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branches, and number of nodes were determined at maturity. The Leaf chlorophyll content was extracted using spectrophotometer set at a wavelength of 634nm, 648nm and 470nm.The chlorophyll a ranges from 0.76 to 1.49, chlorophyll b ranges from 3.17 to7.34 and the total chlorophyll ranges from 3.93 to 8.83. The data analysis was subjected to ANOVA using statistical software. The result showed that accession UAM091556 and accession T107K-297-13 have the highest plant height,which are significant difference ($P<0.05$) from other accessions. T107K-297-13 has the highest peduncle length , number of pods, total number of leaves, number of nodes on main stem, number of branches which are not significantly different from UAM0910556 but significantly different from other accessions and for all the quantitative trait studied.

CHAPTER ONE

CHAPTER FOUR

LIST OF TABLES

LIST OF ABBREVIATIONS

g = gram

Hr = hour

IBPGR = International Board of Plant Genetic Resources

IITA = International Institute of Tropical Agriculture

Kg = kilogram

NMB = Number of main branches

Mg = milligram

Mm = millimeter

NCSS = Number Cruncher Statistical System

NMS = Number of nodes on main stem

PC = Plant curvature

PEG = Polyethylene glycol

which are based primarily on seed and pods characteristics (Westphall 1974; Marechal 1985). The four cultivar includes the biflora, sesquipedalis, textiles and unguiculata, which are grown as forage, vegetable, fiber and pulse respectively.

Vigna unguiculata is an annual herb, in which savannah zone of West Africa has the largest population of about 85.00% of cowpea. Watering of cowpea is done naturally and artificially (Singh *et al.* 1999).

Cowpea is found majorly in savannah region of the tropics and subtropics. It can also be grown in Asia, Nigeria, Africa, USA, and dry savannah region of northern Ghana.

Horse gram (cowpea) are used traditionally to treat diseases like cholesterol reproduction, in blood, hemorrhoids, tumors, scrofula, bronchitis, heart disease, leucorrhoea, menstrual disorders, arthritis etc. Cowpea also has nutritional uses such as in human diet because of its protein, carbohydrate and fiber with percentage of 23.00%, 56.00%, and 4.00% respectively that can fulfill the amino acid that are essential for human .

As animal feeds, leaves and pods as vegetables etc. *Vigna unguiculata* also contains some mineral nutrients or contents and vitamins such as zinc, magnesium, calcium, sodium and vitamin A, C and D etc.

variability of nature and magnitude in the plant material and the character of various association is necessary for yield improvement (Vijayan, 2005).Therefore for the breeding program to be more successful germplasm collection and diversity records are highly desirable (Magloire,1995, Knotova *et al.*,2010).

Morphological traits are influence by environmental factors and may result in changing relationship partterns (Smith and Smith 1989, Selvi*et al*. 2003), nevertheless they are still effective for selection(Magloire, 2005).In cowpea, the quantitative traits have been used for many purposes by different researchers (Pasquet, 1993, Obute, 2001).

The use of spectrophotometer for determination of absorbance of chlorophyll pigments as a function of the wavelength is exploited to determine the concentration of the pigment and relate it to the rate of growth and fruit production in cowpea. While, the relevance of the use of beta radiography as a screening method for plant growth capacity is in the assessment of the plant health status and yield (Lichtenthaler , 1990;Blackburn, 1998; Cerovic, *et al.,* 1999; Takeuchi, *et al.,*2002; Anderson, 2003).

