Characterization of Mung Bean (*Vigna radiata* L. Wilczek) Accessions using Quantitative Traits

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KEYWORDS

Mung bean,
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ABSTRACT

An experiment was conducted at the Crop Science and Horticulture Agricultural farm, Nnamdi Azikiwe University Awka, to study the characterization of 5 mung bean accessions using quantitative traits.The five mung bean genotypes were :Tvr 72,Tvr73,Tvr98,Tvr77 and Tvr 8.The randomized complete block design experiment that was replicated 3 times showed a reasonable level of variations in the mung bean accessions. Tvr8 had the highest plant height (52.7cm) while Tvr73 had highest number of leaves (43). Tvr77(26) and Tvr8(25.9) had highest number of pods, highest number of seeds per pod(12.8) and (13.6) and also the longest pods(9.23) and (9.7) respectively. Traits like pod colour, seed colour, pigmentations are qualitative and were not affected by the environment. Tvr77 and Tvr8 accessions are therefore, recommended for use in mung bean seed production while Tvr73 is recommended for forage production. The findings from this Research can be used for the selection of genotypes for breeding purposes in mung bean.

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INTRODUCTION

Mung bean (*Vigna radiata* L.) commonly known as green gram is an ancient and well-known pulse crop that belongs to family Papilionoideae and originated from South East Asia (Agugo, 2017). Mung beans are mainly grown for human food, in the form of boiled dry beans, stew, flour, sprouts and immature pods as a vegetable (Chadha,2010). The dry beans are sometimes used for poultry feed. , Roasted or boiled mungbean is used as fodder (Agugo,*et al.*, 2010). Thus, it has great value as food and fodder. Mungbean is a cheap source of protein for human consumption. According to Olumike (2014), the nutrient composition of the seed of mung bean contains 20–24% protein, 9.4% moisture, 2.1% oil, 2.05% fats, 6.4% fiber, 343.5 kcal per 100 gram energy, carbohydrates and a fair amount of vitamin A and B. In addition, the protein and carbohydrate contents of mung bean are more easily digestible than proteins derived from other legumes (Ebert *et al*.,2014). On the other hand, mung bean fixes atmospheric N_2 and enriches the soil with N nutrient for the growth of succeeding crops (Idoko and Ajayi, 2013). Moreover, the crop can be successfully grown on marginal lands where other crops perform poorly and most suitable for green manure use (Das,*et al*.,2014).Mung bean has special features such as its earliness in maturity, supply of good yield, drought-resilient property that makes it highly responsive in scanty rainfall and its ability to stimulate striga without being parasitized (Agugo, 2017). The crop also has good nutritive value and reasonable cost for the

consumers (Asrate *et al.,* 2012). Also, mung bean can be used for diabetic patients and it reduces cancer growth in lung and stomach cells. It reduces heart disease risk by reducing low density lipoprotein cholesterol and protects the low density lipoprotein particles from interacting with unstable free radicals. Quantitative traits are measurable phenotypes that show continuous variation over a wide phenotypic range and are influenced by the environment(Fery,2002).They include;plant height, mumber of pods per plant, days to flowers, days to first pods, number of seeds per pod. The main objective of the study was to characterize the 5 mung bean accessions using their quantitative traits.

MATERIALS AND METHODS

Experimental Site:

This research was carried out at the Crop Science and Horticulture Research Farm of Nnamdi Azikiwe University Awka, South East Nigeria, The vegetative cover was dominated by both grasses particularly the spear grass (*Imperata cylindrical*), Elephant grass (*Pennisetumn purpureum*) and broad leaf weed like Wild sunflower (*Aspilia africana*) and the Siam weed (*Chromolaena odorata*) and the land was previously used for inter cropping of cassava with maize.

Source of Materials:

The genotypes of mung bean used for this research were gotten from International Institute of Tropical Agriculture (IITA) Ibadan. The treatments used for this research include:

(1). Tvr8 (2).Tvr72 (3).Tvr73 (4).Tvr77 (5).Tvr98 **Agronomic Practices:** Normal agronomic activities were observed and data collected included :Percentage Emergence(%):,Plant height(cm):Days to Flowering, Number of leaves per plant, Number of branches per plant, Number of Pods Per Plant, Pod length(cm),Pod weight(g),Number of seeds per pod.

