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ORIGINAL ARTICLES

Effect of Seed Biofertilization in Different Levels of Nitrogen on Physiological Traits and Agricultural Features in Wheat Whit Different Levels of Irrigation

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ABSTRACT

To study The effect of mineral and bionitrogen fertilizer on certain physiological and agricultural features in wheat whit different levels of irrigation, an experiment was conducted on Islamic Azad University of Tabriz research farm. The experiment was carried out using Split plot design in randomized complete block whit three replications. Irrigation were arranged as main plot in 3 levels(50,100,150 mm evaporation from pan) and fertilizer as subplots in 6 levels (control, Nitragin in the form of seed coat and in based, Nitragin+50% N, Nitragin+100% N, 50% N, 100% N).The features of leaf number, leaf area, spike length and harvest index were investigated. The results showed that Nitragin per se causes features increase in wheat and combined with chemical N fertilizer significantly increased in features of leaf number, leaf area, spike length. Moreover, Nitragin application in the features leaf number, leaf area in treatments in which Nitragin had been used, increased drought resistance. So, N application whit Nitragin has had positive effect on studied attributes. So, N fertilizer application per se has increased under study features.

Key words: Irrigation, Nitragin, Nitrogen, Wheat

Introduction

More recently, a real challenge faces the workers in the agricultural field to stop using the high rates of agro-chemicals which negatively affect human health and environment. It is well known that corn crop is considered among the most important cereal crops in all over the world that consumes huge quantities of chemical fertilizers. Many attempts have been tried to replace a part of those harmful fertilizer by biofertilizers in maize to get yield of good quality without loss in its quantity(El-Kholy *et al*., 2005). Water and nitrogen (N) availability are the main factors influencing crop growth globally ((Rajala *et al*., 2009).

Modern technology of wheat production mainly based on numerous scientific farming measures as well as application of mineral fertilizers. In the filed practices is very important optimize quantity of fertilizers, decrease expenses of production and improve efficiency of wheat plant of nitrogen absorption, accumulation and reutilization (Bojović and Marković, 2009). Improved nitrogen (N) management is needed to optimize economic returns to farmers and minimize environmental concerns associated with agricultural N use (Carrancaa *et al*., 2009). An essential element of agricultural sustainability is the effective management of N in the environment. This usually involves at least some use of biologically fixed N2 because N from this source is used directly by the plant, and so is less susceptible to volatilization, denitrification and leaching. N2-fixationbased systems are most promising and potentially profitable in extensive rather than intensive agricultural systems, where erratic or historically low rainfall and market changes can seriously impact the economics and efficiency of fertilizer use (Grahama and Vanceb, 2000). Salinity and drought are two major abiotic factors limiting crop production (Bao *et al*., 2009). The aim of this study, the effect of different levels of chemical nitrogen fertilizer and Nitragin alone and together and in interaction with the drought.

Materials and Methods

This study was conducted during growing season of 2008-2009 at the Research Station of Islamic Azad University, Tabriz Branch, Located in the northwest of Iran. The experiment was carried out using split plot design randomized complete block with three replication and irrigation were arranged as main plot in 3 levels (50, 100, 150 mm evaporation from pan) and fertilizer as subplots in 6 levels (control, Nitragin in the form of

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seed coat and in based, Nitragin+50% N, Nitragin+100% N, 50% N, 100% N). (Nitragin : mixture of Azotobacter spp., Azosprillum spp., Pseudomonas spp).Studied variables in the experiment were leaf number, leaf area, spike length and harvest index were investigated. Analysis of variance of data was performed with MSTAT-C software and means were compared using the Duncan's multiple range test at the significance level of 95%.

Results and Discussion

The main effects of drought in number of leaves, leaf area, spike length were significant, while the interaction of these factors except spike length and harvest index were non-significant (Table 1).

Table 1: Table of variance analysis.

S.O.V	Degrees of freedom	Number of leaves	Leaf area	spike Length	Harvest index
Repetition	2	1.29*	70 ^{ns}	12**	117 ^{ns}
A	2	6.78**	1983	4.18**	84.4 ^{ns}
Error(A)	4	0.10	11.9	0.047	87.2
B	5	5.76**	595.6**	2.96**	353.5*
A*B	10	0.26*	38.24*	0.16 ^{ns}	457.9 ^{ns}
Error(B)	30	0.11	13.21	0.14	687
(%) CV		4.73	16.2	5.05	13.15

ns, * and **, respectively, indicating non-significant, significant at 5% and 1%

Number of leaves:

The data indicate that nitragin inoculation could with 50% and 100% nitrogen and 100% nitrogen fertilizer significantly increased on wheat Number of leaves as compared to treatments without inoculation. Researchers have shown that increased nitrogen availability can increase water use efficiency (Rajala *et al*., 2009). The data indicate that nitragin inoculation could significantly increased in low and medium irrigation levels on number of levels in per plant, while the nitragin inoculation could not significantly influence irrigation levels number of levels. Also, with nitragin inoculation could decrease produce cost in effect use chemical fertilizer, in irrigation low level could optimal yield.