was introduced from Africa to the Indian sub-continent approximately2000 to 3500 years ago (Allen, 1983). Before 300 BC, cowpeas had reached Europe and possibly North Africa from Asia. In the 17th century AD the Spanish took the crop to West India. The slave trade from West Africa resulted in the crop reaching the southern USA early in the 18th century. Another view was that the Transvaal region of the Republic of South Africa was the centre of speciation of *V. unguiculata*, due to the presence of most primitive wild varieties (Padulosi, 1997). Presently cowpea is grown throughout the tropic and subtropic areas around the whole world. During the process of evolution of *V. unguiculata*, there was change of growth habit, from perennial to annual breeding and from predominantly out breeding to inbreeding, while cultivated cowpea (subsp.*unguiculata*) evolved through domestication and selection of the annual wild cowpea (var. *dekindtiana*). During the process of domestication and after the species was brought under cultivation through selection, there was a loss in seed dormancy and pod dehiscence, corresponding with an increase in seed and pod size. The precise location of origin of where cowpea was first domesticated is also still under speculation. The wide geographical distribution of var. *dekindtiana* throughout sub-Sahara Africa suggests that the species could have been brought under cultivation in any part of the region. However, the centre of maximum diversity of cultivated cowpea is found in West Africa, in an area encompassing the savannah region of Nigeria, southern Niger, part of Burkina Faso, northern Benin, is the largest producer followed by Niger and Brazil. Other producers are Mali, Burkina Faso and Senegal (Dhanavel *et al.*, 2008). It has been estimated that about 3.3 million tonnes of cowpea grains were produced worldwide in year 2000. Nigeria produced 2.1 million tonnes of this, making it the world's largest producer (IITA, 2004). In Asia, it is especially grown in India. Cowpea is an important pulse crop in India. Seeds are a major source of dietary protein in most developing countries (Dhanavel *et al.*, 2008).

1.1.1 MEDICINAL AND NUTRITION VALUE OF COWPEA

Cowpea is a multifunctional crop. It is used as diuretic and destroys worm in the stomach. Stubborn boils are also treated by applying its ground paste (Duke, 2010). On the other hand, common cold can be cured by giving cooked cowpea seed with spices. Its starch jelly has application in thirst (GAO, 1989). Amenorrhea can be treated by consuming cowpea seed powder while its roots powder is used in painful menstruation, chest pain, epilepsy and blood in urine (Kritzinger *et al.*, 2004). It is also used to cure infections and swellings. Cowpea seeds have been found to prevent birth defects in the brain and spine during pregnancy due to the presence of the highest contents of folic acid and B vitamin (Timko and Singh, 2008). It is also known to have a low amount of fat and high level of fiber which can prevent heart diseases by reducing the LDL (Phillips *et al.*, 2003). Cowpea has alpha amylase inhibitors that alter the function of alpha amylase enzyme on starch. Thus the conversion of starch to maltose is inhibited. Agarwal and Jain (2010) showed the effect of cowpea seed extract on mammalian alpha amylase. Cowpea leaves are also used in different diseases

The variability in the medium yield of cowpea in the different producing regions is an authentic reflection of the soil and climatic conditions required for cowpea production (Ayanwuyi and Akintonde, 2012). Cowpea yield is likely to respond to climate change in a rather context-specific way (Ziervogel, 2008).It follows accordingly that any changes in climate may affect the agricultural division in particular. Climate change will have both positive and negative impacts, and these can be measured regarding impacts on crop maturity, availability of soil water, soil fertility and erosion, incidences of pests and diseases, and sea level rise (Semenov, 2009). The area under cowpea is estimated at 1800 hectares excluding the crop in home gardens (Kimiti *et al.*, 2009).

About 85% of the total area under the cowpea is in arid and semi-arid lands (ASALs) of Eastern province and 15% in the Coast, Western, and Central regions (Kimiti *et al.*, 2009). Despite its importance in the dry areas of Eastern Kenya, its potential, growth and yield are constrained by several a biotic and biotic factors. Among these are low soil fertility, inadequate farm inputs, noxious weeds, pest and diseases and lack of seeds during planting times. This has decreased in the yield potential of 1500 to 239 kg/ha (Kimiti *et al.*, 2009).

1.1.3 ENVIRONMENTAL REQUIREMENTS

a. Climate

Cowpea grows primarily under humid conditions. It is tolerant to heat and drought conditions. Cowpea is sensitive to frost. It germinates rapidly at temperatures above 65oF; colder temperatures

