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FARMERS' KNOWLEDGE AND CULTIVATION OF COWPEA (*Vigna unguiculata (L.) Verdc.*) IN THREE COMMUNITIES OF BOLGATANGA MUNICIPALITY, UPPER EAST REGION, GHANA

ABSTRACT

A study was conducted in three communities of Kumbosco, Zuarungu and Yarigabisi in the Bolgatanga Municipality of the Upper East Region of Ghana. The research sought to examine the extent to which farmers' knowledge, perception and management practices influenced the cultivation of cowpea. A survey involving the use of both open-ended and close-ended questionnaires and also interviews were administered. A total sample size of 60 was used for the study, 20 from each district. Data gathered was analyzed using the Statistical package for Social Scientist (SPSS version 16.0). Frequencies, percentages, bar charts and par charts were used to analyze the various variables. Data collected included; Sex distribution, number of acreages cultivated, household sizes, gender issues, utilization and constraints in production of the crop. The finding from the study showed that farmers in these three communities cultivated cowpea but intercropped with millet. The research revealed again that cowpea was not cultivated by the people as a main crop (91.67%). From the study, males formed the majority (56.67%) of people involved in cultivation of cowpea while females formed the minority (43.33%). Active working age of people who

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engaged in cowpea production was between 30-39 years. Mojority (56.67%) in these communities were Christians, even though cowpea is a traditional crop. Most of the farmers in the three communities used the local white variety (76.67%) for cultivation as compared to the Boufor, Asontem and Red Nkwanta varieties. majority (68.33%) of the farmers in these communities who cultivated cowpea were married. The results revealed that smaller families (1-5, 38.33%) were more involved in cowpea production either for sale or for consumption. It was revealed that the number of acres most farmers cultivated was one acre land or less (63.6%) due to non availability of land in these communities, but 6.06% cultivated 7acres of land; 88.33% of the farmers inherited the land. For non-cowpea producing farmers, 29.63% of them attributed their failure to lack of farming land, 25.93% said they could not control the pests and livestock that destroyed cowpea when cultivated, due to high cost of synthetic pesticides, while 3.70% attributed that to unavailability of ready market for cowpea. 11.11% of the respondents indicated lack of finance to cultivate cowpea as well as low yields of cowpea. Some of the challenges farmers faced included lack of labour to cultivate the crop in a proper manner, difficulties to store the produce (51.72%) due to pests and diseases and limited access to market. One of the basic aims of agricultural extension is about rural development through the introduction of appropriate interventions and strategies to farmers. Results from this research could be useful to the Ministry of Agriculture, the District Assemblies and Non-Governmental Organizations (NGOs) in their poverty reduction strategies. This study would therefore provide an important first step at improving the crop in

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Ghana, particularly the North, and also provide a foundation to enhance their potential use in future, contributing to food security.

Keywords: Cowpea, chemical, cultivation, diseases, farmers, fertilizer, pests, Questionnaire, storage, survey

INTRODUCTION

Cowpea is a warm-season, annual, herbaceous legume, scientifically referred to as *Vigna unguiculata*. It is one of the most important food legume crops in the semi-arid tropics covering Asia, Africa and Southern Europe (Waters, 1987; Adu-Dapaah *et al*., 2003; Rogers, 2003).

Cowpea (*Vigna unguiculata*), an annual legume, is also commonly referred to as black eye pea, Crowder pea or Southern pea. Cowpea originated in Africa and is widely grown in Africa, Latin America and Asia. It is used as a grain crop for animals, fodder, or as a vegetable (Adu-Dapaah *et al*., 2003).

Total worldwide production of cowpea is estimated at 3.3 million tons of dry grain of which 60% is produced in Africa (CGIAR, 2001). About 12.5 million hectares are planted to cowpea in West Africa, making it the region with the largest production and consumption of cowpea in the world, (CGIAR, 2001).

Cowpea is now a broadly adapted and highly variable crop, cultivated around the world primarily for its seed, but also as a vegetable, a cover crop and for fodder (Rogers, 2003).

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In Ghana, cowpea is mostly grown in the savanna, coastal and transitional zones. The vegetative parts and green pod are edible, but the dry grain is either boiled and eaten or milled in several dish preparations, for example, porridge and beans cake as well as processed into snacks (FAO, 1994).

Some of the popular varieties of cowpea grown in Ghana include Boufor, Local white, Asontem, Red Nkwanta and New Era. The seed coat can be white, red, cream, black or brown (Addo-Quaye, 1993).

Cowpea production is an important agriculture venture because, the crop is consumed worldwide. Cowpea is mainly cultivated in the Northern, Upper East and Upper West regions of Ghana, providing many uses (include domestic, economic and environmental) to its inhabitants. In these regions, the rains fall between May and October with an average annual rainfall between 900 and 1100mm (Singh, 1999; PEDUNE project, 2000). The cowpea season is from April to July and from July to October. Cowpea is therefore the first crop to be harvested in these parts of the country and as a result, bridges the ‘hunger gap’ between two rainy seasons (PEDUNE project, 2000).

The crop found to be drought-tolerant crop, meaning it adapts to the drier regions of the tropics, where other food legumes do not perform well. It is recommended as a protein supplement for children, pregnant and lactating mothers as a way of minimizing malnutrition in the rural and urban areas in Ghana (Adu-Dapaah *et al*., 2003). Cowpea is also utilized as cover crop for improving soil fertility. Cowpea also provides fodder for livestock, and as a legume, it fixes nitrogen efficiently up to 60-70 Kg N/ha for the succeeding crop since it provides a high

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proportion of its own N requirement (Adu-Dapaah *et al*., 2003). Cowpea additionally plays an important role by providing cash for farmers. It is shade tolerant and therefore, compatible as an intercrop with maize, and millet. This makes cowpea an important component of traditional intercropping system, especially in the complex and subsistence farming system of the dry Savanna in sub – Saharan Africa (Addo-Quaye, 1993).

But it is inconceivable that farmers within this study area remain poor when the potential to make a decent living could be found in the cultivation of cowpea; The Bolgatanga municipality, being one of the poorest districts in the country.