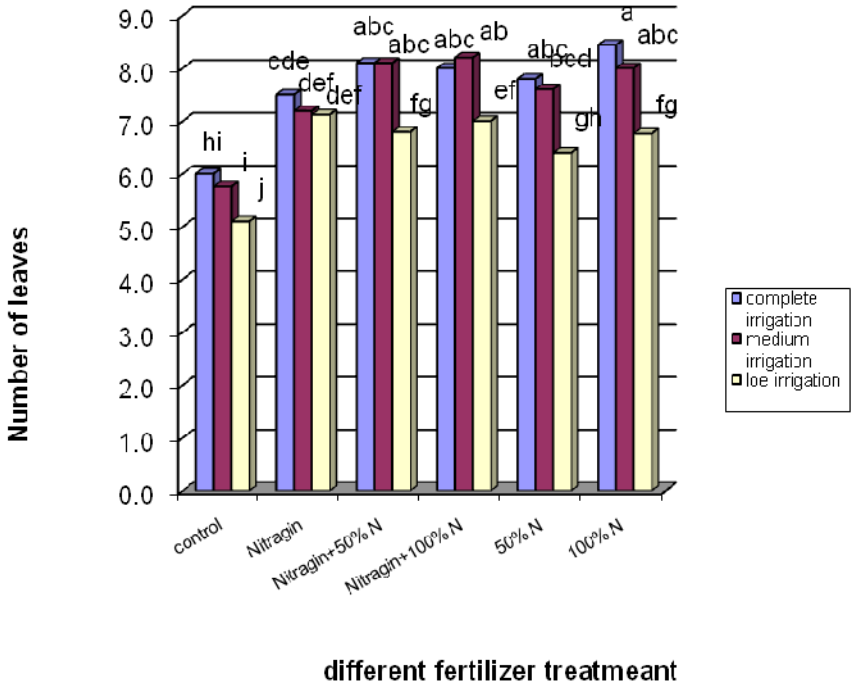

Fig. 1: The effect of different fertilizer treatments on the number of leaves at different levels of water.

Res. J. Fish & Hydrobiol., 6(4): 378-382, 2011

Leaf Area:

The data indicate that nitragin inoculation Nitragin +50% Nitrogen fertilizer, Nitragin +100% Nitrogen fertilizer in complete and medium irrigation levels and 100% Nitrogen fertilizer in complete irrigation levels could significantly incrased leaf area **(**Figure 2). Result indicated increase with only Nitragin +100% Nitrogen fertilizer in medium irrigation level as compared to treatments with complete irrigation. Water deficit treatments and low N fertilization rate reduced significantly total biomass accumulation to leaves and stems (Rajala *et al*., 2009). Correlation of variable indicated that leaf area with tiller number positive correlation and significant.

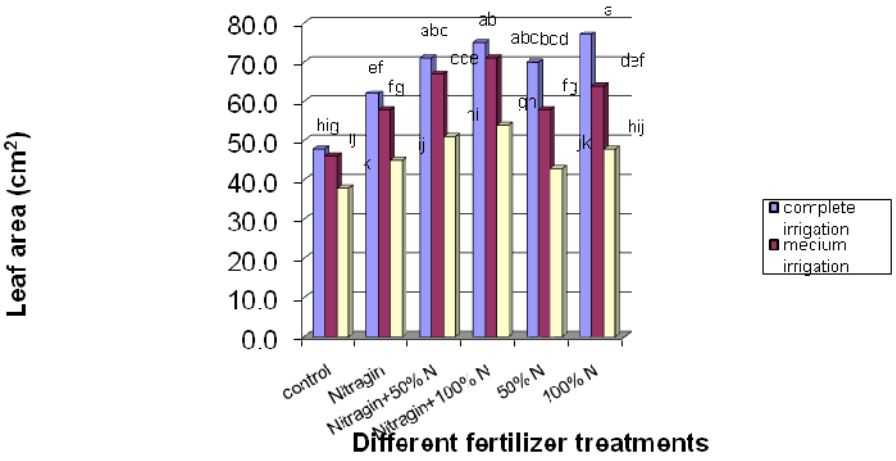

Fig. 2: The effect of different fertilizer treatments at different levels of water on Leaf area.

