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PERFORMANCE OF COWPEA (*VIGNAUNGUICULATA*L) VARIETIES OF MEDIUM DURATION MATURITY AT SUDAN –SAVANNA AGRO-ECOLOGICAL ZONE OF NIGERIA

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ABSTRACT
These experiments were conducted in 2016 and 2017 rainy seasons at the teaching and research farm of the Federal University Dutsin-Ma(Longitude $07^0$29'29" E and Latitude $12^0$27'18" N) The objectives of the research were to evaluate the productivity of twenty four varieties of cowpea sourced from International Institute of Tropical Agriculture (IITA) and to recommend the most productive varieties to the community. The experiments consisted of twenty four (24) varieties of cowpea of medium duration maturity, they included IT07K-274-2-9, IT07K-269-1, IT10K-832-1, IT10K-832-2, IT10K-835-10, IT10K-180-11, IT08K-193-14, IT110-16-71, IT110-21-143, IRS-09-1009-7, IRS-09-1106-4, IAR- 07- 1050, IAR-07-1032-1, IAR-07-1042-1, IAR-07-1058 UAM-1046-6-1, UAM-1051-1, UAM14-154-10-2, UAM14-155-10-3, UAM14-145-4-3, IT07K-297-13, IT08K-150-24, IT08K-150-12 and IT07K-292-10 as check. These twenty four varieties were randomized and laid out in a randomized complete block design (RCBD) and replicated three times. The collected data was subjected to statistical analysis. IT07K-274-2-9, IT09K-832-1, IRS-09-1009-7, IAR 1032-1, IAR-07-1050, IT10K-835—10, IT10K-193-14, IT09K-269-1 and UAM-1046-6-1recorded significantly ($P<0.05$)the highest grain yield in both years of the research compared with the check and are therefore recommended to farmers in this agro-ecological zone of Sudan savanna, Nigeria.

Keywords: *cowpeas, performance, varieties, yield*

INTRODUCTION

Cowpea [*Vignaunguiculata* (L.) Walp.], is the most important source of vegetable protein in rural and urban diets across West and Central Africa and in parts of East and Southern Africa (Bressani, 1985; Singh *et al*., 1997). It is consumed in many forms. Young leaves, green pods, and seeds are eaten as vegetables and dry seeds are used in various food preparations (Nielsen *et al.,* 1997).

Cowpea *is* an important food legume and an integral part of traditional cropping systems in the semi-arid regions of the tropics (Singh *et al*., 2003). It is used for human consumption and animal feed and also it improves soil fertility when grown, thus it has become very valuable in areas where land use has become intensified. Cowpea has outstanding features: *viz*., drought tolerance, shade tolerance, quick growth, and rapid provision of ground cover (Singh *et al*., 1997). These characteristics have made cowpea an important component of subsistence agriculture in the dry savannas of the sub-Saharan Africa where it is grown as a companion crop with cereals and other food crops (Singh *et al*., 2003). According to Kergna *et al* (2013) cowpea is grown on an estimated worldwide area of 14 million ha. However, the bulk of cowpea production comes from the drier regions of northern Nigeria (5 million ha and 2.3 million tons), Niger Republic (3 million ha and 0.4 million tons) and North East Brazil (about 1.9 million ha and 0.7 million tons) In spite of its importance and wide cultivation, the overall productivity of cowpea is very low with average yield particularly in Africa ranging from 100 to 400 kg ha^{-1}Singh, (2000). This is due to several biotic, abiotic and physiological constraints. The abiotic factors include erratic rainfall, high soil temperature, low soil fertility, the biotic factors are insects' pest, parasitic weed, disease induced by fungi, viruses and nematodes. Nigeria remains the largest producer and consumer of cowpea in the world according to Kergna *et al* (2013) Nigeria accounts for 61% of production in Africa and 58% worldwide.

The appreciating economic importance may be due to its food value which made it a good supplement/complimentary source of protein. Cowpea contains 20-25% of protein and 64% carbohydrate (Bresanni, R., 1985). It therefore has a tremendous potential to contribute to the alleviation of malnutrition specifically amongst the poor. Cowpea is an important legume in Sub-Saharan Africa compared to other regions, where the consumption has grown at the rate of 3.2% per annum between 1980 and 2009. The average level of consumption is 4.5 kg/person/year in Sub-Saharan Africa (Nedumaran *et al.,* 2015).

