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# Effect of Row Spacing on Agronomic Traits and Yield of Mungbean (*Vigna radiata* L. Wilczek)

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**Abstract**: Highest plant height (47.50 cm) was observed in 43 cm row spacing where plants were spaced 7 cm within rows. Maximum pods/plant (28.25), number of seeds/pod (10.25), biological yield per plant (39.75 g), grain yield per plant (6.87 g), 100-seed weight (4.27 g) biological yield (3854 kg $ha^{-1}$), grain yield (921 kg $ha^{-1}$) were recorded for row spacing of 20 cm where plants were spaced 15 cm within rows. Based on these results, 20 cm row-to-row spacing with 15cm plant-to-plant can be recommended for irrigated condition to get higher yield.

**Key words:** Row spacing, mungbean, agronomic traits, yield components, grain yield

## Introduction

Mungbean (*Vigna radiata* L. Wilczek) belongs to the family Leguminoseae and sub. family Papilionaceae. Optimum row spacing plays an important role in contributing to the high yield because thick plant population will not get proper light for photosynthesis and can easily be attacked by diseases. On the other hand, very small population will also reduce the yield (Pookpakdi and Pataradilok, 1993). Due to this reason normal population is necessary for high yield. Denmead *et al.* (1962) estimated that 60 cm inter row spacing might increase the energy available for photosynthesis 15-20%, compared with 100cm spaced row in corn. Uniform spacing generally gives a greater yield than hill groupings under favorable moisture conditions. However when moisture is a limiting factor, the advantage may be small or mild (Dungan *et al.*, 1958). Donald (1963) suggested that the advantage of uniform spacing under irrigated conditions is due to reduced competition for light because when the moisture is lacking, light is no longer the limiting factor and the advantage of uniform spacing is lost.

Singh and Singh (1990) reported that seed yield was highest in CV. UMP 79-1-2 (1.21 kg $ha^{-1}$) and lowest in CV. Type-11 (1.06 t), while plant population did not affect seed yield. Pookpakdi and Pataradilok (1993) conducted study in the 1989 wet and dry seasons and the 1990 dry season. Mungbean yield was highest in the 1989 wet season, whereas black gram produced higher yields in the dry seasons. Yield of both crops generally decreased with decreasing plant density, while pod number/plant increased with decreasing density. For commercial cultivation of row spacing of 30cm with plant spacing of 10 cm is generally used to obtain 320,000 plants $ha^{-1}$ (Bashir, 1994).

The study aimed to find out the cost benefit analysis of different levels of input and to find out the optimum level of productivity per hectare for summer mung, when levels of phosphorus and different row spacing were used.

## Materials and Methods

The investigations to evaluate the effect of row spacing on agronomic traits and yield of mung bean was conducted at Malakandher Research Farm, under irrigated condition of Peshawar valley during summer, 2001. The field was thoroughly prepared. The experiment was laid out in Randomized Complete Block Design. Net subplot size was 4 x 2.4 $m^2$. DAP @ 150 kg $ha^{-1}$ as basal fertilizer dose was applied before sowing. Sowing was done on 1st July 2001 using NM 19-19 variety. Treflan 4EC @ 1.2 liter $acre^{-1}$ was applied for weed control as pre emergence herbicide. Dense seeding was done in rows which were thin to plant to plant spacing (cm); 15 in 20 cm spaced rows, 10 in 30 cm spaced rows and 7 in 43 cm spaced rows for maintaining the recommended plant population of 320,000 plant $ha^{-1}$, which can be calculated:

$$\text{Plant population ha}^{-1} = \frac{\text{Area of subplot x 10000}}{\text{(Row-to-Row x Plant-to-Plant)}}$$

Where area of subplot and (Row-to-Row x Plant-to-Plant) will be in the same unit.

In the experiment three row spacing of 20 cm (plant to plant distance was 15 cm), 30 cm (plant to plant distance was 10 cm) and 43 cm (plant to plant distance was 7 cm) were studied. Data was recorded on plant height (cm), pods/plant, pod length (cm), seeds/pod, biological yield $plant^{-1}$ (g), grain yield $plant^{-1}$ (g), 100-seed weight (g), biological yield (kg $ha^{-1}$) and grain yield (kg $ha^{-1}$). The data was analyzed, and compared at 5% probability using LSD Test (Miftah, 2000).

## Results and Discussion

Highest plant height (47.50 cm) was observed in 43 cm row spacing, where plants were spaced 7 cm within rows while minimum plant height (44.75 cm) was for 20 cm row spacing where plants were spaced 15 cm (Table 1). The probable reason for maximum in 43 cm row spacing could be intra row competition of plants for light that results in tall plants while in case of 20 cm plants were uniformly distributed.

