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Research Paper

Cowpea (*Vigna unguiculata* (L.) Walp) clipping management technology 1: A potential for fodder production, sustained growth and food security in the savannah regions of Nigeria

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***Abstract*.** Cowpea (Vigna unguiculata (L.) Walp) is a fast growing crop which covers the soil surface and produces large quantities of (organic) plant biomass. It has been difficult to improve the growth and productivity of these varieties of crop. However, it has been observed that if the dual purpose cowpea is cut before senescence, it can regenerate and re-produce good crop growth in the savannah regions of the tropics. Therefore, this study was carried out on the research field of the Institute for Agricultural Research, Ahmadu Bello University, Samaru, Zaria, Nigeria, during the 2002 to 2005 wet seasons, to evaluate the influence of intra-row spacing, innovative clipping management and time on the growth of dual purpose cowpea. The treatments were laid out in a Randomized Complete Block (RCB) design, replicated three times. The data was analyzed statistically using the analysis of variance test (ANOVA), and the means compared using the Duncan Multiple Range Test (DMRT). The result of this investigation indicated that number of branches plant^{-1} and vine length was highest at the closest (15 cm) intra-row spacing. While leaf fresh and dry weights plant^{-1}, and stem fresh and dry weights plant^{-1} were generally higher at 30 cm intra-row spacing. Lower number of branches plant^{-1}, stem fresh and dry weights plant^{-1}, and vine length plant^{-1} were recorded at 64 DAP. Conversely, fresh fodder yield of plots clipped at 74 and 84 DAP were 62 and 59% higher than those of the control (unclipped) plots. On the whole, clipped cowpea showed a 100% potential regenerative capacity. Thus large amounts (15 tha^{-1}) of fresh organic plant material or biomass (clipped fodder) were produced on-farm/in-situ. It can be concluded that the adoption of this innovative clipping management technology could facilitate sustain growth of the cowpea crop and holds a veritable potential towards enhancing the food security situation of the vast majority of these low income and low technology farmers in the savannahs of sub-Saharan Africa. Indeed, the large amounts of (organic) plant material or biomass (clipped fodder biomass) produced on-farm could be profitably used for organic soil fertility maintenance and/or improvement or alternatively utilized or sold as animal feed (fodder) to generate and/or supplement family incomes for these low inputs, low technology, resource poor farmers. This underscores the encouraging impact this technology holds as a veritable tool towards improved economic/living conditions of these predominantly poor rural farmers. In this manner, the negative effects of poverty are ameliorated through positive impacts on food insecurity in the region.

Keywords: Adoption, clipping, fodder, growth, innovative, management, on-farm, production, sustained, technology.

INTRODUCTION

The cowpea plant (*Vigna unguiculata* (L.) Walp) is a dicotyledonea belonging to the family Fabaceae, formerly Leguminosae (Onwueme, 1979; Singh et al., 1997). The cowpea crop was originally indigenous to Asia (Encarta, 2005), but is today widely grown in mainly tropical parts of the world (Onwueme, 1979). It is grown in Africa, India and Brazil (Steele and Mehra, 1980); where its photosensitivity requirements are diverse (Singh et al., 1997). The earliest cultivars in Africa were probably the spreading photosensitive and short-day types of the sub species *unguiculata* (Onwueme and Sinha, 1991). The growth habits vary from erect, semi-erect, and prostrate (trailing, sprawling, twining) or climbing annual herbaceous legumes (indeterminate type to the fairly determinate types), ranging in height from 20 to 200 cm (David and Adam, 1985), with triple leaves and pods 20 to 30cm long, enclosing several kidney-shaped seeds (Encarta, 2005). The crop has a deep tap root system with numerous spreading laterals in surface soils. The non-spreading type tends to be more determinate in blooming habit and some improved cultivars blossom over a short period. In indeterminate cultivars, flowers and ripe pods are found together on the same plant (Onwueme and Sinha, 1991).

