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Comparison of the impact of bio-fertilizers on agronomic characteristics, livestock and medicinal *Salvia officinalis*

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ABSTRACT: In order to study the effect of stimulating the growth of bacteria and other fertilizer (PGPR) on yield and yield components of medicinal plant Salvia in the cloud for factorial in a randomized complete block design, with three replications in a garden of citrus trees with a height between 2014, 11 meters above sea level was carried out. The first factor in 3 levels include : manure 3 tons, 6 tons per hectare, the second factor control. 4 level include *: Azospirillum, Pseudomonas, Azospirillum and Pseudomonas* + control. The use of stimulus effect of bacteria fertilizer and other significant growth on increasing the length of root, leaf dry weight, shoot dry weight, shoot weight, root weight, air, has a number of tributaries. The interaction of the biological and organic fertilizer is also the root length and the number of branches except on a subsidiary of a significant positive impact on other traits was having. Based on the results of interaction most the length of the root and leaf dry weight and shoot weight, root weight, air organ were tributaries in combination of two bacteria associated with the application of fertilizer and the lowest amount of 6 tons of these attributes in the mode of not using manure and biological fertilizer was achieved without the use of it.

Keywords: Manure, bacteria growth, the number of tributaries, *Salvia officinalis*

INTRODUCTION

Sage *Salvia officinalis* medicinal plant with the scientific name of the family Lamiaceae perennial plant, shrub and a height of 20-90 cm lower part of the wood and the upper part of the stem, square and covered with hairs is palpable.. This plant is native to the Northern Mediterranean regions and are grown in soils of both sides. (Shahrokhi, 1996). The use of animal manures, soil organic matter increase in addition increases the activity of the microorganisms and thus substantially improve the soil structure and the biological activity also bolsters the dogma in the soil and to rotate the food better and one of the factors of influence on increasing the plant's product, the appropriate feed of hospitalization that are located. (Tohidi *et al*, 2009). Research done in the last few decades has shown that the consumption of cattle manure increases the amount of organic material was soil (Naghavi *et al*, 2005; Zamani Bob gohari and *et al*, 2010; Yousefi, *et al.*, 2007). The research showed that a combination of two bacteria *Azospirillum* and pseudomonas. compared to not using it increased 18 percent performance in the rice. The above results showed improved performance improvement in conditions of drought and nitrogen drying decreased under the influence of bacteria growth stimulant. (Niknejad and *et al*, 2012). On examination, the application of Bacillus plant Basil increase yield and yield components and essential oils of basil, and the amount of biomass plant will increase two-fold (Banchyv *et al.*, 2009). Also in other research on *Phyllanthus amarus* medicinal plant under field conditions was done, were identified that Application 12 tons of manure along with producer of nitrogen fixation bacteria in a species of *Azospirillum* sp name remarkable increased grain yield were compared with other treatments (Annamalai, 2004). Jokar and *et al* (2013) indicated by using a combination of the highest manure treatments on biological and medicinal herb plant height obtained by Hollyhock (*Althaea officinalis*) is fitted with a 60 % difference was control. Study on the process of with the development of the leaves were determined using a combination of the two had the effect of biological manure and in the development of the leaves have. In the trial to assess the effect of medicinal plants, manure was carried out on the effect of different levels of Fleawort (*Plantago psyllium*) manure fertilizer on yield of grain was improved but on plant height, number of spikes, 1000-seed weight and yield of straw and Stover had no effect between. (Tabrizi, 2004). The aim of this test, compare the impact of bio-fertilizers and crop Characteristics veterinary medicinal *Salvia officinalis*.

