

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

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11

12 ABSTRACT

13 A study was conducted in Kumbosco, Zuarungu and Yarigabisi in the Bolgatanga  
14 Municipality of the Upper East Region of Ghana. The research sought to examine  
15 the extent to which farmers' knowledge, perception and management practices  
16 influenced the cultivation of cowpea. In the survey, both open-ended and close-  
17 ended questionnaires as well as interviews were administered. A total sample size  
18 of 60 was used for the study with 20 from each district. Data collected included  
19 sex distribution, number of acreages cultivated, household sizes, gender issues,  
20 utilization and constraints in production of the crop. Data gathered was analyzed  
21 using the Statistical package for Social Scientist (SPSS version 16.0).  
22 Frequencies, percentages, bar charts and par charts were used to analyze the  
23 various variables. The findings from the study showed that farmers in these three  
24 communities cultivated cowpea but intercropped with it millet. The research

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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. Active working age of people who engaged in cowpea production was between 30-39 years. Majority (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 consumption. It was revealed that the number of acres most farmers cultivated was one acre or less (63.6%) due to non availability of land in these communities, but 6.06% cultivated 7 acres of land. 88.33% of the farmers inherited the land. 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 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, fertilizer, questionnaire, storage, survey*

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## 50 INTRODUCTION

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

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

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

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

63 In Ghana, cowpea is mostly grown in the savanna, coastal and transitional zones. The vegetative  
64 parts and green pod are edible, but the dry grain is either boiled and eaten or milled in several  
65 dish preparations. For example porridge and bean cake as well as processed into snacks (FAO,  
66 1994).

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

70 Cowpea production is an important agricultural venture because the crop is consumed worldwide.  
71 Cowpea is mainly cultivated in the Northern, Upper East and Upper West regions of Ghana,  
72 providing many uses (including domestic, economic and environmental) to its inhabitants. In  
73 these regions, the rains fall between May and October with an average annual rainfall between  
74 900 and 1100mm (Singh, 1999; PEDUNE project, 2000). The cowpea season is from April to July  
75 and from July to October. Cowpea is, therefore, the first crop to be harvested in these parts of the

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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 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 (Bolgatanga municipality which is one of the poorest districts in the country) 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 (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. So Ghana 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 researchers. 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 ultimately 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: 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 with 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, 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, pie charts were used to analyzed the various variables.

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## RESULTS AND DISCUSSION

### Sex distribution of farmers

Table 1: Sex distribution of respondent.

| 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 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