Despite the agronomic and economic importance of cowpea, including its atmospheric nitrogen fixation ability, nutritional value and a good income placement capacity for farmers, farmers in the Bolgatanga municipality seem not to produce cowpea in larger quantities. Ghana as a result been experiencing seasonal shortages of the grain, especially in the North. Production and utilization have gone down. The crop has, to a large extent, been neglected by research. This study intended, therefore to present useful findings on how cowpea could be explored as an alternative protein source, income generating activity to the famers and also help the farmers within the municipality to inculcate the need to cultivate cowpea in large quantities.

The research, also sought to assess how the farmer's knowledge affected cowpea production in the three communities of the Bolgatanga municipality of the Upper East Region.

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The aim, again were to obtain general information about farmers' management practices of the cowpea crop; assess the constraints and other factors that influence the production of the crop and to assess the extent to which the crop is being utilized; to find out the extent to which farmers knowledge, perception and management practices influenced the cultivation of cowpea. This study would therefore provide an important first step at improving the crop in Ghana, particularly the North, and also provide a foundation to enhance their potential use in future, contributing to food security.

MATERIALS AND METHODS

The study was conducted in the three major Districts of Kumbosco Zuarungu and Yarigabisi, all in Bolgatanga Municipality of the Upper East Region of Ghana.

The Snowball technique was used in selecting the respondents, considering a sampling frame for the population because of the dispersed nature of sites.

A total sample size of 60 was used for the study, 20 each from each district.

Data Collection Methods

The population from which data was collected included Ministry of Food and Agriculture (MOFA), NGOs and farmers. These constituted the source of data for the research. The following tools were used to gather data; interviews, personal observation (Nichols, 1991; Grady, 1998), focused group discussions (Twumasi,

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2001), documentary review of manuals of the Ministry of Food and Agriculture, and the use of questionnaires.

Each method was used based on its relative merit over the others in relation to the situation at hand, type and nature of data to be collected.

Data gathered was analyzed using the Statistical package for Social Scientist (SPSS version 16.0). Frequencies, percentages, bar charts, par charts were used to analyzed the various variables.

RESULTS AND DISCUSSION

Sex distribution of farmers

Table 1: Sex distribution of Respondents

Gender	Number of responses	Percentage (%)
Male	34	56.67
Female	26	43.33
Total	60	100.00

Table 1 shows that out of the total number of farmers under the study, 56.67% of them were males whilst 43.33% were females. This is an indication of the fact that women were equally engaged in agriculture in these communities. Although they assisted on family farms, they were involved in the production of crops such as cowpea, groundnut, Bambara groundnut and soybeans. According to the

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extension agents, women were increasingly involved in cowpea production due to the lower costs of pest-management. Women previously were often reluctant to cultivate cowpea due to the high cost of synthetic pesticides, (Patel, 1995; Nederlot *et al.*, 2004).

Age distribution of farmers

Table 2: Age groups of Respondents

Age Group	Number of Responses	Percentage
20 – 29	14	23.33
30 – 39	21	35.00
40 – 49	8	13.33
50 and Above	17	28.33
Total	60	100.00

From the Table 2, 35.00% of the respondents were between the age groups of thirty and thirty-nine years of age who could be categorized as the active working age. On the other hand, 28.33% of the respondents were above the age of fifty years. About 23.33% of the farmers were between the ages of 20-29 years and 13.33% between 40-49 years. This result shows that the active working age of people who engaged in cowpea production were between 30-39 years. This indicates that both young and old are interested in the cultivation of cowpea in these communities.

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Marital status of farmers

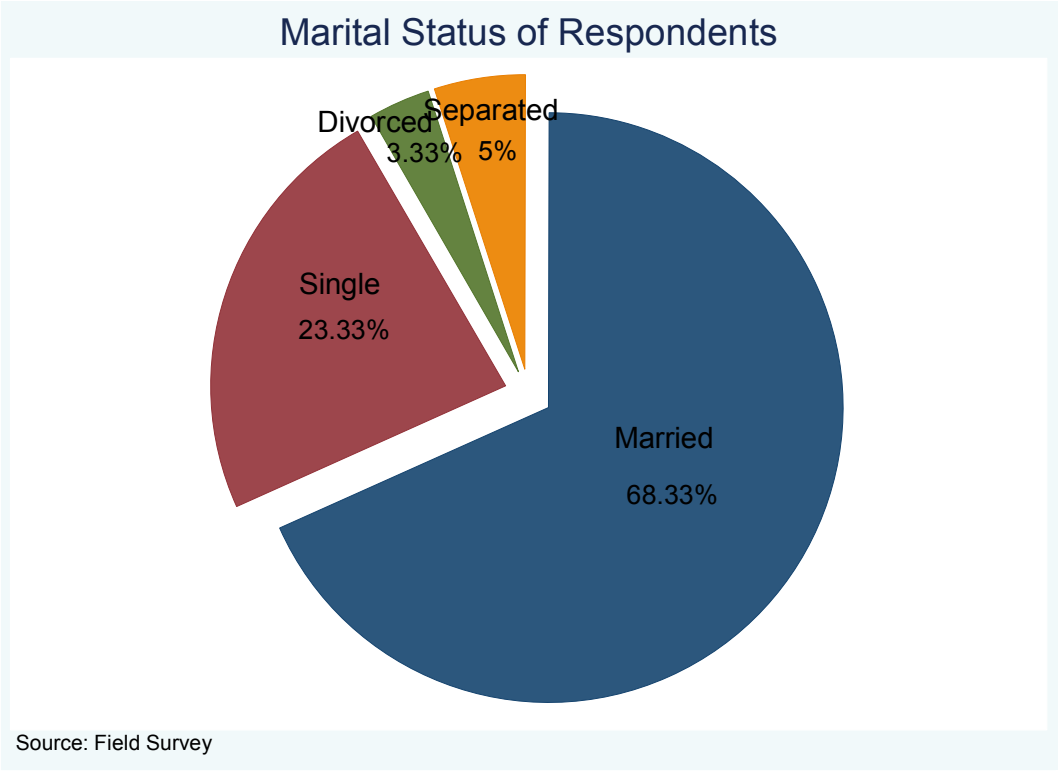

Figure 1: Marital Status of Respondents

From Figure 1, 68.33% of the farmers are married, 23.33% are single, 5% are separated and 3.33% are divorced. This shows that majority of the farmers in these communities who cultivated cowpea was married. It indicates that married people were interested in cowpea production due to its numerous importances to the family. Many dishes are prepared from cowpea which can sustain the family. Due to the time, labour and energy involved in cowpea production, unmarried people did not have interest in cultivation of cowpea.

