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Research article

EFFECT OF PHOSPHORUS FERTILIZER AND MYCORRHIZA ON PLANT HEIGHT, SEED WEIGHT PER PLANT AND GRAIN PER PANICLE IN WHEAT

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ABSTRACT: Cereal crops occupy a prime position in providing food for human consumption. Arbuscular mycorrhizae are the most common type of mycorrhiza, where the fungi colonize the interior of the root and form specialized structures, known as arbuscules, for nutrient exchange with the host. In this study, research crops planted in 2011, and Khash mountain stage carried the gem industry. This study is a factorial experiment in a randomized complete block design with three replicates and all experiments were performed with different levels. In this experiment, a variety of wheat called clear that improved cultivars were used. According to the analysis of variance table mycorrhiza effect on Seed weight per plant, number of panicles per plant was significant.
Key words: panicles per plant, wheat, mycorrhiza

INTRODUCTION

Cereal crops occupy a prime position in providing food for human consumption and according to Graham and Welch [12] about 50% of the soil used for cereal production in the world contains low level of plant available zinc which reduces not only grain yield but also nutritional quality (low in micronutrients essential for good human health). Cereal grains are a major source of zinc intake for persons living in developing countries and zinc deficient cereal food is creating serious health problems. Seed zinc concentrations of wheat grown under zinc deficient conditions are very low [9]. Mycorrhizal fungi form a symbiotic relationship with plant roots. Arbuscular mycorrhizae are the most common type of mycorrhiza, where the fungi colonize the interior of the root and form specialized structures, known as arbuscules, for nutrient exchange with the host. Fungal hyphae extend from the root and explore the soil more efficiently than would fi ne plant roots. Arbuscular mycorrhizae can provide the plant with supplemental phosphorus (P), nitrogen (N), and micronutrients since the plant roots alone are not able to maximize the interception of nutrients [3]. One the most of important effects of mycorrhiza fungi is to increase crop yield, especially in soils with low fertility. Ortas [18] believes that use of the CGR mycorrhiza fungi and increase the allocation and transfer of materials between roots and stems of the leaves, so that more absorption of nutrients and transfer them to cause an increase in shoot dry weight. The yield increase may be due to the extension of roots, which penetrate through the mycelium of fungi in the soil and crops, access to a greater volume of soil [7] it also increases the tolerance of plant to drought stress [21]. Specifi cally in soybean, AM have been shown to improve the overall water status of the plant [19, 25] due to a reduced resistance to water transport [22], associated with an enhanced nutrient [22]. Numerous field studies have demonstrated the benefits of the mycorrhizal association to agricultural crops. Increased levels of root colonization and AMF hyphal density in soil at early growth stages can increase P uptake and yield in maize (*Zea mays* L.) when the soil is P deficient [5, 8, 11, 14]. Arbuscular mycorrhizae interact in the rhizosphere with other beneficial organisms and pathogens, oft en competing for the same colonization sites [13]. Mycorrhizae have been shown to protect plants against pathogens in numerous crops [4, 23, 26]. In soil with adequate plant available P, increased mycorrhizal fungus colonization has generally not translated into increased yields [10, 17, 24].

MATERIALS AND METHODS

In this study, research crops planted in 2011, and Khash mountain stage carried the gem industry. This study is a factorial experiment in a randomized complete block design with three replicates and all experiments were performed with different levels. In this experiment, a variety of wheat called clear that improved cultivars were used. Mycorrhiza arbuscular fungi (AM) in both the inoculated and non-inoculated with three levels of nitrogen and phosphorus fertilizer in three levels as other experimental treatments were used. Urea nitrogen is used by organizations of agricultural support services were provided. The farm has been in previous years under fallow land preparation including plowing, disk loader and fustigation is. The plowing by moldboard plow to a depth of 30 cm was used. The operation of the disc, the disc plow was perpendicular offset to a depth of 15 cm. To soil and plant nutrient land of the amount needed according to soil test results fustigation was done. To measure this trait after five plants were randomly selected and harvested from the middle two lines by removing the border took place clusters each of the plant to seed removed separately the for the plant out and counting were recorded. After data collection, by ANOVA statistical program SPSS, MASTATC took.

RESULTS AND DISCUSSION

Plant height

Analysis of variance was performed to test the interaction Mycorrhiza and P show a significant was not effect on wheat plant height (Table 1). Analysis of variance shows that the use of different levels of fertilizer (P) is causing a significant effect on plant height, so that the increase in chemical fertilizers (phosphorus) of plant height (Table 2). In this study, possibly because of the height, most of the plant, at the right time and the right amount of fertilizer for plants. It is well known that AM fungi are the causes of plant growth, mainly by nutrients uptake [6, 15]. Although AM fungi are generally considered to have a broad host ranges, some species are more effective with particular host plants such as corn, cotton and soybeans in increasing nutrients uptake, plant growth, water uptake and decrease negative effects of environment [20]. Phosphorus deficit is a most important restrictive factor in plant growth and recognition of mechanisms that increase plant phosphorus use efficiency is important [2].

Table 1. ANOVA analysis of the wheat affected by interactions of mycorrhiza in phosphorus

S.O.V	df	Plant height	Seed weight per plant	Grain per panicle	Number of panicles per plant
R	2	18.66	0.6	21.63	8.01
Mycorrhiza	2	1.50	42.04**	16.66	35.63**
P	2	34.56*	5.83	77.90*	7.18
P*M	2	18.2	16.54	87.5*	12.74
C.V	-	10.5	7.84	22.06	7.17

*, ** , ns : significant at p<0.05 and p<0.01 and non-significant, respectively.
P: Phosphorus, M: Mycorrhiza

Seed weight per plant

According to the analysis of variance table mycorrhiza effect on grain yield per plant was significant (Table 1). According to the analysis of variance table Phosphorus effect on grain yield per plant was not significant (Table 1). The highest of the treated seed weight per 100 kilograms (20.46) and the lowest from the control treatment (15.6), respectively (Table 2). Grain yield and P accumulation by wheat were highest P rates [16]. The application of phosphorus fertilizer increased grain yield, at the growth stage [1].

Grain per panicle

According to the analysis of variance table mycorrhiza effect on grain per panicle was not significant (Table 1). According to the analysis of variance table Phosphorus effect on grain per panicle was significant (Table 1). The highest of the treated 100 kilograms (55.2) and the lowest from the control treatment (39.8), respectively (Table 2). The application of phosphorus fertilizer increased grain yield, at the growth stage [1]. Grain yield and P accumulation by wheat were highest P rates [16].

Table 2. Mean comparison of different characteristics influenced by mycorrhiza and phosphorus interactions.

Mean-square				
	Plant height	**Seed weight per plant**	**Grain per panicle**	**Number of panicles per plant**
inoculated				
0 kg	91.4	16.6	39.8b	7.6
50 kg	95.1	16.1	44.55b	8.7
100 kg	100.7	20.46	55.2a	11.4
Non-inoculated				
0 kg	94.4	15.6	40.3b	7
50 kg	96.11	17.2	43.4b	8
100 kg	97.7	18.4	51.3a	9.3

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

Number of panicles per plant

According to the analysis of variance table mycorrhiza effect on number of panicles per plant was significant (Table 1). According to the analysis of variance table Phosphorus effect on number of panicles per plant was not significant (Table 1). The highest of the treated 100 kilograms (11.6) and the lowest from the control treatment (7.6), respectively (Table 2). In soil with adequate plant available P, increased mycorrhizal fungus colonization has generally not translated into increased yields [10, 17, 24].

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