



## Assessment of perceived attributes and constraint to adoption of improved cowpea production technologies among farmers in Damaturu local government area, Yobe State, Nigeria

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### Abstract

The study assessed perceived attributes and constraint to adoption of improved cowpea production technologies among farmers in Damaturu Local Government Area, Yobe State, Nigeria. The specific objectives were to identify the available cowpea production technologies in the study area; examine the attributes that contributes to adoption of improved cowpea production technologies; determine the factors that influenced the adoption of improved cowpea production technologies; identify key constraints to adoption of improved cowpea production technologies. The study adopted the use of multistage sampling technique in obtaining the sampled population. Data were collected through the use of structured questionnaire and interview schedule technique administered to 100 farmers. Descriptive statistic was employed in analyzing the whole objectives of the study. The result of the analysis revealed that majority (24.0%) of the respondents indicated cowpea varieties and pesticide (22.0%) to be readily available in the study area. The result of the analysis on perceived attributes that influences the adoption of cowpea production technologies by farmers indicated cowpea varieties, pesticide and seed rate to be the technologies that were considered the most based on the whole attributes of an innovation. The result further revealed that majority (33.0%) of the respondents indicated creation of awareness and increased output/income (28.0%) as the factor that help influenced the adoption of cowpea production technologies. Amongst the constraints experienced by farmers in adoption of cowpea production technologies includes lack of finance (27.0%) and lack of awareness on the availability of the technology (20.0%) to be the major constraints against farmers likelihood to adoption of the technology. The study recommended that government should develop an effective strategy for the provision of credit facilities to farmers, extension organization must ensure farmers accessibility to certify seed and improved storage facilities should be introduced to farmers at least cost in order to reduce post-harvest loss.

**Keywords:** Adoption, constraint, cowpea, farmers, production, technology

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### 1. Introduction

Cowpea (*Vigna unguiculata L. Walp*) belongs to the family "*Fabaceae*" which is an annual herbaceous legume from the genus *Vigna*. Due to its tolerance for sandy soil and low rainfall it is an important crop in the semi-arid regions across Africa <sup>[16]</sup>. It requires very few inputs, as the plant's root nodules are able to fix atmospheric nitrogen, making it a valuable crop for resource poor farmers and well-suited to intercropping with other crops. The whole plant is used as forage for animals <sup>[15]</sup>. Cowpea is a low cost nutritious food for the rural populace and also fits the condition of the urban poor. It is a versatile African crop because it feeds people, livestock and the next crop through nitrogen fixation. It is a crop that offers farmers great flexibility <sup>[4]</sup>. The dry grain and fodder yield are the most important parts of cowpea <sup>[12]</sup>.

Cowpea is a tropical legume crop of African origin. Cowpea is also known by other names such as black eye beans, china beans, black eye pea and marble beans. The greatest morphological diversity of domesticated cowpea is indeed in West Africa. The major producing countries are Nigeria, Senegal and Tanzania <sup>[7]</sup>. Others include the savanna region of Benin, Burkina Faso, Ghana, Niger, Cameroun and Togo <sup>[1]</sup>.

In Nigeria, farmers who store cowpea fodder to the peak of the dry season for sales have been found to increase their farm income by 25% [5]. Cowpea also plays a role in providing soil nitrogen to cereal crops when grown together, especially in areas which less soil fertility. It does not require high rate of nitrogen because of its ability to fix nitrogen from the air through soil bacteria called Rhizobia [5]. The crop has a protein content of 25% and remains one of the cheapest sources of protein in the diet of many Nigerians, in addition to its several nutritional contents [10].

However, cowpea yield has been in decline due to lack of understanding of the nature of some innovations and persisting problems that hindered its adoption. An effort to reverse this decline and improve cowpea production in the country date back to 1988 but up to date improved cowpea production technologies were diffused by extension personnel and effort where made to increased cowpea production in Nigeria by farmers considering the increasing demand for cowpea associated with its low supply. In spite of all these numerous efforts, cowpea production is still not at its peak to satisfy the need of the populace. As such, the objective of this paper is to assess perceived attributes and constraints to adoption of cowpea production technologies among farmers in Damaturu Local Government Area, Yobe State, Nigeria. The specific objectives were to:

1. Identify the available cowpea production technologies in the study area;
2. Examine the attributes that contributes to adoption of