Household size of farmers

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Table 3: Household Size

Household size	Number of Responses	Percentage (%)
1 – 5	23	38.33
6 – 9	15	25.00
10 – 14	9	15.00
15 and Above	13	21.67
Total	60	100.00

From the Table, 38.33% of the respondents indicated that they had a household size between 1-5, 25.0% of farmers were responsible for feeding between 6-9 house size, 21.67 had a household size between 15 and above and 15.00% between 10-14. The results revealed that smaller families were more involved in cowpea production either for sale or for consumption. The larger families may engage in commercial crop production because of its economic importance. Food which is produced seasonally like cowpea must be taken care of properly because they are “savior” in most families, especially in the West Africa sub-region (Bressani, *et al*., 1985; Akin, 1990).

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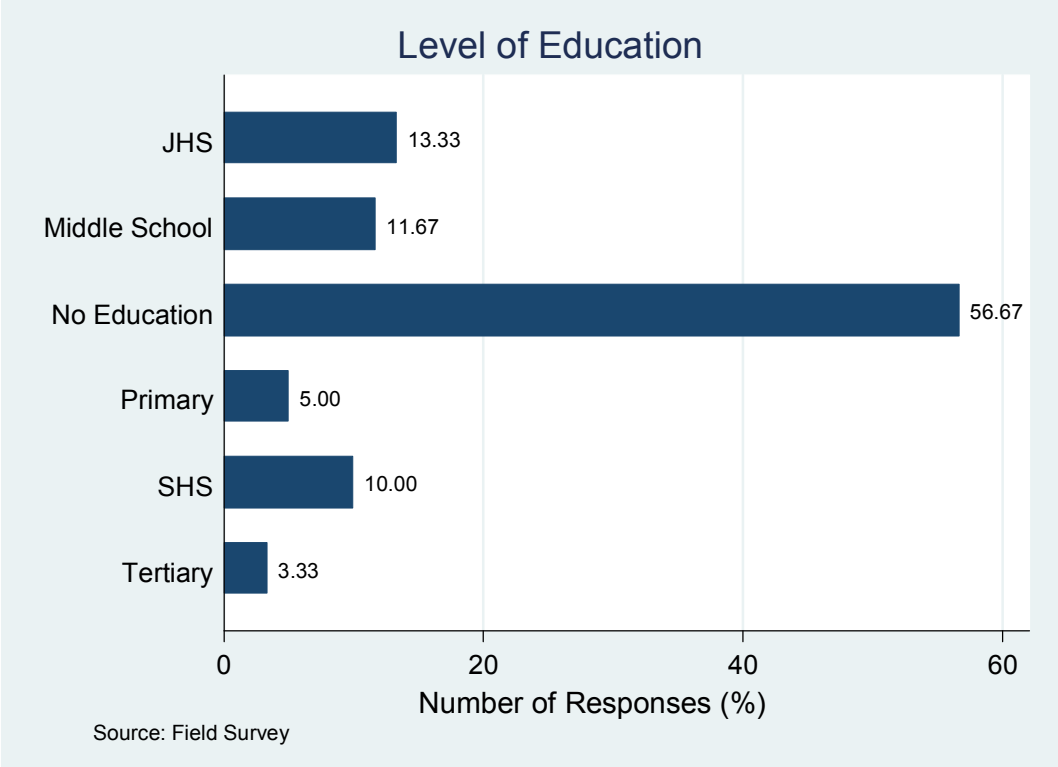

Figure 2: Level of Education

Farmers' level of education

Figure 2 shows that majority of the farmers had no formal education as evidenced by 56.67% of the respondents. Whereas 13.33% and 10.0% of the respondents had respectively attained junior and senior high school education, 11.67% and 3.33% were middle school and tertiary education graduates. Only 5.0% of the farmers represented in the study disclosed that they had attained primary education as at the time of the study.

This indicates that, cowpea plays a major traditional role in the communities. Even though majority of the farmers had no formal education, they were engaged in cowpea cultivation. FIDA, 2000 stated that local farmer's believed that cowpea

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Cultivars have beneficial effect on soil fertility, weed reduction, soil cover and impact on organic matter (ODA, 1998: Rogers, 2003).

Religion of farmers

Table 4: Religious Affiliation

Religion	Number of Responses	Percentage (%)
Christianity	34	56.67
Islam	3	5.00
Traditional worship	23	38.33
Total	60	100.00

From Table 4, 56.67% of them indicated they were Christians, 38.33% were traditional worshippers while 5.0% of the respondents were affiliated to the Islamic religion. The results indicated that a large number of farmers in these communities were Christians, even though cowpea is a traditional crop. This shows that most traditional farmers were now moving from traditional worship to Christianity. Religion does not have any effect on cowpea production in these communities.

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Table 5: Gender and cowpea cultivation

	Cultivation of cowpea		
Gender	NO	YES	Total
Male	17 50.00 62.96	17 50.00 51.52	34 100.00 56.67
Female	10 38.46 37.04	16 61.54 48.48	26 100.00 43.33
Total	27 45.00 100.00	33 55.00 100.00	60 100.00 100.00

The first number in each cell represents the frequency of number of responses; the second number is the row percentage while the third number represents the column percentage.

An equal number of males (50.0%) indicated they cultivated cowpea while 61.54% of the female farmers under the study also stated that they cultivated cowpea. Women are more involved in cowpea cultivation because of it economic benefits to the family. Moreover, women do not intercrop cowpea with other crops, unlike the men who intercrop cowpea with millet and other crops.