MATERIALS AND METHODS

This test is based on factorial completely randomized blocks design with three replications in the citrus trees with a height of 11 m above sea level with a length of 18° 32' North latitude and 36° 52 East in 93 tests. The bio-bacteria used are *Azospirillum* Ayraknzv and *Pseudomonas fluorescens*. To determine the physical and chemical properties of the soil, 0-30 cm depth of soil sample was prepared (Table 1). Applying base requires a 75 kg of k.P.N before the last stage of preparation was given to farm. In order to show inoculated with bacteria, transplanting ready, by preparing a separate solution with a concentration of cfu / ml107 for 12 hours. Transplanting on May 7, 2014 at the desired Plots with 30 × 40 was done. After the establishment of the plant, the weed appeared in few steps immediately to manually was disposed of. Been fitted size traits also include the length of the leaf dry weight, root dry weight, shoot weight, root weight, air organ, were a number of tributaries. To measure the desired plant traits, plot text 6 after removing the margin of accuracy was out. Then the limbs on the base of the plant is cut and then count the number of child branches, leaves and stalks separated and after weighing, in Avon for 48 hours to 72°C and its average weighting and again as the dry weight was in order. Detachable for ease of mud from the root, for 48 hours in a dish of water separately, and was then carefully rinse with water. After measuring the length of the root of the volume by the ruler, by Arlon. To determine dry weight for 48 hours with a 72°C in Avon and average numbers achieved in the statistical analysis used. The analysis of the results obtained from the software SPSS and SAS and to compare the average of LSD was used.

Table 1: Some physical and chemical characteristics for soil of experiment site.

Sand (%)	Silt (%)	Clay (%)	EC (ds/m)	PH	K (mg kg-1)	P (mg kg-1)	N (%)
43	17	22	0.22	7.20	225.51	10.74	0.15

RESULTS AND DISCUSSION

A. Length root

Influence of the interaction between bacteria and manure and guano and 1% level of probability in the bio on the attribute root length was not significant (Table 2). Litter-bacteria interactions revealed (Table 3) the greatest root length, using 6 tons of poultry manure and used in the treatment of bacterial combined with an average of 38.50 cm and 18.40 cm lowest average consumption of poultry manure and bacteria treatment (control) respectively. Using a combination of manure and biological treatment plant in the herb marshmallow-is determined that the difference was 60% in the control group. The study of the development of the leaves were determined using a combination of organic and biological fertilizer had the most influence on the development of the leaves Jokar and *et al* (2013).

B. Leaf dry weight

Using manure and fertilizer application of bacteria and their interaction on the leaf dry weight in 1% level of probability was significant (Table 2). Mutual effects of manure and shown in bacteria (Table 3) the maximum amount of leaf dry weight in patients taking 6 tons/ Hectare manure and application integration of bacteria with an average of 80.50 and lowest number it with an average of 19.23, in control patients (not using manure and bacteria) respectively. If you do not use manure combined consumption and solo sunny along with the results of bacteria is back. Plant height, fresh weight and dry leaves of corn plants inoculated with bacteria of the genus *Azospirillum* increased (Kapvlynk *et al.*, 1982).

C. Shoot dry weight

Taking manure, bio-fertilizers and Treatments use the interaction of Poultry manure and bio-fertilizer on the shoot dry weight attribute at the level of 1 % was significant. Interaction between Poultry manure and bacteria showed the greatest amount of shoot dry weight 6 tons of manure application in fertilizer application and combined application of bacteria with the average number of hot and mean it with least 100.66, 28.16 in patients not using manure and bacteria, respectively. Niknejad *et al* expressed significant improvement in grain yield in drought conditions and reduced nitrogen affected by increasing bacterial growth. Also, the results showed that the differences between the various levels of biological fertilizer in terms of product performance and there is a combined treatment of *Pseudomonas Azospirillum* and highest and control with 43.7 tons with 13.6 tons were having the lowest (Niknejad and *et al*, 2012).

D. Aerial organs weight

The application of manure and different Treatments bacteria and their interaction in 1% level of probability were significant. Results Table 2 litter-bacteria interactions revealed that the highest weight of shoots using 6 tons of poultry manure treatment and use combining the bacteria with an average of 176.16 gr and 77.83 gr lowest average control (no consumption of poultry manure and bacteria), respectively. Research on application of bio-fertilizer *Azospirillum* and *Azotobacter*, increase plant height and dry weight of Shoots the plant Salvia in China over the past two seasons, was the first and second (Joseph *et al.*, 2004).

