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Short Communication

# Effect of different planting on the yield of mung bean (*Vigna radiata* to L.) at Sardasht of Khuzestan

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**ABSTRACT:**

The effect of different planting methods on the yield and yield components of mung bean cv. Gogar in the environmental conditions of Sardasht in Khuzestan was studied. The experiment was conducted on a field at Sardasht in Khuzestan in the agricultural year of 2015-2016. The experiment was conducted as a split plot in a completely randomized block design with four replications. Three treatments of row spacing (50, 65 and 80 cm) were considered as the main plots and three treatments of plant spacing on the row (5, 7.5 and 10 cm) were considered as sub plots. The results showed that the highest and lowest seed yield per unit area belonged to the treatments of row spacing of 50 and 80 cm, respectively (120 and 94.6 grams per square meter, respectively). Increasing the seed yield per unit area by reducing the row spacing was due to increasing the number of seeds per pod (8.7), dry pod weight (73.2 grams per square meter) and biological yield (315.4 grams per square meter). The treatment of plant spacing on the row has no significant effect on the seed yield and its components With the exception of 1000 seed weight and harvest index. The highest yield per square meter was observed in the planting pattern of five in 55 cm. The results also showed that by reducing the plant spacing between and on the rows, the seed yield increased per unit area and decreased per unit single plant. The decrease in the seed yield by decreasing the plant spacing was not reported as significant.

**Keywords:**

Planting, Khuzestan, Mung bean

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## INTRODUCTION

Increasing the yield requires the use of proper agricultural management in each region and the knowledge of physiological relationships of plant with the agricultural systems. The planting pattern and spacing in the field as one of the most important agricultural activities play an important role in the distribution of light on the vegetation (Gardner *et al.,* 2003 and Parker *et al.,* 1981 and Hassani *et al.,* 2015) and also the intra plant competition. Changing the planting pattern by decreasing or increasing the distance between and on the rows lead to decrease or increase the plant density per unit area. Different studies have shown that increasing the plant density and determining the desired density of mung bean in each area cannot maximize the amount of production alone and in this regard, the planting pattern (spacing) is so important. Determining the proper planting pattern in the mung bean is accompanied by improving the light absorption efficiency by the plant and also the uniform use of inputs. Considering the interaction between the planting density, planting patterns and environmental conditions, studying the patterns and plant densities of mung bean in each planting area seems necessary to achieve the maximum yield. However, despite the high potential of mung bean production in Sardasht in Khuzestan, the limited research has been done in this regard.

Mung bean with the scientific name of *Vigna radiata* L. is called Green gram, Mung bean or Golden gram in English. Its old scientific name has been *Phaseolus aureus* Roxb. Today, it is obvious that the agricultural mung bean is from the order of Tunicata, family of Fabaceae, subfamily of Papilionoideae, tribe of Phaseolus, genus of *Vigna* and species of *radiata*. The genus *Phaseolus*, which was introduced by Linnaeus was very large and heterogeneous at that time and included the species that had the twisted or curved style and this characteristic separated it from the genera of Hassani *et al.* (2015) having angular style (less or more than 900 degrees). Other botanists considered this impression as false and transferred some species to another existing genera or newly identified species (Hassani *et al.,* 2015).

## MATERIALS AND METHODS

This study was conducted in Sardasht in Khuzestan (29 degrees 58 minutes to 32 degrees and 58 minutes north and 47 degrees 42 minutes to 50 degrees and 39 minutes east). The experiment was conducted in a split plot in a completely randomized block design with four replications. Three treatments of row spacing (50, 65 and 80 cm) were considered as the main plots and three treatments of plant spacing on the row (5, 7.5 and 10 cm) were considered as sub plots. Since the flowering, podding and the pod maturity in mung bean do not occur simultaneously, the ripe pods were harvested once per week (Hassani *et al.,* 2015). The experimental data were analyzed by using SAS V19 software.

## RESULTS

The results of soil analysis showed that the elements of iron, zinc, manganese and copper are not required because they are located in the in the normal range (Gardner *et al.,* 2003).The highest and lowest seed yield per unit area belonged to the treatments of row spacing of 50 and 80 cm, respectively (120.1 and 94.6 grams per square meter, respectively) and the seed yield increased by decreasing the plant spacing and increasing the density that these results were consistent with the reports of Chopra and Chopra (2000) and Shukla and Dixit (1996) based on increasing the seed yield by decreasing the row spacing. Increasing the density led to increase the seed yield per unit area and decreased the seed yield per single plant. It seems that by increasing the density as a result of decreasing the spacing on and between the rows, the distribution of environmental factors such as light, nutrients and moisture between the plants was more desirably done and the

