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Performance Evaluation of Improved Mung Bean (*Vigna radiata* L.) Varieties at Kile Harari People Regional State

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Abstract: Mung bean (*Vigna radiata* L.) also known as Green gram is a self-pollinated leguminous crop and is among the most important pulse crops of the world. The experiment was conducted at Kile village of Harari regional state on farmers' field during the main cropping season under rain fed with the objective to investigate and select the best adapted mung bean variety for the study area. The experiment consisted of seven mung bean varieties including local check arranged in randomized complete block design with three replications. The analysis of variance revealed that there was significant ($P < 0.05$) difference among the varieties for number of branch per plant, pod per plant, seed per pod and grain yield. The analysis of variance showed that there was no significant ($P > 0.05$) difference among the varieties for plant height and number of bunch per plant. Showa robit gave the highest (969.8 kg/ha) grain yield followed by Borda (MH-97-6) (947.8 kg/ha) while the lowest (637.4 kg/ha) was obtained from local check. Shawa robit and Borda variety gave 52.12% and 48.7% yield advantages respectively over the local check. Therefore, Showa robit and Borda (MH-97-6) improved mung bean varieties were recommended for further demonstration to the study area and similar agro-ecologies.

Keywords: Performance, Variety, Mung Bean

1. Introduction

Mung bean (*Vigna radiata* L.) also known as Green gram is a self-pollinated leguminous crop and is among the most important pulse crops of the world. It has great value as food, fodder and green manure. The economic product of mung bean is the seed grain, which is a good source of dietary protein. This crop can be successfully grown on marginal lands where other crops perform poorly [6]. Mung bean is thought to have originated in the Indian sub-continent where it was domesticated as early as 1500 BC. Cultivated mung beans were introduced to southern and eastern Asia, Africa, Austronesia, the Americas and the West Indies. It is now widespread throughout the Tropics and is found from sea level up to an altitude of 1850 m [10].

As it is a recent addition to the Ethiopian pulse production, mung bean was grown in few areas of north Showa zone and currently becoming popular in other parts of the low land of country. In view of its importance as cash crop and short maturity, its production has increased in Ethiopia from 27,085.92 ha with average seed yield of 966 kg ha^{-1} in 2015/16 cropping season [1] to 37,774.30 ha with average production of 1136 kg ha^{-1} in 2016/17 cropping season [2]. Ethiopia Commodity Exchange (ECX) announces the debut of a new commodity, green mung bean, into its trade floor. Green mung bean is the sixth product that Ethiopian Commodity Exchange is trading. Coffee, sesame, white pea beans, maize and wheat have been traded in Ethiopian Commodity Exchange so far. Mung bean is mostly produced in Amhara regional state particularly in some areas of North Shewa and South Wollo as well as in some woreda's of Benishangul Gumuz regional state [4]. Despite its growing demand in the international market there is chronic supply gap in Ethiopia from the production side. However Ethiopia's mung bean export has grown slightly from time to time [3].

There is a need to expand its production to potential areas

where moisture stress is confront for producing long maturing crops like the low land of eastern Ethiopia. The study area is potential for lowland pulses like mung bean. However, the improved varieties are not yet introduced to farmers in moisture stress areas particularly in Harari region. Therefore, this activity was carried out to investigate and select the best adapted mung bean variety for the study area.

2. Materials and Methods

2.1. Description of the Study Area

The experiment was conducted at Harari regional state, kile village on farmers' field during the main cropping season. Geographically, Kile lies at an altitude of 1300-1800 meters above sea level. The mean annual rainfall of the district was 400mm and maximum and minimum rain fall is 500mm and 300mm, respectively. Like some part of Ethiopia, kile district was characterized by the bimodal rainfall pattern. The first season was characterized by the short rainy season (*Belg*), which extends from March to May, while the second season which is the most important main rainy season (*Meher*) extends from July to October. The dry-spell period was extends from June to July and based on its duration, it may affect crop growth. The minimum and maximum temperature of the area was 25°C and 35°C, respectively with the annual average of 30°C (Harari BoA, 2016, unpublished).

2.2. Experimental Material and Design

Six improved varieties of mung bean, Chineses, Showa robit, NV, Borda (MH-97-6), NVL-1, Rasa (N-26) and Local check were used in this study. The experiment was laid out in RCB design with three replications. The size of each experimental plot was $7.2m^2$ (3m wide and 2.4m long). The mung bean varieties were randomly assigned to the experimental plots. The row spacing used was 40 cm and plant spacing was 10 cm. 20 kg/ha urea was used as starter and recommended amount of NPS fertilizer was applied at planting. All recommended agronomic practice was done as its recommendation.

