Evaluation Of Yield And Yield Attributes Of Some Cowpea (*Vigna Unguiculata (L) Walp)* Varieties In Northern Guinea Savanna

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Abstract: Five cowpea varieties were evaluated in 2009 to determine their grain yield attributes. The experiment was conducted at the Research and Teaching Farm of Department of Crop Science, Adamawa State University Mubi laid in randomized complete block design in three replicates. Data were collected on plant height, number of leaves per plant, number of branches per plant, number of days to flowering, pod filling period, days to physiological maturity, pods per plant, pod length, number of seeds per pods, number of seeds per plant, 1000 seed weight and yield per hectare. Data collected were subjected to analysis of variance. Most of the yield and yield determining attributes recorded significant (P = 0.05) difference due to treatment effects. These varieties flowered between 38.02 days to 50.12 days after planting and the maturity period did not exceed 71 days. Average grain yield ranged between 14,000.3kg/ha to 20, 000.20kg/ha. V_2 (Brown Kananado) recorded the highest yield of 20,000.20kg/ha with V_5 (Ife - Brown) giving the least yield of 14,000.30kg/ha. The need to develop varieties with different attributes and resistance to major biotic and abiotic constraints to suite the needs of different agro – ecological zones can not be over emphasized. This is because varietal requirements in terms of plant type, seed type, maturity, yield for cowpea varies from one agro – ecological region to another. [Journal of American Science 2010; 6(8):508-511]. (ISSN: 1545-1003).

Key Words: Cowpea, Genotypes, Optimum, Evaluation, Yield Components

1. Introduction

Cowpea (*Vigna unguiculata* (L) Walp) is a nutritious legume crop that is of considerable importance in Nigeria and other Sub sahelian countries. Cowpea constitutes a significant proportion of the total dietary protein and energy intake of Nigerians (Davio *et al*; 1976 and Ologhbo and Fetuga, 1987). The two types of cowpea cultivated in Nigeria are the grain and vegetable cowpea. Legumes like cowpea serves as alternatives or supplements to animal proteins, particularly in parts of the world where there is paucity of animal proteins due to socio economic constraints (Ojimelukwe, 2002). The grain cowpea is a crop predominantly of drier regions, but with advances in the crop development has given opportunities for its production in other agro – ecological zones of the country. This can be achieved through more efficient manipulation of the crop duration, reduction in the severity of pests and diseases. . Yield evaluation of some cowpea cultivars has continued to generate interest among researchers in Nigeria (Ndon and Ndaeyo, 2001). Yield evaluation usually involves the consideration of other characters that determine the overall of the genotypes. This is important because yield is a quantitative character and therefore influenced by a number of traits acting singly or interacting with each other. Earliness (Number of days to flowering, pod filling period and number of days to physiological maturity), number of branches per plant, pod length, number of seeds per pod and 1000 seed weight are the necessary agronomic traits of cowpea that contribute to seed yield (Ogunbodede, 1989; Okeleye *et al*; 1999). When the aim is to increase seed yield in cowpea these traits and their inter – relationship are important factors to consider.

Cowpea tolerate heat and dry conditions but intolerant to frost. The ability of cowpea to tolerate heat and dry conditions makes it unique in fixing nitrogen.Cowpea is adapted to warm weather and requires less rainfall than most crops ; therefore, it is cultivated in the semi-arid regions of lowland tropics and subtropics, where soils are poor and rainfall is limited [Mortimore et al; 1997]. Under developed parts of the world attach importance to cowpea cultivation as the crop is drought resistant and do well under various kinds of cropping systems (Singh *et al*; 1997). Yield potential of cowpea is high averaging 1.5 – 3t/ha (Rosalind *et al*; 2000). The fast growth and spreading habit of traditional cowpea varieties suppress weeds and soil nitrogen increased. Agronomic practices such as date of planting, plant

populations, maintenance of physical and chemical properties of the soil, weed control and manipulation of cropping systems strongly influence cowpea yields.