Cowpea is a warm-weather annual crop. It withstands heat better than most other legumes and is very drought-resistant. Moisture deficiency has an adverse effect mainly on vegetative growth, while seed formation is less affected (Onwueme and Sinha, 1991). Cowpea can be grown successfully on a wide variety of soils provided they are well drained. Light sandy loam soils are more suitable than heavy soils. Cowpea can tolerate acidity under conditions of heavy rainfall. Sometimes they are grown on poor acid soils for soil improvement (David and Adam, 1985).

Cowpea features prominently in the farming systems of the semi-arid tropics where they are grown mainly for their mature seeds (David and Adam, 1985). It is equally important in the Sudano- Sahelian agro-ecology of Nigeria, where they are grown for both fodder and grains (Odion and Singh, 2005b).

The different varieties of cowpea cultivated in the Sahel and Sudan savanna regions could be broadly divided into two types: the grain and the fodder/dual purpose types. This includes the early non-photosensitive type that matures long before the cereals (60 to 70 days); the late maturing (85 to 120 days) non-photosensitive dual purpose (grain + leaf) types, and the photosensitive late maturing (85 to 120 days) fodder type that produces abundant vegetation as it spreads across the ground are grown. The groups differ basically in photoperiod sensitivity, plant type (erect versus runner) and response to intra-row spacing (Odion and Singh, 2005a). Traditional farm varieties are the indeterminate, spreading type with a growing period of up to 120 days. They are fast growing, cover the soil surface and produce large quantities of biomass (IITA, 1989).

In Nigeria, cowpeas are sown during the first week of July in the Sudan zone, by mid-July in the northern Guinea zone, by the third to the fourth week of July in the northern half of the Southern Guinea zone, as soon as the late season rain starts in the southern part of the southern Guinea savanna, and about mid-August in the derived savanna and forest zones (Onwueme and Sinha, 1991).

Most African soils are reported to be of ancient origin and have been subjected to leaching for a long time; and since they come from rocks low in nutrient contents, they are typically impoverished and seriously deficient in phosphate and other nutrients. Consequently, it has been difficult to improve the growth and productivity of these varieties using only cultural practices, as a result of the agricultural system (permanent) practiced in the tropics which results in severe nutrient depletion in sub-Saharan Africa (Zake, 1993).

To circumvent this, an important aspect of crop production is the density at which they are planted and this is usually manipulated by the spacing's of the crop plants. Changes in plant density often affects inter plant competition and mutual shading which in turn affects both vegetative reproduction and other developmental processes of the crop (Tetio-kagho and Gardner, 1988).

Also, as a result of the short growing season in the Savannah, late planting of the dual purpose cowpea often results in poor vegetative growth. But when these dual purpose cowpea varieties are planted early in the season, and at closer intra-row spacing, like the grain types, they grow vegetative and the reproductive phase is either suppressed or completely absent. However, it has been observed that if dual purpose cowpea is cut before senescence, it can regenerate and produce good growth and seed (Odion and Singh, 2005b). Since cowpea can regenerate after (clipping) defoliation, it might be possible to grow the crop of dual purpose cowpea for both grain and fodder (Odion and Singh, 2005a; Odion et al., 2007). In so doing the household food security – which is access by all people/members of the household to food required for a healthy life, at all times – can be improved upon and guaranteed (Anderson and Lorch, 1995).

Therefore, this study was carried out with the aim of investigating the influence of intra-row spacing, innovative clipping management and time on the growth of dual purpose cowpea (*Vigna unguiculata* (L.) Walp).

MATERIALS AND METHODS

Field experiments were carried out on the research farm of the Institute for Agriculture Research, Samaru, Nigeria, during the 2002, 2003, 2004 and 2005 cropping seasons. Samaru (11°11′N, 07°38′E and 686 m above sea level) is located in the northern Guinea savanna agro-ecology of Nigeria (Keay, 1959). Usually, rainfall in the region establishes between mid-May and early June and peaks in July/August. Total annual rainfall ranges between 883 to 1062 mm, with an average of 945.20 mm. The dry season starts at about mid-October and extends to the end of April. The mean minimum and maximum temperatures during the rainy seasons range between 14 to 22°C and 29 to 34°C, respectively. The soil of the experimental site at the beginning of the trials in 2002 was loamy characterized by a pH of 6.60; low organic carbon content low organic carbon content (0.299 g kg^{-1}); and low nitrogen (0.087 g kg^{-1}); a phosphorus value of 6.51 mg kg^{-1} and a low level of potassium (0.10 cmol kg^{-1}).

