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Research article

EFFECT OF BIOLOGICAL FERTILIZER ON CORN

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ABSTRACT: Maize is the most important grain crop that has great economic importance and is grown worldwide. The largest areas under maize are in the regions with mild and moderate climate. The selection for highly productive plants has been a constant process since the discovery of maize. Nitrogen is a gas that acts like a precious metal being very stable, it is less soluble in water than oxygen, and does not produce compounds with any element at room temperatures; hence it is called the "aristocrat" among the elements. This research was conducted in 2012 in South Khorasan Agriculture and Natural Resources research station located in mohammedia area in Birjand based on the factorial experiment in a randomized complete block design with three replications. In this experiment, two factors including fertilizer and the time of usage, it was examined on single cross704 corn. Analysis of variance tests indicated that the significant difference between the 1% Fertilizer the weight of 100 grains of corn were biologically.

Key words: Weight of 100 seeds, Grain yield, Biological yield, Percent of protein

INTRODUCTION

Maize is the most important grain crop that has great economic importance and is grown worldwide. The largest areas under maize are in the regions with mild and moderate climate. The selection for highly productive plants has been a constant process since the discovery of maize. Due to the lack of manpower and small plots, during the initial period of maize growing, only the highly productive plants were selected and individually cultivated to achieve maximum yield [13]. Nitrogen is a gas that acts like a precious metal being very stable, it is less soluble in water than oxygen, and does not produce compounds with any element at room temperatures; hence it is called the "aristocrat" among the elements. Nitrogen molecule consists of two nitrogen atoms (N2) linked with triple covalent bond, whose termination requires a large amount of energy. At high temperatures it combines with hydrogen and oxygen building ammonia (NH4) and nitric oxide (NO) [7]. Sobulo and Babalola [10], Ismail et al. [2], Olayinka [5] and Olayinka et al. [6] have reported the use of several organic materials especially cow dung, poultry droppings, refuse compost and farmyard manure as soil amendments suitable for increasing crop production particularly among subsistence farmers in West Africa. Among the different sources of organic manure, which have been used in crop production poultry manure was found to be the most concentrated in terms of nutrient content [4, 15] in the farm. Phosphorous is an essential element for every living organism but its yield increasing effect is less spectacular compared to that of the nitrogen, as having a less strong stimulation on the growth of vegetative organs. It has a role, among other things, in the nucleic acid and membrane synthesis, in the photosynthesis, in the respiration, in the redox processes, in the activation/deactivation of enzymes, in the carbohydrate metabolism and in the N fixation [14]. Fruit phosphorous levels are generally 0.2-0.5% of the dry matter content [3].

MATHERIALS AND METHODS

This research was conducted in 2012 in South Khorasan Agriculture and Natural Resources research station located in Mohammedia area in Birjand based on the factorial experiment in a randomized complete block design with three replications. In this experiment, two factors including fertilizer and the time of usage, it was examined on single cross704 corn. That fertilizer factor included Nitroxin (Azotobacter Azospirillum) and fertile 2 and combining two fertilizers and second treatment involved different stages of use of bio-fertilizers that included mixing fertilizer, 4 up to 6 leaves and the appearance of male inflorescences.

After preparation, cultivated land was conducted in 6 × 3 m basins and two race ways one for irrigation and another one for sewage were used to prevent fertilizer from the basin to the other basins and repeats distance was considered of 3 meters. And treatment given for fertilizers was added to experimental basins in each stage. After data collection, analysis of variance was conducted through MSTATC statistical program. Significant difference test (LSD) and Excel software were used for comparison of averages at the 5% level and to draw diagrams respectively.

Table 1. Soil characteristics of the experiment area

pH	EC (ms/cm)	Sp	SAR	Ca (meq/lit)	Mg (meq/lit)	Na (meq/lit)	K (meq/lit)	Cl (meq/lit)	$So4^{-2}$ (meq/lit)	Hco3 (meq/lit)
8.19	6.34	30.5	8.58	16.9	12.3	32.8	1.1	45.1	9.7	87.3

RESULTS AND DISCUSSION

Biological yield

As can be seen in the analysis of variance test due to fertilizer and the insemination process, biological yield in maize was significant at the 1% level. Comparison of means showed that the interaction of fertilizer and inoculation level was significant at the 1% level.

Table 2. Analysis of average variance of squares traits of corn varieties

S.O.V	df	Weight of 100 seeds	Grain yield	Biological yield	Percent of protein
Block	2	0.26 ^{ns}	80369**	67099.3 ns	0.12ns
Fertilizer	2	13.52**	516980**	11070000**	0.32*
The inoculation	2	39.34**	794525**	6541392.14**	2.65**
Interaction	4	19.25**	114618**	1674848.5**	1.24**
error	16	0.149	6755	123493.4	0.096
C.V	-	15	28	31	5
*, **, ns: significant at p<0.05 and p<0.01 and non-significant, respectively.					

