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ORIGINAL ARTICLE

Effects of Vermicompost and Magnetic Water on mineral nutrition of *Ocimum basilicum*

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ABSTRACT
One of these efforts recent is the usage of magnetic water and vermicompost for the increase of nutrition plants. This research work is a study on the effects of magnetic water and vermicompost that has been done in laboratory complexes martyr Ahmadi Roshan Islamic Azad University of Marand, Iran. Vermicompost at 5%, 15% and 30% of the pot with sand mixed. To apply sprinkling after planting Violet basil in pots, sprinkling with three levels of normal water, Magnetic Water 1000 Tesla and Magnetic Water 2000 Tesla was performed every two days for 4 months. To create the magnetic field of device magnetic was fixed with magnets. During the evaluations conducted and the results of the this research, about nutrition plant showed that the amount of Mg stem only the effects of magnetic water and vermicompost as in probability level of 1% and 5% is significant and in the Mg root only the effects of magnetic water and vermicompost in probability level of 5% is significant and in the K stem, K root and P stem only the effects of magnetic water and vermicompost in probability level of 1% is significant also in the K stem and P stem interaction in probability level of 1% is significant and in the P root main effect of the use vermicompost in probability level of 1% is significant.
Keywords: *Magnetic Water, Nutrition plant, Violet basil, Vermicompost.*

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INTRODUCTION

Water which is destined for consumption has to be treated and purified. Transportation of water to the plants is done by underground metal pipes. The water loses its magnetic charge by the presence of the metallic lining of the pipes and when it is purified and comes out of the tap it is no longer magnetized [1, 2]. It is highly important to know how magnet affects water. Charan [3] has reported that, a plant's metabolism contains 90to 95%of water which is a diamagnetic compound and the rest contains several para, ferro and diamagnetic metals and non-metals in minute forms. The characteristic feature of a variable magnetic field is caused by the change of the position of magnetic poles in a unit of time. The change of pole position may result from the use of rotating magnets [4]. Magnetized water treatment increases plant metabolism in terms of photosynthesis and water uptake [4]. The water treated by pass during a magnetic device called magnetized water. The effects of magnetic fields on running water have been observed for years. This technology was used mainly in countries which have very little chemical industry, like Russia, China, Poland and Bulgaria, who all reported the successful use of magnets in treating water for irrigation, industry and home use. Till 1980, a little were known about how the magnetic field can stimulate plant growth or even prevent [5]. Recent years, there has been a rapid increase in the use of technologies employing magnetic water. The magnetized water is made by ordinary water which is allowed to get through the magnetic field of certain intensity with a certain flow rate, along with a direction perpendicular to the magnetic field lines. The physical and chemical properties of magnetized water have a series of changes which lead to special functions [6]. The studies of Danilov et al., [7] showed that the use of magnetic water increase the numbers of fruits in plant such as cheery and tomato. The researcher works shows that the usage magnetic water and zeolite was

increased the production yields of *Lepidium sativum* L. Ahmed [8] reported that improvement in tomato plant growth parameters which reflected in yield per plant was increased until the treatment of 6000 ppm magnetic water. Also he found that significant increase in plant growth, some chemical contents, fresh and dry weights of plant occurred compared to control. Chaves and Oliveira [9] and Ayars et al.,[1] suggested that WUE is a mechanism underlying plant resilience to water deficits prospects for water-saving agriculture.

MATERIALS AND METHODS

In this study vermicompost used were obtained from a workshop production of organic fertilizer. Washed sand to the amount of 60 kg was prepared. After air drying the washed sand sieve (2 mm) sieves and placed in a cotton Sack and for sterilizing with temperature was 121 °C and atmospheric pressure Was autoclaved. Seed Violet basil Qaramalek Tabriz was prepared. The seeds disinfected with acid chloride 0.5 percent and in plastic pots containing a mixture of vermicompost and sand washed, were grown in controlled conditions. In this study, two major factors, vermicompost and water magnetic with three replications. Treatments for vermicompost, vermicompost at 5%, 15% and 30% of the pot with sand mixed. To apply sprinkling after planting Violet basil in pots, sprinkling with three levels of normal water, Magnetic Water 1000 Tesla and Magnetic Water 2000 Tesla was performed every two days for 4 months. To create the magnetic field of device magnetic was fixed with magnets. The water sample was passed through a magnetic field created and watering the plants done. Regulation of lighting conditions and sprinkling was done every two days. Plant samples were manually harvested and each sample separately in bags labeled specifying their desired treatments assigned and to measure the specifications were transferred to the laboratory. Characteristics of plant nutrition, including K, Mg And P were measured. Specifications measured using the software SPSS was analyzed.

