



Effect of Bio-fertilizers and Manure Fertilizer on Properties Agronomy of Lemon Balm (*Mellisa officinalis*)

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ABSTRACT: In order to study the effects of organic fertilizers and biological growth characteristics, and quantitative and qualitative performance lemon balm herbs factorial experiment in a randomized complete block design with 12 treatments and 3 replications has done in the 2015 crop year in Mahmud Abad city in the Mazandaran province. The first factor in the 3 levels of use of sheep manure at 5 and 10 tonnes per hectare and control, the second factor at four levels of bacteria *Azotobacter* and *Bacillus* respectively from the strains (chrococcum and pobilis), combining bacteria and consumption respectively.

The results showed that the use of biological fertilizers and manure fertilizers to plant height, canopy size, number of tillers, leaf length, total dry matter than the control treatment and the most effective combination of sheep manure and bacteria to increase yield were studied. Sheep manure and bacteria interactions revealed that the highest elevation in the treatment of bacteria with an average consumption of 10 tons and the combination of the average 95 cm and the lowest average 50/52 cm in the treatment of non-use of sheep manure and bacteria, respectively. Using a combination of bio-fertilizer and animal treatment, leads to an increase of 55 percent compared to other control, that is total dry matter of the plant.

Keywords: sheep manure, bacteria growth, yield components, lemon balm

INTRODUCTION

The use of organic fertilizers and feed microorganisms of these substances, leading to the rapid proliferation and increase of organic matter decomposition process to accelerate (Yan and Zhou, 2002). Accelerate the decomposition of organic matter, to speed up the release of minerals for plants and soil system and The plants absorb these substances, to improve growth and better performance is achieved. The best alternative to chemical fertilizers and animal manure can have significant effects in improving soil physical and chemical properties and further increase soil organic matter, improve soil structure and microbial activity are followed (Tohidlou, 2001). The use of organic and chemical fertilizers to improve productivity and increase the yield and quality of tomato plants as well as increased storage properties (Ghorbani, *et al.*, 2008). Jowkar *et al* (2013) demonstrated the use of synthetic fertilizers and biological treatments have significant effects on height, number of branches, canopy size and weight of the herb coriander is dry. The maximum height (55 cm) in combination with bacterial manure was *Azospirillum* and highest canopy (18/23 cm) in

combined treatment *Azospirillum* manure with bacteria that control the difference is around 40 per cent.

The Koochaki and colleagues (2007) found that 15,10,5 amounts of manure per hectare increased yield relative to control plants in the herb plantain. Tavakoli Dynany (2009) showed that inoculation with biological phosphate fertilizer on yield and quality of two varieties of medicinal plants are on plant height, weight of shoot and root length, number of seeds per plant, biological yield was significant. Darzi *et al* (2006) investigated the use of bio-fertilizers, bio-fertilizers on the performance of fennel showed that treatments involving inoculation with Micoriza, biological phosphate fertilizer and the use of vermicompost are significant compared to controls. In addition, biological fertilizer to increase the number of branches per plant. saeednejad *et al* (2010) also medicinal plant height cumin on vermicompost treatment than other organic fertilizers. In a study conducted by Khoramdel *et al* (2008) study the effects of mycorrhiza fungi *Azospirillum* and *Azetobacter sativa* found to lead to increased use of bio-fertilizers, plant height, leaf area index, dry matter accumulation and crop growth rate compared to the control and the combined mycorrhiza and *Azospirillum* had the greatest impact on increasing traits.

MATERIALS AND METHODS

This study factorial experiment in randomized complete block design with three replications in citrus trees in the city Mahmoud Abad 32° 36' minutes latitude longitude 18° 52' minutes and with a

height of 11 meters above sea level in years crop was 93. Biological and *Bacillus* bacteria used *Azotobacter* strains respectively (chrococum and pobilis) respectively.

Table 1: Soil physicochemical properties of the project.

Soil	Sand	Silt	Clay	EC (ds/m)	PH	(ppm) K	(ppm)P	(%) N	Soil sampling depth
S.C.L.L	42	18	22	0.24	7.21	225.62	10.85	0.16	(0-30)

In order to determine the physical and chemical properties of a sample from zero to 30 cm depth were collected (Table 1). Based fertilizers needed 75 kg /h(NPK) before the final stage of preparation was to farm. For the treatment of bacterial, plant roots *Mellisa officinalis* after washing with water at planting for 8 hours in the liquid than transplanting were inoculated (Darzi *et al.*, 2011). In parts of 40 cm between rows and between plants according to plant density 50 cm and 60 cm distance between the parts were in order. Some traits such as plant height, canopy size, number of tillers, leaf length, total dry matter, respectively. To measure the characteristics of the six plants per plot after removing the margins of the text was carefully removed from the soil, number of tillers and leaf length and to determine the dry matter of the plant stem segments weighing oven for 48 hours at 72°C and the mean value obtained was used in the statistical analysis.

To analyze the results obtained from the Software SAS, SPSS and were used for comparison of LSD.