The treatments comprised of three intra-row spacing, 15.0, 30.0 and 45.0 cm on ridges 75 cm apart; three clipping heights (no clipping control - 0 , 12.5 and 25.0 cm); and three clipping periods (64, 74 and 84 days after planting – DAP) respectively. Factorial combinations of these treatments were laid out in a Randomized Complete Block (RCB) design; replicated three times.

The land was ploughed and harrowed twice using mechanical power to give a good soil tilt; then ridged and demarcated into a gross and net plot sizes of 9.0 and 4.5m^2, respectively. Two seeds of cowpea were planted per hole at about 5 cm depth.

Fertilizer was applied at the recommended rate of 10 kg N ha^{-1}, 36 kg P_2O_5 ha^{-1} and 20 kg K_2O ha^{-1} (Enwezor et al., 1989). Weeds were controlled at planting using Gramazone (Paraquat) as a pre- and post-emergence herbicide, supplemented with manual weeding operations. Post-emergence protection against insect pest and fungal attacks were provided using the insecticides and fungicides as and when necessary.
The fields were planted on 13th July, 17th July, 7th June and 17th June, in 2002, 2003, 2004 and 2005, respectively. The cowpea crop was clipped (harvested) at 64, 74 and 84 days after planting (DAP). The first clipping was done on 15th September, 2002; 19th September, 2003; 10th August, 2004; and 17th August, 2005, respectively. The clipped fodder was placed on the plots to decay and act as a source of organic manure. The clipped plants were then left to grow to maturity alongside the control (unclipped) plots for further growth and yield analysis.

Data on the relative regeneration rate (RRR) was assessed using the formula as reported by Odion and Singh (2005a) thus:

$$RRR = \frac{b - a}{b} \times 100$$

Where, a = control plots fodder; and b = clipped plots total fodder.

The data collected was compiled and analyzed statistically using the analysis of variance test (F-test) (Snedecor and Cochran, 1967). The means were compared using the Duncan Multiple Range Test-DMRT (Duncan, 1955).

RESULTS

Number of branches and vine length per plant

Intra-row spacing had a significant effect on the number of branches $plant^{-1}$ in the combined analysis for 2002 to 2005, which showed that the number of branches $plant^{-1}$ at 15 cm intra-row spacing was significantly higher ($p \leq 0.05$) than at 30 and 45 cm; and these were in turn statistically at par with each other. Clipping height did not have any significant influence on the number of branches $plant^{-1}$ in any of the years of this study. In 2002 and the combined analysis for 2002 to 2005, the number of branches $plant^{-1}$ increased significantly with increase in clipping time from 64 to 84 DAP (Table 1).

In all the years and the combined analysis for 2002 to 2005, vine length of plants spaced 15 cm apart was similar to that spaced 30 cm apart, but significantly longer than at 45 cm. Clipping height had no significant effect on vine length $plant^{-1}$. In 2002, clipping at 64 DAP produced significantly shorter vines than clipping at 74 and 84 DAP; which were in turn statistically at par. The combined analysis for 2002 to 2005 showed that delayed in clipping from 64 to 84 DAPS resulted in the production of significantly longer vines $plant^{-1}$ (Table 2).

Leaf fresh and dry weight per plant

In 2002, the 30 cm intra-row spacing produced significantly higher leaf fresh weight $plant^{-1}$ than the 15 and 45 cm intra-row spacing; that were similar. The combined analysis for 2002 to 2005, however showed that leaf fresh weight $plant^{-1}$ of cowpea intra spaced at 30 cm was statistically similar to that spaced at 15 cm; but significantly higher than those spaced at 45 cm. The influence of clipping height on leaf fresh weight $plant^{-1}$ was not significant. Clipping time significantly influenced leaf fresh weight $plant^{-1}$ in the combined analysis (2002 to 2005), where crop plants clipped at 74 and 84 DAP produced leaf fresh weight $plant^{-1}$ which were statistically at par, but significantly higher than those clipped at 64 DAP (Table 3).