RESULTS

Mg concentration in shoot

Analysis of variance showed that the effect of magnetic water and vermicompost as in probability level of 1% and 5% is a significant amount of Mg stem (Table 1). Comparison of the average showed that level of magnetic water the highest amount of Mg Stem is from the use of tap water with water use 1000 tesla there is a significant differences but with the water consumption 2000 tesla at the level of 1% not show significant differences (Figure 1). Comparison of the mean of vermicompost showed that with the increasing use, the amount of Mg Stem process of increase and between the use of 30% vermicompost to use 5% there is a significant difference (Figure 2).

Mg concentration in root

The analysis of variance indicated that the only effect of magnetic water and vermicompost in probability level of 5% the amount of Mg root is significant (Table 1). The comparison average Magnetic Water effects showed that least amount of Mg root of water use is 1000 tesla (Figure 3). The comparison average vermicompost showed that the highest the amount of Mg root there is in consumption 15% vermicompost and with the consumption of 5% there is significant differences (Figure 4).

K concentration in stem

The analysis of variance indicated that the only effect of magnetic water and vermicompost in probability level of 1% the amount of K stem is significant (Table 1). Comparing the average level of magnetic water showed that with increasing magnetic water amount of K stem is a decreasing trend so that the least The amount of K stem of irrigation water allocation 2000 tesla it was observed a significant difference with normal water (Figure 5). The comparison average vermicompost showed that the highest the amount of K stem there is in consumption 15% vermicompost (Figure 6).

K concentration in root

The analysis of variance indicated that the only effect of magnetic water and vermicompost in probability level of 1% the amount of K root is significant (Table 1). The comparison average Magnetic Water effects showed that highest amount of K of water use is 1000 tesla that with the consumption of normal water significant differences in the 1% Shows and approximately 100% has increased but with increasing magnetic intensity the amount of K root is significantly reduced (Figure 7). by comparing average levels vermicompost was determined that the use 5% vermicompost in the first group is located, the lowest amount of K in consumption 15% vermicompost It was observed (Figure 8). Analysis of variance revealed that the interaction in probability level of 1% significant effect on amount of K is rooted (Table 1). The comparison showed that the water 1000 tesla and 5% vermicompost is the highest K root. The lowest amount of K root also in water consumption 2000 tesla and 15% vermicompost it was observed (Figure 9).

P concentration in stem

The analysis of variance indicated that the only effect of magnetic water and vermicompost in probability level of 1% the amount of P stem is significant (Table 1). The comparison average Magnetic Water effects showed that highest amount of P of water use is 1000 tesla that with the consumption of normal water significant differences in the 1% Shows (Figure 10). by comparing average levels of vermicompost was determined with the increasing consumption vermicompost, amount of P stem descending so that the consumption 30% vermicompost has been the lowest amount of P stem (Figure 11). Analysis of variance revealed that the interaction in probability level of 1% is a significant effect on amounts of P stem (Table 1). The comparison showed that the water 1000 tesla and 5% vermicompost is the highest P stem. The lowest amount of P stem also in water consumption 2000 tesla and 15% vermicompost it was observed (Figure 12).

P concentration in root

The analysis of variance indicated that the only effect of vermicompost in probability level of 1% the amount of P root is significant (Table 1). The comparison average levels of vermicompost showed that maximum amount of P root of consumption 5% is vermicompost and by increasing the amount of vermicompost amounts of P root is a process relatively reduced (Figure 13).

Table 1.ANOVA of the effects of treatments on plant nutrition

Source	df	F Values					
		Mg stem	Mg root	K stem	K root	P stem	P root
Repeat	2	1.6 n.s	1.2 n.s	2.52 n.s	0.65 n.s	1.18 n.s	0.25 n.s
Magnetic Water	2	6.5**	3.9 *	11.5 **	51.7**	28.9**	2.33 n.s
Vermicompost	2	5.0 *	8.72*	12.91**	79.25 **	18.28 **	27.58**
Water × Vermicompost	4	2.9 n.s	2.3 n.s	1.19 n.s	27.62**	16.65**	3.25 n.s