Table 2: Decomposition of variance (compared to average) for root length, stem dry weight, leaf dry weight, shoot weight, root weight, air and the number of child branches.

S.O.V	df	The number of tributaries	Root weight (gr)	Weight shoots (gr)	Shoot dry weight (gr)	Dry weight Leaf (gr) (gr)	Along Root(cm)
Block	13	34.16	374.92	28.17	1292.67	756.67	95.21
total error	22	4.15	31.46	107.28	7.40	6.81	16.64
Poultry manure	2	57.64**	1520.31**	5679.45**	5520.48**	2119.65 **	464.63**
bacteria	3	13.88*	417.69**	2290.67**	1480.320**	1348.06**	88.75**
*Poultry manure bacteria	6	0.95^{ns}	93.74*	666.68**	217.87**	238.80**	6.21^{ns}
CV		14.04	15.49	9.25	4.65	6.27	14.47

Table 3: Reciprocal effects of manure and bacteria for root length, dry weight, leaf dry weight, shoot weight, root weight, and the number of aerial organs tributaries.

Poultry manure	bacteria	The number of tributaries	Root weight (gr)	Weight shoots (gr)	Shoot dry weight (gr)	Dry weight Leaf (gr) (gr)	Along Root(cm)
	AZ	14.53b-e	44.50b	110.00 cde	64.66d	14.50de	30.00bcd
3 ton	PS	13.80b-e	41.50 bc	110.00 cde	66.06d	39.16e	30.66bc
	AZ+PS	16.40 abc	48.16b	134.33 b	83.00b	64.66 b	33.16bcd
	Control	13.40 b-e	31.50 def	96.66 ef	45.00f	32.00 fg	22.66cde
	AZ	16.73 ab	39.50bcd	125.70 bc	74.50c	53.66 c	34.16ab
6 ton	PS	16.80 ab	42.00 bc	123.20bcd	76.16c	44.83 d	33.00abc
	AZ+PS	18.66 a	60.33 a	176.16a	100.66a	80.50 a	38.50a
	Control	14.60 bcd	33.83 cde	108.16de	53.16e	34.16 f	27.16cde
Control	AZ	12.66 de	27.50ef	98.26ef	38.16g	29.66 g	20.83ef
	PS	12.33 de	24.66efg	95.00efg	35.33g	30.16fg	22.16ef
	AZ+PS	13.13 cde	23.83fg	88.16fg	36.73g	29.50g	23.50def
	Control	11.13e	17.16g	77.83.g	28.16h	19.23h	18.4f

E. The weight of the root

According to the results of the Table 2 average of the squares in the attribute root length was observed that application of manure and consumption of Treatments bacteria in 1% level of probability and their interaction at the 5% level the significant effect. Based on the results obtained from the Table 3 interaction was observed when bacteria manure and the maximum amount of fertilizer application on root weight 6 tons/ Hectare manure use and taking some bacteria with the average and lowest average 17.16, 60.33 in control patients (not using manure and bacteria) respectively.

F. The number of child branches

Based on the results obtained from the Table 2 average total adjectives tributaries in the squares of the impact of manure at the level of 1% and 5% of bacteria on the surface was significant and meaningful interaction between them has not been. The results of the Table 3 interaction of bacteria and Poultry manure that it is the largest number of tributaries in the fertilizer application 6 ton application of manure/ Hectare plus some bacteria with an average of 18.66, and lowest in patients with an average 11.13 control it (not using manure and bacteria) respectively. The use of the different Treatments are a number of significant impact on Fertilizers tributaries have. The maximum number of child branches 53/19 in combining bacteria and manure recovered (Tahmasebi and *et al,* 2013).

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