RESULTS AND DISCUSSION

A. Height

The results showed that bacteria and sheep manure treatment effect was significant at the 1% level, but the interaction between bacteria and sheep manure on plant height had no significant effect (Table 2). The interaction of sheep manure and bacteria showed the highest elevation in the treatment of bacteria with an average consumption of 10 tons and integration (cm) 95 and the lowest average (cm) 52.50 in the treatment of non-use of sheep manure and bacteria, respectively (Table 3). The use of bio-fertilizer with *Azotobacter* and *Azospirillum* in the *Salvia officinalis*, increase in plant height, fresh and dry matter of the plant parts that correspond with our findings (Youssef *et al.*, 2004).

Table 2: Analysis of variance measured.

Sources changes (s.o.v)	Degree of freedom	Height	Canopy	Tillers	Leaf length	Total dry weight
Block	2	4.42	62.03	2.98	0.29	164.54
Bacteria	3	711.74 **	654.76 **	102.72**	3.65 **	6092.39**
Sheep manure	2	930.88**	542.32 **	145.85**	5.25**	14394.47**
Sheep * Bacteria manure	6	21.28 n.s	56.14 n.s	12.66**	0.34 n.s	264.39 n.s
Error (cv)	22	46.71 9.17	42.40 9.17	1.64 11.31	0.47 12.91	451.39 11.16

B. Canopy

The results showed that the treatment effect of sheep manure on the surface of bacteria and by 1 percent as Canopy was significant But a significant effect of the interaction between bacteria and sheep manure as plants with no Canopy (Table 2).

Mean comparisons showed that sheep manure and bacteria and integrating the highest Canopy in the treatment of 10 people with an average consumption of bacteria 92.83(cm) and the lowest average 54.33(cm) in the treatment of non-use of sheep manure and bacteria (Table 3).

Kouchaki *et al.* (2008) results showed that the function of biological fertilizer to increase plant height and diameter, fresh and dry weight and performance is *Nigella sativa* oil. *Azotobacter* inoculation effect on growth characteristics and yield and dry matter in maize were analyzed, the results showed that inoculation with *Azotobacter* increased corn traits were compared to control (Biari *et al.*, 2007).

C. Tillers

Based on the results affect treatment and sheep manure bacteria and their interactions were significant at the 1% level by the interaction of sheep manure and bacteria (Table 3) showed that the highest number of tillers per treatment with an average of 10 tons and a combined consumption of bacteria (20.77) and the lowest average (3.793) in the treatment of non-use of sheep manure and bacteria, respectively.

Table 3: The interaction between manure and bacteria on the characteristics measured.

Sheep manure	Bacteria	Height (cm)	Canopy (cm)	Tillers (Count)	Leaf length (cm)	Total dry matter (gr)
	<i>Bacillus</i>	75.00 cdef	73.00 bcd	12.06 d	5.50abcd	193.5 cde
Tone 5	<i>Azotobacter</i>	77.66 bcde	70.66 bcde	14.66 c	5.50 abcd	190.1 cdef
	synthesis	82.16 bc	75.16 bc	17.00 b	5.91 ab	231.7 ab
	instance	65.66 f	61.00 ef	8.41 ef	4.50 d	175.7 def
Tone 10	<i>Bacillus</i>	79.00 bcd	78.20 b	11.55 d	5.80 abc	209.2 bcd
	<i>Azotobacter</i>	88.83 ab	79.66 b	12.08 d	6.16 a	218.0 bc
	synthesis	95.00 a	92.83 a	20.77 a	6.33 a	263.8 a
instance	instance	69.66 def	62.00 def	10.20 de	5.50 abcd	191.8 cdef
	<i>Bacillus</i>	66.66 ef	66.33 cde	8.51 ef	4.83 bcd	160.0 ef
	<i>Azotobacter</i>	69.50 def	66.40 cde	7.76 f	4.66 cd	157.0 f
	synthesis	73.00 cdef	72.33 bcd	9.26 ef	5.68 abc	177.8 cdef
	instance	52.50 g	54.33 f	3.79 g	3.33 e	115.7 g

D. Leaf length

Bacteria and sheep manure treatment effect was significant at the 1% level, but the interaction was not significant. Interaction of sheep manure and bacteria showed the highest leaf length and 10 tons of combined treatment with an average consumption of bacteria 6.33 (cm), and the lowest average 3.33(cm) treatment avoiding the use of sheep manure and bacteria, respectively. Numerous reports on various plants, such as mint, showed that nitrogen was significantly effective in vegetative growth and increase the serving of plant organs and increase green color (Jahangir *et al.*, 2008. 1999).

E. Total dry matter

According to the results of analysis of variance, bacteria and sheep manure treatment effect was significant at the 1% level, but their interactions were not significant. Table 4 interaction of sheep manure and bacteria showed the highest total dry weight of 10 tons and the combination treatment, with an average consumption of bacteria 263.8 (gr) and the lowest average 115.7(gr) in the treatment of non-use sheep manure and bacteria, respectively. The application of nitrogen fertilizer can affect the quality and quantity of dry basil, essential oil yield and affect plant height (Vysany *et al.*, 2012).

Similar results in relation to the positive impact of organic fertilizers on increasing the use of lemon balm herb plant dry weight of compost (Dallata, 2000) have been reported.

CONCLUSION

In the end, it can be concluded that using a larger amount of manure (10 tons) with integrated fertilizer biological *Azotobacter* and *Bacillus* can be higher performance achieved and also due to the increase in product quality, environmental protection and public health importance the use of livestock manure and bacteria is more appropriate.

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