Cowpeas contribution to ecological stability is usually underestimated. Cowpea, through its symbiotic association with beneficial bacteria, fixes nitrogen from the atmosphere to the soil and hence enhances soil fertility which also benefits other crops succeeding it. The broadleaf nature of cowpea and soil covering effect ameliorates soil erosion (Singh *et al*., 1999).

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Cowpea is a legume that is extensively grown throughout sub-Saharan Africa. It is a subsistence crop, often intercropped with sorghum, maize and pearl millet. The grain provides valuable protein and the leaves are used as a nutritious vegetable. (IPM CRSP, 2000).

Millions of African farmers grow cowpea, some two hundred million Africans consume cowpea, many, maybe a majority of these farmers are women. Cowpea grain, nutritious and inexpensive, serves as a source of cheap protein for both rural and urban consumers. The cowpea grain contains about 25 percent protein and 64 percent carbohydrate (Bresanni, 1985). Even the goats and the cattle benefit from cowpea, this genuinely African crop for the hay left over after the grain is harvested as a high-value nutritious forage.(A BIOTECH, 2002).

The protein in cowpea seed is rich in amino acids, lysine and tryptophan in comparison with cereal grain; however, it is deficient in methionine and cystine in comparison with animal protein. (Davis *et al*., 1991).

Cowpea is an indigenous crop that has evolved from the native wild types and its genetic diversity is greater than that of any other crop in the dry African savannah. (IFAD, 2000). In semiarid zones of West and Central Africa, farmers traditionally cultivate two main types of

cowpea: early maturing varieties grown for grain and late maturing varieties that are grown for fodder production (Inaizumi *et al*., 1999)

Cowpea is the most economically important indigenous African legume crop. (Langyntuo *et al*., 2003). Cowpeas are of vital importance to the livelihood of several millions of people in West and Central Africa. Rural families that make up the larger part of the population of these regions derive from its production, food, animal feed, alongside cash income.

Cowpea is referred to as the "hungry-season crop" given that it is the first crop to be harvested before the cereal crops are ready. It is a crop that offers farmers great flexibility. They can choose to apply more inputs and pick more beans, or –ifcash and inputs are scarce -they can pick fewer beans and allow the plant to produce more foliage. This means more fodder for livestock, so that lower bean yields are balanced by more livestock feed, which in turn translates into more meat and milk. This flexibility in use that makes cowpea an excellent crop under the challenging climatic conditions faced by African farmers (Okike, 2000).

Cowpea also contributes to the sustainability of cropping systems and soil fertility improvement on marginal lands through nitrogen fixation, provision of ground cover and plant residues, which minimize erosion and subsequent land deterioration. The deep root systems of cowpea help to stabilize soil, and the ground cover it provides preserves moisture; these traits are particularly important in the drier regions where moisture is always needed, soil is fragile and subject to erosion. (Bean/Cowpea CRSP West Africa Mission 1998).

In Nigeria the major constraints to the adoption of dry season dual -purpose cowpea include insect attack both in the field and in storage, insufficient water, nematodes, lack of land, and lack of seed. The magnitude of these problems also varies with location (Inaizumi *et al.*, 1999).

Cowpeas plays a significant role as a major source of protein among the rural poor, source of income, improvement of soil fertility though nitrogen fixation and protect the soil therefore research to find out the most productive varieties in our agro-ecological zone would not be over emphasized A lot of cowpeas germ plasm has being developed by IITA there is therefore the need to evaluate the performance of these new varieties under our ecological condition. Cowpea yields are low often due to early cessation of rains therefore introducing varieties of cowpea of medium duration maturity would boost production, food security and livelihood of millions of small scale farmers that grows cowpeas in this ecological zone..

MATERIALS AND METHODS

These experiments were conducted in the rainy seasons of 2016 and 2017 at Federal University Dutsin-Ma, teaching and Research Farm Badole (Longitude $07^0$29'29" E and Latitude $12^0$27'18" N) in the Sudan savanna ecological zone of Nigeria.

