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Evaluating Maize Yield in Intercropping with Mungbean

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ABSTRACT

To evaluate maize yield in an intercropping system with mungbean, this experiment was conducted in 2010 at the Agriculture and Natural Resources Research Center, Hamedan, Iran. The experiment was conducted in the form of a randomized complete block design with four replications. Treatments of the experiment included four different ratios of maize / mungbean planting density: 25/75, 50/50/ 75/25, 100/0. Results indicated that different ratios significantly affected most of the measured traits except for plant height and the number of ears in plant. 75% maize + 25% mungbean gave the highest yield and yield components.

Keywords: competition, maize, mungbean, *Vigna radiata*.

INTRODUCTION

Intercropping is a cropping system which integrates crop production with soil conservation. Intercropping, 'the cultivation of two or more crops at the same time in the same field, is a common practice especially in the tropics and in the developing countries. Benefits of intercropping may be briefed as: better use of resources, improvement of soil fertility by legume components of the system, soil preservation through covering the bare land between the rows, reduction of biotic and abiotic risks by increasing diversity, suppression of weeds infestation, etc. [6, 5, 8].

Generally, intercropping is more beneficial when the two crops are morphologically different, e.g., with different root system and canopy structure. So, plants will absorb water and nutrients from different soil depths, and shoots will not compete for sunlight and gases. Moreover, higher diversity reduces the risk of damages caused by biotic and abiotic factors. Regarding this, maize / legumes intercropping has become a very common intercropping system around the world. Maize is a wide row crop with high nitrogen requirement; mungbean is a legume capable of biological nitrogen fixation. Moreover, maize can physically support mungbean [1, 2, 6].

A very important point in intercropping is to select the best seeding rate ratio of the main crop and the intercrop, which result in the lowest competition and the highest yield. So this

experiment was conducted to find the best seeding rate ratio of maize and mungbean in an intercropping system.

MATERIALS AND METHODS

This experiment was conducted in 2010 at the Agriculture and Natural Resources Research Center, Hamedan, Iran (30° 24' N, 48° 18' E, elev. 1171 m above the sea level). The experiment was conducted in the form of a randomized complete block design with four replications. Treatments included four different ratios of maize / mungbean planting density: 25/75, 50/50/ 75/25, 100/0.
At the end of the growing season, samples were harvested and maize yield and yield components were evaluated. Data were analyzed using SAS and means were compared according to Duncan's Multiple Range Test.

RESULTS AND DISCUSSION

Results indicated that ratios of seeding rate significantly affected ear diameter and ear length at P≤0.01; stem diameter, 100 kernels weight and grain yield at P≤0.05; and had no significant effect on plant height and the number of ears (Table 1).

Table 1. Analusis of the variances for the measured traits

SOV	df	Mean Squares (MS)						
		Plant height	Stem diameter	Ear diameter	Ear length	The number of ears in unit area	100 kernels weight	Grain yield
Replication	3	ns	**	ns	ns	ns	ns	ns
Treatment	3	ns	*	**	**	ns	*	*
Error	27	98.066	45.62	0.052	0.690	0.104	0.006	0.224
CV (%)	-	5.01	9.5	8.25	6	19.3	1	7.25

*ns, nonsignificant; *, significant at P≤0.05; **, significant at P≤0.01.*

Results of mean comparison also indicated that grain yield was the highest (8.02 ton/ha) in ratio 2 and the lowest (7.46 ton/ha) in ratio 4 (Table 2), however, ratios 1, 2 and 3 were significantly the same. 100 kernels weight was the highest (16.22 g) in ratio 4 and the lowest (16.11 g) in ratio 3. Generally, it can be concluded that 75% maize + 25% mungbean was the best ratio of seeding rate for maize production.

Table 2. The effects of different seeding rate ratios on the measured traits

Treatments	Plant height (cm)	Stem diameter (mm)	Ear diameter (cm)	Ear length (cm)	The number of ears in unit area	100 kernels weight (g)	Grain yield (ton/ha)
Ratio 1	224a	48.62a	4.15a	22.99a	16.83a	16.2a	7.8ab
Ratio 2	216.05a	43.56ab	4.07a	22.14b	16.58ab	16.17ab	8.02a
Ratio 3	218.25a	44.34ab	4.13a	22.13b	16.25b	16.11b	7.62ab
Ratio 4	217.18a	40.23b	3.75b	21.69b	16.58ab	16.22a	7.46b

Means in a column followed by the same letter are not significantly different at P≤0.01.

Results of the experiment indicated that intercropping maize with mungbean (75/25) increased maize grain yield. This can be attributed to the ability of mungbean and other legumes to fix atmospheric nitrogen to soil, making it available to plant roots [4, 7]. The intercropping not only affects plant growth, but provides many other benefits to the soil and agroecosystem. Kariaga (2004) evaluated the effects of maize, beans and cowpea sole and intercropping on runoff and concluded that runoff was the highest in sole maize and the lowest in maize-cowpeas intercropping [3]. They reported that runoff was 1226.3 L in bare fallow, 856.6 L in sole maize, 434.7 L in maize intercropped with beans, 180.7 L in maize intercropped with cowpeas and 222.6 L in maize intercropped with beans and cowpeas.

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