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Effect of nitrogen fertilizer and spray the element boron some agronomic traits of corn (*Zea mays L.*) hybrid (*SC704*) in Varamin, Iran

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ABSTRACT

To study the effect of different levels of nitrogen fertilizer and foliar micronutrient boron element properties cropping of corn hybrid (SC704), an experiment was conducted in randomized complete block design with spilt-plot arrangement during 2011 growing season in agricultural research farm of Islamic Azad University, Varamin-Pishva, Iran. The main plots allotted to Nitrogen Fertilizer (N0= Lack of nitrogen fertilizer, N1= 50% recommended nitrogen fertilizer, N2= Use the recommended amount of fertilizer nitrogen, N3= nitrogen fertilizer by 50% over the recommended); sub plots allotted to Boron rates (B1= Sprayed with water, B2= foliar boron concentration of 500 g ha, B3= thousand liters of water and sprayed boron concentration of 800 grams per thousand liters of water per hectare). The results showed that, except during Tassel other traits measured under different nitrogen levels were significant. Increase nitrogen intake improves biological yield of corn. Average dry matter yield of 1.136 kg m N0 treatment to 1.345, 1.431 and 1.499 kilogram per square meter respectively for treatments N1, N2 and N3 increased. Also spray the element boron is also positive and significant effect on dry matter production of corn and its rate of 1.259 kg m B0 treatment to 1.393 and 1.406 kg per square meter, respectively, for the two treatments B1 and B2 increased. Nitrogen concentrations measured in the experiment were affected by different levels of nitrogen intake.

Key words: Corn, Nitrogen, Boron, Yield, Agronomic Traits

INTRODUCTION

Nitrogen has deep effect on corps growth and corn has great tendency to absorb nitrogen from soil in form of nitrate and ammonium (Sian, 1988, Edward and Broder, 1976). Water and nitrogen are two main factors on determining global farming production (Ovverman et al 1995). Campose et al 2004 demonstrated that corn is more sensitive to water shortage at blossoming, pollination, and primary stage of reproductive growth. Hhart and Andrada 1995 reported that nitrogen shortage both reduces number of seeds and ever 1000 seeds' weight as well. Nitrogen shortage cased 9 to 25% reduction of weight and 14 to 18% reduction of grain yield.

Increased from zero to 360 kg nitrogen per hectare yield of grain and straw and maize straw increased Russel, *et al*. (1992).

behavior of metals and boron between metals and non-metals. The amount of boron in the soil varied from 2 to 100 mg per kg or even more variable. Fair value based on changes in soil-forming parent rocks. The elements calcium and sodium borate the soil. The arid climate also take about two milligrams per kilogram. In soils with light texture, rainfall or irrigation of boron leached out of the plant is available. Also at higher pH and calcareous soils of eight, boron uptake greatly reduced. According to studies, the addition of nitrogen fertilizer increased boron concentration in the third and fourth harvest of white clover in the second year is shaping product. Different species have different capabilities absorption of boron in the soil (Malakouti, 1997).

MATERIALS AND METHODS

The experiment was conducted in Azad Islamic University-Varamin, Pishva Unit Researching Farm located in Ghale Sin Varamin, in 51°31' East Longitude and 35°20' North Latitude and 1050m higher that sea level in an area of 1250 square meter in 2011farming year. The experiment was laid out in split plot experiment in frame of accidental complete block design with 3 repetitions. The main plots allotted to Nitrogen Fertilizer (N0= Lack of nitrogen fertilizer, N1= 50% recommended nitrogen fertilizer, N2= Use the recommended amount of fertilizer nitrogen, N3= nitrogen fertilizer by 50% over the recommended); sub plots allotted to Boron rates (B1= Sprayed with water, B2= foliar boron concentration of 500 g ha, B3= thousand liters of water and sprayed boron concentration of 800 grams per thousand liters of water per hectare). Corn variety hybrid SC704 was seeded. Each experimental units (plot) was comprised on 5 rows with length of 7m each of which in 75cm intervals. Distance over line was 20cm and seeding conducted on stacks (three seeds on every stack in 3 to 5 cm depth). Irrigation was scheduled on 7 days periods until emergence of 8 leaves afterward water shortage shock from evaporation basin initiated.