Number of pods/plant is the key yield component in leguminous crops. Number of pods/plant was maximum (28.25) for 20 cm row spacing. Minimum pods/plant (22) were for 43 cm row spacing. As in the case of 20 cm row spacing plants were spaced 15 cm within rows while in 43 cm row spacing plants were spaced 7 cm within rows. The result shows that plants needs uniform distribution for maximum pods/plant and inter or intra row spacing less than optimum results in competition for nutrients light and space. The results are in similarity with that of Rajput *et al.* (1984), who reported that increasing row or plant spacing increased the number of pods/plant.

Effect of row spacing was non significant for the pod length (Table 1). It has values of 7.57, 7.50 and 7.75 cm pod length in 20, 30 and 43 cm spaced rows, respectively. It can be concluded that pod length is a genetically controlled parameter and is less affected by the changes in the micro environment.

Number of seeds $pod^{-1}$ (Table 2) is an important parameter that directly affects yield potential of legumes. Significant higher number of 10.25 seeds was recorded for 20 cm row spacing where plants were spaced 15 cm within rows. These results do not confirm the findings of Maia *et al.* (1982) and Shahidullah and Hosain (1981), who reported that row spacing had non-significant effect on number of seeds/pod.

Total biological yield of crop for an area is dependent upon the individual plant yield. The 20 cm row spacing produced the highest

Table 1: Plant height (cm), pods/plant and pod length (cm), of mungbean as affected by different row spacing

| Row spacing (cm) | Plant height (cm) | Pods/plant | Pod length (cm) |
|---|---|---|---|
| 20 | 44.75b | 28.25a | 7.57 |
| 30 | 44.50b | 25.00b | 7.50 |
| 43 | 47.50a | 22.00c | 7.75 |
| LSD Value | 2.430 | 1.706 | 1.031 |

Means followed by different letters are significantly different at 5% probability

Table 2: Seeds pod$^{-1}$, biological yield plant$^{-1}$ (g) and grain yield plant$^{-1}$ (g) of mungbean as by different row spacing

| Row spacing (cm) | Seeds pod$^{-1}$ | Biological yield plant$^{-1}$ (g) | Grain yield plant$^{-1}$ (g) |
|---|---|---|---|
| 20 | 10.25a | 39.75a | 6.87a |
| 30 | 9.25b | 35.50a | 6.25ab |
| 43 | 8.50b | 27.75b | 5.25b |
| LSD Value | 0.7621 | 6.467 | 1.180 |

Means followed by different letters are significantly different at 5% probability level

Table 3: 100 seed weight (g), biological yield (Kg ha$^{-1}$) and grain yield (Kg ha$^{-1}$) of mungbean as affected by different row spacing

| Row spacing (cm) | 100 seed weight (g) | Biological yield (Kg ha$^{-1}$) | Grain yield (Kg ha$^{-1}$) |
|---|---|---|---|
| 20 | 4.27a | 3854a | 921.0a |
| 30 | 3.66b | 3335b | 818.8b |
| 43 | 3.25b | 3238b | 727.0c |
| LSD Value | 0.4985 | 310.4 | 85.62 |

Means followed by different letters are significantly different at 5% probability level

biological yield per plant (39.75 g) followed by 30 cm row spacing (35.50 g) (Table 2). Wider row spacing of 43 cm produced the lowest biological yield per plant (27.75 g). The results indicated that excessive inter or intra row competition decreased per plant biological yield. The results confirm the findings of Sai-babu and Garg (1988), who reported dry matter and seed yield decreased with increase in row spacing in mung bean.

Maximum grain yield per plant (6.87 g) was recorded for 20 cm row spacing, while minimum (5.25 g) was for 43 cm row spacing (Table 2). A similar result has been reported by Sai-babu and Garg (1988).

100-seed weight (Table 3) was significantly higher (4.27 g) than all other row spacings. These results are supported by Singh and Sharma (1990), who reported that narrow row spacing resulted in higher 1000-grain weight in case of soybean.

20 cm spaced rows produced significantly higher biological yield of 3854 kg ha$^{-1}$. Minimum biological yield of 3238 kg ha$^{-1}$ was recorded for row spacing of 43 cm. Results are confirmed by Kumar and Sharma (1989) who reported higher biological yield at narrow row spacing, but don't confirmed by Soni *et al*. (1991), who reported non significant effect of row spacing on biological yield.

Different row spacing, have different yield i.e., 921, 818.8, 727 kg yield ha$^{-1}$ for row spacing of 20, 30 and 43 cm, respectively (Table 3). The results are supported by Ali-khan and Kiehn (1989), Kler *et al*. (1991), Singh *et al*. (1991) and Board *et al*. (1992), who reported that narrow spacings resulted in higher grain yields in food legumes.

It may be concluded that row spacing of 20 cm (with plant to plant distance was 15 cm) is the best on the basis of present experiment.

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