There has been a lot of attention on the impact that climate change scenarios in exacerbating on the prevalence of pests and diseases on crop production, including mycotoxigenic fungal infection and contamination with mycotoxins (Paterson and Lima, 2010). If the temperature rises in cool or temperate climates, the relevant regions may become more susceptible to aflatoxins. Insect pests contribute to the major biotic stresses in cowpea growing regions in both developing and developed countries (Dauost *et al.* 1985). The major insect pests in East Africa include; aphids, weevils and a multiple of sucking bugs and leaf-eating beetles Fusarium wilt (*Fusarium oxysporum*), Asochyta blight (*Asochyta phaseolorum*), Brown blotch (*Colletotrichum capsici* or *Colletotrichum truncatum*), Brown rust (*Uromyces* spp.). Aphids are the primary causing vectors for significant yield losses.Thrips infestation, especially during seedling stage, often results in total crop failure (Ezueh, 1981; Price *et al.* 1983; Ta'Ama, 1983). These pests and diseases cause damage to the cowpea plant either by destroying its leaves, stems, and roots and as a result adversely reduce the productivity of the crop (Schwartz, Steadman, Hall, and Forster, 2005).

The parasitic weed (string) also poses a significant threat to cowpea production. Striga spp. The genus Striga, family Orobanchacecae, comprises about 41 species that are found in the African region and sections of Asia; Africa is the presumed zone of origin (Wolf *et al.*, 1991). By parasitizing crop species, they can cause substantial yield losses and are therefore considered

(Mohamed *et al.*, 2001). Two striga species and its distribution in Africa have been reported. Striga *gesneriodes* is mostly found in Sudan and West Africa, while *Alectra vogelii* is found in Guinea, Sudan, West and Central Africa and part of Eastern and Southern Africa (Timko and Singh 2008). *Alectra vogelii* is more widely distributed than Striga gesneriodes and is an obligate root-parasitic flowering plant of the family Scrophulariaceae which is one of the major concerns in lowering cowpea yields (Boukar, 2004).Melton *et al.* (1987) reported the resistance to southern bean mosaic virus-cowpea strain is conditioned by two recessive genes, *sbc-l* and *sbc-2.* Hobbs *et al.* (1987) studied three sources of resistance to this virus. Singh and Reddy (1986) reported that resistance to the southern root-knot nematode *(Meloidogyne incognita* [Kofoid and White] Chit wood) is conditioned by a single dominant gene, confirming the results that had been published earlier by others (Fery, 1985). Fery *et al.* (1994) characterized several new sources of resistance to root-knot nematodes.

1.1.5 GENETIC DIVERSITY

This genetic diversity is essential to decrease crop vulnerability to a biotic and biotic stress, ensure long-term selection gain in genetic improvement, and promote rational use of genetic resources (Martin *et al*., 1991; Tesemma *et al*., 1991; Mesmer *et al*., 1993; Barrett and Kidwell, 1998). Genetic diversity in crop species can be determined by using the agro-morphological as well refers to sum total of genetic variations found in a species or population (Singh, 2000). Genetic markers are specific chromosomal fragments within a genome, which presence and absence can be monitored, respectively. They allow for a rapid assessment of genetic diversity on the genome level and have been widely used to characterize genetic resources in various plant species (Beebe *et al.* 2001; Kubik *et al.*, 1999).

The genetic diversity in the germplasm of a breeding programmed affects the potential genetic gain through selection. Estimates of genetic diversity using new molecular tools, especially molecular markers have proven to be a useful way to delineate existing heterotic groups, identify new heterotic groups and assign inbred of unknown genetic origin to established heterotic groups (Dubreuil *et al.*, 1996; Hongtrakul *et al.*, 1997; Saghai-Maroof *et al.*, 1997; Pejic *et al.*, 1998; Casa *et al.*, 2002).

1.1.6 MORPHOLOGY AND BIOLOGY

Summerfield *et al.* (1974), Kay (1979) and Fox and Young (1982) described cowpea as an annual herb reaching heights of up to 80 cm with a strong tap root and many spreading lateral roots in the surface soil.

