

The effect of magnesium on fresh weight, dry weight and potassium and calcium rate on *Mentha saiva* L

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ABSTRACT: In this study, the effect of magnesium were evaluated on menthe saiva L. Therefore, 80 pots were selected and the magnesium treatment at 0, 20, 40, 60 mg/kg level of soil, from the source of magnesium oxide added to the soil. To providing and also to boost nutrient the amount of 100 mg nitrogen, 80 mg phosphorous and potassium per 1kg soil ordinary ammonium nitrate, super phosphate triple and potassium sulfate were added. Measured various included: fresh and dry weight and weight and potassium and calcium rate in every stage were measured. According to obtained results could describe such that using the treatments of 40 gr level of magnesium were shown the better effects than other treatments in often measured parameters of menthe saiva L.

Keywords: menthe, magnesium, fresh and dry weight.

INTRODUCTION

Mint by science name (*menthe saiva* L) is the lamiaceae plant. it is a perennial herbaceous plant (Splittstoesser, 1990; Janick, 1989). Menthe grows well in all regions of the world that have cold and temperate climate, but very cold climate is not suitable for this plant (Daneshvar, 2010). Mint vegetative period prolonged about 80 to 100 days. At first, the plants were grew slowly, while during 2 to 3 weeks were speeded. The undergrounding plant organs are superficial and the obtained branches were scattered to around. Flowers come into existence early summer (July). After the first harvest, if the climate conditions are suitable, plants will be blossom (flower) again (Omid Beygi, 2011). Successful production of plants is required to existence of enough and usable amount of plant nutrient. Not only nutrient must be as a compound that the plant must be easy to use, the balance between amounts of them is so important (Tandon, 2010). Magnesium is the only existence metallic element in chlorophyll and it is introduced as the central core of chlorophyll manufacturer.

Thus magnesium was involved in metabolism and photosynthesis indirectly. Magnesium was also involved in enzymes activity of plants and it was activated the phosphorus carriers which are effective on attracting other elements. Magnesium with participating in citric acid cycle as a mint metabolism cycle was involved in plant's respiration (Karim Zadeh, 2009). This element means magnesium was caused to uptake phosphorus in menthe. And also the production of hydrocarbons and carbohydrates is effective. Yellowness between veins is the symptoms of magnesium deficiency in menthe. And at first these symptoms were observed in the old leaves and leaves start to fall out, in case of severe deficiency (Rahdari, 2011). Magnesium deficiency was also caused to reduce the chlorophyll rates and photosynthesis. Due to metabolic activity reduction of mint, vegetated growth and the plant yield was reduced too (Karim Zadeh, 2009). In one study was evaluated the effect of mineral nutrient deficiency means (nitrogen, phosphorous, potassium, magnesium and calcium) on rates of fresh and dry weight, root and shoot length, RWC (relative water content of fenugreek (*Trigonella foenum graecum*)). The results were shown that magnesium deficiency led to increase the root and shoot dry weight, root and shoot fresh weight, root and shoot length and the RWC that increase was significant in 5% of statistical level (Rahdari, 2011). In another study were evaluated the percentage and yield of essential oils of basil (*Ocimum basilicum* L) by the effect of nitrogen, magnesium and

manganese usage. Results were shown that the highest percentage of essential oil and its yield was obtained by the effect of the dual interaction consumption 150 kg of per hectare nitrogen, the magnesium foliar by the half kg of per hectare rates (pazaki, 2011).

MATERIALS AND METHODS

In this study the effect of magnesium on menthe saiva L was evaluated. To this purpose 80pot were selected and the magnesium treatment at 0, 20, 40, 60 mg/kg level of the soil from the source of magnesium oxide added to the soil. To providing and also to boost nutrient the amount of 100 mg nitrogen, 80 mg phosphorous and potassium per 1kg soil ordinary ammonium nitrate, super phosphate triple and potassium sulfate were added. In during the period of plants growth was tried to keep pots moisture at field capacity. 45 days after greening the menthe, the first harvesting was done and 45 days after the first harvesting the second one was done (Planting in June 20th, first harvesting in July 3rd, second harvest in September 18th). Measured parameters included: fresh and dry weight at every stage and calcium and potassium rates in menthe.

RESULTS AND DISCUSSION

Results

Fresh weight of menthe

The mean comparison of data with Duncan's test was shown in level 5 that the highest fresh weight of menthe was observed in 40 mg treatment of magnesium with 43.35% gr mean and the lowest fresh weight of menthe in control treatment with 34.82% gr mean. In this relationship was observed significant difference between control treatment and other applied treatment (table 1).

Table 1. the comparison of different levels of magnesium effect on fresh weight of menthe

Mg (mg/kg/soil)	Control	20	40	60
Fresh weight (gr)	34.82 ^b	40.41 ^a	43.35 ^a	41.44 ^a

*The means with at least common letter, have not significant difference ($P \leq 0.05$) Duncan's test.

Dry weight of menthe

The mean comparison of data with Duncan's test was shown in level 5 that the highest dry weight of menthe was observed in 40 mg treatment of magnesium with 6.01% gr mean and the lowest dry weight of menthe in control treatment with 4.88% gr mean. In this relationship was observed significant difference between control treatment and other applied treatment (table 2).

Table 2. the comparison of different levels of magnesium effect on dry weight of menthe

Mg (mg/kg/soil)	Control	20	40	60
Dry weight (gr)	4.88 ^b	5.75 ^a	6.01 ^a	5.56 ^a

*The means with atleast common letter, have not significant difference ($P \leq 0.05$) Duncan's test.

Potassium rate

The mean comparison of data with Duncan's test was shown in level 5 that the highest potassium rate of menthe was observed in 40 mg treatment of magnesium with 1.36% gr mean of dry material and the lowest potassium rate of menthe in control treatment with 0.82% gr mean of dry material. In this relationship was observed significant difference between all applied treatments of magnesium (table 3).

Table 3. the comparison of different levels of magnesium effect on potassium rate of menthe

Mg (mg/kg/soil)	Control	20	40	60
Potassium rate (percent)	0.82 ^d	1.06 ^c	1.36 ^a	1.16 ^b

*The means with atleast common letter, have not significant difference ($P \leq 0.05$) Duncan's test.

Calcium rate

The mean comparison of data with Duncan's test was shown in level 5 that the highest potassium rate of menthe was observed in 20 mg treatment of magnesium with 1.29% gr mean of dry material and the lowest potassium rate of menthe in control treatment with 0.85% gr mean of dry material. In this relationship was observed significant difference on calcium rate of menthe between all applied treatments of magnesium (table 4).

Table 4. the comparison of different levels of magnesium effect on calcium rate of menthe

Mg (mg/kg/soil)	Control	20	40	60
calcium rate (percent)	0.85 ^d	1.29 ^a	1.23 ^b	0.90 ^c

*The means with atleast common letter, have not significant difference ($P \leq 0.05$) Duncan's test.

Conclusion and discuss

The results were suggested that magnesium was so effective to improve growth parameters (fresh and dry weight of menthe) and also to increase potassium and calcium rate of menthe and use of this element(magnesium) could be provide increasing the yield and also mineral nutrient (calcium and potassium) of menthe. Also in this study, the magnesium treatment of 40 mg/kg was shown better results than other treatments often in evaluated parameters.

Suggestions

1. Using of magnesium in the amount of 40 mg/kg of soil to improve growth parameter of menthe
2. Further research on this issue with different concentrations by researchers
3. Further research on this issue on other plants

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