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Research Article

Influence of Intercropping Maize-Mung Bean and Plant Date on Yield and Yield Components

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ABSTRACT

Maize (*Zea mays* L.) is the world's widely grown highland cereal and primary staple food crop in many developing countries. It was originated in America and first cultivated in the area of Mexico more than 7,000 years ago, and spread throughout North and South America. In the world production, maize is ranked as the third major cereal crop after wheat and rice. Intercropping systems as an example of sustainable agricultural methods and objectives such as ecological balance. Interest the most out of resources. Increase the quality and quantity performance and development decrease of pests. Diseases and weeds traces. Intercropping systems use resources more effectively than a Mono cropping takes place and therefore the amount of available material for use weed decreases. The field experiment was laid out factorial with randomized complete block design with three replications. Treatments included plant date (D1: 24 March, D2: 8 April and D3: 18 April) and intercropping (I1: pure mung bean, I2: pure maize, I3: 25% maize + 75% mung bean, I4: 75% maize + 25% mung bean). Analysis of variance showed that the effect of plant date and intercropping on all characteristics was significant.

Key words: Intercropping, Plant date, Maize, Mung bean

INTRODUCTION

Maize (*Zea mays* L.) is the world's widely grown highland cereal and primary staple food crop in many developing countries (Kandil, 2013). It was originated in America and first cultivated in the area of Mexico more than 7,000 years ago and spread throughout North and South America (Hailare, 2000). In the world production, maize is ranked as the third major cereal crop after wheat and rice (Zamir *et al*., 2013). Population growth and natural resource degradation and subsequent need to increase of food production, are considered as the major problems nowadays. To face the growing need for dietary sources, increasing of crop yield is essential, this will lead to pressure on natural resources and threaten sustainability of farming systems. Therefore, need to design and implementation of sustainable and high yield systems gradually increases (Javanshir *et al*., 2002). To achieve this objective, one of the option is growing plants in mix pattern. Multi-product farming is growing of more than one crop in a farming year and a piece of arable land. Setting of planting date in intercropping planting is far more complex than a single planting, since may contain a mixture of species with different requirements and growing course. Generally, by more differences between species as requirement for environmental factors, the amount of product obtained from a mixture was more than single planting (Pasari *et al.*, 2000). Clement *et al.* (1992) during study on intercropping of corn and soybean in Canada observed that highest corn and maximum soybean product was made in 2:1 and 3:2 row arrangement of corn and soybean. Sharaiha and hattar (1993) in survey the effect of intercropping and litter on the yield of corn, soybean and watermelon in single and mixed planting, stated that highest yield of Corn was obtained in blending with soybean, that produced an Increase up to 45 and 65 percent at level of 40 tons of litter depending on the year of test. And maximum yield of soybean was achieved in corn-soy blend with 35 and 34 percent depending on the year of test. Nabavi and Mazaheri (1998) by researching the effects of nitrogen different levels on intercropping of corn and soybean, said that highest LER was obtained from intercropping of both plants in planting ratio of 75% soybeans + 25% corn. Pirzad *et al.* (2002) in review of competition performance in corn and soybean intercropping stated that assessment of different

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treatments using LER showed that corn intercropping in density of 5.3 plants per square meter with density of 42 soybean plants per square meter had the highest biological efficiency. Intercropping systems as an example of sustainable agricultural methods and objectives such as ecological balance. Interest the most out of resources. Increase the quality and quantity performance and development decrease of pests. Diseases and weeds traces (Fernandez *et al*., 2007). Intercropping systems use resources more effectively than a Mono cropping takes place and therefore the amount of available material for use weed decreases (Zimdahl, 1993). In Intercropping with increasing diversity in weed control is less and therefore the number of weeds per unit area decreases (Javanshir *et al*., 2000). Intercropping uniform population of weeds by reducing the relative abundance of dominant weed population changes (Poggio, 2005; Asgharipour and Armin, 2010).

MATERIALS AND METHODS

Location of experiment

The experiment was conducted at the Zahedan Region.