Figure 1: Picture showing a mature cowpea plant with green pods, dry pods and flower (Source: IITA Research Station Ibadan, 2000)

Fruit are pods that vary in size, shape, color and texture. They may be erect, crescent-shaped or coiled. They are usually yellow when ripe, but may also be brown or purple in color. There are usually 8-20 seeds per pod. Seeds vary considerably in size, shape and color. They are relatively large (2-12 mm long) and weigh 5-30 g/100seeds. Seed shape is correlated with that of the pod. Where individual seeds are separate from adjacent ones during development, they become deiform, but as crowding assay of quantitative traits do not need any sophisticated equipment or complex procedures, they are generally simple, rapid and inexpensive to score. It has been used as a powerful tool in the classification of cultivars and also to study taxonomic status. Morphological traits continue to be the first step in the studies of genetic relationships in most breeding programme (Cox and Murphy, 1990; Van Beuningen and Busch, 1997) because,

(1) The existing data bases on the germplasm collection or breeding stocks can often be used for genetic analysis

(2) Statistical procedures for morphological trait analysis are readily available

(3) Morphological information is essential in understanding the videotape performance relationships;

(4) Explanation of heterosis may be enhanced if a morphological measure of distances is included as an independent variable.

In cowpea breeding programme, the major emphasis has been on the collection and conservation of genetic pools. IITA houses over 16000 cultivated and wild accessions of cowpea that cover a wide spectrum of growth habits, Environmental responses and varying pest and disease susceptibilities. It is this precious source of material that serves as the essential foundation for the breeding of new improved lengthy and costly processes (Cooke, 1984). The genetic control of many morphological characters is assumed to be complex, often including epistatic interactions, and has often not been elucidated (Smith, 1986).Many morphological markers are recessive and therefore only expressed in the homologous condition. Most elite cultivated and breeding materials do not abound with readily observable morphological markers, a large number of which have deleterious effects on agronomic performance (Smith, 1986). Hence, morphological appearance cannot adequately describe cultivars without extensive replicated trials (Lin and Binns, 1994) and therefore, valid comparisons are only possible for descriptions taken at the same location during the same season(Smith and Smith, 1989).

1.1.8 CLASSIFICATION

All cultivated cowpeas are grouped under *V. unguiculata,* which is subdivided into four semi groups: Unguiculata, Biflora, Sesquipedalis, and Textiles (Westphall, 1974; Marechal *et al.,* 1978; and Marechal, 1985).

Verdcourt (1970) and Marechal *et al.,* (1978) classified cowpea as follow:

SUBTRIBE:	Phaseolinae
GENUS:	*Vigna*
SPECIES:	*V. unguiculata*

1.1.9 IMPORTANCE OF COWPEA FOR FOOD SECURITY

Food security is defined by Parnell and Smith (2008) as the ability of an individual to access enough food that is nutritious, safe, and personally acceptable in a socially acceptable way. According to Schonfeldt and Pretorius (2011), food insecurity is one of the main causes of malnutrition in South Africa, and statistics shows that one out of two households is experiencing hunger. Since South Africa has the ability to import food, if necessary, to meet basic nutritional requirements of its population (DAFF, 2011), it has been considered as a food secure nation. However, this may not be particularly true since food imports are often expensive and therefore unaffordable to the general populace (Laker, 2007). In 2005, it was reported that one third of South Africans were at risk of hunger and that one out of every five people was food insecure (NFCS-FB-1, 2008; Schonfeld *et al.*, 2010) and these results give us a clear picture of the situation on the ground.

ecosystem resilience (Akibode and Maredia, 2011). Of all the domesticated legumes, competitive advantage over other legume seeds since it has been given more attention as a protein crop. It is only recent that researchers decided to explore other underutilized legumes such as cowpea (El-Jasser, 2011).Cowpea is treated as a staple food crop in many regions of Africa (Keller, 2004). It is the most important food legume grown in the tropical savanna zones of Africa. Cowpea is considered as a neglected crop due to limited research and improvement on its potential use as a leafy vegetable. Neglected as it may be, the crop is still one of the highly appreciated crops in several African countries (Keller, 2004; Weinberger and Msuya, 2004). Farmers in drought-prone areas, with less rainfall, and less developed irrigation systems are becoming more interested in cowpea cultivation due to its multipurpose uses. The short life cycle of some varieties are priced for their ability to mature early thus provide food during periods of food scarcity. Cowpea plays a very important subsistence role in diets of many households in Africa (Kebe and Sembene, 2011). It provides nutrients that are deficient in cereal crops, e.g. iron, calcium and zinc.