In 2002, leaf dry weight $plant^{-1}$ of crops grown at 15 and 30 cm intra-row spacing were statistically at par, but significantly higher than those spaced at 45 cm. Leaf dry weight $plant^{-1}$ was not significantly influenced by the height of clipping in all the years of this investigation. In 2002, leaf dry weight $plant^{-1}$ was significantly higher at 84 DAP than at 64 and 74 DAPS, which were statistically at par; while in the combined analysis for 2002 to 2005, leaf dry weight $plant^{-1}$ of crops clipped at 64 DAP was significantly lower than those clipped at 74 and 84 DAPS; which were statistically the same (Table 4).

Stem fresh and dry weight per plant

In 2002 and the combined analysis for 2002 to 2005, stem fresh weight $plant^{-1}$ was significantly higher in crops grown at 30 cm intra-row spacing than those grown at 15 and 45 cm intra-row spacing which were in turn statistically at par. The influence of clipping height on

Table 1. Number of branches plant^{-1} of cowpea as influenced by intra-row spacing, clipping management and time treatment at Samaru, Zaria, Nigeria.

Treatment	Number of branches		
	2002	2005	Combined (2002 – 2005)
Intra-row spacing (cm)			
15	24.90	16.39	21.96^a
30	21.20	16.83	19.00^b
45	21.99	15.16	18.47^b
SE±	1.74	0.94	0.64
Clipping height (cm)			
0 (Control)	22.69	16.13	19.81
12.5	23.03	16.51	20.14
25.0	22.37	15.74	19.48
SE±	1.74	0.94	0.64
Clipping time (DAP)			
64	6.50^c	11.16^c	14.13^c
74	21.83^b	14.66^b	19.14^b
84	39.77^a	22.55^a	26.15^a
SE±	1.74	0.94	0.64

Means followed by different letter(s) are significantly different at 5% level of probability using Duncan's Multiple Range Test (DMRT).

Table 2. Vine length (cm) plant^{-1} of cowpea as influenced by intra-row spacing, clipping management and time treatment at Samaru, Zaria, Nigeria.

Treatment	Vine length		
	2002	2005	Combined (2002 – 2005)
Intra-row spacing (cm)			
15	101.38^a	122.84	102.91^a
30	90.55^{ab}	121.36	97.24^{ab}
45	83.90^b	115.75	89.48^b
SE±	4.44	6.69	2.42
Clipping height (cm)			
0 (Control)	91.95	119.98	96.54
12.5	89.07	124.03	95.31
25.0	94.82	115.94	97.78
SE±	4.44	6.69	2.42
Clipping time (DAP)			
64	81.68^b	78.22^b	79.40^c
74	96.37^a	142.36^a	100.56^b
84	97.79^a	139.37^a	109.66^a
SE±	4.44	6.69	2.42

Means followed by different letter(s) are significantly different at 5% level of probability using Duncan's Multiple Range Test (DMRT).

stem fresh weight plant^{-1} was not significant throughout the period of this investigation. In 2002, stem fresh weight plant^{-1} of crops clipped at 74 and 84 DAP were statistically at par, but significantly higher than those clipped at 64 DAP. The combined analysis for 2002 to 2005, showed that stem fresh weight plant^{-1} of plots

Table 3. Leaf fresh weight (g) plant^{-1} of cowpea as influenced by intra-row spacing, clipping management and time treatment at Samaru, Zaria, Nigeria.

Treatment	Leaf fresh weight		
	2002	**2005**	**Combined (2002 – 2005)**
Intra-row spacing (cm)			
15	69.08^b	53.16	85.95^a
30	83.69^a	60.18	91.57^a
45	57.23^b	52.16	74.34^b
SE±	4.88	4.78	4.09
Clipping height (cm)			
0 (Control)	70.00	55.17	83.97
12.5	70.33	56.12	86.52
25.0	69.66	54.21	81.38
SE±	4.88	4.78	4.09
Clipping time (DAP)			
64	61.73	34.78^b	73.99^b
74	74.79	59.45^a	86.41^a
84	73.48	71.27^a	91.46^a
SE±	4.88	4.78	4.09

Means followed by different letter(s) are significantly different at 5% level of probability using Duncan's Multiple Range Test (DMRT).