The treatments consisted of twenty four (24) varieties of cowpeas of medium maturity as follows: IT07K-274-2-9, IT07K-269-1, IT10K-832-1, IT10K-832-2, IT10K-835-10, IT10K-180-11, IT08K-193-14, IT110-16-71, IT110-21-143, IRS-09-1009-7, IRS-09-1106-4, IAR- 07- 1050, IAR-07-1032-1, IAR-07-1042-1, IAR-07-1058 UAM-1046-6-1, UAM-1051-1, UAM14-154-10-2, UAM14-155-10-3, UAM14-145-4-3, IT07K-297-13, IT08K-150-24, IT08K-150-12 and IT07K-292-10 as check. This variety (IT07K-292-10) was selected to serve as check because of its high productivity, tolerance to common pest and diseases and adaptation to environmental condition in the area under study.

The aim of the study was to evaluate the performance of twenty four (24) new varieties of cowpea under the ecological condition of Sudan savanna and identify those varieties that are high yielding and well adapted to the ecological environment of the area under study. Each variety was randomly assigned to a plot and were laid out in a randomized complete block design (RCBD) and replicated three times. The gross plot size was 4m x 3 m (12 m^2) and the net plot was the two inner rows 4m x 1.5m (6m^2). The land was ploughed, harrowed and ridges were constructed before planting. Cowpea seeds were planted at a spacing of 75cm between rows and 25cm between plants in a row, two seeds were sown per stand. Planting was carried out on 03/08/2016 and 20/07/2017respectively. Weeding was carried out manually at 3weeks and 6 weeks after sowing. NPK (15:15:15) fertilizer at the rate of $N_{15}P_{15}K_{15}$ Kg/Ha was applied at time of planting. Insect pests and diseases were controlled by spraying insecticide (Labdashicyhatothrin 2.5EC) five times using knapsack sprayer at the rate of 3liter per hectare.

Data were collected on stand count, days to 50% flowering, plant height (cm), number of pods per plant, length of pod, number of seeds per pod, and 100 seed weight (g). Ten plants from the net

plot at full maturity were randomly harvested and used for yield analysis i.e. Data collected were subjected to statistical analysis of variance (ANOVA) to test for significance of difference among means as described by Gomez and Gomez (1984) using SAS package version 9.0 of statistical analysis (SAS, 2002) and the differences among treatment means were separated using Duncan's Multiple Range Test (DMRT) (Duncan, 1955) at 5% level of probability.

RESULTS

Results of our experiments indicated that growth parameters (table 1) of cowpea were significantly (P<0.05) affected by the years of experiment. Plant height was significantly (P<0.05) different between the years of experiment for example the highest value for plant height was 207cm in 2017 but it was only 61.7cm in 2016 which is significantly (P<0.05) lower compared to 2017. Days to 50% flowering and days to maturity (table.2) were not significantly (P<0.05) affected by type of variety in both years of experimentation. The average days to 50% flowering in all the 24 varieties are 57 and 64days for 2016 and 2017 respectively. Number of days to 50% flowering was not significantly (P<0.05) affected by varieties and years of experimentation. There were no significant (P<0.05) difference number of days to maturity in all the 24 cowpea varieties and in both years of experimentation.

Number pods per plant (table 3) are an important parameter for yield determination in cowpeas. The higher the number of pods per plant the higher the grain yield. In 2016 the highest number of pods per plant (50.6) was recorded in IT07K-269-1 and closely followed by IT10K-832-1, IT11D-15-71, IT07K-274-2-9, IT08K-193-14 and IAR07-1050 and were 49.7, 48.3, 48.3, 48.0, and 46.3 respectively. Number of pods per plant was not significantly (P<0.05) different between the varieties in 2016. While in 2017, IT08K-193-14, IT07-274-2-9, UAM-1046-1, IT07K-269-1, IT08K-150-1, UAM-1046-6-1 and IAR-09-1106-4 recorded the highest numbers of pods per plant but this too were not significantly (P<0.05) different from the check.

Number of seeds per pod (table.3) also has significant influence on yield formation. The highest number of seeds per pod (14.03) was observed in IT10K-835-10 in 2016 but this was not significantly (P<0.05) different from the check and the other varieties. While in 2017, IT10K-832-1 recorded the highest number of seeds per pod (14.7) even though the difference with check and other varieties was not significantly (P<0.05) different from the check.