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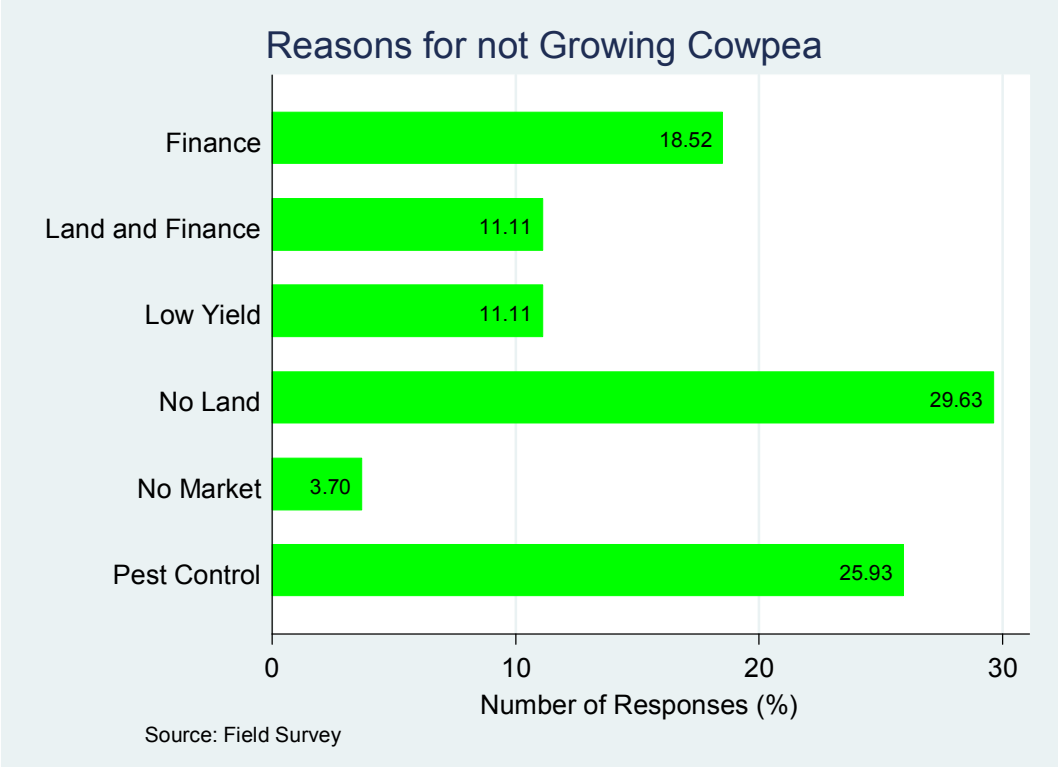

Figure 3: Reasons for not Growing Cowpea

For the respondents who indicated that they were not cultivating cowpea, 29.63% of them attributed their failure to lack of farming land; 25.93% said they could not control the pests and livestock that destroy cowpea when cultivated while 3.70% attributed that to no unavailability of ready market for cowpea.

Whilst 11.11% of the respondents indicated that land and lack of finance to cultivate cowpea as well as low yield of cowpea, 18.52% of the farmers emphasized that lack of funds was the main factor that hindered the cultivation of cowpea. Other factors are that farmers were often reluctant to cultivate cowpea due to the high costs of synthetic pesticides. The study revealed that land is the major reason for not cultivating cowpea in large quantit

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Table 6: Farm Size (Acres)

Number of Acres	Number of Responses	Percentage (%)
One Acre	21	63.64
2 – 3	10	30.30
7 and Above	2	6.06
Total	33	100.00

It was discovered that 63.64% of the farmers cultivated cowpea on a one acre land or less whilst 30.30% used up to three (3) acres only for cowpea production. Meanwhile, only 6.06% of the farmers under the study used more than seven (7) acres for cowpea cultivation. The result revealed that majority of farmers cultivated cowpea on one acre land due to non availability of land in these communities.

Table 7: Challenges in growing cowpea

Challenges in growing cowpea	Number of Responses	Percentage (%)
NO	2	3.33
YES	55	91.67
Missing	3	5.00
Total	60	100

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As in every aspect of life, farmers in cowpea production also face challenges before and during the cultivation and after harvesting processes. Apart from the 5.0% non-response rate for this item on the questionnaire, 91.67% of the respondents affirmed that they did face challenges in the process of cowpea production while 3.33% indicated otherwise. Some of the challenges farmers faced included lack of labour to cultivate it in a proper manner, difficulties to store the produce due to pest, pest and diseases during cultivation and limited access to market.

Table 8: Challenges of cowpea production

	RANKING (%)			
	1	2	3	4
Storage	-	55.00	8.33	-
Pest	90.00	1.67	-	-
Disease	1.67	3.33	55.00	3.33
Marketing	-	3.33	-	60.00

In an attempt to find out the challenges faced by farmers in this sector, the items in the above table were ranked by respondents.

It was discovered that the destruction of cowpea crops by pests was the main concern by farmers as indicated by 90.0% of the respondents. The second most challenging problem as evidenced from the study was storage which represented

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55.00% whilst disease was ranked third as a challenge to cowpea production indicated by 55.00%. The last and least ranked item was the problem of marketing the product. The focus of cowpea research in West Africa over the preceding fifteen to twenty years was mainly to develop cowpea cultivars that are resistant to pest and diseases within a sustainable farming system, (Hammond, 2002).

Table 9: Most profitable crop as ranked by respondents

	RANKING (%)				
	1	2	3	4	5
Rice	1.67	18.33	13.33	23.33	10.00
Bambara Beans	-	5.00	5.00	13.33	41.67
Groundnut	-	11.67	28.33	20.00	5.00
Millet	95.00	1.67	1.67	-	-
Maize	3.33	30.00	16.67	6.67	8.33

Results from Table 9 shows that 95.0% of them ranked millet as the most profitable crop to them. Maize was not left out as 30.0% of the respondents strongly supported the crop as the second most profitable crop to them. 28.33% also ranked groundnut as their number third most profitable crop whilst 23.33% of the respondent ranked rice as fourth and Bambara groundnut as fifth crop.