2. Materials and Methods

This experiment was conducted in the experimental field of the Department of Crop Science, Faculty of Agriculture Adamawa State University Mubi which is located (10^o 11' N, 13^o 19' E) at an altitude of 696m. The experiment was conducted in 2009 cropping season. The mean annual rainfall of Mubi is about 1016mm with sandy loam soil texture (Rayar, 1986). Treatments consisted of five varieties of cowpea which were laid in randomized complete block deign (RCBD) with three replicates. Two varieties were obtained from ADADP Yola and the other three were local genotypes obtained from Mubi market. Each experimental plot measured 4m x4m where appropriate varieties were planted at 50cm x 50cm. Three seeds were planted per hole and later thinned to two per hole one week after .seedling emergence. Weeding was done twice using manual labour at 4 and 8 weeks after sowing. Spraying against insect pests were done twice commencing the onset of seed formation and repeated after 4 weeks. Data were collected on plant height, number of leaves per plant, number of branches per plant, number of days to flowering, pod filling period, number of days to physiological maturity, number of pods per plant, pod length, number of seeds per pod, number of seeds per plant, 1000 seed weight and yield per hectare. The data was subjected to analysis of variance (ANOVA) using the statistical analysis system (SAS). Means were separated using the Least Significant Difference (LSD) at P = 0.05

3. Results and Discussion

The physio-chemical characteristics of the experimental areas are shown in Table 1.The result from the chemical analysis show that the soil was slightly acidic. Although the organic carbon (0.65%) and available nitrogen (0.40%) values were low there was a high concentration of available phosphorus 6.6 (ppm). The particle size analysis show that, the soil type of the experimental area was sandy loam with a high proportion of sand (56.5%) and silt (40.5%) and less clay (3.0%). The soil had a high water holding capacity with a maximum of (39.7%).

Table 2 summarizes the effect of varietal difference on plant height, number of leaves per plant, number of branches per plant, number of days to flowering, pod filling and number of days to physiological maturity.

Table 1: Physioco–Chemical Characteristics of the Soil From the Experimental Area

Chemical analysis	
P^H in water	6.80
Organic Carbon (%)	0.65
Carbon to Nitrogen ratio (C:N ratio)	1: 40
Available Nitrogen (%)	0.40
Available Phosphorus (PPM)	6.60
Available Calcium (Me/100g)	4.20
Available Sodium (Me/100g)	0.35
Available Potassium (Me/100g)	0.49
Particle Size Analysis	
Clay (%)	3.00
Sand (%)	56.50
Silt (%)	40.50
Soil Texture	Sandy Loam
Maximum water Holding Capacity (%)	39.7

Table 2: Plant height, number of leaves per plant, number of branches per plant, number of days to 50% flowering, pod filling period, number of days to physiological maturity of some cowpea varieties.

Treatment	*Plant Height (cm)*	*Number of Leaves Per Plant*	*Number of Branches Per Plant*	*Number of Days to Flowering*	*Pod Filling*	*Number of Days to Physiological Maturity*
V_1	190.41	65.02	5.62	45.03	22.01	63.27
V_2	181.30	71.31	5.27	44.27	22.03	62.09
V_3	56.710	38.91	3.72	38.02	19.00	53.18
V_4	65.240	41.20	3.40	38.71	21.49	53.00
V_5	170.02	66.07	4.19	50.12	24.00	70.49
SD(P=0.05)	33.43	6.790	NS	3.030	1.250	4.370

V_1 = White Kananado
V_2 = Brown Kananado
V_3 = White Borno Local
V_4 = Brown Borno Local
V_5 = Ife – Brown

The result showed a significant (P=0.05) difference in plant height. Highest means of 190.41cm was recorded with V_1 (White Kananado), followed by 181.30cm with V_2 (Brown Kananado). V_3 (White Borno Local) significantly recorded the least plant height of 56.71cm compared to other treatments. Significant (P=0.05), difference was recorded on the number of leaves. The highest mean number of leaves per plant (71.31) was obtained with V_2 (Brown Kananado) followed by 66.07 with V_5 (Ife-brown). The least mean of 38.91 was recorded with V_3 (White Borno Local). The variations in plant height, number of leaves and the mean were very high. Plant height and number of leaves were evaluated and determined by the vegetative growth of the 5 cowpea varieties. This is in conformity with

suggestion by Pfeiffer and Harris (1990) who observed and reported that measurement are used as indicator of vegetative growth.The soil texture of the experimental area based on the particle size analysis is sandy loam. The good performance of the cowpea in the study area with sandy loam soil is in total conformity with the findings of Rayar[1986] who observed that legumes can do well on sandy loam soils which can help in producing an extensive root system that extracts moisture from lower depth of soil.