148 **Table 2: Age groups of respondent.**

| 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         |

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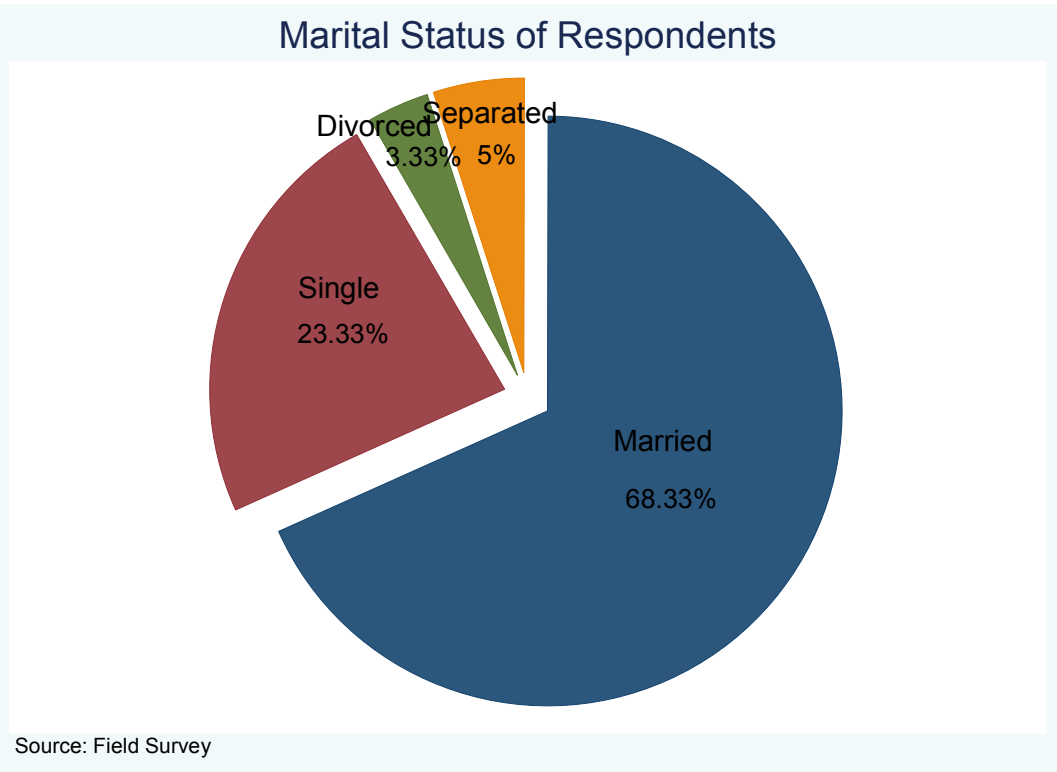
150 From Table 2, 35.00% of the respondents were between the age groups of thirty  
151 and thirty-nine years of age who could be categorized as the active working age.  
152 On the other hand, 28.33% of the respondents were above the age of fifty years.  
153 About 23.33% of the farmers were between the ages of 20-29 years and 13.33%  
154 between 40-49 years. This result shows that the active working age of people  
155 who engaged in cowpea production were between 30-39 years. This shows that  
156 the majority of the farmers are youthful with much exuberance and hence if given  
157 the necessary support can go into large scale production of the crop. The older  
158 people 49 years and above were not much interested in cowpea production  
159 probably because it is labour intensive and hence they cannot perform rigorous  
160 farm operations.

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163 **Marital status of farmers**