100 seeds weight (table. 4) plays are very critical role in determination of cowpea yield. We observed a significant difference (P<0.05) in 100 seeds weight between varieties in 2016. IT07K-297-13, UAM 154-10-2 and UAM 155-10-3 recorded the highest 100 seeds weight and were 22.8g, 22.7g, 22.2grespectively but there were no significant difference (P<0.05) compared with the check. We observed a decrease in 100 seed weight in 2017 compared to 2016. The highest recorded was 200.7g in IT10K-817-3 but this was not significantly different with other varieties.

Total grain yield per plot (table 4) was significantly (P<0.05) affected by varieties. In 2016 IT10K-863-11 and IT07K-247-2-9 recorded the highest grain yield per plot and were 1350g and 1033g respectively. These were significantly (P<0.05) higher compared with the check. IT07K-247-2-9, IT09-832-1, IT10K-8632-11, IT10K-835-10, UAM104-6-6-1 and IT10K193-10 performed remarkably well and produced the highest grains yield per plot. In 2017 IT07K-269-1 and IT10K-832-2 recorded the highest grain yield per plot which was 1350g and 1133g respectively and this yield was significantly deferent(P<0.05) compared with check and other varieties. IT10K-832-1 recorded the lowest grain yield per plot (200g) in 2016 while in 2017; IT10K-832-2 recorded the lowest grain yield per plot which was 113.3g

DISCUSSION

Plant height was significantly (P<0.05) different between the years of experimentation but was not significantly (P<0.05) different between the varieties. Days to 50% flowering and days to maturity were not significantly different in all the varieties and in all the years of these experiments, this could be attributed to the genetic factors inherent in all the varieties tested. Similar observations were reported by Dugje *et al.,* (2009), Singh, 1999; Singh *et al.,* 1997).

The better performance recorded as per number of pods per plant could be attributed to enhance agronomic practices and adaptation to the ecological environment by the varieties. Cowpeas varieties that are better adapted to the environment tend to be more productive hence produces more pods per plant and subsequently produces more yield. Varieties that performed poorly IT10K-832-1 and IT10K-832-2 in 2016 and 2017 respectively achieved such low yield as a result of having low number of pods per plant, lower number of seeds per pod and lower 100 grain weight. These are signs of poor adaptation to the ecological environment and lack of tolerance to local pest and diseases. (Dugje *et al.,* 2009; Singh *et al.,* 1999; Onyibe et *al.,* 2006 and Kamara *et al.,* 2001) reported poor performance of some cowpea varieties that are attributed to poor adaptation to the environment and low tolerance to common cowpea pest and diseases.

Number of seeds per pod could be attributed to inherent genetic makeup, soil moisture and fertility level as well as good agronomic practices. Number of seeds per pod is closely related to yield, thus the higher the number of seeds per pod the higher the grain yield. This yield parameter could be enhanced through better nutrition, irrigation and pest and diseases control. According to Singh et al., (1999) and Kamara *et al.,* (2001) chemical pest control in cowpeas can double or even triple the yield of cowpea in Sudan savanna areas. The five chemical sprays during this experiment might have contributed to the enhanced number of seeds per pod in all the varieties and in all the years of this experimentation.

Improvement in 100 seed weight as was recorded in 2016 could be attributed to good nutrition and better agronomic practices. This was also reported in the works of Sanusi *et al.,* (2014). UAM 154-10-2 and UAM 155-10-3show better adaptation to the environment hence produces well filled seeds that are heavier and have high grain yield. Superior performance of UAM 154-10-2 and UAM 155-10-3 at Savanna ecological zone was also reported in the works of (Singh *et al*., 1999; Dugje *et al.,* 2006 and Onyibe *et al.,* 2006). Recording of high grain yield of cowpeas in both year of experimentation could be attributed to high number of plant count, pods per plant, seeds per pod and heavier 100 seeds weight. Any increase in the yield parameters would lead to increase in yield. Sanusi *et al.,* (2014) reported significant increase in yield of cowpea with improvement in level of phosphorous nutrition at Sudan savanna ecological zone.

CONCLUSION AND RECOMMENDATION

Introducing new cowpea varieties that are high yielding and of medium duration maturity to Sudan Savanna ecological zone would enhance yield, food security and income of the small scale farmers who constitute the bulk of cowpeas growers in the country. The medium maturity varieties of cowpeas developed by IITA possess a lot of potential for boosting cowpea production in this area in the face of changing climate occasioned by early cessation or late commencement of rains in the Sudan savanna ecological zone of Nigeria.

