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## Influence of Mycorrhiza Fungi on some Characters of Corn

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**Abstract** Environmental impacts and reduced the quality of agricultural products. Currently, alternative fertilizers such as bio fertilizers have been considerably considered to reduce these adverse effects. One of the pillars of sustainable agriculture is the use of bio-fertilizers in agro-ecosystems with a view to eliminating or significantly reducing the use of chemical inputs. In order to investigate the effect of mycorrhiza fungi and phosphorus fertilizer on yield and yield components of corn, a factorial experiment was conducted in a factorial experiment in a completely randomized block design with three replications in Saravan. In this experiment, different levels of mycorrhiza inoculum in two levels of A1 (mycorrhizal inoculation, so as to be approximately 1 to 2 g for each seed soaked with seed) and A2 (no mycorrhizal inoculation) as the first factor and the amounts different levels of phosphorus fertilizer in six levels of non-use of phosphorus fertilizer as control (B1), 50 kg / ha pure P / ha (B2), 75 kg P / ha (B3), 100 kg P / ha (B4), 125 kg P / ha, (B5) and 150 kg p / ha (B6) were fed from ammonium phosphate fertilizer (46% pure P). The results showed that inoculation of mycorrhiza and phosphorus fertilizer had a significant effect on all traits.

**Keywords** Corn, Phosphor, yield

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### Introduction

Corn was first domesticated by native peoples in Mexico about 10,000 years ago. Native Americans taught European colonists to grow the indigenous grains, and, since its introduction into Europe by Christopher Columbus and other explorers, corn has spread to all areas of the world suitable to its cultivation. The leafy stalk of the plant produces separate pollen and ovuliferous inflorescences or ears, which are fruits, yielding kernels or seeds. Maize has become a staple food in many parts of the world, with total production surpassing that of wheat or rice. However, not all of this maize is consumed directly by humans. Some of the maize production is used for corn ethanol, animal feed and other maize products, such as corn starch and corn syrup. The six major types of corn are dent corn, flint corn, pod corn, popcorn, flour corn, and sweet corn. The average recovery of phosphorus fertilizer by crops is very low and varies from 15-20% on single crop basis [1]. This may be attributed to reversion of applied phosphates to less available forms such as octa calcium phosphates, carbonate apatite, hydroxy apatite and flour apatite by reacting with clays and calcium compounds [2]. Economic problems arising from growing increased use of chemical fertilizers on the one hand and environmental issues associated with non-normative use of these fertilizers such as environmental pollution, loss of soil fertility and reduce the value of quality herbal products, On the other hand, has resulted in greater attention to biological fertilizers [3]. According to Rashid & Din [4], degree of phosphorus fixation depends on the ratio of applied phosphorus, the fixation of broadcasted phosphorus is much greater than the phosphorus applied through bands. Fertigation is a technique that involves application of plant nutrients through irrigation. Add organic matter of soil to provide the greatest plant needs is one of the benefits of this type of fertilizers. In addition, the supply of nutrients to be fully compatible with the natural power of plants ,help to biodiversity, intensification of vital activities, improve the quality and keeping health of the environment is one of the most important biological



advantages [5]. It is an effective means of placement of fertilizers and improving fertilizer use efficiency [6]. Latif *et al.*, [7] also reported that solution of phosphate fertilizer applied along with the first irrigation produced wheat grain yield equivalent to conventional soil mixing before sowing or top dressing after plant emergence. They further narrated that P-uptake by wheat was also higher when it was applied by fertigation as compared to soil mixing [8]. Shah *et al.*, [9] also demonstrated the agronomic efficiency of fertigation over broadcast method in mungbean. Earlier studies showed little utility of applied phosphorus before sowing until first irrigation to wheat crop [7]. Microorganisms such as the photosynthetic bacteria (*Rhodospseudomonas Palustris* and *Rhodobacter sphaeroides*), lactobacilli (*Lactobacillus plantarum*, *L. casei*, and *Streptococcus lactis*), yeasts (*Saccharomyces* spp.), and actinomycetes (*Streptomyces* spp.). Microorganisms in EM improve crop health and yield by increasing photosynthesis, producing bioactive substances such as hormones and enzymes, accelerating decomposition of organic materials and controlling soil-borne diseases [10]. Phosphorus fertilizer use efficiency (PUE) averaged 8% when P was broadcast and incorporated and 16% when P was either knifed with anhydrous ammonia or applied with the seed in winter wheat [11].

## Materials and Methods

### Location of Experiment

In this research, crops planted in 2017 in saravan.

### Composite Soil Sampling

The soil of the experimental site belonging clay-loam. Composite soil sampling was made in the experimental area before the imposition of treatments and was analyzed for chemical and physical characteristics.