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166 **Figure 1: Marital Status of Respondents**

167 The results indicated that 68.33% of the farmers are married, 23.33% are single,  
168 5% are separated and 3.33% are divorced (Figure 1). This shows that majority of  
169 the farmers in these communities who cultivated cowpea were married. It  
170 indicates that married people were interested in cowpea production due to its  
171 numerous importances to the family. Many dishes are prepared from cowpea  
172 which can sustain the family. Due to the time, labour and energy involved in  
173 cowpea production, unmarried people did not have interest in cultivation of  
174 cowpea (Figure 1).

175 **Household size of farmers**

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176 **Table 3: Household Size**

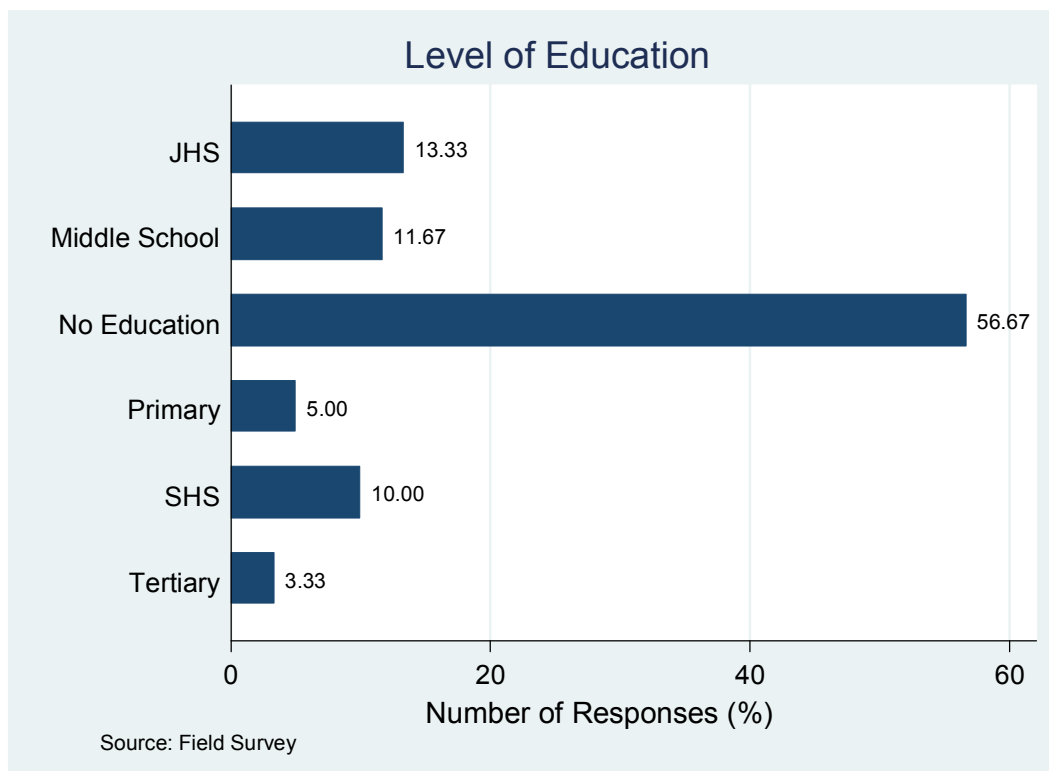
| Household size | Number of Responses | Percentage (%) |
|----------------|---------------------|----------------|
| 1 – 5          | 23                  | 38.33          |
| 6 – 9          | 15                  | 25.00          |
| 10 – 14        | 9                   | 15.00          |
| 15 and Above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