Evaluating the performance of these 24new varieties of cowpeas under Sudan savanna agro-ecological zone has helped us to identify the most productive lines that could be up scaled to wider areas in this area to boost production.

Based on the result of our two years experiments we concluded that the following varieties of cowpeas IT07K-274-2-9, IT09K-832-1, UAM-1046-6-1, IT107K-835-10, IT09K-269-1, IT10K-180-11 a IAR-1032-1, IAR-07-1050 and IT10K-193-14 are identified as the most productive, and therefore recommended to farmers on this agro ecological zone.

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TABLE1: GROWTH PARAMETERS FOR VARIETIES OF COWPEAS OF MEDIUM DURATION MATURITY AT FUDMA UNIVERSITY FARM BADOLE FOR 2016 AND 2017 RAINY SEASONS

	2016			2017		
TREATMENTS	**Plant height**	**Stand count**	**Performance count**	**Plant height**	**Stand count**	**Performance count**
IT07K-274-2-9	60.00ab	16.67ab	5.00a	202.67a	57.00a	5.00a
IT07K-269-1	52.67abcdef	17.00ab	5.00a	187.67abc	49.00abc	5.00a
IT10K-832-1	43.00ef	14.33b	4.33b	173.00abcde	54.67ab	5.00a
IT10K-832-2	57.00abcd	17.67ab	4.67ab	189.00ab	57.67a	5.00a
IT10K-835-10	54.00abcde	17.67ab	4.67ab	143.67bcdefg	40.67cdef	5.00a
IT10K-180-11	47.00cdef	19.00a	5.00a	137.33cdefg	11.33k	5.00a
IT08K-193-14	57.33abcd	19.00a	5.00a	144.67bcdefg	15.00kj	4.33a
IT11D-16-71	41.67f	14.00b	4.67ab	148.00bcdef	14.00kj	4.67a
IT11D-21-143	55.67abcde	18.00ab	5.00a	190.67	25.33ghij	5.00a
IRS-09-1009-7	60.00ab	16.33ab	5.00a	171.67abcde	31.67efgh	4.33a
IRS-09-1106-4	54.00abcdef	19.00a	5.00a	137.33cdefg	20.00hijk	5.00a
IAR- 07- 1050	59.00abc	15.67ab	5.00a	185.33abcd	43.33bcde	5.00a
IAR-07-1032-1	46.00def	14.33b	5.00a	126.00efg	42.33bcdef	5.00a
IAR-07-1042-1	50.00abcdef	16.33ab	5.00a	206.67a	46.00abc	4.67a
IAR-07-1058	52.00abcdef	16.00ab	4.67ab	177.00abcde	38.33cdefg	4.33a
UAM-1046-6-1	47.00cdef	18.33ab	5.00a	192.33ab	44.67abcd	5.00a
UAM-1051-1	48.67bcdef	16.67ab	5.00a	155.67abcdefg	24.00hijk	4.33a
UAM14-154-10-2	61.67a	15.67ab	4.67ab	207.00a	30.67efghi	4.00ab
UAM14-155-10-3	57.67abcd	14.67ab	5.00a	167.00abcdef	30.00efghi	4.33a
UAM14-145-4-3	52.67abcdef	15.00ab	4.67ab	136.00defg	32.33efgh	2.67c
IT07K-297-13	57.67abcd	14.33b	5.00a	146.00bcdef	44.33abcd	2.33c
IT08K-150-24	43.00ef	18.33ab	5.00a	117.00gf	47.67abc	2.33c
IT08K-150-12	47.33abcdef	18.33ab	4.67ab	108.00g	18.00ijk	3.00bc
IT07K-292-10	50.33abcdef	17.33ab	5.00a	127.33efg	29.00fghi	3.00bc
Se±	4.487	1.560	0.1903	18.059	4.785	0.398

Means in the same column followed by unlike letters are significantly different

TABLE 2: GROWTH PARAMETERS FOR VARIETIES OF COWPEAS OF MEDIUM DURATION MATURITY AT FUDMA UNIVERSITY FARM BADOLE FOR 2016 AND 2017 RAINY SEASONS

