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The effect of different nitrogen levels on seed yield and morphological characteristic of mungbean in the climate condition of Khorramabad

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ABSTRACT

In order to evaluate and determine the appropriate nitrogen fertilization the morphological characteristics and seed yield of mungbean three cultivars, an experiment was done as split plot based on randomized complete block design with four replications in summer 2011 in the city of Khorramabad. In this study, different levels of nitrogen fertilizer (control, 50, 100, 150 kg/ha urea) as sub-plots and three mungbean cultivars (Partow, Gohar, locally) was considered as the main factor. The result of analysis variance on morphological characteristics on seed yield showed that between different cultivar in the eyes of first pod height and seed yield were significant at 5% level probability. In addition, between different amounts of nitrogen fertilizer for stem diameter and number of node and seed yield showed significantly different. Interaction between urea fertilizer and cultivars, number of nodes and seed yield were significant effect at 1% and 5% level probability. The highest seed yield of 8.9 grams per square meter and the number of sub-branches with (1.5) and the height of the first pod from ground level with (25.51 cm) and stem diameter (1.13 cm) and number of nodes (8.28 pcs) and pod length (7.5 cm) was obtained at 150 kg/ha urea. Between different amount of nitrogen fertilizer, 150 kg/ha urea, showed higher values than the other. In this experiment, 150 kg/ha nitrogen fertilizer with partow cultivar (V1) is the most appropriate treatment and suitable for this region.

Keywords: mungbean, nitrogen fertilizer, morphological characteristics, seed yield.

INTRODUCTION

Mungbean (Vigina Radiata Wilczek) is one of the worth of crops rich in protein. Mungbeans seed are rich in Protein that is used completed, split peas or flour. Compared with the varieties mungbean very easily digestible, palatable and tastier. Its seed for produce soup, seasoned rice and ... is used. Green beans used in the cannery. Its straw used in animal nutrition and weight does not create them. Mungbean agricultural as green manure can be used to strengthen the ground. Mungbean causes biological stabilized nitrogen of soil and interfere between soil erosion [4]. Mineral nutrition of plants is still one of the most important factors determining the final production plants [7]. Nitrogen is an essential nutrient that needed to grow plants that large amount of it, needed for plant growth that its deficiency in the soil is usually common. Soil mineral fertilizers in agricultural systems are important institutions because the need for food plants resolves in the shortest possible time. Nitrogen deficiency reduces the number of branches per plant, plant height, stem diameter, pod length, number of nodes [5]). Mungbean was one of the major crops having a

high percentage of protein as one of the major sources plant protein, in human nourishment. In addition is planting widely in Iran knowing about echo- physiologically factors affecting growth can be an important step in increasing production. Adequate nitrogen is one of the most important management factors that cause increasing in seed yield [4]. Amount of nitrogen in crop establishment, competitive ability, and its performance is impressive. Nitrogen deficiency cause reduce early vigor and crop yield will be reduced accordingly [9].Considering given the amount of nitrogen fertilizer depends on many factors, including plant type, variety, climate and soil conditions, crop management, and so on. Therefore suitable for the determination of suitable application of nitrogen to enhance performance and improve morphological properties of mungbean plant this experiment is carried out.

METERIALS AND METHODS

This experiment in summer 2011 in Khorramabad with latitude 33 degrees 29 minutes North and longitude 48 degrees 21 minutes east, and the height of 1250 m above the sea was conducted. Then select a site plan and before any operation, land preparation samples consisting of 30-0 cm depth was selected at random from several points were prepared and sent to the laboratory for analysis. The analysis showed that the soil texture was clay (Table 1). The experiment was done in split plot arranged in a randomized complete block design with four replications. Factors were included cultivars in three levels (Partow, local, gohar) in main plots and four levels of urea (control, 50,100,150 kg/ha) were placed in the subplots. For prepared the land at first by using the moldboard plow was relatively deep. Then, for easy leveling of soil, the trowel was used. The distance between rows was 50 cm and between repetitions of the experiment was 2.5 meters.

Table 1: Results of the chemical analysis of experiment site soil before cultivation

Optimum range	results	analysis
‹2	0.51	ds/s salty
6.5- 7.8	7.2	PH
‹15	35.2	Na(%)
Loam Clay ‹Loam	Clay	Soil Texture
1.5‹	1.48	C(%)
0.17‹	0.139	Total N(%)
14	2.8	Fe PPM
13	1	Mg PPM
2.2	0.44	Zn PPM

Each plot consists of 5 lines planted 5 meters in length. The distance between plants was 10 cm deep plowing done fall season before. Half of urea fertilizer in the planting time in the shape of strip along the ridges was used. The remaining half of the urea applied 45 days after planting. First irrigation immediately after planting and next irrigation with considering the plant needs and environmental conditions was conducted. During the growing period tear up the weeds was done manually. Final harvest of each plot was equivalent to 4 square meters 10 plants from each plot were randomly selected and yield components were counted and the average was calculated.