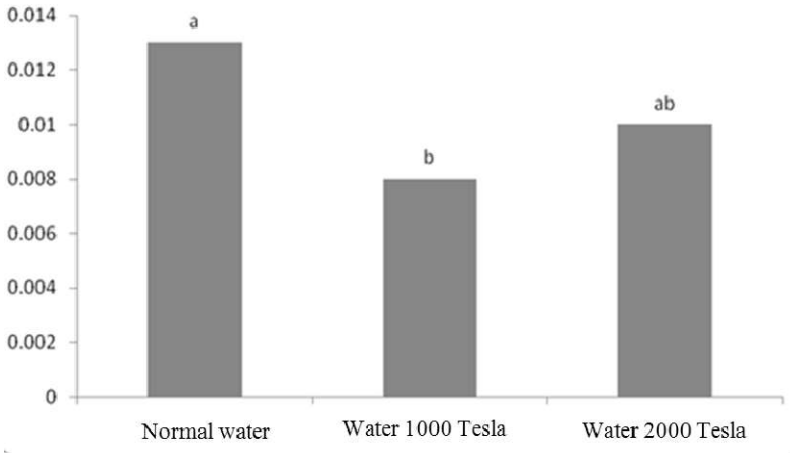

Fig.1. Mean comparison of the effects of magnetic water on the Mg stem in shoot

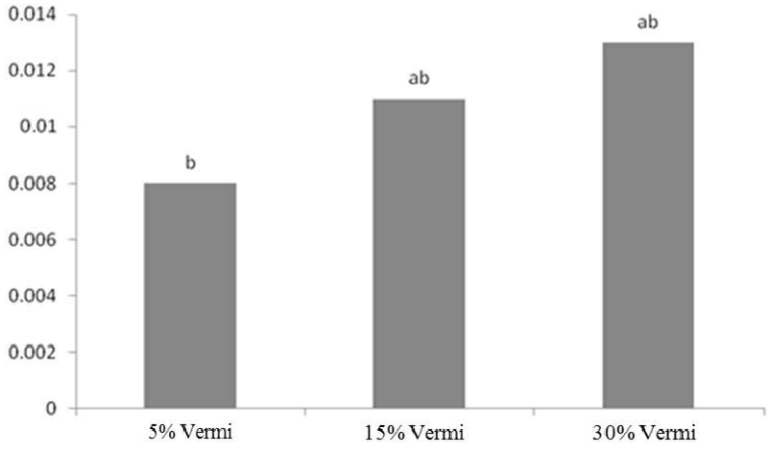

Fig.2. Mean comparison of the effects of vermicompost on the amount of Mg in shoot

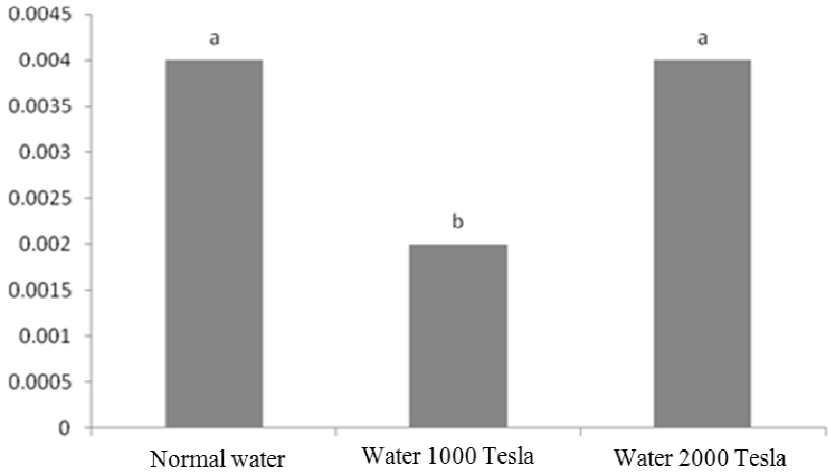

Fig.3. Mean comparison of the effects of magnetic water on the Mg in root

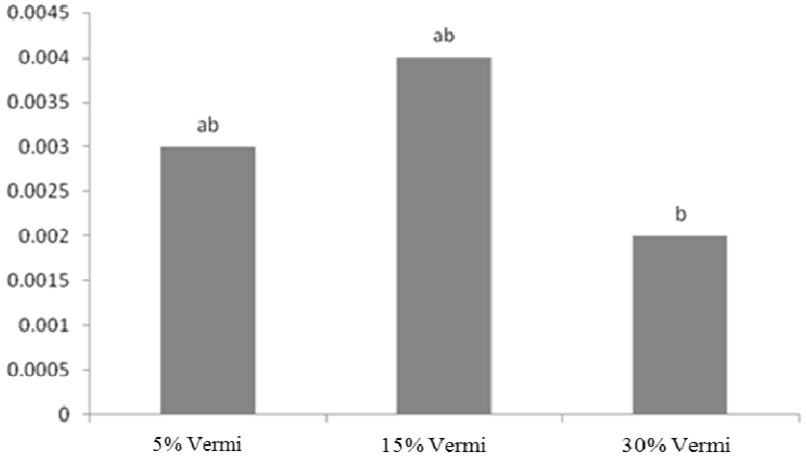

Fig.4. Mean comparison of the effects of vermicompost on the amount of Mg in root