**Table 1. Some physical and chemical characteristics of the soil**

| S.No | Soil parameters | Values |
|---|---|---|
| 1 | Depth (cm) | 0-30 |
| 2 | Salinity (dS/m) | 0.78 |
| 3 | Acidity (pH) | 7.23 |
| 4 | Soil texture | Sandy loam |
| 5 | Organic carbon OC (%) | 0.58 |
| 6 | Nitrogen N (%) | 0.03 |
| 7 | Phosphorus P (%) | 7.4 |
| 8 | Potassium K (ppm) | 242.5 |
| 9 | Zinc Zn (ppm) | 0.72 |
| 10 | Iron Fe (ppm) | 5.96 |
| 11 | Manganese Mn (ppm) | 7.4 |
| 12 | Bromium Br (ppm) | 0.2 |
| 13 | Copper Cu (ppm) | 1.031 |

reaction led to increase the yield per unit area that the results were consistent with the reports of (Hassani *et al.,* 2015 and Dhoke *et al.,* 2013).

The highest and lowest 1000 seed weight was observed in the treatment of row spacing of 80 and 50 cm, respectively (42.7 and 30 g, respectively). Increasing the row spacing increased the nutritional environment for each plant and in this condition the seed share of photo assimilates was increased. This led to a significant increase in 1000 seed weight. Decreasing the spacing on the rows also led to a significant decrease in 1000 seed weight and the lowest 1000 seed weight was obtained in the spacing of 5 cm on the row and the highest 1000 seed weight was obtained in the spacing of 10 cm on the row.

The highest and the lowest biological yield per unit area were observed for treatments of row spacing of 50 and 80 cm, respectively (315.4 and 245.8 grams per square meter, respectively) and the difference between these two treatments was significant. While increasing the spacing on the row, decreasing the plant competition led to increase the plant space for growth and accumulation of dry matter per square meter, so that there was the highest biological yield in the spacing of 50 cm between the row and 10 cm on the row (345.7 grams per square meter). The highest and lowest biological yield per single plant belonged to the spacing on the row of 10 and 5 cm, respectively (19.4 and 9 grams per plant, respectively). The difference between all three treatment levels was evaluated in terms of the characteristic of significant biological yield. The presence of enough space for the development of plants and leaves, and also an increase in the nutritional level of each of plants led to increase the biological yield per single plant in lower density that these results were consistent with the reports of Shukla and Dixit (Shukla and Dixit, 1996; Dhoke *et al.,* 2013; Parker *et al.,* 1981). The highest biological yield (per single plant) was in the planting pattern with the spacing of 10 cm on the row and 80 cm between the rows (20.6 grams per square meter).

Decreasing the row spacing and consequently increasing the density led to increase the dry matter of pods per unit area. The dry matter of pods per unit area was significantly higher in the treatment of 50 cm (73.2 grams per square meter) than other treatments. Increasing the spacing on the rows caused a significant increase in dry matter of pod per plant and the highest dry matter of pod per plant belonged to the treatment of 10 cm spacing on the row (2.4 g per plant). Pod dry matter, harvest index and biological yield with 20, 20 and 19 per cent (respectively) had the highest contribution to the changes in the seed yield per unit area. In the condition of single plant, the biological yield (60%), harvest index (27%) and number of seeds per pod (2%) had the highest contribution to the changes in the seed yield per plant, respectively.

## DISCUSSION

According to the results, it seemed that increasing the number of plants per unit area on the one hand and non-significant decrease in seed yield per single plant, on the other hand increased the seed yield (137.5 grams per square meter). In this planting pattern, while decreasing the spacing between and on the rows in the planting pattern was closer (5 x 55 cm) and subsequently increasing the plant density per unit area decreased the plant yield per unit area. The test results of soil experimented are observed in Table 1. The results of measuring elements in Table 1 showed that the soil did not need the macro and micro elements such as Zn, K, Fe, Mn, Cu as chemical fertilizer. From this day, pH and structure of the soil were determined after the measurement and it was completely compatible with the conditions needed to test. In his experiments, Shukla found that number of pods per plant and seeds per pod are the most sensitive parameters to changes in density and planting date among the yield components. Also, regarding the effect of density on the seed yield, it can be said that in low densities (33.13 plants per square meter) a remarkable part of the solar radiation is not absorbed in the early stages of growth due to the lack of sufficient vegetation and thus the yield that is the result of photosynthesis, dry matter accumulation and its transfer to the seed is reduced. On the other hand, it seems that in the high densities (33.33 plants per square meter), increase in the competition, shading of other plant increase, transfer of photosynthetic matters to seeds is less and thus the seed yield is decreased compared to the low densities due to production less pods per plant.

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