Data were analyzed using the software SAS - MSTATC and graphs were plotted using EXCEL software and statistical comparison was done by Duncan test at 5% level.

RESULTS AND DISCUSSION

Number of sub branches per plant

The results of the variance analysis showed that the effect of varieties on number of sub branches per plant was not significant at any level. Thus, the number of sub branches did not affected by variety and urea fertilizer (Table 2). In addition, the number of sub branches was not affected by the interaction effect (table 2). Mean comparison showed that the interaction of the partow (V1) × 150 kg/ha urea (N4) (1.75 ounce) obtained the highest number of sub branches. Sub branches trait is a genetic trait and less affected by environmental factors and nitrogen fertilizer is more stable than other traits [6].

However, can be seen in the number of branches increased with increasing nitrogen. This can be it justifies that increaseing nitrogen can increase factors such as root growth, increased leaf area, increasing the number of leaves and at last vegetative growth and uses of environmental factors would be better. Because the plant is growing well and fast.

Height of the first pod from ground level

The results showed that effect of variety on the height of the first pod was significant at five percent level (Table 2). Thus, there are significant differences between cultivars for this trait. So that the minimum height of the first pod from ground, related to gohar variety (Figure 1). In various experiments conducted by researchers determined that the height of the first pod from ground level is a genetic factor and only in special cases, such as increases too much nitrogen can be changed. The results obtained with the results [9,3] are consistent. Urea fertilizer did not affect height of the first pod from ground surface and this difference of any level was not significant. but in mean comparison it was observed that the maximum height of the first pod from ground surface in 150 kg/ha nitrogen (25.51 cm) and the minimum height of the first pod from ground level at 100 kg/ha nitrogen (18.14 cm) was observed.

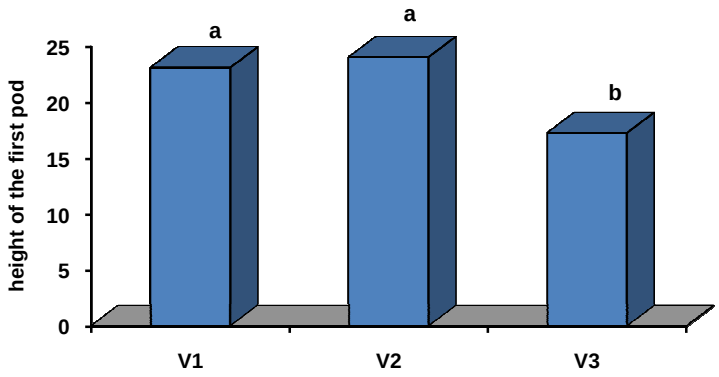

Figure 1: Effect of mungbean variety on height of the first pod

Stem diameter

Results showed that the effect of variety on stem diameter at any level is not significant. It can be said that stem diameter figures did not affect by variety (Table 2). Stem diameter affected by nitrogen fertilizer (Table 2) and was significant at 1% level probability. In mean comparison showed that the highest stem diameter at 150 kg/ha nitrogen (N4 =1.31 cm) and minimum stem diameter obtained from control (no fertilizer). One of the main reasons for the increase in the amount of 150 kg/ha nitrogen is increasing amount of nitrogen, but the lack of nitrogen can reduce the number of sub branches, and at last stem diameter is reduced and eventually the results with the results of Hatami et al (1992) is consistent. Stem diameter were not affected by the interaction effect.

Number of nodes

The results of variance analysis showed that the effect of varieties on number of nodes did not significant at any levels (Table 2). Therefore, all of varieties did not different with each other in the number of nodes on the main stem, did not differ. Urea fertilizer affected number of nodes on the main stem, and it was significant at 1% level probability (Table 2). Mean comparison showed that the maximum numbers of nodes on the main stem at 150 kg/ha urea (8.28) and the minimum number of nodes on the main stem obtained from control treatment (5.14). Therefore, it can be concluded by increasing the amount of nitrogen in mungbean plots (N4) increased the concentration of hormones that increase the hormones increase the length between the nodes and at last causes increase the number of nodes on the main stem of the mungbean plant. These findings with Zand & Ghaffari , 1993 and Ghaffari & Musapur, 1999 is consistent. The number of nodes affected by the interaction of cultivar × nitrogen and it was significant at 1% level probability. The maximum number of nodes obtained from V1N4 (9.35 numbers).

Pod length

The results of variance analysis showed that the effect of varieties and urea fertilizer and interaction between them were not significant at any levels on pod length (Table 2). Thus, the varieties were not affected pod length (Table 2). So that this can be justified Khorramabad region because of the high temperature of 30 degrees in July through September moisture evaporation from the soil surface is highs so the warm weather and high humidity, evaporation from the soil surface during the growing season, mungbean, pod length decreases [8]. Despite the large amount of urea (150 kg/ha) those events will not occur. Results with the results of the test Akbari et al, 1373in the case of two cultivars of bean are consistent.