	2016		**2017**	
TREATMENT	**Days to maturity**	**Days to 50% flowering**	**Days to maturity**	**Days to 50% flowering**
IT07K-274-2-9	78.00e	57.33a	82.33cdefg	62.00h
IT07K-269-1	78.00e	57.33a	83.33bcdef	58.00i
IT10K-832-1	78.00e	56.33a	79.33g	58.33i
IT10K-832-2	79.00de	55.00b	83.67bcdef	64.67bcde
IT10K-835-10	79.00de	57.00ab	81.33efg	62.00a
IT10K-180-11	80.67abcd	57.33a	83.00bcdefg	64.33cdef
IT08K-193-14	80.00bcde	56.33ab	83.33bcdef	66.00ab
IT11D-16-71	80.67abcd	57.33a	82.33cdefg	64.33cdef
IT11D-21-143	80.67abcd	56.67ab	80.67fg	63.67defg
IRS-09-1009-7	80.67abcd	56.00ab	84.67bcde	66.00ab
IRS-09-1106-4	81.67abc	57.67a	81.67defg	63.33efgh
IAR- 07- 1050	82.00abc	57.00ab	83.33bcdef	64.00def
IAR-07-1032-1	82.00abc	57.00ab	89.00a	63.00fgh
IAR-07-1042-1	82.67a	57.33a	86.67ab	64.00def
IAR-07-1058	82.33ab	56.33ab	89.00a	64.33cdef
UAM-1046-6-1	79.00de	57.00ab	86.67ab	65.00abcd
UAM-1051-1	80.67abcd	57.00ab	85.00bcde	62.00h
UAM14-154-10-2	80.00bcde	56.00ab	86.67ab	62.33gh
UAM14-155-10-3	79.67cde	56.67ab	85.33abcd	64.33cdef
UAM14-145-4-3	79.00de	56.67ab	85.33abcd	65.00abcd
IT07K-297-13	81.00abcd	56.33ab	84.00bcdef	66.33a
IT08K-150-24	82.00abc	56.33ab	86.00abc	64.33cdef
IT08K-150-12	81.33abcd	57.00ab	86.00abc	65.67abc
IT07K-292-10	82.00abc	57.00ab	81.33efg	64.33cdef
SE±	0.901	0.800	1.405	0.550

Means in the same column followed by unlike letters are significantly different

Table3: YIELD PARAMETERS FOR VARIETIES OF COWPEAS OF MEDIUM DURATION MATURITY AT FUDMA UNIVERSITY FARM BADOLE FOR 2016 AND 2017 RAINY SEASONS

TREATMENTS	2016			2017		
	Number of pods per plant	**No of seed/pod**	**Pod weight(g)**	**Number of pods per plant**	**No of seed/pod**	**Pod weight/plot (g)**
IT07K-274-2-9	48.33abc	10.97b	936.70abcdef	51.67a	14.200	1350.00bc
IT07K-269-1	50.66a	12.33ab	551.70fgh	49.33ab	13.93ab	1800.00a
IT10K-832-1	49.67ab	11.90ab	401.70h	47.67ab	14.73a	1333.30bc
IT10K-832-2	46.00abcde	11.27b	403.30h	52.00a	14.13ab	1350.00bc
IT10K-835-10	42.67abcdef	14.03a	660.00cdefgh	48.00ab	14.47a	1533.30ab
IT10K-180-11	44.00abcdef	11.67ab	616.70defgh	42.67b	13.60ab	1183.30bcde
IT08K-193-14	48.00abc	12.77ab	803.30dcefg	52.33a	14.20ab	783.30efghi
IT11D-16-71	48.33abc	12.13ab	598.30efgh	47.00ab	14.40a	1033.30cdefg
IT11D-21-143	44.00abcdef	12.13ab	693.30cdefgh	48.33ab	13.27ab	1350.00bc
IRS-09-1009-7	42.67abcdef	11.00b	1288.30a	46.00ab	13.53ab	1066.70cdefg
IRS-09-1106-4	44.00abcdef	11.90ab	1003.30abcd	49.00ab	14.47a	1133.30cdefg
IAR- 07- 1050	46.33abc	11.87ab	770.00bcdefgh	46.33ab	14.67a	1213.30bcd
IAR-07-1032-1	39.67abcde	11.97ab	566.70fgh	45.33ab	14.27ab	1100.00cdefg
IAR-07-1042-1	39.67cdefg	12.53ab	956.70abcde	45.00ab	13.00ab	1083.30fghi
IAR-07-1058	40.00cdefg	13.37ab	596.70efgh	44.67ab	13.67ab	733.30fghi
UAM-1046-6-1	43.00abcdef	11.30b	1036.70abc	49.67ab	13.33ab	883.30defgh
UAM-1051-1	38.00defg	11.48ab	1091.70ab	48.00ab	13.87ab	783.30efghi
UAM14-154-10-2	41.00abcdefg	13.07ab	448.30gh	48.33ab	13.67ab	700.00ghij
UAM14-155-10-3	37.33efg	13.53ab	700.00cdefgh	48.33ab	12.80b	783.30efghi
UAM14-145-4-3	42.67abcdef	11.97ab	736.70bcdefgh	48.33ab	13.87ab	250.00k
IT07K-297-13	35.67gf	12.17ab	620.00defgh	44.67ab	13.67ab	386.70ijk
IT08K-150-24	32.67g	12.77ab	691.00cdefgh	46.00ab	13.80ab	416.70ijk
IT08K-150-12	32.67g	12.10ab	443.30gh	49.00ab	13.93ab	283.30jk
IT07K-292-10	32.67g	11.93ab	628.30defgh	47.67ab	14.67a	500.00hijk
SE±	2.587	0.916	136.924	2.445	1.080	149.721