177

178 From Table 3, 38.33% of the respondents indicated that they had a household  
179 size between 1-5, 25.0% of farmers were responsible for feeding between 6-9  
180 house size, 21.67 had a household size between 15 and above and 15.00%  
181 between 10-14. The results revealed that smaller families were more involved in  
182 cowpea production either for sale or for consumption. The larger families may  
183 engage in commercial crop production because of its economic value.

184 Food which is produced seasonally like cowpea must be taken care of properly  
185 because they are “savior” in most families, especially in the West Africa sub-  
186 region (Bressani, *et al.*, 1985; Akin, 1990).

187



188

189 **Figure 2: Level of Education**

190 **Farmers' level of education**

191 Figure 2 shows that majority of the farmers had no formal education as  
 192 evidenced by 56.67% of the respondents. Whereas 13.33% and 10.0% of the  
 193 respondents had respectively attained junior and senior high school education,  
 194 11.67% and 3.33% were middle school and tertiary education graduates. Only  
 195 5.0% of the farmers represented in the study disclosed that they had attained  
 196 primary education as at the time of the study.

197 This indicates that cowpea plays a major traditional role in the communities.  
 198 Even though majority of the farmers had no formal education, they were engaged  
 199 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 (Table 4).

217

218 **Table 5: Gender and cowpea cultivation**

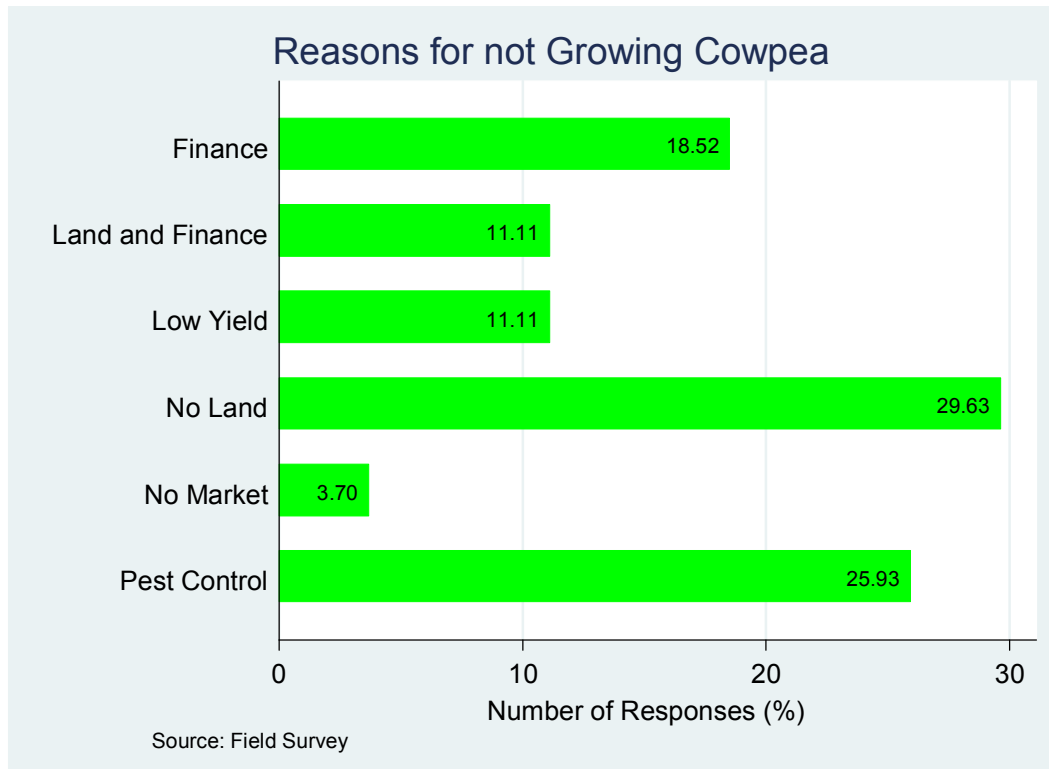
| Cultivation of cowpea |        |        |        |
|-----------------------|--------|--------|--------|
| Gender                | NO     | YES    | Total  |
|                       | 17     | 17     | 34     |
| Male                  | 50.00  | 50.00  | 100.00 |
|                       | 62.96  | 51.52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

219

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

223 An equal number of males (50.0%) indicated they cultivated cowpea while  
224 61.54% of the female farmers under the study also stated that they cultivated  
225 cowpea. Women are more involved in cowpea cultivation because of its  
226 economic benefits to the family. Moreover, women do not intercrop cowpea with  
227 other crops unlike the men who intercrop cowpea with millet and other crops.

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229 **Figure 3: Reasons for not Growing Cowpea**

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

235 Whilst 11.11% of the respondents indicated that land and lack of finance to  
 236 cultivate cowpea as well as low yield of cowpea, 18.52% of the farmers  
 237 emphasized that lack of funds was the main factor that hindered the cultivation of  
 238 cowpea. Other factors are that farmers were often reluctant to cultivate cowpea

due to the high costs of synthetic pesticides (Figure 3). The study revealed that land is the major reason for not cultivating cowpea in large quantity.

**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 of 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 cultivated more than seven (7) acres for cowpea cultivation (Table 6). The result revealed that majority of farmers cultivated cowpea on one acre land due to non availability of land in these communities. This shows that most of the farmers are subsistence farmers, producing the cowpea for their household consumption only. This has an implication for low cowpea production in the community and the region as a whole. But if these categories of farmers are supported; in land acquisition and other farm inputs, there will be an increase in the general cowpea production.

**Table 7: Challenges in growing cowpea**

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

256

257 As in every aspect of life, farmers in cowpea production also face challenges  
258 before and during the cultivation as well as after harvesting processes (Akin,  
259 1990). Apart from the 5.0% non-response rate for this item on the questionnaire,  
260 91.67% of the respondents affirmed that they did face challenges in the process  
261 of cowpea production while 3.33% indicated otherwise. Some of the challenges  
262 farmers faced included lack of labour to cultivate it in a proper manner, difficulties  
263 to store the produce due to pest, pest and diseases during cultivation and limited  
264 access to market.

265

266 **Table 8: Challenges of cowpea production**

| RANKING (%) Challenges of Cowpea Production |       |       |       |       |
|---------------------------------------------|-------|-------|-------|-------|
|                                             | 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 |

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267

268 In an attempt to find out the challenges faced by farmers in this sector, the items  
269 were ranked by respondents (Table 8).

