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GROWTH AND YIELD RESPONSE OF MASHBEAN GENOTYPES TO VARIOUS PLANTING DENSITIES

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Abstract: Response of ten mashbean genotypes namely 9010, 98-CM-525, 98-CM-524, 9006, ES-1, 9081, 98-CM-523, Mash-3, 9092 and 98-CM-522 to three planting densities viz. 10, 15 and 20 cm. was studied under field conditions during Kharif 2001. The genotype ES-1 gave significantly the highest seed yield of all other genotypes. Various planting densities significantly affected the number of branches plant^{-1},seed yield (kg ha^{-1}), biomass (kg ha^{-1}) and harvest index (%).

Keywords: Mashbean, genotypes, planting densities, growth and yield component

INTRODUCTION

Mashbean (*Vigna mungo*) is an important pulse crop, not only in Pakistan but also in whole world. It grows on marginal lands where other crops perform poorly. Being leguminous, it demands less nitrogenous fertilizers and it fits well in different crop rotations systems to maintain the fertility level of the soil [Nazir 1994].

In Pakistan mashbean is grown on an area of 45.7 thousand hectares with annual production of 25.6 thousand tones, making an average yield of 563kg ha^{-1} [Anonymous 2001]. Shrivastava [1977] reported that cultivar Type-9 gave the highest seed yield with a density of 185000 plants ha^{-1} grown in rows 30cm apart. Reddy *et al.* [1990] observed that three varieties of *Vigna mungo* varied significantly in number of pods plant^{-1}, number of seeds pod^{-1}, 1000 grain weight and seed yield. Verma *et al*. [1991] found that Jahawar Urd Bean-2 is suited for close planting and yields 1554 kg ha^{-1}at 7.5 x 30cm spacing. Dasgupta and Das [1991] observed that BR-68, LU-525 and TL-25 had high yield potential because of greater number of pods plant^{-1} and number of seeds pod^{-1}.

This experiment was conducted to determine best combination of genotype and planting density of mashbean suited to agroecological conditions of Multan.

MATERIALS AND METHODS

An investigation to see the effect of various planting densities on different mashbean genotypes was conducted at the Experimental Farm of University College of Agriculture, Bahauddin Zakariya University Multan during Kharif 2001. The experiment was carried out in randomized complete block design laid out in factorial fashion with three replications having net plot size of 1.2 m x 4 m. Ten genotypes of mashbean namely 9010, 98-CM-525, 98-CM-524, 9006, ES-1, 9081, 98-CM-523, Mash-3,

9092 and 98-CM-522 were tested. Three levels of planting density viz. 10, 15 and 20 cm were studied. The crop was sown on July 31, 2001 with the help of single row hand drill. The crop was sown in 30cm apart rows. All other agronomic practices were kept normal and uniform for all the treatments.

Growth and yield parameters studied were number of plants m^{-2}, number of branches $plant^{-1}$, leaf area index, number of pods $plant^{-1}$, plant height (cm.), number of seeds pod^{-1}, 1000 grain weight (gm), seed yield (kg ha^{-1}) total biomass (kg ha^{-1}) and harvest index (%). Standard procedures were adopted to record data on various growth and yield parameters. Data collected were analyzed statistically using Fisher's analysis of variance technique. Least Significant Difference test at 0.05 probability was employed to compare the differences among the treatment's means [Steel and Torrie 1984].

RESULTS AND DISCUSSION

Various genotypes were found to be non-significant as regards the number of plants m^{-2} (Table1). Number of $plants^{-2}$ varied significantly with different planting densities (Table1). Maximum number of plants m^{-2} (21.1) were observed at seeding density of 10 cm. Minimum number of plants m^{-2} (11.47) were recorded at seeding density of 20 cm. Interaction between treatments under study was non-significant.

Table 1: Growth and yield response of different mashbean genotypes to various planting densities