Table 4. Leaf dry weight (g) plant^{-1} of cowpea as influenced by intra-row spacing, clipping management and time treatment at Samaru, Zaria, Nigeria.

Treatment	Leaf dry weight		
	2002	**2005**	**Combined (2002 – 2005)**
Intra-row spacing (cm)			
15	13.67^a	22.71	22.01
30	13.87^a	25.77	22.72
45	9.89^b	19.52	22.38
SE±	0.76	2.55	2.00
Clipping height (cm)			
0 (Control)	12.48	22.66	22.37
12.5	12.77	22.37	24.22
25.0	12.19	22.96	20.51
SE±	0.76	2.55	2.00
Clipping time (DAP)			
64	10.19^b	8.59^b	15.28^b
74	11.96^b	28.94^a	26.91^a
84	15.28^a	30.46^a	24.91^a
SE±	0.76	2.55	2.00

Means followed by different letter(s) are significantly different at 5% level of probability using Duncan's Multiple Range Test (DMRT).

clipped at 74 and 84 DAP were statistically at par; but stem fresh weight of plants clipped at 84 DAP were significantly higher than those clipped at 64 DAP. However, plants clipped at 64 and 74 DAP did not statistically differ (Table 5).

In 2002, stem dry weight plant^{-1} of crops intra spaced at

Table 5. Stem fresh weight (g) plant^{-1} of cowpea as influenced by intra-row spacing, clipping management and time treatment at Samaru, Zaria, Nigeria.

Treatment	Stem fresh weight		
	2002	**2005**	**Combined (2002 – 2005)**
Intra-row spacing (cm)			
15	53.12^{b}	55.89	70.77^{b}
30	72.36^{a}	62.87	84.04^{a}
45	44.12^{b}	55.09	70.17^{b}
SE±	4.74	5.43	4.14
Clipping height (cm)			
0 (Control)	56.71	57.95	75.02
12.5	63.77	62.15	81.40
25.0	69.64	53.75	68.66
SE±	4.74	5.43	4.14
Clipping time (DAP)			
64	41.91^{b}	35.48^{c}	66.00^{b}
74	62.77^{a}	55.75^{b}	74.28^{ab}
84	65.44^{a}	82.61^{a}	84.81^{a}
SE±	4.74	5.43	4.14

Means followed by different letter(s) are significantly different at 5% level of probability using Duncan's Multiple Range Test (DMRT).

30 cm was significantly higher than those spaced at 45 cm, but statistically at par with plants grown at 15 cm intra-row spacing. The combined analysis (2002 to 2005) showed that plants clipped at 12.5 cm height produced significantly heavier stem dry weight plant^{-1} than the control and those clipped at 25.0 cm height, which were statistically at par. In 2002 and the combined analysis for 2002 to 2005, crops clipped at 74 and 84 DAP produced stem dry weight plant^{-1} which were statistically at par, but significantly higher than those crops clipped at 64 DAP (Table 6).

Relative regenerative rate and total fresh fodder yield

Relative regenerative rate was not significantly influenced by the treatments throughout the period of study (Table 7).

Fresh fodder yield was significantly influenced by intra-row spacing in 2002 and the combined analysis (2002 to 2005) where fresh fodder yield significantly decreased with increasing intra-row spacing from 15 to 45 cm in 2002, while the combined analysis (2002 to 2005) produced significantly higher fresh fodder yield at 15 cm intra-row spacing than at 30 and 45 cm, which were in turn statistically at par. The influence of clipping height on harvested fresh fodder yield was not significant throughout the study period. Time of clipping significantly influenced fresh fodder yield in 2002, and the combined analysis (2002 to 2005), where the fresh fodder produced from plots clipped at 74 and 84 DAP were statistically the same, but significantly higher than those obtained from plots clipped at 64 DAP (Table 8).