The seeds contain proteins that are rich in amino acids, lysine and tryptophan, but they lack methionine and cystine when compared with animal protein. Cowpea seed is therefore, valued as a nutritional supplement to cereals, combining cowpea with a cereal crop, e.g. rice or maize meal; one can make food with a near-complete or a balanced set of nutrients (Davis *et al*., 1991).

unguiculata using morphological markers.

2. To identify accession with superior characteristics for breeding work.

3. To determine variation in chlorophyll content of the leaves of *Vigna unguiculata*.

The seeds used for these experiments were from cowpea with different accessions which are: NGB/06/0050, NG/SA/07/063, IT07K-318-33, TI07K-297-13, UAM091055-6, IT97K-499-35, and IT89KD-288.

a

NGB/06/0050

b

NG/SA/07/063

c

IT07K-318-33

d

TI07K-297-13

e

UAM0919556

f

IT97K-499-35

g

IT89KD-288

Plate 1: Varieties of *Vigna unguiculata* used

2.3.1 SOIL PREPARATION

The soil used was collected in Federal University Oye-Ekiti, Ekiti State. It is sand-loamy soil inside a perforated container and the seeds were planted. Watering of the seeds was done adequately.

2.3.2 GERMINATION EXPERIMENT

The seeds of *Vigna unguiculata* were planted in screen house of Federal University Oye Ekiti, Ekiti State. The seeds were planted in August, 2018. After soil preparations, four seeds were planted per pot for each accession and this was done in triplicates. The seeds started growing three days after planting. For NG/SA/073 and NGB/06/0050 accession, some of the leaves started dropping four weeks, 3days after planting and after six weeks of planting replicate one of NG/SA/073 and NGB/06/0050 accessions dries off. The flowers started growing after five weeks of planting and the pod after seven weeks of planting.

WEEDING

Weeding was done when necessary and was done manually (by hand)

HARVESTING

The seeds were harvested at 10 weeks after planting and were done manually by cutting and opening of the pod after drying.

Biomass determination was done by weighing the fresh leaves which serves as the fresh weight, the dried weight was done by drying the leaves in an oven at 80 ^{o}C for 24hours and the water content is calculated by subtracting the dried weight from fresh weight.

2.5 DETERMINATION OF LEAF AREA

The leaf area was calculated using Kemp equation in which the product of length, breadth and constant k (0.66) and the S.I unit is in Centimeter (cm).

Mathematically;

Leaf area=Length x Breadth x 0.66

2.6 CHLOROPHYLL CONTENT

After 10 weeks of planting, fresh leaves were collected. 0.25g of the leaves sample were macerated i.e. crushing in 5ml of 80% acetone using mortar and pestle. The extract was placed in water bath at 70 degree for few minutes in order to decolorize. The supernatant were read at absorbance 663nm, 645nm and 652nm using spectrophotometer and expressed in mg g^{-1} fresh weight basis.

statistical procedures. This was achieved using SPSS (Version 17) *unguiculata* at maturity is shown in table 1. The accessions exhibited significant variation with respect to eight quantitative characters. Taking plant height for instance, UAM0910556 recorded the highest length of 91.58cm while NGB0050 recorded the least of 22.43cm. The accession IT97K-499-35 was significantly higher from accessions T107K-297-13, NGSA63, IT07K-318-33 and IT89KD288 while NGSA63 was not significantly different from T107K-297-13.

3.1.2Peduncle Length

The result of peduncle length as shown in Table 1 shows that T107K-297-13 has the highest length of 18.29cm which is not significantly different from UAM0910556 of length 17.15cm, while IT97K-499-35 has the lowest length of 4.00cm.

3.1.3 Terminal Leaf Length

UAM0910556 has the highest terminal leaf length of 10.72cm, followed by T107K-297-13 of 7.24cm while IT89KD288 has the lowest length of 1.93cm and NGB0050, NGSA63, IT07K-318-33 were not significantly different from each other (Table 1).

3.1.4 Terminal Leaf Width

UAM0910556 has the highest terminal leaf width of 4.85cm which is not significantly different from TI07K-297-13 of width 3.46, while IT89KD-288 has the lowest width of 0.72cm while TI07-499-35, NGSA63, NGB0050 were not significantly different from IT07-318-33 (Table 2).