2.3. Data Analysis and Management

2.3.1. Data Collected

Data of plant height (PH), number of branch per plant (NBr), number of bunch per plant (NBn), pod per plant (PP), seed per pod (SPP) and grain yield (GY) per hectare were collected.

2.3.2. Statistical Data Analysis

Analysis of variance was carried out using Gen Stat discovery 18th edition software for the parameters studied following the standard procedures outlined by Gomez and Gomez (1984). The means were separated using the Duncan Least Significant Difference (LSD) test at 5% level of probability.

3. Results and Discussion

Analysis of variance (ANOVA) indicated that there was significance (P<0.05) difference among mung bean varieties for number of branch per plant, pod per plant, seed per pod and grain yield per hectare tested at 5% probability level. However, no significance difference was observed between varieties for plant height and bunch per plant (Table 1).

3.1. Plant Height

Analysis of variance showed that there was no significance (P>0.05) difference for plant height among mung bean varieties (Table 1). The current finding is in line with researchers who reported non-significant result for plant height [11].

3.2. Number of Branch Per Plant

The analysis of variance showed that there was significance (P<0.05) difference for number of branch per plant among mung bean varieties. The highest (1.533) branch per plant was obtained from showa robit followed by borda and rasa and the lowest (0.533) gained from chineses variety (Table 1).

3.3. Number of Pod Per Plant

The analysis of variance revealed that there was significance (P<0.05) difference for number of pod per plant among varieties. Showa robit and chineses mung bean variety gave the highest (20.67) and the lowest (12) pod per plant respectively (Table 1). The current results are line with the finding of researchers who reported the highest pod per plant for showa robit mung bean variety [11, 13].

3.4. Seed Per Pod

There was significance (P<0.05) difference for seed per pod among varieties. The highest (11.9) seed per pod was obtained from rasa followed by showa robit and local check gave the lowest (9.0) (Table 1). The results are in agreement with those of researchers who reported difference in seeds per pod among the cultivars might be due to genetically determined differences [5, 12, 13].

3.5. Grain Yield Per Hectare

The analysis of variance showed that there was significance (P<0.05) difference for grain yield among varieties. The highest (969.8 kg ha^{-1}) grain yield was obtained from showa robit followed by borda (947.8 kg ha^{-1}) and the lowest (637.4 kg ha^{-1}) was from local check (Table 1). The current results are in agreement with those of researchers who reported that various cultivars of the same species grown in the same environment give different yields as the performance of a cultivar mainly depends on the interaction of genetic makeup and environment [8, 9]. The results are also in line with the finding of researcher who reported maximum grain yield 786.8 kg/ha was harvested from borda followed by rasa (662.1kg/ha) [7]. Similarly reported the

highest yield obtained from showa robit variety [11].

Table 1. The mean of growth, yield parameters and yield for mung bean varieties at Kile Harari.

Varieties	PH (cm)	NBr	NBn	PP	SPP	GY (kg/ha)
Chineses	26.87	0.533[d]	4.767	12[b]	10.67[ab]	790.2[ab]
Showa robit	26.33	1.533[a]	5.333	20.67[a]	11.23[a]	969.8[a]
NV	27.33	1[c]	5	15.8[ab]	10[ab]	901.1[ab]
Borda (MH-97-6)	27	1.433[ab]	4.9	17.2[ab]	10.9[ab]	947.8[ab]
NVL-1	27.33	1.1[bc]	4.533	15.33[ab]	11.1[ab]	919.5[ab]
Rasa (N-26)	28.7	1.433[ab]	5.9	17.23[ab]	11.9[a]	926.7[ab]
Local check	24	1.1[bc]	5	14.9[ab]	9[b]	637.4[b]
LSD (5%)	NS	0.3569	NS	5.574	1.93	287.6
CV%	10.3	17.3	26.9	19.4	10.2	18.6

NS: non-significant, Means in the same column sharing the same letter(s) are not significantly different at P<0.05. PH=plant height, NBr=Number of branches, NBn=Number of Bunches, PP=pod per plant, SPP=seed per pod, GY=grain yield.

4. Conclusion and Recommendation

Mung bean (*Vigna radiata* L.) also known as Green gram is a self-pollinated leguminous crop and is among the most important pulse crops of the world. The experiment was conducted at Kile village of Harari regional state on farmers' field during the main cropping season under rain fed. Varieties showed significant (P<0.05) difference for number of branch per plant, pod per plant, seed per pod and yield per hectare. Accordingly showa robit and borda (MH-97-6) gave the highest as compared to local check and other varieties. Furthermore, Showa robit and Borda (MH-97-6) showed 52.12% and 48.7% yield advantage over the local check respectively. Therefore showa robit and borda mung bean varieties (MH-97-6) were recommended for further demonstration to the study area and similar agro-ecologies.

Acknowledgements

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