Statistical Analysis:

The data obtained from the various observations were subjected to statistical analysis by using analysis of variance while differences of the treatment of means were tested using least significant difference at 5% level of probability. Agronomic traits were tested using Genstat 12thedition.

RESULTS:

Table1. showed that there was variability in plant heights at 2, 4, 6, and 8 weeks after planting. At 2 weeks after planting,Tvr72(19.3cm)had the highest plant height while the other genotypes did not vary significantly for example TVr8 (17.7cm). At 4 weeks, the five genotypes did not vary significantly. At 6 weeks, Tvr72 (29cm),Tvr73 (28cm) and Tvr8 had the highest plant heights followed by Tvr98 and Tvr77 which did not vary. At 8 weeks, Tvr8 had the highest plant height (52.7cm), followed by other 4 accessions which did not significantly vary.

Table 1. Effect of mung bean genotypes on plant height (cm)

TREATMENTS	Weeks after planting			
	2	4	6	8
Tvr72	19.3b	24.7b	29.0b	50.0ab
Tvr73	16.3ab	27.7b	28.3b	50.3ab
Tvr98	17.3ab	24.7b	26.3ab	51.3ab
Tvr77	16.3ab	25.7b	23.3ab	51.8ab
Tvr8		25.7b	27.3b	
	17.7ab			52.7a

Means with the same letter(s) under the same column are not significantly different ($P \leq 0.05$) using Duncan Multiple Range test (DMRT).

Table 2. At two and four weeks after planting, number of leaves of the accessions did not significantly vary. At 6 weeks after planting,Tvr8(21.33) was the least. At 8 weeks after planting, Tvr73(43.05cm) had the highest number of leaves but not significantly different from Tvr98(42.67cm),Tvr77(42.08cm) and Tvr8(38.40). while Tvr72(28.07cm) had the least number of leaves. Table 2.

Table 2. Effect of mung bean genotypes on the number of leaves.

TREATMENTS	**Weeks after planting**			
	2	4	6	8
Tvr72	6.83a	20.08a	28.33b	28.07ab
Tvr73	6.67a	22.83a	27.33b	43.05b
Tvr98	8.00a	20.33a	28.00b	42.67b
Tvr77	6.33a	22.50a	31.00b	42.08b
Tvr8	6.67a	21.17a	21.33ab	38.40b

Means with the same letter(s) under the same column are not significantly different ($P \leq 0.05$) using Duncan Multiple Range test (DMRT).

At two weeks, Tvr98 (2.33) had the highest number of branches,other genotypes were not significantly different.At weeks 4 and 6, the genotypes number of branches were not significantly different.Table.3. All the genotypes had emergence that is 50% and above at four days after planting.

Table 3. Effect of mung bean genotypes on number of branches and Days to 50% Emergence

TREATMENTS	**NO OF BRANCHES**			**Days To 50%**
	2 WEEKS	4 WEEKS	6WEEKS	Emergence(4days)
	2	4	6	
Tvr72	2.00ab	4.03a	5.57a	50
Tvr73	2.00ab	4.17a	5.90a	50
Tvr98	2.33b	4.47a	5.87a	56
Tvr77	2.00ab	4.37a	6.17a	50
Tvr8	2.00ab	4.17a	5.97a	50

Means with the same letter(s) under the same column are not significantly different ($P \leq 0.05$) using Duncan Multiple Range test (DMRT).

There was no significant difference ($P \leq 0.05$) in the number of flowers among the varieties. Table 4.

Table 4. Effect of mung bean genotypes on flower number.

TREATMENTS	**Weeks after planting**		
	4	6	8
Tvr72	4.83a	8.08a	7.73a
Tvr73	7.40a	10.58a	8.07a
Tvr98	7.33a	9.58a	6.75a
Tvr77	6.50a	10.17a	8.97a
Tvr8	5.67a	8.92a	7.13a

Means with the same letter(s) under the same column are not significantly different ($P \leq 0.05$) using Duncan Multiple Range test (DMRT).