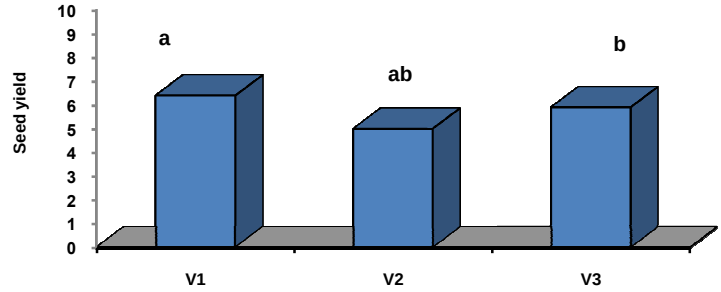

Figure 2: effect of variety on seed yield

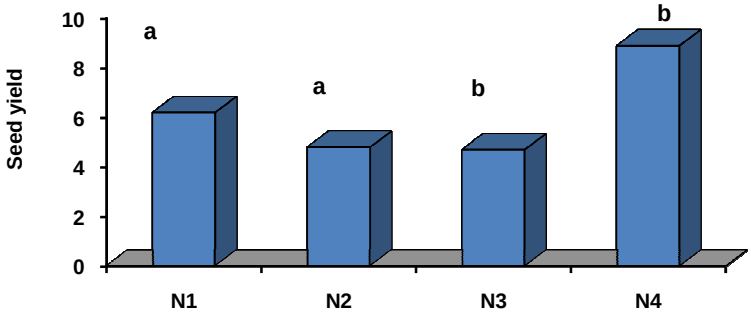

Figure 3: effect of nitrogen fertilizer on seed yield

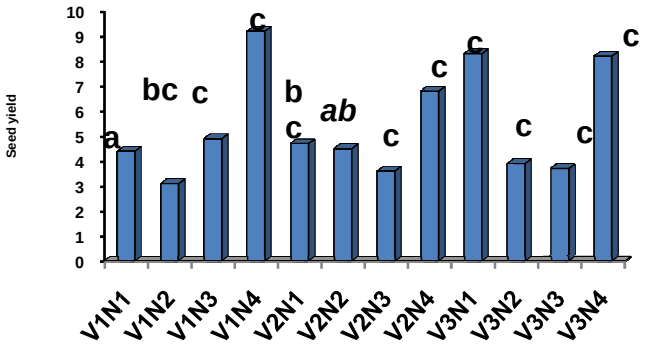

Figure 4: Interaction between variety and nitrogen fertility on seed yield

Seed yield

The results of variance analysis (Table 2) showed that the effect of varieties on seed yield was significant at 5% level probability (figure 2). According to the mean comparison, Gohar variety (5 grams per square meter) had the lowest amount and Partow variety had the highest seed yield. Seed yield was affected by urea and this difference was significant at 1% level probability (Table 2). The yield was affected by the interaction of cultivar × urea, and this difference was significant at the five percent level (figure 3, 4). According to the mean comparison, the highest seed yield observed from V1N4 (9.2 grams per square meter). In control treatment of urea fertilizer early growing season because of mungbean, faced with a situation and nitrogen entering the plant is sufficient for all operations of the plant, such as leaf production, development and production of parts and have strong meristematic cells. However, in trifoliate stage because the root nodes are not well established it faced with lack of nitrogen fixation and seed decreased. These results with experiments Sarparast et al, 2000 is consistent

Table 2: Variance analysis of traits were measured

Mean Squares (MS)							
Variations Resources	**df**	**Number of Sub branches**	**Plant length to first pod**	**Stem diameter**	**Number of nods**	**Pod length**	**Seed yield**
Replication	3	0.035 ^{ns}	5298 ^{ns}	0.096 ^{ns}	0.223 ^{ns}	0.448 ^{ns}	0.04 ^{ns}
Varieties(A)	2	0.036 ^{ns}	117.25*	0.025 ^{ns}	0.788 ^{ns}	1.42 ^{ns}	0.221*
Error a	6	0.064	38.59	0.033	0.529	0.497	0.05
Nitrogen fertilizer(B)	3	0.126 ^{ns}	110.93 ^{ns}	0.438*	23.49**	1.44 ^{ns}	0.31**
Interaction (A×B)	6	0.151 ^{ns}	65.42 ^{ns}	0.117 ^{ns}	2.43**	1.07 ^{ns}	0.16*
Error b	27	0.086	54.11	0.076	0.65	0.87	0.05
CV(%)	-	21	28	3.2	22	13	25

*Ns, *, ** are insignificant, significant at probability levels of 5 and 1 percent, respectively*

CONCLUSION

The results of this study showed that the height of the first pod was affected by varieties. On the other hand, nitrogen fertilizer affected stem diameter and number of nodes. In summary, the results and its main purpose of this experiment caused to introduced the planting of 150 kg/ha, nitrogen fertility (N4) with Partow variety (V1) as better treatment. The highest biological yield, seed yield, yield components (number of pods per plant), pod length, number of nodes, were obtained from this treatment.

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