### Field Experiment

In order to investigate the effect of mycorrhiza fungi and phosphorus fertilizer on yield and yield components of corn, a factorial experiment was conducted in a factorial experiment in a completely randomized block design with three replications in Saravan.

### Treatments

In this experiment, different levels of mycorrhiza inoculum in two levels of A1 (mycorrhizal inoculation, so as to be approximately 1 to 2 g for each seed soaked with seed) and A2 (no mycorrhizal inoculation) as the first factor and the amounts different levels of phosphorus fertilizer in six levels of non-use of phosphorus fertilizer as control (B1), 50 kg / ha pure P / ha (B2), 75 kg P / ha (B3), 100 kg P / ha (B4), 125 kg P / ha, (B5) and 150 kg p / ha (B6) were fed from ammonium phosphate fertilizer (46% pure P).

### Data Collect

Data collected were subjected to statistical analysis by using a computer program SAS. Least Significant Difference test (LSD) at 5 % probability level was applied to compare the differences among treatments` means.

## Results and Discussion

### Plant Height

Analysis of variance showed that the effect of mycorrhiza on plant height was significant (Table 1). The maximum of plant height was obtained on inoculated treated samples (Table 2). Analysis of variance showed that the effect of phosphor on plant height was significant (Table 1). The maximum of plant height was obtained on 150 kg/ha treated samples. According to Rashid & Din [4], degree of phosphorus fixation depends on the ratio of applied phosphorus, the fixation of broadcasted phosphorus is much greater than the phosphorus applied through bands. Fertigation is a technique that involves application of plant nutrients through irrigation. Add organic matter of soil to provide the greatest plant needs is one of the benefits of this type of fertilizers. In addition, the supply of nutrients to be fully compatible with the natural power of plants, help to biodiversity, intensification of vital activities, improve the quality and keeping health of the environment is one of the most important biological advantages [5].



**Table 1:** ANOVA analysis of the corn affected by interactions of mycorrhiza and phosphorus

S.O.V	df	Plant height	Number of seeds per ear	Number of rows per ear
R	2	40.19ns	3417.36ns	9.52ns
Mycorrhiza (M)	1	2880.11**	93738.02**	0.69ns
P	5	2256.44**	4306.36*	1.02ns
M*P	5	2811.44**	3227.96ns	3.96ns
Error	22	274.13	1511.57	1.67
C.V	-	8.97	10.90	9.12

\*, \*\*, ns :significant at  $p < 0.05$  and  $p < 0.01$  and non-significant, respectively.

P: Phosphorus, M: Mycorrhiza

### Number of Seeds per Ear

Analysis of variance showed that the effect of mycorrhiza on number of seeds per ear was significant (Table 1). The maximum of number of seeds per ear was obtained on inoculated treated samples (Table 2). Analysis of variance showed that the effect of phosphorus on number of seeds per ear was significant (Table 1). The maximum of number of seeds per ear was obtained on 150 kg/ha treated samples. It is an effective means of placement of fertilizers and improving fertilizer use efficiency [6]. Latif *et al.*, [7] also reported that solution of phosphate fertilizer applied along with the first irrigation produced wheat grain yield equivalent to conventional soil mixing before sowing or top dressing after plant emergence. They further narrated that P-uptake by wheat was also higher when it was applied by fertigation as compared to soil mixing [8].

### Number of Rows per Ear

Analysis of variance showed that the effect of mycorrhiza on number of rows per ear was not significant (Table 1). The maximum of number of rows per ear was obtained on inoculated treated samples (Table 2). Analysis of variance showed that the effect of phosphorus on number of rows per ear was not significant (Table 1). The maximum of number of rows per ear was obtained on 150 kg/ha treated samples. Shah *et al.*, [9] also demonstrated the agronomic efficiency of fertigation over broadcast method in mung bean. Earlier studies showed little utility of applied phosphorus before sowing until first irrigation to wheat crop [7].

**Table 2:** Mean comparison of different characteristics influenced by mycorrhiza in phosphorus in nitrogen interactions

	Mean-square		
	Plant height	Number of seeds per ear	Number of rows per ear
Mycorrhiza inoculated	193.38a	407.50a	14.33a
Non-inoculated	175.50b	305.44b	14.05a
Phosphorus control	159.50c	316.50c	13.50a
50 kg	172.83bc	339bc	14a
75 kg	180.16b	348.17abc	14.16a
100kg	187.66b	370ab	14.33a
125kg	189.33b	376.67ab	14.50a
150kg	217.16a	388.50a	14.66a

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

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