270 It was discovered that the destruction of cowpea crops by pests was the main  
271 concern by farmers as indicated by 90.0% of the respondents (Akin, 1990). The  
272 second most challenging problem as evidenced from the study was storage  
273 which represented 55.00% whilst disease was ranked third as a challenge to  
274 cowpea production indicated by 55.00%. The last and least ranked item was the  
275 problem of marketing the product. The focus of cowpea research in West Africa  
276 over the preceding fifteen to twenty years was mainly to develop cowpea  
277 cultivars that are resistant to pest and diseases within a sustainable farming  
278 system (Hammond, 2002).

279

280 **Table 9: Most profitable crop as ranked by respondents**

| RANKING (%) of Most Profitable Crop |       |       |       |       |       |
|-------------------------------------|-------|-------|-------|-------|-------|
|                                     | 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  |

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Results from Table 9 indicated 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.

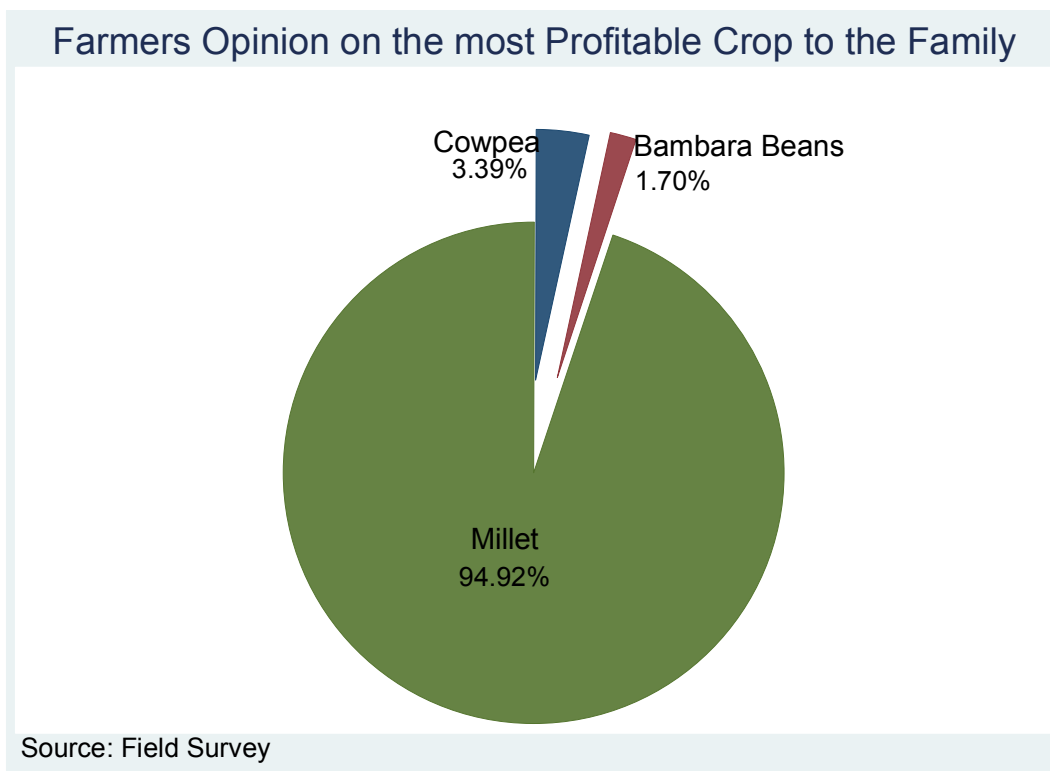


**Figure 4: Farmer's opinion on the most important crop to the family**

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

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East Region. It is the staple and a traditional crop as well. Millet ranked as the most profitable because farmers can depend on millet for the whole dry season either for feeding or selling some to solve their problems.

