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Effect of Different Planting Densities on Yield and Yield Components of Mungbean (*Vigna radiata* L.)

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Abstract: Mungbean variety NM-96 was planted to see the effect of different planting densities on yield and yield components. Crop was planted at 15, 30 and 45 cm single row strips with 5, 10 and 15 cm plant spacings. Maximum number of branches per plant was obtained with plant spacings 15 and 10 cm, respectively, while minimum with 5 cm. Maximum number of pods per plant was observed with the crop sown at 45 cm row spacing against minimum at 15 cm. Maximum number of seeds per pod was observed with a row x plant spacing combination at 45 x 15 cm against minimum at 15 x 5 cm. Maximum seed yield was obtained with the combination of row x plant spacings at 30 x 10 cm as compared to the other combinations while minimum seed yield was observed when row x plant spacing combination kept at 45 x 15 cm. Maximum harvest index was obtained with row x plant spacings at 45 x 15 cm against minimum harvest index when row x plant spacings were maintained at 15 x 5 cm.

Key words: Planting densities, yield; yield components, *Vigna radiata* L.

Introduction

Mungbean (*Vigna radiata* L.) belongs to family leguminosae and is commonly known as green gram. It is an important conventional pulse crop of Pakistan, cultivated on an area of 197.7 thousand hectares with annual production of 80,000 tones of grains annually and average yield of 498 kg/ha (Anonymous, 1995). Mungbean is short duration and drought tolerant crop. On area basis, it ranks second to chick pea (*Cicer arietinum* L). amongst grain legumes cultivated in Pakistan (Anonymous, 1995).

Mungbean contains protein 22-24, oil 1.0-1.5, crude fibre 3.5-4.5 ash 4.4-4.5 and carbohydrates 65-68 per cent (Concidine, 1982). Due to its high protein contents it serves as a source of plant protein in human diet. Hence it is called poor man's meat in the developing world and as health food in developed world. Being leguminous, it maintains soil fertility by converting and fixing atmospheric nitrogen in available form through symbiosis with rhizobial strains. Mungbean as a short duration legume, may fit well in different cropping patterns. Moreover, two crops of mungbean can be raised in a year during spring and autumn seasons. It therefore, is good source of income for the growers with an added advantage of maintaining the soil fertility.

Mungbean variety NM-96 is recently evolved and recommended for general cultivation, but most of its agronomic requirements contributing to higher yield, are to be ascertained. Planting density is of prime importance amongst various agronomic practices. By maintaining proper plant population through improved planting methods, yield can be increased. Therefore, the present study was contemplated to evaluate the feasibility and comparative efficiency of different planting densities under conditions prevailing at Faisalabad.

Materials and Methods

The investigations, to see the effect of different planting densities on yield and yield components of mungbean (*Vigna radiata* L.) variety NM-96 was carried out at the Agronomic Research Area, University of Agriculture, Faisalabad. The experiment was laid out in Split Plot Design having three replications. The net plot size was 2.70 x 6.0 meter. The following treatments were included in the trial. Row to row distance, $S_1 = 15$cm, $S_2 = 30$cm and $S_3 = 45$cm. Plant to plant distance, $P_1 = 5$cm, $P_2 = 10$cm and $P_3 = 15$cm.

The crop was sown with the help of single row hand drill on a well prepared seed bed in the first week of August and the seed rate was 20 kg/ha. A basal dose of 20 kg Nitrogen and 50kg P_2O_5 was applied at the time of sowing. The inter-row spacing was randomized in the main plots and intra-row spacing in the sub-plots in three replications. The crop was sown on August 10, 1996 with the single row hand drill and plant population was maintained by uprooting and gap filling at seedling stage after germination. The crop was harvested on October 30, 1996.

Number of plants per unit area, plant height at maturity (cm), number of branches per plant, number of pods per plant, number of seeds per pod, 1000-grain weight(g), seed yield per hectare (kg), straw weight per plot (kg), harvest Index (%), protein contents of seed (%) were recorded during the course of study.

The data collected were analyzed statistically by using the Fisher's Analyses of Variance Technique and LSD test at 5 per cent probability was applied to compare the treatment means (Steel and Torrie, 1980).

Results and Discussion

Mungbean crop planted at 15 x 5 cm row x plant spacing gave maximum number of plants m^{-2}. On the contrary, minimum number of plants was observed when row x plant spacing are at 45 x 15 cm.