In table 2 below the result of the leaf area shown that UAM0910556 has the highest leaf area of 42.74, followed by TI07K-297-13 of 16.64 while IT89D-288 has the lowest leaf area of 2.74 and IT07K-318-33 was significantly different from NGB0050 and NGSA63.

3.17 Number of Nodes on Main Stem

IT07-318-33 has the highest number of main branches of 24.67 which is not significantly different from NGSA63 of 24.33 while TI07-499-35 has the lowest number of main branches of 4.33.Accession NGB0050 of 18.33 was not significantly different from UAM0910556 of 17.67 while IT89KD-288 of 15.33 was significantly higher from IT07-318-33 (Table 2)

3.1.8 Number of Leaves

The result of number of leaf as shown in Table 2 shows that T107K-297-13 has the highest number of leaf of 57.00 which is significantly higher from NGSA63 of 54.66 and TI07-499-35 has the lowest number of leaf of 17.00

3.19 Number of Pods

TI07-297-13 has the highest number of pods of 11.00, followed by UAM0910556 of 8.00 which is not significantly different from NGSA63 of 7.67. Accession IT89KD-288 of 3.33 is significantly highre from IT07-318-33 and NGB0050 and TI07-499-35 has the lowest number

3.3 VARIABILITY IN THE CHLOROPHYLL CONTENT AMONG THE ACCESSIONS

Accession IT07K-297-13 has the highest chlorophyll content of 8.83 whileIT89D-288 has the lowest chlorophyll content of 3.93 and IT07K-99-35,NGB0050 and UAM0910556 were not significantly different from each other while NGSA63 of 7.09 is significantly higher from TI07K-318-33 of 6.87 (Table 5).

IT07K-318-33	29.23^{c}	7.83^{c}	4.27^{c}	2.14	13.00^{c}	11.61^{c}	13.00^{c}	32.33^{c}	5.00^{c}
TI07K-297-13	35.19^{d}	18.29^{d}	7.24^{d}	3.46	17.67^{d}	16.64^{d}	17.67^{d}	48.33^{d}	11.00^{d}
UAM0910556	91.58^{e}	17.15^{e}	10.72^{e}	4.85^{a}	15.67^{e}	42.74^{e}	15.67^{e}	37.67^{e}	8.00^{e}
IT97K-499-35	50.33^{f}	4.00^{f}	2.17	1.03	4.33^{f}	4.43^{f}	4.33^{f}	12.00^{f}	1.67
IT89KD288	25.73^{g}	4.15^{g}	1.93	0.72	9.33^{g}	2.74	9.33^{g}	21.33^{g}	3.33

PDL= peduncle length, TLL= terminal leaflet length, TLW=terminal leaflet width, NMB= number of main branches, NMS= number of nodes on main stem, PH= plant height, LA =leaf area, NL=number of leaves, NP=number of pod

The mean value with different superscript was significantly different at 5% level of probability. While the mean value without superscript was not significant. Therefore, PH, PDL, NMB, NMS AND NL were the most significant accession at 5.00% level of probability while TLL, TL, NP and LA were least significant at 5.00% level of probability.

significance α=0.05, this leads to the rejection of H_0, which indicates that there is a significant difference in at least one of the characters of the factors based on their accession.

Table 4: Biomass Analysis among the Seven Accessions

Accession	Wet weight(g)	Dried weight(g)	Water content	Total biomass
NGB	17.80	2.60	15.20	0.0032
NG/SA/063	30.40	6.40	24.00	0.0049
UAM0910556	16.20	7.00	9.20	0.0075
IT89KD-288	10.70	6.10	4.60	0.012
TI07K-297-13	24.70	8.80	15.90	0.01
IT07K-499-35	16.90	7.10	9.80	0.025
IT07K-318-33	18.30	6.90	11.40	0.01