Compared to the results carried out indicated that the highest yield of combining two biological fertilizers and manure to fertilize 2 with the value (15510) pounds And the minimum amount of fertilizer (13,382) and the highest biological yield at insemination fertilizer The 4 to 6 leaf stage value (15586) kilograms or less related to the amount of seed money (13953) kg per hectare, respectively. Based on the results of a pot experiment, the positive effects of combined inoculation with Azotobacter and azospirillum expressed on dry matter corn and sorghum in this study, dry corn and sorghum as compared to the control without inoculation were about 12 and 15% increased [12]. The study showed that maize inoculated with bio fertilizers plant dry weight increased because it improves their availability and uptake of nutrients listed and stated that this issue has finally increased dry matter accumulation in maize [11].

Weight of 100 seeds

Analysis of variance tests indicated that the significant difference between the 1% Fertilizer the weight of 100 grains of corn were biologically. The greatest impact of fertilizer nitroxin number (34.04 g) and minimum number of manure to be fertilize. Also reported that wheat seeds inoculated with azospirillium baselines positive effect on plant height and spike length and grain weight was 100 [11]. Also have a significant effect on the level of 1% in weight of 100 seeds were inoculated fertilizer on the most effective male inflorescence emergence stage number (35.4) and lowest in the financial seed number (31.2). Interaction of fertilizer and inoculation was also a significant effect on the level of 1% by weight of corn has 100 grains. The most impact on the stage (a3b3) combined with two fertilizer male inflorescence emergence stage number (36.4 g) and the lowest effect level (a2b2) fertile fertilizer 2 4 to 6 leaf stage number (28.6 g) was observed.

Table 3. Comparison of Average main factors

Means				
Treatment	**Weight of 100 seeds**	**Grain yield**	**Biological yield**	**Percent of protein**
Fertilizer				
Azotobacter	34.04a	5040c	13382c	8.66a
fertile 2	31.8b	5972b	14992b	8.34b
Azotobacter*fertile 2	33.97a	6430a	15510a	8.67a
The inoculation Stage				
Seed rub	31.26c	5382c	13953c	9a
4 to 6 leaf	33.2b	6274a	15586a	8.73a
Male flowers appear	35.4a	5785b	14345b	7.95b
Common letters in each column indicate no significant difference between the treatments and insemination process.				

Percent of protein

The table shows the results of analysis of variance at 5% level of bio fertilizers has had a significant effect on protein content. The mean maximum combined effect of fertilizer and manure fertile -2 nitroxin number (8.67) and fertilizer nitroxin number (8.66) and the least fertile manure number (8.34) respectively. The percentage of protein in the inoculum also significant at 1% and most significant property related to the number of seeds is [9]. The interaction of fertilizer and inoculated at 1% level of significant difference in the percentage of protein in maize showed The maximum number of treatments (a1b1) nitroxin fertilizer in the seed stage with a number of properties and the lowest percentage of treatment-related protein (a1b3) nitroxin fertilizer male inflorescence emergence stage number is (7.46).

Grain yield

Experimental results show that the use of fertilizers significant at 1% level of yield plots there. So that according to the highest average yield in comparison to the combination of two fertilizer plot fertile 2 nitroxin and value (6430) kg and the lowest amount of fertilizer nitroxin (5040) kilograms. It can be seen that the highest yield in plots 4 to 6 leaf stage value (6274) kg and the lowest seed in the property with a value of (5382) respectively. Also reported that wheat seeds inoculated with Azospirillium brasilense had no significant effect on seed yield [9].

Table 4. The mean interaction effects for different traits of maize

Mean				
Interaction	**Weight of 100 seeds**	**Grain yield**	**Biological yield**	**Percent protein**
a1b1	31.52e	4595h	12460d	9.43a
a1b2	35.6b	5637f	15250bc	9.1ab
a1b3	35.2bc	4889g	12440d	7.46d
a2b1	32.3d	5731ef	14630c	9.03abc
a2b2	28.6g	6293c	15220bc	8.46c
a2b3	34.6c	5893d	15120bc	7.53d
a3b1	30.2f	5823de	14770c	8.53bc
a3b2	35.3b	6893a	16290a	8.63bc
a3b3	36.4a	6574b	15470b	8.86abc
Common letters in each column indicate no significant differences between treatment means the 5% level. a1: Azotobacter, a2: fertile 2, a3: Azotobacter* fertile, b1: Seed rub, b2: 4 to 6 leaf, b3: Male flowers appear				

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