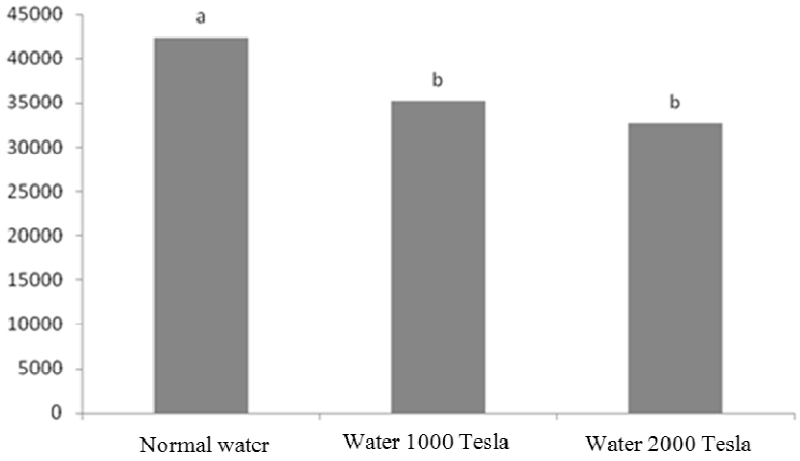

Fig.5. Mean comparison of the effects of magnetic water on the K in stem

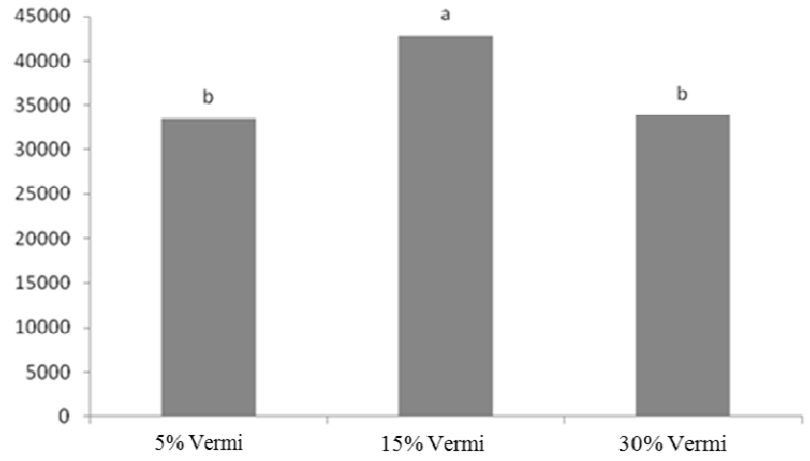

Fig.6. Mean comparison of the effects of vermicompost on the amount of K in stem

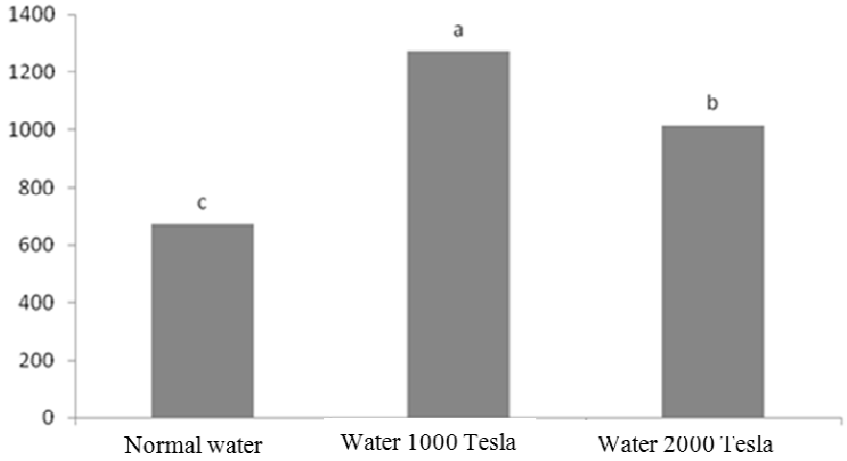