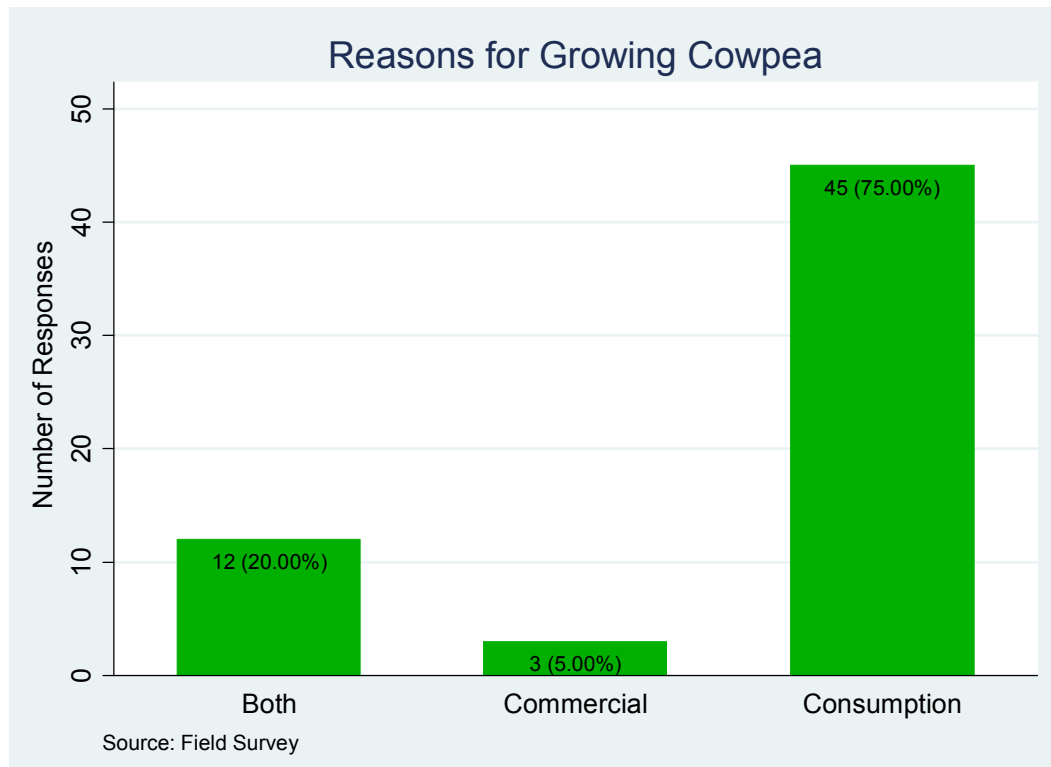


**Figure 5: Reasons for growing Cowpea**

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

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and for commercial purposes. The study revealed that, insufficient land hampered them from producing cowpea in large quantities for commercial purposes, so, they only produced the crop on subsistence basis to feed their families. Today and future agriculture of these communities and the country as a whole must target large scale production of most staple crops in order to be able feed the ever increasing population. Cowpea is one of the most important protein sources in the community since animal protein is expensive and not easily affordable by the rural people.

**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

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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.

**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 the use and non-use of fertilizer for cowpea production whereas 3.33% of the individuals failed to respond to whether or not they used fertilizer in the cultivation of cowpea. 48.33% respondents indicated that they used fertilizer while 48.33% of them did not use fertilizer in the cultivation of cowpea. Fertilizer is not

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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 fertilizer because they were financially handicapped and could not afford fertilizer due to the high cost.

**Table 12: Types of Fertilizer Used**

| 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 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 NPK 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         |

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**

| Reasons for growing cowpea | Cultivating cowpea as a main crop |                     |                       |
|----------------------------|-----------------------------------|---------------------|-----------------------|
|                            | NO<br><i>n</i> (%)                | YES<br><i>n</i> (%) | Total<br><i>n</i> (%) |
| 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

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

371 Below the table is the Pearson chi-square statistic which attempts to test the  
 372 hypothesis of independence of the two items. At 5% significance level, there is  
 373 enough evidence to indicate that the farmer's reason for growing cowpea  
 374 influenced them to either cultivate cowpea as a main crop or not.

375

376 **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<br><i>n</i> (%) | YES<br><i>n</i> (%) | Total<br><i>n</i> (%) |
| NO                                        | 22 (38.60)         | 0 (0.00)            | 22<br>(38.60)         |
| YES                                       | 30 (52.63)         | 5 (8.77)            | 35<br>(61.40)         |
| Total                                     | 52 (91.23)         | 5 (8.77)            | 57<br>(100.00)        |

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

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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.