IT89KD-288	0.76	3.17	3.93
TI07K-297-13	1.49	7.34	8.83
IT97K-499-35	1.36	5.91	7.27
IT07K-318-33	1.34	5.53	6.87

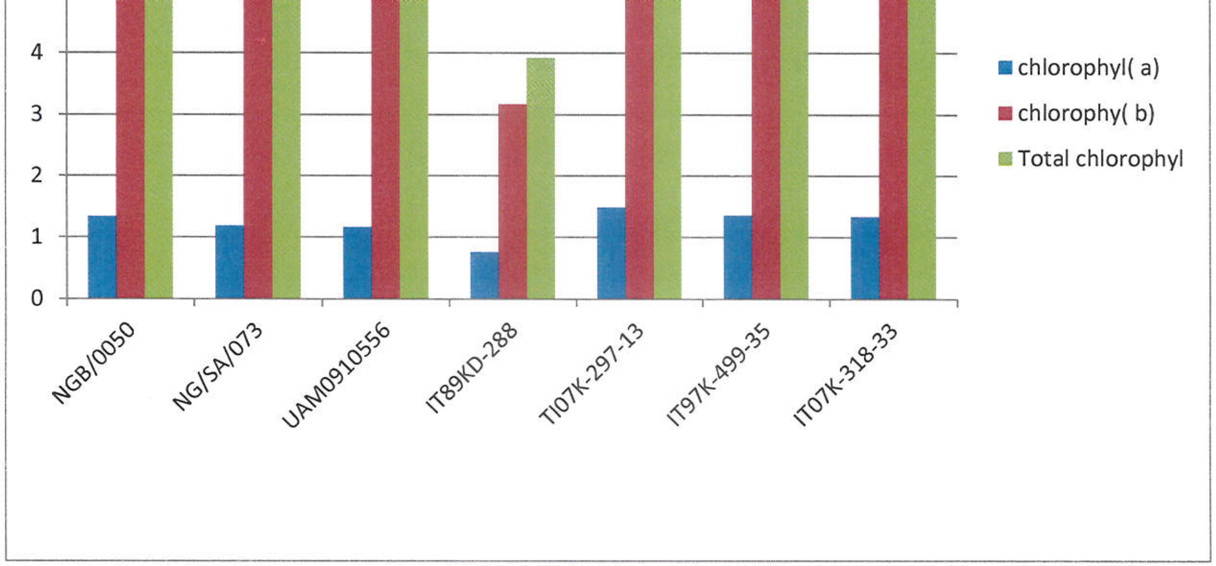

Figure 3: Chart Representing the Chlorophyll Content among the Accession

significant differences observed among the quantitative traits may be due to the influence of the environment on the genotypes and as a result of the differences in the genetic potential of different cowpea genotypes. This in agreement with the findings of Ariyo (1993) and Adeniji (2003) who stated the role of environmental factor and differences in genetic makeup of different varieties in yield determination of okra. The characters showing high range of variation have more possibility for improvement by using them for more breeding work to develop better varieties of cowpea. All the eight characters under study exhibited variability as shown in Table 1 above. Characters such as plant height, peduncle length, number of pods which have wide range of variations in their mean values indicates high range of genetic diversity of these characters and thus providing greater scope for selecting desirable genotypes for further breeding work. This is in accordance with the findings of Singh *et al.*, 2006 and Reddy *et al.*, 2012b who worked on okra.

Also, plant height in this study varied significantly among the cowpea accessions studied (Table 3.1).UAM0910556 recorded the highest length of 91.58cm, followed by IT97K-499-35, NGSA63, TI07K-297-13, IT07K-318-33, IT89KD288 and NGB0050 recording mean plant height of 50.33cm, 37.05cm, 35.19cm, 29.23cm, 25.73cm and 22.43cm respectively.

value=0.0031, which is s than the level of significance $\alpha=0.05$,this leads to the rejection of H_0, which indicates that there is a significant difference in at least one of the characters of the factors based on their accession.

In biomass production accession IT07K-499-35 has higher significant difference when compared to other accessions.

The accession used in this study showed highly significant differences in total chlorophyll content; Accession TI07K-297-13 had higher total chlorophyll content than all other accession with 8.83. Total chlorophyll content increase for all the accessions and this increase can be associated with plant growth stage

4.1 CONCLUSION

In this study to determine the genetic diversity of cowpea using morphological marker, accession UAM0910556 and TI07K-297-13 which has superior characteristics and Accession TI07-297-13 which has the highest level of chlorophyll content could be selected for further breeding work.

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