planted in each line at distance of 15CM between plants.

Phosphate fertilizer was added as a single dose before planting when preparing the land in the form of triple superphosphate (46% P2O5) (150 kg P2O5 / ha), while nitrogen fertilizer has been added as a dose of 100 kg N / ha in the form of urea fertilizer (46% N) after two weeks of planting. All operations were conducted; service ,irrigation, controlling diseases and insects at all experimental units and whenever the need arises for them (Kutub, 1961).

Experience carried out indiscriminate and complete design a simple experiment with a single factor (different types of fertilizers in four levels; the first is nitrogen fertilization of (100 kg N / ha)(the symbol is F1), the second is phosphate fertilization (150 kg P2O5 / ha) (its symbol is F2) and the third is both types of fertilizers in the same doses mentioned previously,(the symbol is F3). The plants without fertilization (control) (F0). The averages were compared by the test of less significant difference at level of 5% (Alrawy and Khalafalla, 1980).

Five plants from the middle of median row has been tested from each experimental unit for measuring the rise of plants, number of leaves, number of ramifications, the vegetation yield, the quantity of dry matter for the unity of the area and the total chlorophyll of the fifth leaf from the top of the plants. Chlorophyll was extracted by acetone 85% .Then estimated using (Spectrophotometer) on Wavelength 663, 645 (Ranganna, 1977).

The essential oil was distilled from the leaves of mint using steam distillation, as described in the British Pharmacopoeia (British Pharma Copoeia, 1958).

Results and discussion

Table (1) shows that fertilization by phosphate or nitrogenous fertilizers has increased significantly the high of plant, number of leaves and ramifications, vegetation yield, the sum of dry matter and the total content of chlorophyll compared with other plants (control), which gave less indicators.

While there are no significant differences between the treatment of nitrogen fertilization and Phosphates in the vegetation yield, the sum of dry matter and content of chlorophyll.

But there is significant difference in the number of branches at phosphate fertilizer (8.13 branch / leaf)

compared with nitrogenous fertilizer (6.32 branch / leaf). The reason is that the element phosphorus is one of the essential elements for plants and works to give strength to grow and increase in the number of ramifications in the plant (Abu Dahi and Alyunis, 1988).

Both Praszna (1992) on the pepper mint and Ahsan (1999) on the local mint found that nitrogen fertilization increased the high of plants and green yield, as well as Chang (1987) who founds that an increase in nitrogen fertilization caused increasing of dry matter in two types of mint.

Fertilization with each of nitrogenous and phosphate fertilizers has increased significantly the sum of aromatic oil compared with the control plants.(Table 1).

Fertilization with (100 kg N / ha + 150 kg P2O5 / ha) increased significantly the high of plant to (64.26 cm), number of leaves to (100.62), branches to(8.36 branch in plant), vegetation yield to (10.44 tons), The sum of dry matter to(1.22 tones / ha)and of total chlorophyll to (7.01 mg / 100 gm soft material) compared with control plants high(31.13 cm), number of leaves (70.61 leaf), number of branches (5.03 Branch), green yield (7.22 tones / ha), sum of dry matter (0.64 tons / ha total chlorophyll(5.23 mg / 100 gm soft material).

This improvement of vegetation growth may be due to the element of nitrogen which involved in many biological processes inside the plant, including photosynthesis and encourages vegetation growth so increase the growth of plant, elongate, enlarge and brighten leaves, (Abu Dahi and Alyunis , 1988). High rate of plant growth can be achieved only when sufficient quantities of nitrogen are ready (Mengel, 1972, Hehl)

In addition phosphorus is important component which stimulates the photosynthesis and enters into the composition of rich energy compounds and strengthens roots of the plant (Abu Dahi, and Alyunis, 1988).This leads finally to increase vegetation growth and chlorophyll content of the leaves. This is similar to what Jaskonis (1967) found that the dry matter and the number of leaves and branches increased when composting plant nitrogen and phosphate fertilizer.

Aromatic oil increased significantly in composted plants by nitrogenous fertilizers with phosphate reached 53.72 kg / ha compared with control plants without fertilizer. Which gave less sum of oil (46.71 kg / ha) (Table 1). The increase in the amount of oil is due to increase of dry matter as a result to increased vegetation growth (Table 1). This was confirmed by Shrubis (1964) that the quantity of oil increased as a result of nitrogenous and phosphate fertilizers together.

Inferred from this experiment that fertilization with mixture of nitrogenous and phosphate fertilizers improved both vegetation growth and aromatic oil of mint plant.

Table 1: Effect of nitrogen and phosphate fertilization in vegetation growth and aromatic oil of local mint plant

Aromatic oil (kg/ha)	Total chlorophyll in leaves (mg/100g dry matter)	Dry matter (kg/ha)	vegetative yield (ton/ha)	No of branches (branch/plant)	No. of leaves (leaf/plant)	Planthigh (cm)	treatments
46.71	5.23	0.64	7.22	5.03	70.61	31.13	(control)F_0
50.22	6.91	1.15	9.86	6.32	90.41	59.58	F_1 (100 kg N/ha)
51.91	6.43	1.03	9.71	8.13	81.01	50.78	F_2 (150 kg P_2O_5/ ha)
53.72	7.01	1.22	10.44	8.36	100.62	62.26	F3 (100 kg N/ha) + (150 kg P_2O_5/ ha)
2.92	0.63	0.19	1.93	1.12	8.65	5.76	L.S. D

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