Fig.7. Mean comparison of the effects of magnetic water on the K in root

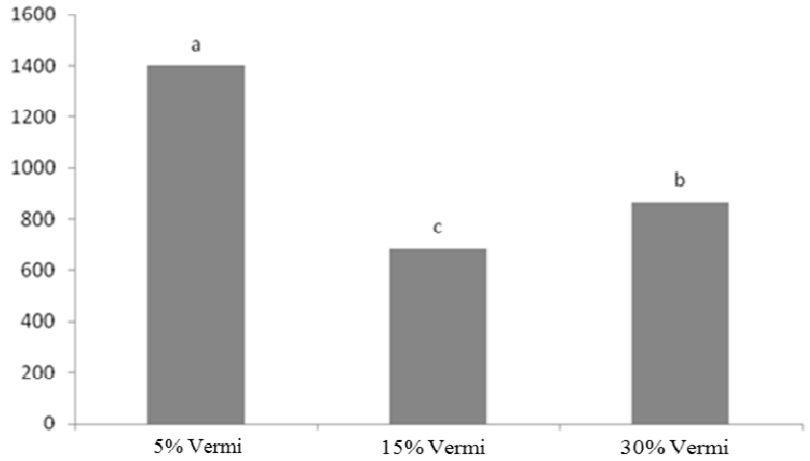

Fig.8. Mean comparison of the effects of vermicompost on the amount of K in root

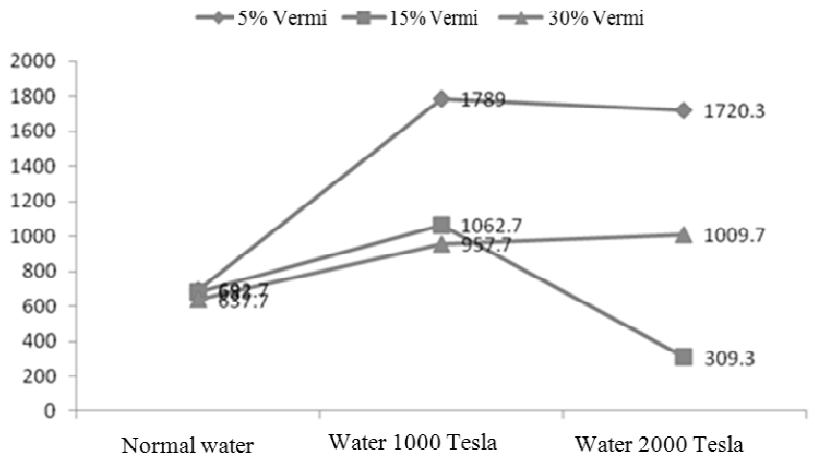

Fig.9.Mean comparison of the effect of Magnetic Water and vermicompost on the amount of K in root