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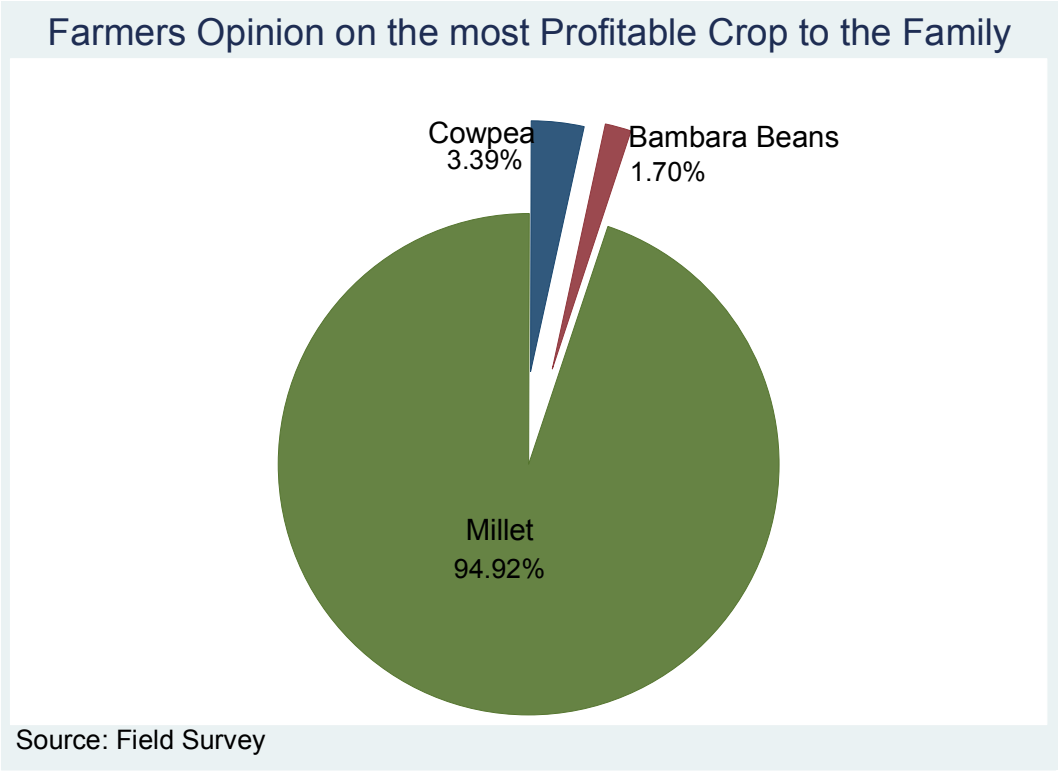

Figure 4: Farmer's opinion on the most important crop to the family

Based on the farmers' opinion on the importance of the crops they grow, 94.92% of them concomitantly ranked millet as the first most important crop to the family. This could be due to wide variety of reasons to include the main crop that gives the family a year long food among others. Millet is the principal crop in the Upper East Region. It is the food staple crop and a traditional crop as well. Millet ranked as the most profitable because farmers can depend on millet for the whole dry season either by feeding or selling some to solved their problems.

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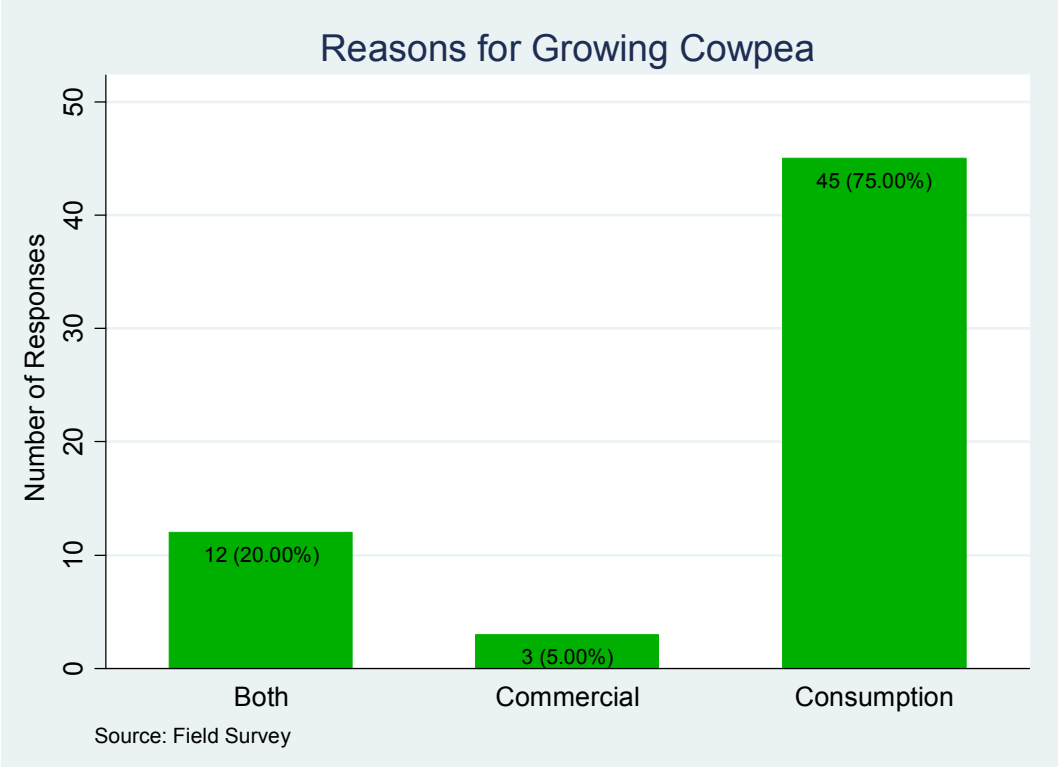

Figure 5: Reasons for growing Cowpea

Every farmer produces certain crops for reasons known to them. The cultivation of cowpea is not an exception as 75.0% of the farmers under the study disclosed that the production of cowpea was mainly for household consumption while 5.0% cultivated cowpea for commercial purposes. However, 20.0% of the farmers included in the study sample produced cowpea for both household consumption and for commercial purposes. The study revealed that, because of lack of land, farmers did not produce cowpea in large quantities for commercial purposes, they only produced the crop on subsistence basis to feed their families.