Treatments	No. of plants m^{-2}	No. of branches $plant^{-1}$	Height of plant (cm)	Leaf Area Index	No. of Pods $plant^{-1}$	1000 grain weight (gm)	No. of seeds pod^{-1}	Seed yield (kg ha^{-1})	Total biomass (kg ha^{-1})	Harvest Index (%)
Genotypes										
9010	16.33	7.67^{a}	21.33	22.65^{e}	37.33	41.22	5.78^{cd}	133.44	4194.78	6.89
98-CM-525	19.67	6.00^{b}	23.00	35.09^{d}	36.89	35.89	6.22^{a}	164.89	3706.55	6.51
98-CM-524	16.44	6.33^{b}	22.4	31.24^{c}	33.89	45.67	5.55^{d}	138.11	2583.00	6.77
9006	12.44	6.44^{b}	20.11	22.07^{e}	30.78	50.44	6.22^{a}	109.22	2545.22	7.34
ES-1	21.11	8.00^{a}	21.4	33.89^{b}	34.67	29.55	5.78^{cd}	178.55	4666.22	7.38
9081	17.89	6.44^{b}	20.7	24.97^{a}	35.44	45.89	6.11^{ab}	138.55	3937.11	8.32
98-CM-523	13.00	6.00^{b}	19.7	39.89^{a}	35.22	49.78	5.89^{bc}	105.00	2654.67	8.23
Mash-3	15.22	5.89^{b}	22.4	25.01^{d}	36.87	38.67	6.11^{ab}	127.89	7897.00	8.08
9092	12.67	5.78^{b}	21.7	20.27^{f}	36.22	44.78	6.00^{abc}	106.00	3911.11	8.39
98-CM-522	21.00	7.78^{a}	24.00	30.58^{c}	34.67	30.22	5.89^{bc}	177.69	4427.67	8.45
Seeding Density										
10 cm	21.10^{a}	6.1^{b}	21.53	27.36	34.80	40.9	5.93	172.77^{a}	3843.37^{ab}	9.28^{a}
15 cm.	17.17^{a}	6.33^{ab}	22.40	27.81	36.67	41.47	6.03	142.00^{a}	4190.73^{a}	7.00^{b}
20 cm.	11.47^{b}	6.9^{a}	21.1	27.53	36.40	41.27	5.90	99.03^{b}	2543.50^{b}	6.63^{b}
Interaction	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S

Means sharing the same letters are statistically non-significant at 0.05 probability level.
N.S = Non-significant.

Numbers of branches per plant were significantly different in various genotypes (Table1). Maximum number of branches $plant^{-1}$ (8) were observed in the genotypes ES-1, while minimum number of branches $plant^{-1}$ (5.78) were found in the genotype 9092. Significant differences

were found among different seeding densities for the number of branches plant^{-1} (Table1). Maximum number of branches plant^{-1} (6.9) were observed at the seeding density of 20 cm and minimum (6.1) were recorded at seeding density of 10 cm. Interaction between genotypes and planting densities were found to be non-significant.

Non-significant differences were observed among different genotypes for the plant height at maturity (Table1). Similarly plant height was found to be non-significant among different seeding densities. Interaction between seeding densities and different genotypes was also non-significant.

Differences observed among different genotypes for leaf area index were significant (Table1). Maximum leaf area index (39.89) was found in the genotype 98-CM-523 and minimum (20.27) was observed in the genotype 9092. Seeding densities were found to be non-significant as regards leaf area index (Table1). Interaction between factors under study was also non-significant.

Various genotypeswere found to be non-significant as regards number of pods plant^{-1} (Table1). However, Reddy *et al.* [1990] reported significant differences between genotypes for number of pods plant^{-1}. Non-significant results were observed among different seeding densities for number of pod plant^{-1} (Table1). Interaction between genotypes and planting densities and genotypes was also found to be non-significant.

All genotypes varied significantly for number of seed pod^{-1} (Table1) as seeds pod is a genetically controlled character.

Maximum number of seeds pod^{-1} were observed in genotypes 98-CM-525 and 9006 (6.22) and minimum (5.55) were found in the genotype 98-CM-524. These results are in line with the results of Reddy *et al*. [1990] and Dasgupta and Das [1991]. Interaction between factors under study was also non-significant.

All the genotypes were found to be non-significant as regards the 1000-grain weight (gm) (Table1). These results are contradictory with those of Reddy *et al.* [1990] who reported significant differences among genotypes for 1000-grain weight. Non-significant differences were observed among different seeding densities for 1000-grain weight (Table 1). Interaction between genotypes and seeding densities was also found to be non-significant.

Non-significant differences were observed among different genotypes regarding the seed yield. However, the genotype ES-1 produced maximum seed yield (178.55-kg ha^{-1}) of all other genotypes (Table 1). Different seeding densities affected significantly the seed yield. Maximum seed yield (172.77-kg ha^{-1}) was obtained at the density level of 10 cm and minimum (99.03-kg ha^{-1}) was recorded at the planting density of 20 cm. (Table 1). Interaction between genotypes and planting densities was found to be non significant.

Various genotypes showed non-significant differences for the total biomass (kg ha^{-1}) (Table1). However significant differences were found

among the seeding densities for the total biomass (Table1). Maximum biomass was observed at seeding density of 15 cm (4190.73 kg ha^{-1}) and minimum (2543.5 kg ha^{-1}) was found at seeding density of 20 cm. Interaction between factors under study was non-significant.

Non-significant differences were observed among different genotypes regarding harvest index (%) (Table1). Significant differences were recorded among various seeding densities for harvest index (Table1). Maximum harvest index (9.28%) was found at the seeding density of 10 cm while minimum harvest index (6.63%) was recorded at planting density of 20 cm. Interaction between different genotypes and planting densities was found to be non-significant.

CONCLUSION

The variety ES-1 may be preferred over other varieties due to maximum seed yield and it should be planted at plant-to-plant distance of 10 cm.

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