DISCUSSION

Influence of clipping management on fodder production, growth of cowpea and food security

The cowpea crop favorably responded to closer intra-row spacing as was corroborated in the number of branches plant^{-1} plant height, and fresh fodder yield, which increased significantly at 15 cm intra-row spacing (highest crop density). Branching has been noted to be genetically controlled and is an effective way of increasing leaf area per plant. This phenomenon has been observed in the sorghum plant which tillered (branch from the nodes close to or below the soil surface) when the plant density was doubled, the heads per hectare also doubled, indicating that little tillering occurred at the lower density (Gardner et al., 1985). Indeed, the important contribution of number of branches, vine length, leaf and stem fresh weights etc., to the overall photosynthetic activity of crop plants has been underscored (Loomis and Williams, 1963; Williams and Joseph, 1976; Arnon, 1977; Gardner et al., 1985; Tetio-kagho and Gardner, 1988). On the whole, increase in fresh fodder yield is indicative of the fact that, even at this low intra-row spacing's (high density), intra-crop

Table 6. Stem dry weight (g) plant^{-1} of cowpea as influenced by intra-row spacing, clipping management and time treatment at Samaru, Zaria, Nigeria.

Treatment	Stem dry weight		
	2002	**2005**	**Combined (2002 – 2005)**
Intra-row spacing (cm)			
15	8.25^{ab}	27.35	18.60
30	9.53^{a}	25.86	17.78
45	6.95^{b}	25.03	16.15
SE±	0.72	2.72	0.97
Clipping height (cm)			
0 (Control)	8.24	26.07	17.63^{b}
12.5	9.36	30.47	20.47^{a}
25.0	7.13	21.70	14.79^{c}
SE±	0.72	2.72	0.97
Clipping time (DAP)			
64	5.86^{b}	10.24^{b}	12.76^{b}
74	8.74^{a}	32.69^{a}	19.39^{a}
84	10.13^{a}	35.30^{a}	20.74^{a}
SE±	0.72	2.72	0.97

Means followed by different letter(s) are significantly different at 5% level of probability using Duncan's Multiple Range Test (DMRT).

Table 7. Relative regenerative rate (RRR) of cowpea as influenced by intra-row spacing, clipping management and time treatment at Samaru, Zaria, Nigeria.

Treatment	Relative regenerative rate		
	2002	**2005**	**Combined (2002 – 2005)**
Intra-row spacing (cm)			
15	98.79	98.78	96.66
30	98.90	99.16	96.98
45	99.14	99.40	97.15
SE±	7.24	8.59	0.53
Clipping height (cm)			
0 (Control)	-	-	-
12.5	99.06	99.11	97.46
25.0	98.83	99.12	96.39
SE±	7.24	8.59	0.53
Clipping time (DAP)			
64	99.10	99.11	97.29
74	98.93	99.11	95.97
84	98.79	99.12	97.52
SE±	7.24	8.59	0.53

Means followed by different letter(s) are significantly different at 5% level of probability using Duncan's Multiple Range Test (DMRT).

competition for available resources and the mutual shading of leaves was not so intense as to adversely impact negatively on the crop's growth.

Fresh fodder yield obtained from plots clipped at 74 and 84 DAP was higher over those clipped at 64 DAP. It could be said that the non attainment of maximum growth

Table 8. Harvested total fresh fodder yield (t ha $^{-1}$) of cowpea as influenced by intra-row spacing, clipping management and time treatment at Samaru, Zaria, Nigeria.

Treatment	Total fresh fodder yield (t ha^{-1})		
	2002	2005	Combined (2002 – 2005)
Intra-row spacing (cm)			
15	42.86^{a}	19.03^{a}	18.96^{a}
30	29.88^{b}	11.81^{b}	13.95^{b}
45	19.05^{c}	12.98^{b}	11.43^{b}
SE±	2.90	1.97	0.93
Clipping height (cm)			
0 (Control)	-	-	-
12.5	30.26	16.48	15.22
25.0	30.93	12.74	14.35
SE±	2.90	1.97	0.93
Clipping time (DAP)			
64	7.64^{b}	9.33^{b}	7.30^{b}
74	43.66^{a}	19.50^{a}	19.31^{a}
84	40.49^{a}	15.00^{a}	17.73^{a}
SE±	2.90	1.97	0.93

Means followed by different letter(s) are significantly different at 5% level of probability using Duncan's Multiple Range Test (DMRT).