The result revealed that no significant (P=0.05) difference was recorded among the treatments although there were higher number of branches with V_1 (White Kanando) compared to other treatments. Number of branches ranged from 3.40 to 5.62. Days to flowering statistically differ in all the treatments. Longer days to flowering 50.12 were recorded with V_5 (Ife- Brown). These varieties flowered between 38.02 days to 50.12 days; while the period between flowering and maturity implies that these varieties must fill their seeds very fast and this is an important trait in areas where water availability is very low. It is worth interesting to note that the number of days to physiological maturity did not exceed 71 days. Another interesting fact about this result is that $V_3$and V_4 matured before 54 days making them more adaptable in drought –prone areas. Similar result were reported by (Ndaeyo *et al*; 1995) who found that seed colour preference and use differed from region to region and the maturity, growth habit and photosensitivity requirement depends upon the cropping systems. Furthermore, this result is corroborated by [Grema,1995 and IITA,1998] who found that no single variety of cowpea can be suitable for all conditions.

Table 3:Number of pods per plant , pod length, number of seeds per pod , number of seeds per plant, 1000 seed weight and yield per hectare of some cowpea varieties.

Treatment	*Number of Pod Per Plant*	*Pod Length (cm)*	*Number of Seeds Per Pod*	*Number of Seeds Per Plant*	*1000 Seed Weight*	*Yield Per Hectare (Kg/Ha)*
V_1	33.40	13.23	17.11	415.08	160.13	19,012.10
V_2	35.72	14.81	16.24	420.16	168.04	20,000.20
V_3	30.90	19.00	14.28	312.41	120.00	16,000.00
V_4	32.41	20.03	12.41	310.10	121.40	15,214.80
V_5	23.34	17.50	13.14	258.21	140.91	14,000.30
LSD (0.05)	8.38	1.70	1.18	40.49	12.01	315.1000

The mean number of pods per plant pod length number of seeds per pod, number of seeds per plant, 1000 seed weight and yield per hectare of some cowpea varieties are presented in Table 3. Significant (P=0.05) difference was observed for all the yield components. The result showed that number of pods per plant ranged 23.34 in V_5 to 35.77 in V_2. Significantly longer pods 20.03 were recorded with V_4 while the least 13.23 was recorded with V_1. There was significant difference in the number of seeds per pod which ranged from 12.41 to 17.11. The number of seeds per plant was significantly higher 420.16 with V_2 and also significantly lower 258.21 with V_5. Significant difference was observed for all the treatments which ranged from 120.00g to 168.04g for 1000 seed weight. Grain yield (kg/ha) was significantly (P = 0.05) superior 20,000.20 with V_2, although V_5 recorded the lowest yield 14,000.30 in the mean where significant difference was observed due to treatment effects. This result showed that where there were more pods per plant and more number of seeds per plant the yield was increased. Based on the result from the present study cowpea yield in Nigeria is low. The use of early maturing varieties as adopted in this study can help in minimizing these problems. This study agrees with the earlier views of [Ofori and Djagbletey 1995; Okeleye *et al*; and Ndon and Ndaeyo, 2001] who reported that early maturing Cowpea genotypes have been shown to yield as much as or more than the late maturing varieties with added advantage of being suitable in areas with unreliable rainfall in terms of total amount,distribution and duration where crop failure is often attributed to early cessation of rains and there by making it adaptive to different agro-ecological environments in Nigeria.Varietal requirements in terms of plant type, seed type, maturity, yield for cowpea varies from region to region thus the importance of selection of varieties.

4. Conclusion

It can be concluded from this study that early maturing cowpea can perform very well in Northern Guinea Savanna. V_1 (White Kananado) and V_2 (Brown Kananado) recorded the highest yield of 19,012.10kg/ha and 20,000.20kg/ha respectively.The yield ranged from 14,000.30kg/ha to 20,000.20kg/ha. The earliness character (days to flowing, pod filling and days to physiological maturity enables them to flower, pod fill and mature early and therefore escape the dryness of November and December). From the findings of this study the yield of V_1 and V_2 were quite high and encouraging. Since V_1 and V_2 performed better, they are recommended to farmers of this area based on their optimal performance for adoption.

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