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Table 10: Varieties of Cowpea Grown

Variety	Number of Responses	Percentage (%)
Boufor	3	5.00
Local White	46	76.67
Asontem	1	1.67
Red Nkwanta	4	6.67
Missing	6	10.00
Total	60	100.00

Among the many varieties of cowpea in the market, the Local White won the hearts and interest of the farmers in the community as evidenced by 76.67% of the respondents. The Red Nkwanta was also well patronized as indicated by 6.67% of the respondents. Meanwhile, 10.0% of the respondents failed to provide an answer to this item. This shows that, farmers in these communities were not adopting the new varieties of cowpea. It appeared that most improved cowpea varieties were yet to be adopted by farmers, (IITA, 1997; Kamara, *et al*., 2006).

Farmers reported that prices for local varieties were much higher than the improved varieties.

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Table 11: The use of fertilizer by farmers

Use of Fertilizer	Number of Responses	Percentage (%)
NO	29	48.33
YES	29	48.33
Missing	2	3.33
Total	60	100.00

According to the study, an equal number (48.33%) of respondents indicated whether or not they used fertilizer in cowpea production whereas 3.33% of the individuals failed to respond to whether or not they use fertilizer in the cultivation of cowpea. 48.33% respondents indicated that they use fertilizer while 48.33% of them do not use fertilizer in the cultivation of cowpea. Fertilizer is not commonly used on cowpea. Farmers generally did not think it was needed, because of cowpea's ability to fix atmospheric nitrogen (Rogers, 2003). Some farmers said they did not use fertilize because they were financially handicap and could not afford fertilize due to the high cost.

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Table 12: Type of Fertilizer Use

Type of fertilizer	Number of responses	Percentage (%)
Phosphate	4	13.79
Potassium	1	3.45
Organic Manure	11	37.93
NPK	13	44.83
Total	29	100.00

Out of the twenty-nine (29) respondents who indicated that they used fertilizer in the cultivation of cowpea, 44.83% of them preferred the NPK fertilizer; 37.93% used the organic manure while 13.79% used the phosphate fertilizer. A few respondents (3.45%) used potassium instead. This shows that farmers in these communities were well adapted to NKP fertilizer, even though some used organic manure. NPK is the most common fertilizer used by farmers as it ensured maximum yield.

Table 13: Cultivation of cowpea as a main crop

Cultivating cowpea as a main crop	Number of Responses	Percentage (%)
NO	55	91.67
YES	5	8.33
Total	60	100.00

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It was discovered that all except 8.33% of the farmers cultivated cowpea as a main crop, while 91.67% of the respondents did not cultivate cowpea as their main crop because it was not their stable crop and could not sustain the family for a longer period. Farmers indicated that they only cultivated the crop as a supplement.

Table 14: Relationship between the purpose and mode of cultivation of cowpea

	Cultivating cowpea as a main crop		
Reasons for growing cowpea	NO *n*(%)	YES *n*(%)	Total *n*(%)
Commercial Use	0 (0.00)	3 (5.00)	3 (5.00)
Household Use	45 (75.00)	0 (0.00)	45 (75.00)
Both Purposes	10 (16.67)	2 (3.33)	12 (20.00)
Total	55 (91.67)	5 (8.33)	60 (100.00)

Pearson Chi2 (2) = 38.18 p-value = 0.000

The above table looks at the relationship between the purpose of cultivation of cowpea and the mode of producing the crop. The number in parenthesis represents the cell percentage. For example, out of the twelve (12) respondents who indicated that they produced cowpea for both commercial and household use, 3.33% stated that they cultivated cowpea as a main crop whereas 16.67% stated otherwise.

Below the table is the Pearson chi-square statistic which attempts to test the hypothesis of independence of the two items. At the 5% significance level, there

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is enough evidence to indicate that the farmer's reason for growing cowpea influenced them to either cultivate cowpea as a main crop or not.

Table 15: Cross tabulation of relative yield of cowpea and mode of cultivation

	Cultivating cowpea as a main crop		
Yield of cowpea relative to other legumes	NO *n* (%)	YES *n* (%)	Total *n* (%)
NO	22 (38.60)	0 (0.00)	22 (38.60)
YES	30 (52.63)	5 (8.77)	35 (61.40)
Total	52 (91.23)	5 (8.77)	57 (100.00)

Pearson chi2 (1) = 3.45 p-value = 0.063

In an attempt to establish whether or not the yield of cowpea, relative to other legumes could influence the farmer to produce cowpea in large quantities leading to possibly growing cowpea as a main crop, the above table proved that the two items were independent at the 5% significance level. This suggests that the yield of cowpea relative to other legumes did not have any relationship to the mode of cowpea production.

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Table 16: Access to land for farming

Access to land for farming	Number of Responses	Percentage (%)
Inheritance	53	88.33
Land Lease	4	6.67
Purchase	1	1.67
Missing	2	3.33
Total	60	100.00

The study revealed that 88.33% of the farmers inherited the land they were currently using for cowpea production whereas 6.67% of the respondents acquiring the land by lease. However, 1.67% of the respondents purchased their own land for crop production. The results also show that most farmers in these communities inherited land for farming which continued from generation to generation. The indigenous people in these communities did not purchase land for farming.

Table 17: Yield of cowpea per acre (in bags)

	Mean	N	Sd	Min	Max
Yield per Acre	2.73	37	4.77	1	20

Out of the sample size of sixty (60), thirty-seven (37) of them responded to the questionnaire. The mean yield per acre according to the thirty-seven respondents was approximately three (3) bags with a minimum of one bag to a maximum of twenty bags.

