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Effect of phosphate fertilizer (fertilize 2), phosphorus and nitrogen on yield and nitrogen content of seed in corn SC704 variety

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ABSTRACT

In order to study the effect of phosphate fertilizer (fertile2), phosphorus, and foliar application of nitrogen on yield and yield components of maize cultivar SC 704 in weather conditions of Kouhdasht an experiment in the spring and in the summer of 2011 in Baghazal village as a split plot with three replications was conducted. First Factor: spraying nitrogen at three levels (1: no spray (control) 2: Once spraying (tasseling stage) 3: Double spray (corn emergence stage and pollinated). The second factor was Fertilizers biological phosphate (fertile 2) at two levels: (1: use 2: disuse) and the third factor: chemical fertilizer phosphorus at two levels: (1: use full recommended 2 - ½ recommendations based on soil test). Nitrogen foliar application significantly increased seed yield, biological yield, corn diameter, corn length, numbers of seed and nitrogen content of seed yield. The highest seed yield obtained from twice spraying nitrogen, phosphorous fertilizer (fertilize 2), and 50% chemical phosphorus recommended (10307.11 kg/ ha). Mean comparison results indicated that there was significantly difference between the main factors in seed yield, biological yield, cob weight, TSW, seeds per corn and seeds nitrogen percent. In addition, there was not significant different in corn diameter about main and interaction effects.

Keywords*:* corn, phosphate fertilizer (fertile2), nitrogen, nitrogen content, yield

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INTRODUCTION

Accurate diagnosis nitrogen statue is very important for crop. If the optimal amount of nitrogen available to plants cause increase plant yield and less pollution to the environment occurs. The most important nutrition-limiting factor on growth and production of plants is nitrogen. Especially in arid and semi-arid conditions of Iran that organic matters of soil is low, resulting nitrogen deficiency is a major limiting factor (malagoli et al, 2005). Corns belong to Graminea Family, Panicoide subfamilies of grasses, Zea sex and have many species. . Maize has very strong root system and it is developed. Soils penetrate related to soil depth and soil texture. Main ingredient of the corn is starch (75-65 percent), and almost all forms of industrial use of corn-based starch in its starch. Corn uptake nitrogen in 2 Forms(NO3 and NH4), but in ideal conditions NH4 is the better source for providing nitrogen because it will take less energy to convert protein (Salardini, 2005; Khajehpour, 2001). Enough phosphorus uptakes in the early period of growth in plant are great importance. This importance is more evident in reproductive organs (Sharma, 1999). Shirvani Sarakhsi, et al (2009) in the study showed that different concentrations of nitrogen on harvest index, shoot dry weight, number of seeds per row were significant. In addition, the effect of foliar application at different growth stages on maize seed yield was significant. Tosi Kohal, et al (2010) in the study of the concentrations and the time of foliar nitrogen supplementation effects on yield and yield components of rapeseed as second culture in

paddy yield showed that foliar nitrogen concentration (10 per thousand) in stem elongation or before flowering can increase seed yield, oil yield rapeseed in plant. Yousefi et al (2009) in study the effect of Biological Effects of Phosphate Fertilizer (fertilize2) with foliar micronutrient elements on dry matter accumulation in maize yield components showed that they significantly increased dry matter and seed yield. The highest seed yield, TSW, numbers of seed per corn affected by bio-fertilizer treatment 50 kg /ha. It seems that use bio-fertilizer with chemical fertilizer is a good way to increase yield and reduce environmental pollution. lopez et al (2005) showed Bio-fertilizers can be the best alternative for chemical fertilizer and full input systematic. Tohidi Nia et al (2008) in the study the effect of use different sources and amount of phosphorus on seed and biological yield showed that the effect of bio-fertilizer had significant effect on the traits that studied.

MATHERIALS AND METHODS

In order to study the effect of phosphate fertilizer (fertile2), phosphorus, and foliar application of nitrogen on yield and yield components of maize cultivar SC 704 in weather conditions of Kouhdasht an experiment in the spring and in the summer of 2011 in Baghazal village as a split plot with three replications was conducted. First Factor: spraying nitrogen at three levels (1: no spray (control) 2: Once spraying (tasseling stage) 3: Double spray (corn emergence stage and pollinated). The second factor was Fertilizers biological phosphate (fertile 2) at two levels: (1: use 2: disuse) and the third factor: chemical fertilizer phosphorus at two levels: (1: use full recommended 2 - ½ recommendations based on soil test). During the growing season to determine, the physiological parameters six times samples collected from experimental plots.