Composite soil sampling

Composite soil sampling was made in the experimental area before the imposition of treatments and was analyzed for physical and chemical characteristics.

Field experiment

The field experiment was laid out factorial with randomized complete block design with three replications.

Treatments

Treatments included plant date (D1: 24 March, D2: 8 April and D3: 18 April) and intercropping (I1: pure mung bean, I2: pure maize, I3: 25% maize + 75% mung bean, I4: 75% maize + 25% mung bean).

Data collect

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

RESULTS AND DISCUSSION

Maize height

Analysis of variance showed that the effect of plant date on maize height was significant (Table 1). The maximum of maize height of treatments 24 March was obtained (Table 2). The minimum of maize height of treatments 18 April was obtained (Table 2). Analysis of variance showed that the effect of intercropping on maize height was significant (Table 1). The maximum of maize height of treatments pure maize was obtained (Table 2). The minimum of maize height of treatments 75% maize + 25% mung bean was obtained (Table 2).

Maize dry weight

Analysis of variance showed that the effect of plant date on maize dry weight was significant (Table 1). The maximum of maize dry weight of treatments 24 March was obtained (Table 2). The minimum of maize dry weight of treatments 18 April was obtained (Table 2). Analysis of variance showed that the effect of intercropping on maize dry weight was significant (Table 1). The maximum of maize dry weight of treatments 75% maize + 25% mung bean was obtained (Table 2). The minimum of maize dry weight of treatments 25% maize + 75% mung bean was obtained (Table 2).

Maize wet weight

Analysis of variance showed that the effect of plant date on maize wet weight was significant (Table 1). The maximum of maize wet weight of treatments 24 March was obtained (Table 2). The minimum of maize wet weight of treatments 18 April was obtained (Table 2). Analysis of variance showed that the effect of intercropping on maize wet weight was significant (Table 1). The maximum of maize wet weight of treatments 75% maize + 25% mung bean was obtained (Table 2). The minimum of maize wet weight of treatments 25% maize + 75% mung bean was obtained (Table 2).

Table 1: Anova analysis of the maize and mung bean affected by plant date and intercropping

Sov	df	Maize height	Maize dry weight	Maize wet weight	Mung bean height
R	2	800.3	0.084	1.96	0.48
Plant date (D)	2	4808.1**	19.82**	1201.2**	5.17*
Intercropping (I)	2	1736.4*	1.08*	163.08**	16.009**
D*I	4	91.7^{ns}	1.85**	10.19^{ns}	8.81**
Error	16	303.4	0.18	22.26	0.93
CV	-	10.95	10.89	12.62	4.36

Table 2: Comparison of different traits of maize affected by plant date and intercropping

Treatment	Maize height	Maize dry weight	Maize wet weight
Plant date			
24 March	180.3a	5.64a	44.80a
8 April	162.2b	3.27b	43.28a
18 April	134.4c	2.90b	24.07b
Intercropping			
Pure maize	172.7a	3.74b	38.86a
25% maize + 75% mung bean	159.2ab	3.74b	32.58b
75% maize + 25% mung bean	145b	4.34a	40.71a

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

Table 3: Comparison of different traits of mung bean height affected by plant date and intercropping

Treatment	Mung bean height
Plant date	
24 March	22.88a
8 April	22.33ab
18 April	21.38b
Intercropping	
Pure mung bean	21.66b
25% maize + 75% mung bean	23.72a
75% maize + 25% mung bean	21.22b

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

Mung bean height

Analysis of variance showed that the effect of plant date on mung bean height was significant (Table 1). The maximum of mung bean height of treatments 24 March was obtained (Table 3). The minimum of mung bean height of treatments 18 April was obtained (Table 3). Analysis of variance showed that the effect of intercropping on mung bean height was significant (Table 1). The maximum of mung bean height of treatments 25% maize + 75% mung bean was obtained (Table 3). The minimum of mung bean height of treatments 75% maize + 25% mung bean was obtained (Table 3).

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