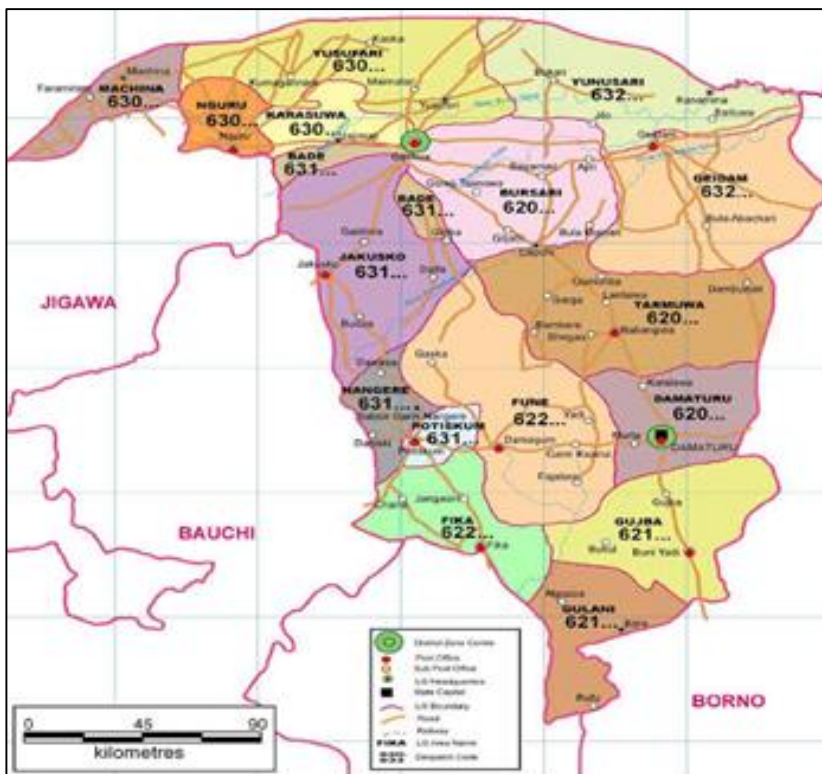
improved cowpea production technologies;

3. Determine the factors that influenced the adoption of cowpea production technologies;
4. Identify key constraints to adoption of improved cowpea production technologies.

## 2. Methodology

### The Study Area

The study was conducted in Damaturu Local Government Area, Yobe State, Nigeria. Its headquarters is in the town of Damaturu, the state capital. The area has an equal latitude and longitude of 12°00'00N 12°00'00E / 12.00000°N 12.00000°E of the Greenwich Meridian with a postal code of 620. The area has an annual rainfall of 649mm/25.6 inch with an initial Temperature of 25.2°C / 77.4°F. [7]. It shares border with Borno State to the East, Fune LGA to the West, Tarmuwa LGA to the North and Gujba LGA to the south. It has an area of 2,366 km<sup>2</sup> with a population of 388,014 [14]. The population of the LGA is unevenly distributed with Damaturu town being the most populated area. Damaturu is divided into eleven (11) political wards namely; Njiwaji/Gwange, Nayinawa, Damakasu, Marfakalam, Kallalawa/Gabai, Sasawa/Kabaru, Bindigari/Pawari, Gambir/ Moduri, Kukareta, Damaturu central and Maisandari. Farming and animal rearing are the main occupations of the area. The main crops grown are cowpea, millet, guinea corn, groundnut, sesame and gum Arabic.



**Fig 1:** A Map of Yobe State Showing the Study Area.

### Sampling Technique and Sample Size

A multi-stage sampling technique was employed in selecting the respondents. In the first stage, purposive sampling technique was used to select two (2) Agricultural blocks available in the Local Government Area, these are; Damaturu and Sassawa. In the second stage, two (2) cells were selected from each of the selected Agricultural blocks through a

simple random sampling technique to give a total of four (4) cells. The sampled cells were Kukareta, Marfakalam, Damakasu and Kabam. In the third stage, twenty five (25) farmers were selected from each of the sampled cells at random from the sampling frame of cowpea farmers in the area to give a total of one hundred (100) farmers that were considered for the study.

### Sources of Data

The study used both primary and secondary data. Primary data were obtained from respondents with the use of structured questionnaires and interview schedule techniques while secondary data was obtained from articles, journals, publications, IFAD, YOSADP and IITA.

