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Research Article

Influence of Bio Fertilizer and Ascorbic Acid on Some Characteristics of Sun Flower

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ABSTRACT

Sunflower (*Helianthus annuus* L.) is gaining popularity as an oilseed and a feedstock crop, because it shares several positive agronomic features with other common oil crops such as canola and soybean, yields well in a variety of conditions and can be grown easily and profitably at both small farms and large field scale. Deficit irrigation and use of biological fertilizers are the critical components to crop production in sustainable farming systems. In such a system, fertilizing with organic fertilizers such as vermicompost, farm-yard manure, nitrogenous bio-fertilizer and phosphatic bio-fertilizers (Phosphate Solubilizing Microorganisms) are noticed. The field experiment was laid out factorial with randomized complete block design with three replications. Treatments included bio fertilizer (control (A1), Nitroxin (A2), Biosulfur (A3), Phosphate fertile 2 (A4)) and Ascorbic acid in three levels control (B1), 100 mg/l (B2) and 200 mg/l (B3). Analysis of variance showed that the effect of bio fertilizer and ascorbic acid on all characteristics was significant.

Key words: Biological yield, Grain yield, Harvest index

INTRODUCTION

Water and nutrients are the most important factors during plant growth and development. Deficit irrigation and use of biological fertilizers are the critical components to crop production in sustainable farming systems (Canbolat *et al*., 2006; Sparks, 2009). In such a system, fertilizing with organic fertilizers such as vermicompost, farm-yard manure, nitrogenous bio-fertilizer and phosphatic bio-fertilizers (Phosphate Solubilizing Microorganisms) are noticed. However, there are evidences indicating that the yield in organic farming systems is less than that in conventional production systems, especially in areas with low organic matter in soil (Dawson *et al*., 2007; Tabrizi *et al*., 2008). The lower yield in organic production system is attributed to asynchronism of plant need for nutrients especially N and P, and the conversion of nutrients supplied in organic manure to a form available to crops (Kato and Yamagishi, 2011). Although long-term experiments have shown no difference between yield in organic and conventional systems (Kato and Yamagishi, 2011). Organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved. The natural recycling of farm-waste organic matter through composting is aimed at minimizing nutrient loss, reducing waste accumulation and limiting greenhouse gas emission. Developing inexpensive and nutrient-rich organic media alternatives will not only eliminate environmental impacts but also reduce nursery costs and fertilization and irrigation rates (Wilson *et al*., 2001). Application of organic manures has various advantages like improving soil physical properties, water holding capacity, and organic carbon content apart from supplying good quality of nutrients (Ayeni and Adetunji, 2010). Furthermore, Nanjappa *et al*. (2001) and Jayanthi *et al*. (2002) suggested that application of vermicompost and manure together showed a positive and meaningful improvement in the maize and oat seed's functioning. Findings of these researches clearly indicated that the use of vermicompost not only causes better plant's growth but also effects the crop functioning. Use of vermicompost in the sustainable agriculture caused significant increases in

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the population of beneficial microorganism such as mycorrhizal fungi and phosphate dissolving bacteria and fungi in the soil. Production of nutritious elements such as nitrogen, transferable phosphor, magnesium, dissolved potassium required for the plants and causes improvement in the growth and function of the agricultural plants (Jayanthi *et al*., 2002). Ascorbic acid ubiquitously present in plants and has been reported to play a vital role in alleviating the adverse effects of salt on plant growth and metabolism in many crop plants. It is an abundant small molecule in plants. It is a major substance in the network of antioxidants that include ascorbate, glutathione, a-tocopherol, and a series of antioxidant enzymes. It has also been shown to play multiple roles in plant growth, such as in cell division, cell wall expansion, and other developmental processes (Conklin, 2001; Pignocchi and Foyer, 2003). Sunflower is one of the most important oil crops and due to its high content of unsaturated fatty acids and a lack of cholesterol, the oil benefits from a desirable quality. Sunflower (*Helianthus annuus* L.) is gaining popularity as an oilseed and a feedstock crop, because it shares several positive agronomic features with other common oil crops such as canola and soybean, yields well in a variety of conditions and can be grown easily and profitably at both small farms and large field scale. In addition, seeds from non-oilseed sunflower types are popular as a snack and bird food. In Greece, sunflower is principally grown in the northern part of the country (70% of the total sunflower area), mostly as a rainfed rotation partner to winter cereals (Kallivroussis *et al*., 2002).