**Table 16: Sources of 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 used cowpea production whereas 6.67% of the respondents acquired the land through lease. However, 1.67% of the respondents purchased their own land for crop production. The results also showed 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.

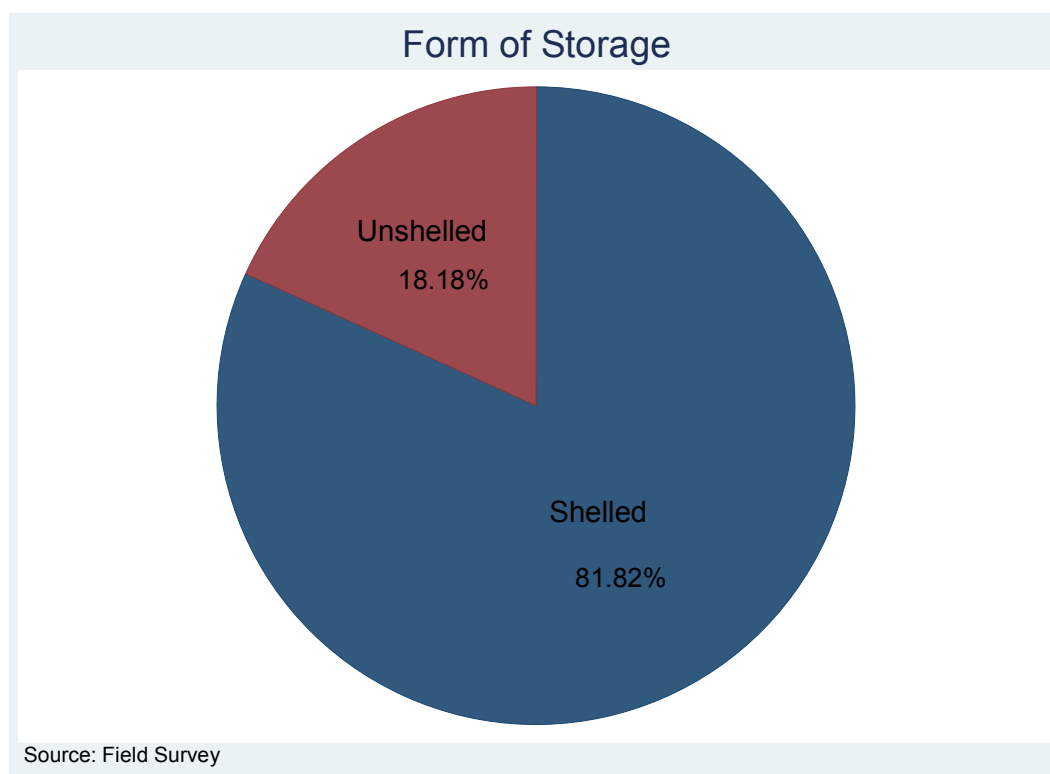
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394 Table 17: Yield of cowpea per acre (in bags)

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

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

399



400

401 **Figure 6: Forms of Storage**

402 Cowpea is either stored with or without the shell. From the study, 81.82% of the  
 403 respondents confirmed that they stored cowpea by removing the shells while

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18.18% preferred storing cowpea unshelled. Farmers store cowpea by removing the shells to ensure low moisture content and to make storage very easy.

**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 insect 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).

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**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         |

421

422 Table 19 shows that 59.65% of the respondents disclosed that they used  
 423 chemicals in storing cowpea to preserve it for future use while 48.28% of them  
 424 indicated otherwise. Farmers used oil, ashes and neem leaves to preserve  
 425 cowpea with weevil infestation. According to Masur, (1994), palm oil and cotton  
 426 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         |

428

429 With farmers who store their crops, 91.67% of them revealed that they could  
 430 keep cowpea in the store for more than six months while 8.33% could only  
 431 preserve the crop up to a maximum of six months. Most farmers attributed to the

fact that they stored cowpea for more than six months 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         |

83.05% of the respondents indicated that they used cowpea for funeral purposes, while 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.

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

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