Crop planted in rows 45 and 30 cm gave tallest plants of 71.08 and 70.31 cm, respectively, against the smallest ones when row spacing was maintained at 15 cm. These results are in coincide with those of Taylor (1980). Similarly tallest plants were observed with plant spacing at 15 and 10 cm, respectively against the smallest ones with plant spacing at 5 cm. These results are partly in agreement with those of Karim *et al.* (1981) that shows maximum number of branches per plant was obtained with plant spacings 15 and 10 cm, respectively. While minimum number of branches was recorded with plant spacing maintained at 5 cm. These results are in confirmity with that of Svoboda and Hruska (1983).

Mungbean crop sown 45 cm row spacing gave maximum number of pods per plant against minimum number of pods per plant at 15 cm row spacing which are in accordance with those of Taylor (1980). Similarly, 15 cm apart plant spacing gave maximum number of pods per plant against minimum number of pods per plant when plant spacing kept

Table 1: Seed yield (kg ha^{-1}) as affected by different planting densities

A-Analysis of Variance

S.O.V.	D.F.	S.S.	M.S.	F-ratio	Prob.
Rep.	2	174.05	87.023	1.17	
S (RxR)	2	20181.42	10090.709	135.75	0.000**
Error I	4	297.34	74.335		
P (P x P)	2	14555.90	7277.950	32.49	0.000**
S x P	4	26852.42	6713.105	29.97	0.000*
Error II	12	2647.99	223.999		
Total	26	64749.12			

* Significant = ** Highly significant

B-Individual Comparison of Treatment Means

Treatments		Row Spacing			
		S1 (15 cm)	S2 (30 cm)	S3 (45 cm)	Means
Plant Spacing	P1 (5cm)	1001.00 cde	1011.33 bcd	1024.15 bc	1012.16 b
	P2	1021.56 bc	1089.30 a	981.28 e	1031.71 a
	P3	1032.10 b	993.90 de	898.63 f	974.88 c
	Means	1018.22 b	1031.51 a	968.02 c	

Any two means not sharing a letter differ significantly at 5% probability (LSD).

at 5 cm. Almost similar results were reported by Sai Babu *et al.* (1988)

Maximum number of seeds per pod was observed with a row x plant spacing combination at 45 x 15 cm against minimum number of seeds per pod when row x plant spacings combination was maintained at 15 x 5 cm. These results concur with the findings of Sai Babu *et al.* (1988). Crop grown at 15 cm apart plant spacing exhibited maximum 1000-seed weight against minimum 1000-seeds weight with plant spacing at 5 cm. These results are in accordance with Nakagava *et al.* (1983). It has been also observed that there were non-significant effects of row spacings and the combinations of row x plant spacings. Similar results were observed by Trung and Yoshida (1985). Maximum seed yield was obtained with the combination of row x plant spacings at 30 x 10 cm against minimum seed yield when row x plant spacing combination kept at 45 x 15 cm (Table 1). These results are supported by Hussain and Gill (1974) and Singh *et al.* (1990). However, contradictory results are reported by Randhawa (1974) who might have run the trial in different set of conditions with crop varieties having different genetic characters.

Crop sown at the row x plant spacings at 15 x 5 cm gave maximum straw weight while minimum straw weight was obtained when row x plant spacings kept at 45 x 15 cm which are similar with the findings of Trung and Yoshida (1985).

Maximum harvest index was obtained with row x plant spacings at 45 x 15 cm against minimum harvest index when row x plant spacings were maintained at 15 x 5 cm. Almost similar results were reported by Singh *et al.* (1983). Seed protein contents was affected significantly by row spacing. However, maximum seed protein content was obtained with wider row spacing. These results are not in line with those reported by Jain and Chauhan (1988). Mungbean crop sown at 15 x 10 cm plant spacings gave the highest seed protein contents while the minimum seed protein contents was observed with plant spacing of 5 cm. These results are in line with those of Dwangan *et al.* (1992). Combinations of row x plant spacings found statistically non-significant with each other which are not in agreement with those of Dwangan *et al.* (1992) which might be due to variation in growth environments.

The conclusion of this study is that mungbean (*Vigna radiata* L.) should be planted in row spacing at 30cm and plant spacing at 10cm to get the maximum seed yield per hectare from this crop under the agro-ecological conditions obtaining at Faisalabad.

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