INTERNATIONAL JOURNAL OF PLANT, ANIMAL AND ENVIRONMENTAL SCIENCES
IJPAES

Volume-3, Issue-3, July-Sept-2013

ISSN 2231-4490
Coden : IJPAES www.ijpaes.com

Received: 1st Mar-2013 Revised: 10th Mar-2013 Accepted: 13th May-2013

Research article

YIELD EVALUATION OF SOME CULTIVARS OF MUNGBEAN (*Vigna radiata* (L) WILCZEK) IN SOUTHERN GIUNEA SAVANNA LOCATION OF NIGERIA.

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ABSTRACT: Field experiment was conducted in the early and late seasons of 2006 to determine Mungbean (*Vigna radiata* (L) Wilczek) cultivars that are high yielding in the guinea savanna zone of Nigeria. The experiment was sited at the research farm of the university of Agriculture, Makurdi, Nigeria. Treatments included five mungbean cultivars (local variety, Vc 2768A, Vc 1178A, Vc 2778A, and Vc 1973A) arranged in a complete randomized block design with three replications. Parameters assessed included plant height (cm), number of branches per plant, number of nodules per plant, number of pods per plant, 1000 seed weight (g) and grain yield (kg/ha). The result showed that there was no significant difference between the cultivars in terms plant height and the number of branches per plant, Vc 2768A was the tallest cultivar while Vc2778A was the shortest. Number of nodules per plant differed significantly between the cultivars. Vc 2768A gave the highest grain yield of 2266.67kg/ha while the lowest yield of 441.67kg/ha was obtained from Vc 2778A lower than the yield obtained from local variety (891.67kg/ha). In conclusion, cultivar Vc 2768A which gave the highest grain yield can be used by resource poor farmers in the southern Guinea Savanna Agro-ecological zone of Nigeria.

Key words: South Guinea Savanna, Cultivar, Yield

INTRODUCTION

Mungbean (*Vigna radiata*) is an ancient and widely used pulse crop. It belongs to the family of leguminocea. It originated from India and has not been widely domesticated in tropical Africa (Rowland, 1993). In some parts of the world, it is referred to as green gram or golden gram. It is extensively grown in south, southeast and east Asia, and in East Africa. In the United States, production is mainly in California and the South Central States (Fuller, 2007). It has just been introduced into Nigeria and is getting its place in Plateau State and some northern states (Douglas *et al*., 1982). It is relatively a drought tolerant crop and varieties that mature in 60 – 70 days are available. Mungbean is a grain legume among other legumes and is capable of fixing nitrogen through symbiosis with a rhizobium species into the soil (Fuller, 2007). The mungbean crop is in demand because of its increased use as dry bean sprouts and nodules (Fuller & Harvey, 2006). The bean offers 21 – 28% protein and can be processed into many ways for human food. Mungbean are boiled either after soaking, which softens the grains, speed up the cooking process and loosen the skins, or after breaking them to enable the seed coat to be winnowed away. Grinding or pounding the seed before cooking is also quite widespread especially in West Africa. This process considerably improves palatability and digestibility that makes them of particular value in preparing infant food. Rowland (1993) reported that oil extracted from mungbean could be used as cooking oil and as an insecticide carrier. Also the fresh plants are used as animal feeds in India and California and other countries where they are widely cultivated. It is familiar to many because of its use for bean sprouts in salad bars across the country. Mungbean seeds are sprouted for fresh use or canned for shipment to restaurants.

Sprouts are high in protein (21%–28%), calcium, phosphorus and certain vitamins. Because they are easily digested they replace scarce animal protein in human diets in tropical areas of the world. Because of their major use as sprouts, a high quality seed with excellent germination is required. The food industry likes to obtain about 9 or 10 grams of fresh sprouts for each gram of seed. Larger seed with a glassy, green color seems to be preferred.

If the mungbean seed does not meet sprouting standards it can be used as a livestock food with about 1.5 ton of mungbean being equivalent to 1.0 tons of soybean meal for protein content (Fuller and Harvey, 2006). It is not possible for every Nigerian to afford animal protein because of the high cost and unavailability. Plant proteins usually form the cheapest and the readily available source of protein that serve as substitute for animal protein. United States production is estimated at around 100,000 acres. The majority of this acreage is harvested for a variety of food products, but some mungbean fields are plowed under as a green manure crop. Several million pounds of mungbeans are consumed each year in the U.S., with almost three fourths of that being imported (Sugar, 2011). It is, therefore desirable to screen mungbean cultivars in the southern guinea savanna to select those that can be used by farmers to boost production. This study is justified because of the paucity of research on the yield and adaptability of cultivars in the study area.

Objectives of the study

The aims and objectives of the study are to examine the growth habit of mungbean from germination to flowering in a southern guinea savanna location, to determine the maturity period and high yielding variety(ies) and finally to make recommendation based on the results of the study for adoption by farmers.

MATERIAS AND METHODS

The experiment was conducted on a sandy loam soil at the Teaching and Research farm of the Department of Crop Production, University of Agriculture, Makurdi. The experiment was laid out in a randomized complete block design with five treatments of the mungbean varieties (local variety, VC2768A, VC1178A, VC 2778A, VC1973A) each replicated three times. Each block contained five experimental unit measuring 2m x 2m and were spaced 1m apart. Treatments were randomly assigned to plots measuring 5 m long by 3.75 m wide. Adjacent plots were separated by 0.75 m path whilst 1.0 m path separated blocks. Two seeds of each mungbean varieties were sown to designated plots on July 21, 2006 (for early planting) and September 7, 2006 (for late planting) at spacing of 50 x 10 cm. Seedlings were thinned to one plant / hill. Data were collected on ten plants based on the following parameters: plant height at 4 and 6 weeks after planting (WAP); number of branches, nodulation and 50% flowering all at 6 WAP; number of pods per plant, number of seeds per pod and grain yield at harvest and weight of 1000 seed. Data collected were subjected to analysis of variance and means were separated using Duncan New Multiple Range Test at 5% level of probability.