Spike length:

The data indicate that low and medium irrigation treatments lead to decrease spike length ratio in complete irrigation treatment. Irrigation treatments lead to decrease 12% spike length ratio in irrigation treatments. Drought (Water deficit treatments) and low N fertilization rate reduced significantly total biomass accumulation to leaves and stems also number and weight of tillers per plant (Rajala *et al*., 2009). The great spike length 16%, 26, 16 was obtained under Nitragin +50% Nitrogen fertilizer and Nitragin +100% nitrogen Fertilizer and 100% Nitrogen Fertilizer only, spike length ratio to control. Data indicated (Figure 3) that only 50% Nitrogen fertilizer leads to increase 10% spike length ratio to control, while increase 10% Nitragin biofertilize. Zamora and Romero (2001) showed that cereals such as maize have high N fertilization requirements for optimal yield. It would therefore be a noteworthy achievement if cereals could profit from biological nitrogen fixation and thereby decrease their requirements for N-chemical fertilization. Variable of correlation indicate that leaf area effective correlation and significant.

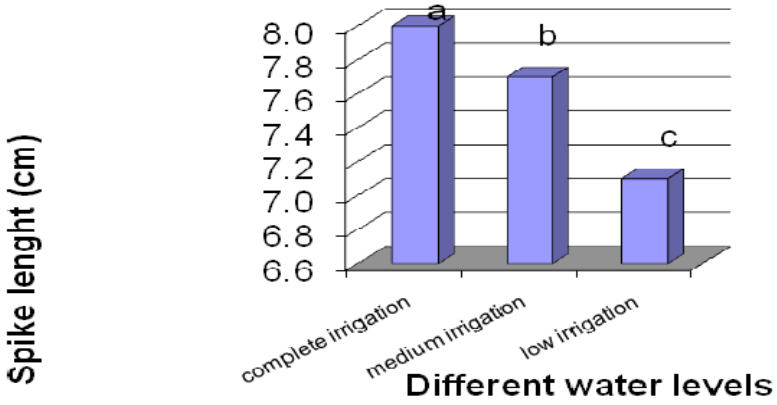

Fig. 3: Effect of water levels on the spike Length.

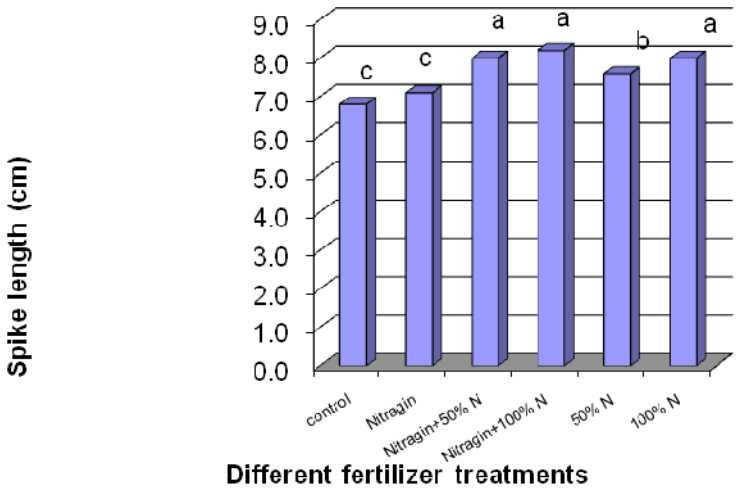

Fig. 4: Effect of different fertilizer treatments on spike length.

Harvest index:

Significant increased in harvest index was recorded by control treatment and Nitragin and Nitragin +50% Nitrogen fertilizer. According to available reports, up to the optimum rate, N application has little effect on HI and there was no indication that the timing of nitrogen application could affect HI (Sticksel *et al*., 2000).

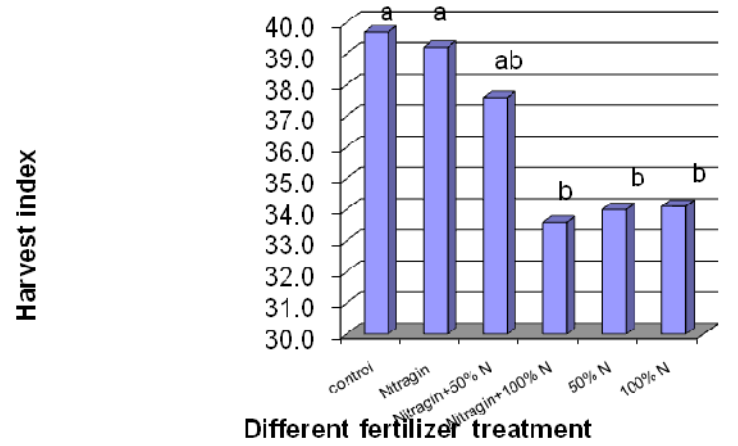

Fig. 5: Effect of different fertilizer treatments on harvest index.

In general, it was observed that the same traits apply chemical fertilizers with nitrogen Nitragin has more impact. It is recommended for sustainable agriculture and reduce the environmental risks of chemical fertilizers will accelerate the process of biological fertilizers.

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