RESULTS AND DISCUSSION

Dry Yield

Dry matter yield of the final result of the plant's ability to absorb water and nutrients and the use of inputs used in plant interactions with environmental conditions. . Results from data analysis showed a significant effect ($p \leq 0.01$) levels of nitrogen on dry matter yield of corn (Table 1).

The lowest biological yield of 50% more than the recommended amount of fertilizer nitrogen treatment (N3) with 1.499 kg m was achieved. Biological nitrogen consumption, increased performance in all three treatments were nitrogen use. The increase compared with the control group N3 equivalent to 31.95 % N2 for treatment equivalent to 25.96% for N1 treatment equivalent to 18.39%, respectively. More or equal to 26.96%, respectively . N2 and N3 was no significant difference between the two treatments (Table 2). Corn capable of high levels of nitrogen and this is mainly due to plant C4 photosynthetic system. Nitrogen consumption and increase the stability of maize leaves This corn plant's ability to absorb water, nutrients and light in the photosynthesis more increased corn production and in turn led to further development. Cardwell (1982) carried out extensive studies on the Minnesota America reported that during the first 25 days of maize growth, only 8% of nitrogen uptake by plants is. Effects of boron foliar micronutrient elements on dry matter yield of maize was statistically significant at 1%. Both foliar boron concentrations of 500 and 800 grams per thousand liters of water per hectare, increased dry matter yield of maize respectively 64/10% and 67/11% in the control group were compared. However, there was no significant difference between the two levels of spraying (Table 2).Interaction between boron and foliar nitrogen on corn dry matter yield was significant at the 5% statistical level and showed. The effect of boron foliar nitrogen levels on dry matter yield for the same was not affected by different nitrogen levels (Table 3)

Length Tassel

Effect of different levels of nitrogen and boron foliar application on corn Tassel average Statistical level of 5% and 1%, respectively, in sharp interaction of these two factors was significant at the 5% statistical level (Table 1). All three treatments increased nitrogen use during treatment compared with no use was Tassel however, this increase was not significant for the two treatments N1 and N3 But for the N2 treatment recommended amount of nitrogen was significant compared with the control N0. Between three levels of N1, N2 and N3 were not significant (Table 2). Both foliar micronutrient element boron was also significantly increased during Tassel corn. This increase is equivalent to B1 treatment 11.07% and for the treatment of B2 9.14%, respectively. However, significant differences were observed between the two treatments B1 and B2. These results may indicate this is an additive effect of low zinc intake over a Tassel But by increasing the dose will not be more impressed Tassel (Table 2).

The findings Brittan (2006) during Tassel a significant role in the pollination of crops is uniform, Such that for each 5 cm length Tassel, quickly followed by inoculation of pollen grain varieties has increased 19 to 28%. The interaction between the two levels of foliar boron and nitrogen herd Tassel statistical level of 5% was significant and showed Effects of boron foliar nitrogen uptake during Tassel affected differently. Maximum length Tassel treatment B1N2 (in thousands of liters of water sprayed at a concentration of 500 grams per hectare of nitrogen fertilizer rate recommendations) to the 35.07 cm, respectively. Although many of the treatments was not significantly different. Tassel shortest of foliar nitrogen and water without using the 23.53 cm was achieved only in the lowest group were analyzed (Table 3).

Height plant

The analysis of variance table (Table 1) Treatment effect of nitrogen and boron foliar micronutrient elements, Statistical level of 1% and 5% respectively, and the interaction between the two treatments at the 5% statistical level, the corn plant height was significant. Corn plant nitrogen consumption increased. The four levels of nitrogen intake was significantly different from the mean height. The mean plant height of maize to nitrogen fertilizer treatments (Table 2) showed that Most of the treatment plant nitrogen consumption by 50% Fertilizer than recommended by the 228.9 cm, respectively, which was significantly higher than all other treatments. Lack of nitrogen use pretreated with 170.40 cm, the lowest mean plant height to be appropriated. Even the smallest amount of fertilizer (50% recommended fertilizer) also caused a significant increase in plant height of maize as compared to control (no fertilizer) was. The increase for the treatment of 18.9% and 50% more than the recommended levels of fertilizer recommended fertilizer respectively 25.9%, and 33.8% . Nitrogen consumption increased grain yield and plant height in maize. Sexton (1996) Maximum height of corn plants treated with foliar application of boron concentration of 800 grams per thousand liters of water per hectare and 210.9 cm was Compared with the lowest foliar treatment with 192.6 cm, 9.5% increased. Concentration of between 500 and 800 grams per liter of water per hectare, there was no significant difference in plant height (Table 2). N0B0 treatment average height of 134.5 cm. While the two treatments N0B2 N0B1 and plant height, respectively, to 183.7 and 193 cm increased This indicates the role of boron in plant growth is improved (Table 3).