Means in the same column followed by unlike letters are significantly different

Table 4: YIELD PARAMETERS FOR VARIETIES OF COWPEAS OF MEDIUM DURATION MATURITY AT FUDMA UNIVERSITY FARM BADOLE FOR 2016 AND 2017 RAINY SEASONS

TREATMENTS	**2016** **100 seed weight(g)**	**Total seed weight/plot(g)**	**2017** **100 seed weight(g)**	**Total seed weight/plot(g)**
IT07K-274-2-9	21.19abcd	566.70abc	19.28abcde	1033.30abc
IT07K-269-1	18.31bcdefg	300.00def	18.48bcde	1350.00a
IT10K-832-1	15.54g	200.00f	17.70cdef	616.70def
IT10K-832-2	17.73defg	266.70ef	20.56abc	113.30ab
IT10K-835-10	19.39abcdefg	366.70bcdef	19.13abcde	1033.30abc
IT10K-180-11	15.89fg	333.30cdef	17.56cdef	933.30bcd
IT08K-193-14	17.45defg	266.70ef	17.85cde	583.30def
IT11D-16-71	15.45g	233.30ef	16.67ef	800.00bcde
IT11D-21-143	16.90efg	300.00def	21.11ab	800.00bcde
IRS-09-1009-7	20.93abcd	666.70a	17.39def	666.70de
IRS-09-1106-4	16.65fg	666.70	18.79abcde	700.00cde
IAR- 07- 1050	18.80abcdefg	433.30abcdef	14.75f	800.00bcde
IAR-07-1032-1	18.12cdefg	233.30ef	17.62cdef	750.00cde
IAR-07-1042-1	20.70abcde	533.30abcd	18.32bcde	583.30def
IAR-07-1058	17.93defg	316.70cdef	17.70cdef	533.30ef
UAM-1046-6-1	19.02abcdefg	650.00a	19.02abcde	600.def
UAM-1051-1	22.16ab	616.70ab	21.62a	566.70ef
UAM14-154-10-2	22.72a	233.30ef	20.46abcd	483.30efg
UAM14-155-10-3	22.12abc	383.30bcdef	19.34abcde	483.30efg
UAM14-145-4-3	21.94abc	366.70bcdef	19.57abcde	150.00g
IT07K-297-13	22.58a	366.70bcdef	18.58abcde	163.30g
IT08K-150-24	13.36bcdefg	266.70ef	17.74cdef	156.70g
IT08K-150-12	16.85efg	233.30ef	19.46abcde	283.30fg
IT07K-292-10	19.77abcdef	466.70abcde	19.51abcde	283.30fg
SE±	1.406	90.570	1.080	125.228

Means in the same column followed by unlike letters are significantly different, V= variety