Table.5 showed that there was slight variability in the pod characteristics. There was significant difference ($P \leq 0.05$) in the pod lengths Tvr77(9.23cm) and Tvr8(9.7cm) had the longest but similar pod lengths. Tvr73(7.87cm) and Tvr98 (7.9cm) accessions were the least. At 8 weeks, highest number of pods came from Tvr77(26) and Tvr8(25.9) which were significantly the same.The least values also came from Tvr73(16.83cm) and Tvr98(13.07cm)accessions. On number of seeds/pod, Tvr77(12.8) and Tvr8(13.6) had the highest number of pods but not significantly different from the other genotypes.

Table.5 Effect of mung bean genotypes on pod characteristics

Accessions	Pod length(cm)	Pod weight(g)	Number of Pods/plant		Seed/pod
			6WEEKS	8WEEKS	
Tvr72	8.57a	14.00a	15.33bc	21.08a	11.13b
Tvr73	7.87ab	9.67a	15.10abc	16.83a	11.47b
Tvr98	7.90ab	14.00a	15.08bc	13.07a	11.60b
Tvr77	9.23a	12.33a	17.67ab	26.00b	12.87b
Tvr8	9.70a	14.67a	15.28ab	25.90b	13.67b

Means with the same letter(s) under the same column are not significantly different ($P \leq 0.05$) using Duncan Multiple Range test (DMRT).

DISCUSSION

The experiment was conducted to study the characterization of 5 mung bean accessions using qualitative and quantitative traits. The experiment showed a reasonable level of variations in the mung bean accessions and this is in line with the findings of Paven *et al.,* (2019). Tvr8 had the highest plant height (52.7cm), Tvr73 had the highest number of leaves (43).On yield parameters, Tvr77(26) and Tvr8(25.9) had the highest number of pods, the highest number of seeds per pod,(12,8) and (13.6) and also the longest pods(9.23) and (9.7) respectively. This is in harmony to the findings Rasul *et al*.,(2009); Ebert,(2014); and Sajjan *et al*., (2002), who reported that genetic constitution of crop varieties influence their growth characters. Mehmet *et al* .,(2014) and Imran *et al* (2015) also attributed the growth characters of crop species not only to genetic constitution of the crop but also to the suitable agro-ecological zone where they can express their full genetic resources for growth and yield enhancement. Higher number of branches, plant height,flowers, pod size pod number observed in Tvr77 and Tvr8 could possibly be attributed to the utilization of its good genetic make-up to exploit the favourable agro-ecological conditions of the study area for rapid growth and branching. This is also in harmony with the reports of Ebert,(2014) and Ray and Sofie *et al*., (2011) who attributed the growth characters of crop species not only to genetic constitution of the crop but also to the suitable agro-ecological zone where they can express their full genetic resources for growth and yield enhancement Traits like petiole and pod colour, seed colour, pigmentations are qualitative and not effected by the environment. colour in their study involving accessions from Andhra Pradesh.Traits like pod colour, seed colour, pigmentations are qualitative and not effected by the environmentPaven *et al.,* (2019). We therefore recommend Tvr77 and Tvr8 accessions for use in mung bean seed production and Tvr73 for forage production, as a cover crop and for poor soils remediation. The findings from this Research can be used for the selection of genotypes for breeding purposes in mung bean.

CONCLUSION

In conclusion, The experiment revealed significant variations among the mung bean accessions, particularly in quantitative traits related to plant height, number of leaves, pods, seeds per pod, and pod length. These findings align with previous studies emphasizing the influence of genetic constitution and agro-ecological conditions on crop growth and yield. Additionally, qualitative traits such as pod and seed color were observed, providing further insights into the genetic diversity of the accessions. Based on these results, Tvr77 and Tvr8 are recommended for mung bean seed production, while Tvr73 is suitable for forage production. Overall, these findings provide valuable information for genotype selection and breeding efforts in mung bean cultivation.

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