RESULTS

Table 1 shows the effect of cultivar type on the growth characters of *Vigna radiate* for early and late season. Plant height and the number of branches per plant did not differ significantly among the cultivars except for late season planting where Vc 2778A had significantly reduced plant height compared with other varieties. The cultivar Vc 2768 was the tallest while Vc2778A was the shortest in both early and late season. Plant height ranged from 14.4 – 22.3cm. number of branches were not significantly affected by mungbean varieties in both seasons. There was a significant difference between cultivars in nodulation with Vc 2778 producing the highest number of nodules while VC 1178 had the lowest number of nodules in both seasons.

The number of pods per plant and the grain yield differed significantly between the cultivars (Table 2). Vc 2768A and Vc 1973A significantly produced higher number of pod in both early and late season and the least was obtained from VC 2778A compared with other varieties. There was no significant difference between cultivars in 1000 seed weight in both seasons. Vc 2768A significantly produced higher grain yield in both plantings while Vc2778A variety significantly produced lower grain yield.

Table 1Effect of cultivar on growth characters of *V. radiate* at Makurdi.

Cultivar	Plant height (cm)	No of branches per plant	No of nodules per plant
Early planting			
Local	20.8a	3a	5b
Vc 2768A	22.3a	3a	7a
Vc 1178A	19.8a	3a	1.5c
Vc 2778A	14.4a	1.7a	5b
Vc 1973A	20.4a	2.3a	4.7b
Late planting			
Local	17.5a	2a	4b
Vc 2768A	20.9a	3a	7a
Vc 1178A	16.4a	1.8a	1c
Vc 2778A	11.2b	2a	3b
Vc 1973A	17.0a	1.5a	4b

Means within a column with the same letters do not differ significantly according to DNMRT at 5% level of probability

Table 2: Effect of cultivar on agronomic variables of *V. radiate* at Makurdi.

Cultivar	No of pods	1000 seeds weight(g)	Grain yield(kg/ha)
Early planting			
Local	34.3c	38.3a	891.67c
Vc 2768A	48.7a	45.3a	2266.67a
2Vc 1178A	35.0bc	37.3a	1075.00c
Vc2778A	23.7d	34.5a	441.67d
Vc 1973A	44.7ab	37.0a	1233.33b
Late planting			
Local	30.5a	36.5a	884b
Vc 2768A	39.9a	39.2a	1767a
Vc 1178A	26.4a	38.3a	991b
Vc 2778A	11.2b	35.0a	363c
Vc 1973A	37.0a	35.3a	974b

Means within a column with the same letters do not differ significantly according to DNMRT at 5% level of probability

DISCUSSION

The plant height and the number of branches did not differ significantly between cultivars. Purseglove (1988) reported that *V. radiata* grows to a height of 30cm and above depending on the environmental and prevailing weather conditions. Reduction in plant height in the late season planting could be attributed to the environmental and prevailing weather conditions. The recommended planting date for legumes in the study area is between 15th June to 15th July (BNARDA, 1993; Avav, 1997) consequently the late planting may have affected the growth of the plant. The number of nodules differed significantly between the cultivars in both season. Cultivars with the highest number of nodules (Vc 2768A) gave the highest grain yield.

The yield of legumes is dependent on the size and number of nodules on the root system (Purseglove, 1988) and largely on weather conditions, soil, cultural practices, and variety (Oplinger, 1990). Yields can range from 300 to over 2,000 pounds per acreYields from second crop plantings are not as large as main crop yields (Oplinger, 1997). Cultivar Vc 2768A gave the highest number of pods per plant, 1000 seed weight and grain yield, this agrees with the findings of Purseglove (1988) who reported that the yield of *V. radiata* depends on the number of pods per plant. Similarly, the highest number of nodules, which is critical yield determinant, was obtained from the same cultivar. However, in the trial, cultivar VC 1187A with the least number of nodules, gave grain yield that was higher than the local variety and Vc 1973A with higher number of nodules (Tables 1 and 2). This could mean that the number of nodules per plant is one of the determinant factors of grain yield in legumes. The general trend, however, was that the higher the growth characters, the higher the agronomic yield.

CONCLUSION

The research showed that there was no significant difference in plant height and the number of branches per plant between the cultivars. The height ranged from 14.4cm to 23.3cm, Vc 2768A was the tallest while Vc2778A was the shortest. This showed that plant height of *V. radiata* and the number of branches per plant did not depend on the cultivar planted. The number of nodules per plant differed significantly between the cultivars. Vc 2768A with the highest nodules gave the highest grain yield (2266.67kg/ha). The lowest yield of 441.67kg/ha was obtained from Vc 2778A, which was lower than the yield of the local variety (891.67kg/ha). Not every exotic cultivar of *V. radiata* will give higher yield than local variety.

RECOMMENDATION

Farmers in the Southern Guinea Savanna should adopt the exotic cultivars Vc 2768A and Vc 1973A for high grain yield.

The crop should be grown early probably between 15th June and 15th July, which is the recommended planting date for legumes in the study area.

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