The results of soil physicochemical properties are shown in the table (Table 1). Based on the soil analysis table, soil texture is loam.

Each plot as a treatment consists of 6 lines long, with length of 6 m and distance between lines was75 cm. Distance between plants on lines was 20 cm. there were three seeds per each hill and at the proper time (four-leaf) one shrub that had better situation was maintenance and other plants removed. Based on the results of soil analysis 150 kg/ha triple superphosphate and 150kg/ha potassium sulfate from urea source 350 kg urea per unit area was used. All of the fertilizer (phosphorus and potassium) were used concur in 31 May 2011. Seed yield and biological yield at physiological maturity (black layer formed in the lower part of the grain), in 2 lines op plot were done with hem consider. With consider that SC704 is delayed variety when the seed moisture was 25% in 20 October 2011 were removed the plants.

MSTATC computer software was used for analyzing the data variance and comparing their mean (by Duncan Test), and the diagrams were drawn by Excel software.

Table1: Soil characteristics of the experimental site in Koohdasht, Iran where the experiment was conducted.

Texcure	CU	ppm Zn	Mg ppm	Fe ppm	(%) C	pH	N (%)	EC)cm)	K ppm	P ppm	Depth cm
Loam	0.68	0.33	4.3	5	0.78	7.8	0.3	1.51	290	7	0-60

RESULTS AND DISCUSSION

Corn length

Analysis of variance showed that the main effects of foliar nitrogen and chemical phosphorus fertilizers were significant at 1% and main effect of bio-fertilizer (fertiliz2) was significant at 5% level probability. Double and triple interactions were not significant (Table 2). Mean comparisons showed there was a significant difference between the different levels of foliar nitrogen with nitrogen fertilizer. The highest coin length (24.41 cm) obtained from twice spraying and minimum corn length (17.58 cm) obtained from control factor. Between levels of bio-fertilizer (fertiliz2) there were significant differences such that the highest corn length (21.83 cm) obtained from the factor of fertilize 2 and minimum corn length (20 cm) obtained from disuse fertilize2. Between chemical phosphorus fertilizer levels there were significant different. The highest corn length (21.16 cm) obtained from 50% chemical fertilizer factor and minimum corn length (20.66 cm) obtained from a factor of 100% chemical fertilizer.

Corn diameter

Analysis of variance showed that none of the main effects and their interactions was not significant (Table 2).

Mean comparison showed that there was not significant different between levels of foliar, biological fertilize 2 and the use of chemical fertilizer Phosphate. The highest corn diameter (5.667 cm) obtained from the twice spraying × fertilize 2 × 50% chemical fertilizer phosphate and minimum corn diameter (4.93 cm) obtained from control factor × 50% chemical phosphate fertilizers. Safari (2010) concluded that increasing nitrogen fertilizer increased corn diameter significantly.

Numbers of seed per corn

Analysis of variance showed that the main effects (foliar nitrogen, fertilizer biological (fertile2), and chemical fertilizer phosphorus), the interaction between foliar nitrogen ×chemical fertilizer phosphorus on number of seeds per corn was significant at 1% level probability (Table 2).

Mean comparison showed that there was significant different between different levels of foliar application of nitrogen, fertilize 2 and the use of chemical fertilizers Phosphate. The highest number of seeds per corn (773.5) obtained from foliar × 50 % chemical phosphate fertilizer and the lowest number of seeds per corn (383.167) obtained from control factor× 100% chemical phosphate fertilizers. The results of the investigation of Moussaoui Jangali (2005) on maize showed that in treatment that mycorrhiza and revealed bacteria with chemical fertilizer was applied the maximum number of seeds per corn.

Seed yield

Analysis of variance showed that the main effects (spraying with nitrogen fertilizer, bio-fertilizer (fertile2) and the interaction between bio-fertilizer (fertile2) × chemical phosphorus fertilizer on TSW were significant at the 1% level probability (table2).