(full vegetative coverage) viz. lack of the attainment of full canopy or leaf area (LA) at the early stage of the crops life – 64 DAP accounted for the inadequate (full or maximum) utilization of the incoming solar radiation for growth. While, the observed increase in fresh fodder yield at 74 DAP, coincided with the period of the crops maximum vegetative growth (Musa, 1990).

It is instructive to note that in the present study, cowpea clipping management produced large (15 tha^{-1}) volume of green plant organic material (fresh fodder) on-farm; though, in the Sahel, green fodder yields approaching 30 to 40 t/ha or 3 to 4 tha^{-1} of dry weight have been reported (IITA, 1989).

It is clear that the adoption of this technology has the potential for multiple applications. First, since it has been discovered that when the cowpea crop is cut at vegetative growth phase it can regenerate one hundred percent (100%) provided there is enough soil moisture; it might be possible to grow cowpea for green manure, through the clipping of its foliage and allowing for the clipped organic material to be used green organic manure for soil fertility maintenance and/or improvement in the degraded soils of the arid savannahs; where it has consistently been argued that the intermediate products of the decomposition of fresh organic matter, which help to improve the physical condition of the soil; such as water-holding capacity, CEC, pH etc. (Joy and Wibberley, 1979; Murthy and Hirekerur, 2004), is what is direly lacking in many tropical cropping systems, where little or no agricultural residues are returned to the soil. This results in decline in soil organic matter (Lal, 1986; Bouwman, 1990; Post and Mann, 1990; Woomer and Ingran, 1990), and lower plant biomass productivity (Woomer and Ingran, 1990). Importantly, clipped fodder, can be used to correct soil Al toxicity and Ca deficiency (Lu and Hue, 1990; Woomer and Mulchena, 1993), as cowpea residue has good liming properties (reducing Al toxicity and increasing Ca availability) and fresh materials, especially those of cowpea, were reported to have out yielded their ashed counterparts, indicating significant organic-soil mineral interactions.

Secondly, the clipped cowpeas vegetative re-growth could be utilized as animal fodder (feed) – indeed, the above ground plant parts of cowpea, except for its pods, are usually harvested for fodder. In some areas, trading in these residues (haulms) can be highly remunerating and is used by the resource poor farmer to supplement the depleted family income at the height of the farming season; when they are in dare need of funds to meet up with his other farms operational and other family economic activities at the peak of the dry season (Sambo and Odion, 2011). In fact, it is reported that in West and Central Africa, farmers who cut and store cowpea fodder, for subsequent sale at the peak of the dry season, have been found to obtain as much as 25% of their annual income by this means (Singh et al., 1997).

In this regard, the food security of household, defined as one which has access to enough food for individual members to lead a healthy life, could be greatly enhanced. Critical to the understanding of food security is recognizing that it hinges as much on lack of purchasing power and entitlement as on variable supply. What is important for households and individuals is the availability and adequacy of food intake; and this intake can either be produced or procured with enhance family incomes (Alamgir and Arora, 1991).

Conclusion

From the findings of this investigation, it can be concluded that clipping management practices which have been reported to be more common with grasses and forage legumes (Chapparro and Sollenberger, 1991), have found useful application in the management of fodder type varieties of crops, such as the dual purpose cowpea, which grows vegetative in the northern Guinea savanna agro-ecology of Nigeria. Indeed, its adoption has the potential of producing large amounts of organic plant material (clipped fodder) on-farm (*in-situ*); which could be put to various uses: on our degraded soils, cowpea could be beneficial for soils restoration, which can lead to higher crop productivity. Without a doubt, such pro-poor agricultural practices originating from sustainable agricultural development practices need to be encouraged and supported; as this has the potential of reducing food insecurity and poverty in sub-Saharan Africa, where the crop features prominently in the farming system.

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