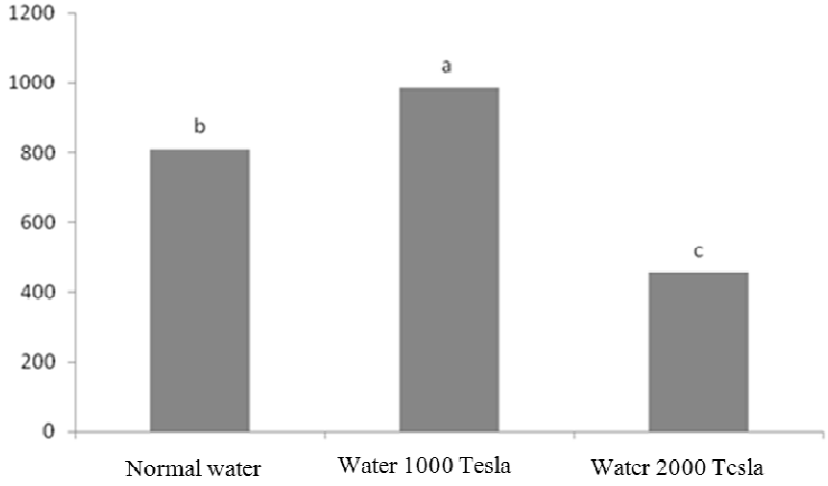

Fig.10. Mean comparison of the effects of magnetic water on the P in stem

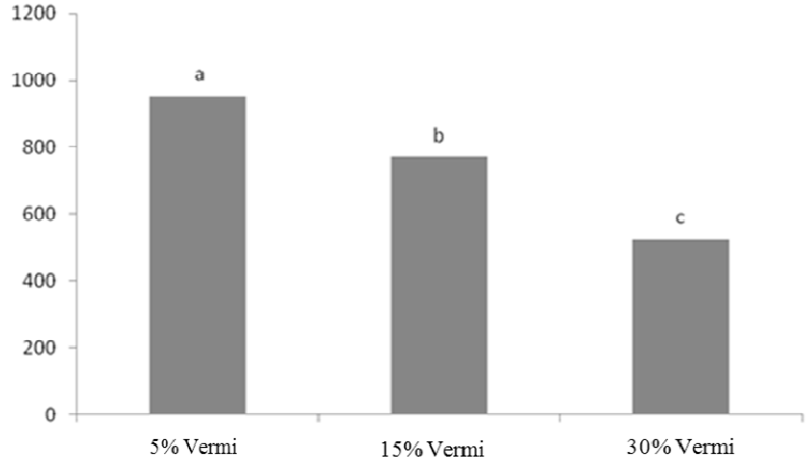

Fig.11.Mean comparison of the effects of vermicompost on the amount of P in stem

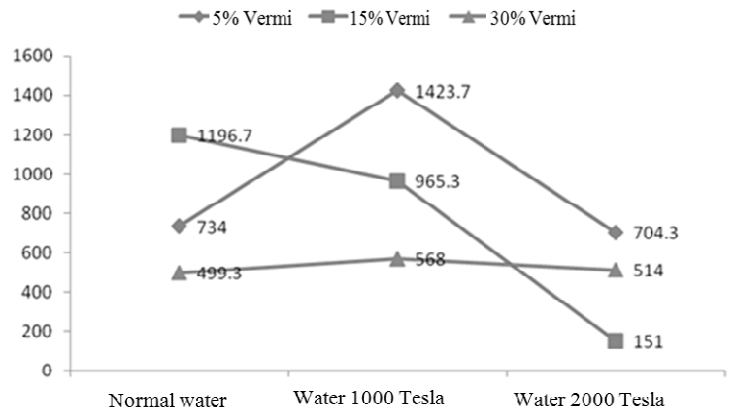

Fig.12.Mean comparison interaction Magnetic Water and vermicompost on the amount of P in stem

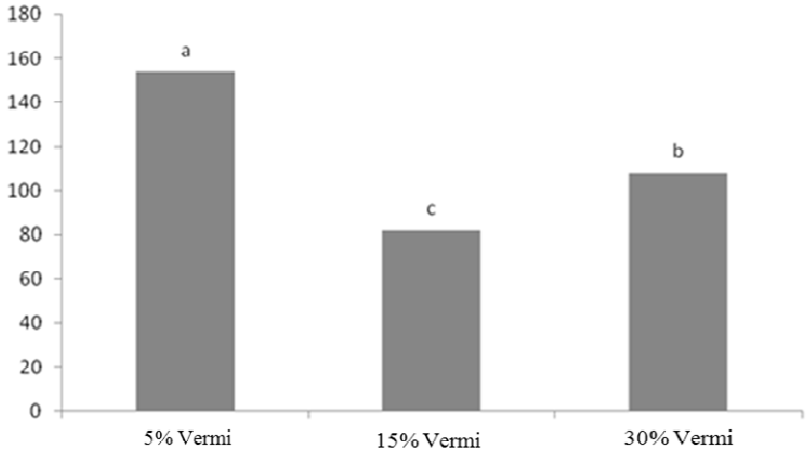

Fig.13. Mean comparison the effects of vermicompost on the amount of P in root

DISCUSSION AND CONCLUSIONS

During the evaluations conducted and the results of the this research, about nutrition plant showed that the amount of Mg stem only the effects of magnetic water and vermicompost as in probability level of 1% and 5% is significant and in the Mg root only the effects of magnetic water and vermicompost in probability level of 5% is significant and in the K stem, K root and P stem only the effects of magnetic water and vermicompost in probability level of 1% is significant also in the K stem and P stem interaction in probability level of 1% is significant and in the P root main effect of the use vermicompost in probability level of 1% is significant. The studies of Danilov et al., [7] showed that the use of magnetic water increase the numbers of fruits in plant such as cheery and tomato. The researcher works shows that the usage magnetic water and zeolite was increased the production yields of Lepidium Sativum L.

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