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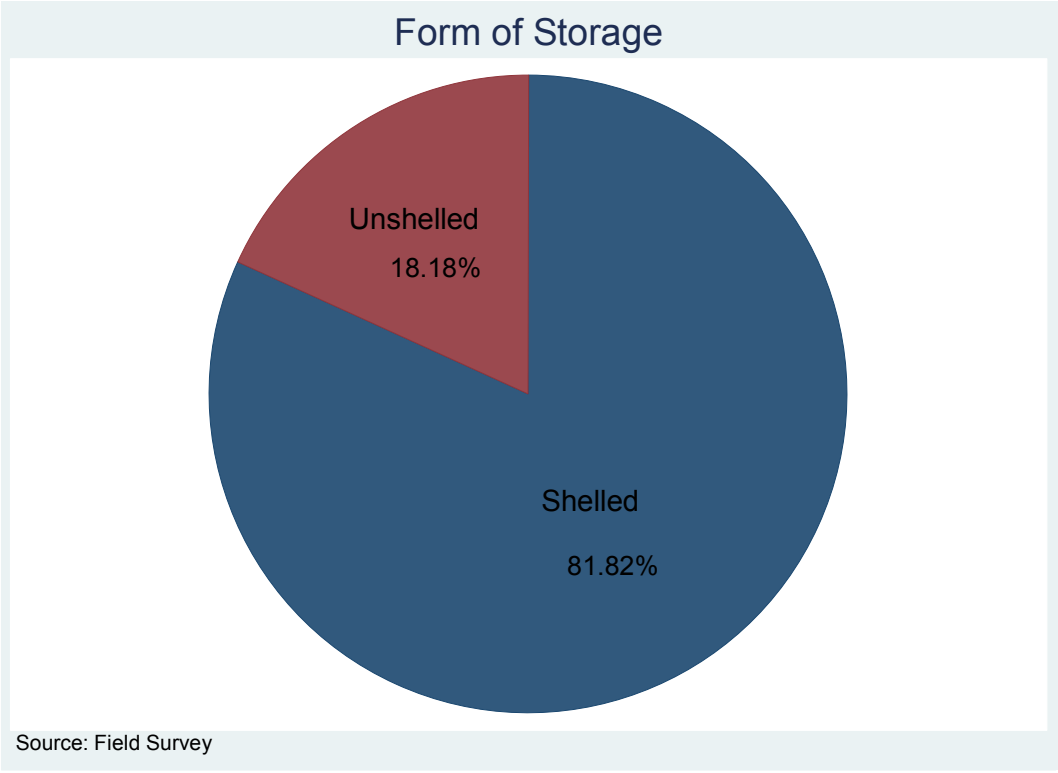

Figure 6: Forms of Storage

Cowpea is either stored with or without the shell. From the study, 81.82% of the respondents confirmed that they store cowpea by removing the shells whilst 18.18% preferred storing cowpea unshelled. Farmers store cowpea by removing the shells to ensure low moisture content and to make storage very easy.

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Table 18: Problems with forms of storage

Problems with Forms of Storing Cowpea	Number of Responses	Percentage (%)
NO	28	48.28
YES	30	51.72
Total	58	100.00

Cowpea, either stored shelled or unshelled, still gave farmers reasons to worry as 51.72% of the farmers confirmed they had problems with the mode of storing cowpea after production. The main problem in storing legumes such as cowpea was susceptibility to insects attack. There are over ten (10) pest species of grain legumes in Africa which destroy grain from the field and in storage and among these are weevils, (Fellow, 1980; Onyebe, 2006).

Table 19: Use of chemicals in storage

Use of chemicals in storage	Number of Responses	Percentage (%)
NO	23	40.35
YES	34	59.65
Total	57	100.00

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Table 19 shows that, 59.65% of the respondents disclosed that they used chemicals in storing cowpea to preserve it for future use while 48.28% of them indicated otherwise. Farmers used oil, ashes and neem leaves to preserve cowpea with weevil infestation. According to Masur, (1994), palm oil and cotton seed oil can stop insect's infestation when in every kilogram of beans.

Table 20: Length of Storage

Length of Storage	Number of Responses	Percentage (%)
Less than 6 months	5	8.33
Six months and more	55	91.67
Total	60	100.00

With farmers who store their crops, 91.67% of them revealed that they could keep cowpea in the store for more than six months while 8.33% could only preserve the crop up to a maximum of six months. Most farmers attributed to the fact that they stored cowpea for more than six month because they applied chemicals such as oil, ashes and neem leaves to the grain before storage.

Table 21: Uses of Cowpea

Use of the Crop	Number of Responses	Percentage (%)
Funeral	49	83.05
Food	10	16.95
Total	59	100.00

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Whereas 83.05% of the respondents indicated that they used cowpea for funeral purposes, 16.95% added that cowpea was used for food as well. This revealed that cowpea was a traditional crop in these three communities.

Table 22: Cowpea as a traditional crop

Cowpea as a traditional crop	Number of Responses	Percentage (%)
NO	10	16.95
YES	49	83.00
Total	59	100.00

The notion that cowpea is a traditional crop was supported strongly by 83.0% of the respondents while 16.95% indicated otherwise.

However, all the respondents under the study attested to the fact that traditional belief did not hinder cowpea production in these three communities.

Conclusively, the findings from the study showed that farmers in these three communities cultivated cowpea but intercropped with millet. The research revealed that cowpea was not cultivated by the people as a main crop and that both males and females were involved in its cultivation with males being the majority. Most of the farmers in the three communities used the local white variety for cultivation as compared to the Boufor, Asontem and Red Nkwanta.

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Non-availability of land resulted in farmers not cultivating cowpea on large scale as well as difficulty in pest control. Observation also showed that farmers in the three communities used cowpea for traditional purposed such as funeral rites.

REFERENCE

Abatania, L, Gyasi, KO, Coulibaly, O, Adeoti R and Salifu, AB (1997). The Adoption and Impact of Cowpea Technology in Ghana. (IITA, 1997). Savanna Agriculture Research Institute (SARI). PRONAF Socio-economic Report

Addo-Quaye, AA, Darkwa, AA and Ocloo, GK (2011). Yield and Productivity of Component Crops in a Maize-Soybean Intercropping System as Affected by Time of Planting and Spatial Arrangement. Vol. 6, no. 9, September, 2011 ISSN 1990-6145. *ARPN Journal of Agricultural and Biological Science* ©2006-2011 ASIAN Research Publishing Network (ARPN). www.arpnjournals.com

Addo-Quaye, AA., Darkwa, AA and Ampiah, MKP (2011). Performance of Three Cowpea (*Vigna unguiculata* (L.) Walp) Varieties in Two Agro-ecological Zones of the Central Region of Ghana ii: grain yield and its components vol. 6, no. 2, February 2011. ISSN 1990-6145. *AR PN Journal of Agricultural and Biological Science* ©2006-2011. Asian Research Publishing Network (ARPN). www.arpnjournals.com

Adu-Dapaah, AK, Ahenkora, K, Asibuo, JY and Oppong-Konadu, EY (2003). The Potential of Cowpea leaves as leafy vegetables in Ghana. *Ghana Journal of Horticulture*. (3): 101-107.