Mean comparison showed that there was significant different between levels of foliar application with nitrogen fertilizer, bio-fertilizer (fertile2) and the use of chemical fertilizer phosphorus. That the highest seed yield (10307.11 kg) obtained from fertilized 2 × 50% chemical fertilizer phosphate and the minimum seed yield (5838.55 kg) obtained from disuse fertilize 2 × 100% chemical fertilizer phosphorus. Kazemi et al (2011) with study on corn plant showed that the use of bio-fertilizer (fertile2) cause increased seed yield and reduced amount of chemical phosphate fertilizer is used.

Biological yield

Analysis of variance showed that the main effects (bio-fertilizer (fertile2) and chemical phosphorus fertilizer) and the interaction between foliar nitrogen× bio-fertilizer (fertile2) on biological yield were significant at the 1% level probability (table2). The main effect of foliar applications with nitrogen and the interaction of foliar nitrogen × chemical phosphorus fertilizer and interaction of biological fertilizer (fertile2) × chemical phosphorus fertilizers were significant at the 5% level probability (Table 2).

Mean comparison showed that there was significant different between levels of foliar application of nitrogen, bio-fertilizer (fertile2) and chemical fertilizer phosphate. The highest biological yield (26770.5) obtained from twice spraying × using fertilized 2 and the lowest biological yield (16812.83) obtained from the control plots × disuse fertilized 2. Also, between the levels of bio-fertilizer fertilized 2 and the use of chemical fertilizer phosphate there were significant differences so the highest biological yield (25223.16) obtained from twice spraying × 50% chemical fertilizer phosphate and the lowest biological yield (16765.5) obtained from control factor ×100% chemical phosphate fertilizers. Kazemi et al (2011) with study on corn plant showed that the use of bio-fertilizer (fertile2) cause increased biological yield and reduced amount of chemical phosphate fertilizer is used.

Nitrogen content of the seed

Analysis of variance showed that the main effects of foliar nitrogen and bio-fertilizer (fertilized2) were significant on nitrogen content of seeds (Table 2).

Mean comparison showed that there are significant differences in levels of foliar nitrogen so the highest nitrogen percent of seed (9.5) obtained from twice foliar and the lowest (3.6) obtained from control factor. Between different levels of bio-fertilizer (fertilize2), there was significant difference so the highest nitrogen content of seed (7.1) obtained from bio-fertilizer (fertilize2) and the lowest nitrogen content of seed (5.91) obtained from disuse of bio-fertilizer (fertilize2). In the measured nitrogen content of seed, the most important thing is folia that because of

spraying more nitrogen in the grain storage and transport is higher so that more nitrogen stored in seed and cause increase to nitrogen content of seed (besharati, 2007).

Table 2: Variance analysis between traits measured

Nitrogen percent	Biological yield	Seed yield	Seeds per corn	Corn diameter	Corn length	df	S.O.V
0.907^{ns}	2563383.111^{ns}	879166.361^{ns}	962.750^{ns}	0.394^{ns}	8.583^{ns}	**2**	**r**
74.492^{**}	57275322.111^{*}	29844859.11^{**}	122230.3^{**}	0.292^{ns}	95.333^{**}	**2**	**A**
22.602^{**}	$1989.7340.44^{**}$	58956802.778^{**}	150414.69^{**}	0.722^{ns}	30.250^{*}	**1**	**B**
0.183^{ns}	98238823.444^{**}	781472.444^{ns}	861.778^{ns}	0.006^{ns}	0.333^{ns}	**2**	**A×B**
18.102^{ns}	112409472.11^{**}	32802347.11^{**}	128044.64^{**}	0.063^{ns}	47.250^{**}	**1**	**C**
0.528^{ns}	5129077.444^{*}	1116995.444^{ns}	118733.44^{**}	0.017^{ns}	$1/0^{ns}$	**2**	**A×C**
0.063^{ns}	2105625.00^{*}	5128525.444^{ns}	306.250^{ns}	0.007^{ns}	0.694^{ns}	**1**	**B×C**
0.347^{ns}	23550.333^{ns}	1846148.111^{ns}	939.0^{ns}	0.037^{ns}	0.778^{ns}	**2**	**A×B×C**
1.551^{ns}	10169124.202^{ns}	4663017.210^{ns}	12643.023^{ns}	1.132^{ns}	5.614^{ns}	**22**	**error**
19.14	15.49	25.42	19.80	9.62	4.95		**CV**

*Ns, *, ** are insignificant, significant at probability levels of 5 and 1 percent, respectively*

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