Leaf Nitrogen

Different levels of nitrogen statistically significant effect on the level of 1% on the amount of nitrogen in leaves (Table 1). The lowest amount of nitrogen in leaves of nitrogen use pretreated with 4.82%, respectively. With increasing nitrogen fertilizer increased leaf nitrogen so that the nitrogen treated for three 0.5, 1 and 1.5 times the recommended amount of leaf nitrogen respectively 13.28%, 67.01% and 98.81% increased compared with the control treatment (table 2). Nitrogen in the structure of chlorophyll, proteins, all enzymes, compounds between fuel and building construction materials and energy, and even oxy ribonucleic acid is involved in the D building. It is also the first nutrient deficiencies in soils of arid and semi-arid occurs. Nitrogen supply sufficient cause excessive vegetative growth and dark green color is (Tisdale et al., 1993). Nitrogen in plant tissues after carbon, oxygen and hydrogen, it is maximum. Analysis of variance of the data also showed that levels of the element boron is also statistically significant at the 1% level on a corn leaf nitrogen (Table 1). Increase consumption of boron and nitrogen increased leaf so that the character of the 6.154% in terms of consumption of the B 7.062 and 7.572 percent, respectively, for the element boron concentration was 500 and 800 worms (Table 2). The increase for both boron concentrations were statistically significant compared with the control Beegle, (2002) stated that the boron is used as a foliar application increased grain yield and nitrogen uptake occurs. But if sprayed boron concentration greater than the limit, it will cause poisonous effects resulting in decreased performance.

Table1. Analysis Variance of agronomical characteristic

S.O.V	Df	Dry Yield	Length Tassel	High plant	Leaf Nitrogen
Replication	2	0.080	5.808	11.223	0.031
Factor A	3	22.343**	12.007**	5588.933**	41.823**
Error	6	0.248	4.406	33.246	0.056
Factor B	2	8.013**	36.564**	1218.203**	6.139**
AB	6	2.484^{ns}	24.959*	659.914*	1.275^{ns}
Error	16	0.043	3.902	17.337	0.115
%c.v	-	15.3	16.27	12.04	4.90

Ns,,**: Non- significant and significant at in 0.05 and 0.01 level of probability respectively.*

Table2. Means comparison of agronomical characteristic

S.O.V	Dry Yield (kg/m^2)	Length Tassel (cm)	High plan (cm)	Leaf Nitrogen (%)
Factor A	-	-	-	-
N0	1.136 c	29.96 b	170.4 d	4.82 d
N1	1.345 b	31.38 ab	202.6 c	5.46 c
N2	1.431 a	32.56 a	214.7 b	8.05 b
N3	1.499 a	32.20 ab	228.9 a	9.39 a
Factor B	-	-	-	-
B0	1.259 b	29.53 b	192.6 b	6.154 c
B1	1.393 a	32.80 a	209 a	7.062 b
B2	1.406 a	32.23 a	210.9 a	7.572 a

Means with the same letter in each column have not statistically significant difference.

Table3. Means comparison of agronomical characteristic

S.O.V	Dry Yield (kg/m^2)	Length Tassel (cm)	High plan (cm)
B0 × N0	0.896 i	23.53 c	134.5 i
B1 × N0	1.225 a	33.13ab	183.7 h
B2 × N0	1.287 g	33.20ab	193.0 j
B0 × N1	1.307 g	30.60b	198.8fg
B1 × N1	1.345 f	31.93ab	201.8ef
B2 × N1	1.383 e	31.60ab	207.2de
B0 × N2	1.403de	31.40ab	210.4 d
B1 × N2	1.430dc	35.07 a	214.5cd
B2 × N2	1.461bc	31.20ab	219.1.bc
B0 × N3	1.429cd	32.60ab	226.5 b
B1 × N3	1.573 a	31.07 b	235.9 a
B2 × N3	1.494 b	32.93ab	224.1 b

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