AID, (1974). Agency for International Development, Washington, D.C 20523.

UNDER PEER REVIEW

Anchirinah, Vincent M.; Yiridoe, Emmanuel K.; Bennett-Lartey, S.O. (2001). Enhancing Sustainable Production and Genetic Resource Conservation of Bambara Groundnut: A Survey of Indigenous Agricultural Knowledge Systems. *Outlook on Agriculture,* Volume 30, Number 4, 1 December 2001, pp. 281-288(8)

Audit Report USAID/Indonesia; General Participant Training Project No. 497-11-690-183

Bressani R. (1985). Nutritive Value of Cowpea. In: Cowpea Research, Production and Utilization. Singh, SR and Rachie, K O. (eds): John Wiley and sons, New York. 353-359.

ccafs.cgiar.org/sites/default/.../center_technical_report_2011_merged.pdf

CGIAR, (2001). Cowpea (V.U).CGIAR on line / CGIAR Research.

FAO, (2013). FAOSTAT Agricultural Database. January, 2013.

faostat.fao.org/default.aspx

faostat.fao.org/site/613/default.aspx

Farmer Field School: Activities Report 2000-2001

Faugier, J. and Sargeant, M. (1997). Sampling hard to reach populations, Journal of Advanced Nursing, vol. 26, 790-797.

Gbaguidi, BJ, Coulibaly, O (2001). PRONAF's Farmer Field Fora (FFF)

Gbaguidi, BJ, Coulibaly, O (2004). FIDA, (2000). PRONAF, (2004). Technology for Poverty Reduction and Sustainable Livelihoods in West Africa. Activity Report, 2004. IITA, 2004.

UNDER PEER REVIEW

Grady, MP (1998). *Qualitative and Action Research*: A Practiioner Handbook, Phi Delta Kappa International, *1998*. ISBN, 0873678087 Dec 1, 1998 - Action Research in Education, 55 p

Hammond, H, Gbaguidi, BJ, Coulibaly, O (2002).The case of Cowpea Farmer Field Project. PRONAF-IITA (2002) 'Farmer Field School'. Rapport provisoire d'activités. Campagne. 2001–2002. Cotonou, Benin: PRONAF, IITA.

International Institute of Tropical Agriculture (IITA-BENIN) Cotonou, Benin

J. Clapp and M.J. Cohen, eds., pp.237-250. Waterloo, Ontario, Canada: The Centre for International Governance Innovation (CIGI) and Wilfrid Laurier University Press, 2009.

McCalla, A.F. (2009). "The Governance Challenges of Improving Global Food Security." The Global Food Crisis: Governance Challenges and Opportunities.

Musur, (1994). The Prevention of Food Adulteration Act and rules (as on 1.10.2004). www.ncib.in/pdf/ncib_pdf/Food%20Adulteration%20Act.pdf

Nederlof, ES., Tossou, *O.,* Sakyi-Dawson, O and Kossou, DK *(*2004*).* Grounding Agricultural Research in Resource-Poor Farmers′ Needs*:* A Comparative Analysis of Diagnostic studies in Ghana and Benin. Dormon, E.N A., C. Leeuwis, F.Y. Fiadjoe, O. *Sakyi-Dawson* and A. van Huis, 2007. Vol.16, No.5: 405-412. 14.

Nichols, P. (1991). Social Survey Methods: a Field Guide for Development Workers, Oxfam Development Guideline no. 6 pp. 33-49

Nichols, P. (1991). Strength and Limitation of Interviews. Social Survey Methods, Oxford; Oxfarm Development Guideline no. 6. 50-72

UNDER PEER REVIEW

Nurudeen, AR (2011). Decision Support System for Agro-Technology Transfer (DSSAT) Model Simulation of Maize Growth and Yield Response to NPK Fertilizer Application on a Benchmark Soil of Sudan Savanna Agro-Ecological Zone of Ghana. (MSc. Thesis, June, 2011).

ODA, (2007). Aid Architecture: An Overview of the Main Trends in Official Development Assistance Flows. Overseas Development Administration. Institute of Tropical Agriculture. International Development Association Resource Mobilization (FRM), February 2007.

Office of the Auditor-General, Area Auditor General - South Asia

Onyinbe, JE, Kamara, AY and Omoigui, IO. (2006). Guide to Cowpea Production in Borno State; Promoting Sustainable Agriculture in Borno State (*PROSAB*). Ibadan, Nigeria.

Patel, PN (1995). Fungal, Bacterial and Viral Diseases of Cowpeas in the USA-Chapter 14 in Cowpea Research, Production and Utilization. S.R. Singh and K.O. Rachie (eds.): John Wiley & Sons Ltd.

PEDUNE Project (2000). PEDUNE Ghana, Season 1997-1999. Working document No. 01/99-TR/GH International Institute for Tropical Agriculture and Agency for Swiss Development and Cooperation.

Singh, BB, Asante, SK Ajeigbe, H and Mohammed, SG (1999). General Guide for Cowpea Cultivation and Seed Production. Sasakawa Global 2000 Nigeria Project. Federal Ministry of Agriculture, Abuja, Nigeria.

Socioeconomic Studies of PRONAF.

UNDER PEER REVIEW

Twumasi, PA (2001). Social Research in Rural Communities, Accra, Ghana. Ghana Universities Press. African Information Centre. 2001ISBN: 9964302673 Language: English Series: second.

Waters, L (1987). Cowpea in Grain Legumes as Alternative. The proceedings of a symposium sponsored by the *Center for Alternative Plant and Animal Products* of the *University of Minnesota*, *St. Paul*, *MN*

www.cgiar.org/

www.delhi.gov.in/wps/wcm/connect/.../completePFARules_1955.doc?MOD

www.fao.org/corp/statistics/

www.kit.nl/net/KIT_Publicaties_output/showfile.aspx?e=1030

www.meas-extension.org/meas-offers/case-studies/farmer-field-fora

www.share4dev.info/kb/documents/3374.pdf

www.tdx.cat/bitstream/handle/10803/6987/12ANNEX2.pdf?sequence=13