MATERIALS AND METHODS

Location of experiment

The experiment was conducted at the zahak which is situated between 31° North latitude and 61° East longitude.

Composite soil sampling

Composite soil sampling was made in the experimental area before the imposition of treatments and was analyzed for physical and chemical characteristics.

Field experiment

The field experiment was laid out factorial with randomized complete block design with three replications.

Treatments

Treatments included bio fertilizer (control (A1), Nitroxin (A2), Biosulfur (A3), Phosphate fertile 2 (A4)) and Ascorbic acid in three levels control (B1), 100 mg/l (B2) and 200 mg/l (B3).

Data collect

Data collected were subjected to statistical analysis by using a computer program MSTATC. Least Significant Difference test (LSD) at 5 % probability level was applied to compare the differences among treatments` means.

RESULTS AND DISCUSSION

Capitule dry weight

Analysis of variance showed that the effect of bio fertilizer on capitule dry weight was significant (Table 1). The maximum of capitule dry weight of treatments Nitroxin was obtained (Table 2). The minimum of capitule dry weight of treatments Control was obtained (Table 2). Analysis of variance showed that the effect of Ascorbic acid on Capitule was significant was significant (Table 1). The maximum of Capitule of treatments 200 mg/l was obtained (Table 2). The minimum of Capitule of treatments control was obtained (Table 2).

Harvest index

Analysis of variance showed that the effect of bio fertilizer on Harvest index was significant (Table 1). The maximum of Harvest index of treatments Nitroxin was obtained (Table 2). The minimum of Harvest index of treatments Control was obtained (Table 2). Analysis of variance showed that the effect of Ascorbic acid on Harvest index was significant was significant (Table 1). The maximum of Harvest index of treatments 200 mg/l was obtained (Table 2). The minimum of Harvest index of treatments control was obtained (Table 2).

Grain yield

Analysis of variance showed that the effect of bio fertilizer on grain yield was significant (Table 1). The maximum of grain yield of treatments Nitroxin was obtained (Table 2). The minimum of grain yield of treatments Control was obtained (Table 2). Analysis of variance showed that the effect of Ascorbic acid on grain yield was significant was significant (Table 1). The maximum of grain yield of treatments 200 mg/l was obtained (Table 2). The minimum of grain yield of treatments control was obtained (Table 2).

Biological yield

Analysis of variance showed that the effect of bio fertilizer on biological yield was significant (Table 1). The maximum of biological yield of treatments Nitroxin was obtained (Table 2). The minimum of biological yield of treatments Control was obtained (Table 2). Analysis of variance showed that the effect of Ascorbic acid on biological yield was significant (Table 1). The maximum of biological yield of treatments 200 mg/l was obtained (Table 2). The minimum of biological yield of treatments control was obtained (Table 2).

Table 1: Anova analysis of the sun flower affected by Ascorbic acid and bio fertilizer

Sov	df	Capitule dry weight	Harvest index	Grain yield	Biological yield
R	2	29527.4	4.22	50852.3	1617220.3
bio fertilizer (B)	3	128555.1**	13.89ns	761154.1**	45064829.1**
Ascorbic acid (A)	2	40413.3**	32.62*	189940.5*	17827908.6**
A*B	6	1039.9ns	17.35*	134767.7*	2941531.2ns
Error	22	4645.3	5.9	36454	2232247.5
CV	-	21.38	18.24	11.38	11.61

*, **, ns: significant at P<0.05 and P<0.01 and non-significant, respectively.

Table 2: Comparison of different traits affected by Ascorbic acid and bio fertilizer

Treatment	Biological yield	Harvest index	Grain yield	Capitule dry weight
Bio fertilizer				
Control	10163.4 c	12.37b	1250.89b	199.44c
Nitroxin	15040.3 a	15.04a	1877.33a	469.07a
Biosulfur	11924.8b	12.44b	1731.78a	355.98b
Phosphate fertile 2	14316.4a	13.39ab	1847.33a	250.66c
Ascorbic acid				
Control	11713.8b	12.27b	1531.67a	265.86b
100 mg/l	12729.2b	12.45b	1744.58a	380.84a
200 mg/l	14140.8a	15.21a	1754.25a	309.66b

Any two means not sharing a common letter differ significantly from each other at 5% probability.

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