### Analytical Techniques

Descriptive statistics such as measures of central tendency (i.e. frequency distribution, percentages and mean) were used to analyze the objectives of the study.

## 3. Result and Discussion

### Availability of Improved Cowpea Production Technologies Result

**Table 1:** Available Cowpea Production Technologies

Technologies	Frequency (f)	Percentage (%)	Mean ( $\pi$ )
Cowpea varieties	24	24.0	
Insect resistance	15	15.0	
Seed rate	8	8.0	
Seed dressing/treatment	11	11.0	25
Recommended spacing	7	7.0	
Pesticides	22	22.0	
Storage facilities	14	14.0	

Source: field survey, 2020.

\*Multiple responses

### Discussion

The availability of improved cowpea production technologies among farmers are presented in Table 1, the result of the

analysis shows that (24.0%) of the respondents indicated cowpea varieties to be available in the study area, (22.0%) indicated availability of pesticide, (15.0%) of the respondents indicated availability of insect resistance cultivars. The result further revealed that (14.0%) of the respondents indicated storage facilities to be the most available production technology followed by seed dressing/treatment which account for (11.0%) of the respondents. The least among the available cowpea production technologies were seed rate and recommended spacing which constitute (8.0%) and (7.0%) of the respondents in the study area.

This implies that cowpea varieties and pesticide application are the most available and required technologies by farmers because it assists immensely in determining output in cowpea production. The low adoption for some of the improved cowpea production technologies is associated with the low level of awareness and preference of the technology among the respondents. This agrees with the findings of [8] which revealed that cowpea production technologies considered to be available to farmers includes; improved seed variety, seed treatment, planting spacing, land preparation, fertilizer application and chemical application [18]. Also revealed that majority (99.3%) of the respondents indicated land preparation as the most available production technology followed by planting date and storage facilities, seed rate, pesticide, fertilizer application and seed treatment respectively.

### Perceived Attributes that Contributes to Adoption of Cowpea Production Technologies Result

**Table 2:** Perceived Attributes that Contributes to Adoption of Cowpea Production Technologies

Cowpea production technologies	Attributes that Contribute to Adoption of an Innovation						
	Relative Advantage	Accessibility	Compatibility	Trial-ability	Complexity	Divisibility	Observe-ability
	%	%	%	%	%	%	%
Cowpea varieties	20.0	15.0	10.0	14.0	9.0	23.0	21.0
Insect resistance	11.0	5.0	8.0	11.0	11.0	17.0	10.0
Seed rate	0.0	6.0	21.0	20.0	3.0	21.0	11.0
Seed dressing/treatment	20.0	18.0	19.0	16.0	18.0	10.0	10.0
Recommended spacing	10.0	21.0	16.0	18.0	15.0	15.0	13.0
Pesticides	26.0	30.0	17.0	15.0	31.0	11.0	22.0
Storage facilities	13.0	5.0	9.0	6.0	13.0	3.0	13.0

Source: field survey, 2020.

\*Multiple responses

### Discussion

The result of the analysis on perceived attributes that influences the adoption of cowpea production technologies by farmers are presented in Table 2. The result of the analysis on relative advantage indicated pesticides which constitutes (26.0%) of the respondents, followed by cowpea varieties and seed dressing/treatment which constitutes (20.0%) each of the respondents in the study area. This implies that the respondents perceived the technologies to be better than the status quo in the study area. This will result in an expanding number of farmers to adopt the innovation due the improved performance of the technologies. The result also revealed that pesticides (30.0%), recommended spacing (21.0%) and seed dressing/treatment (18.0%) were the most accessible technologies in the study area. This may be due to frequent awareness and high demand for the technologies.

The result of the analysis further indicated seed rate and seed dressing/treatment which constitutes (21.0%) and (19.0%) of

the respondent to be consistent with the existing past experiences and needs of potential adopters. This implies that compatibility is paramount as an indicator for adoption of an innovation because farmers are likely to adopt technologies that are related to their current practices due to fear of changes. The result on trial-ability of the technologies revealed that majority (20.0%) as well as (18.0%) of the respondents perceived seed rate and recommended spacing as the production technologies that can be experimented with a limited basis. This implies that small scale farmers prefer technologies that can be applied in a narrow scale so that it can serves as a basis for monitoring and future expansion of the technologies.

Moreover, majority (31.0%) of the respondents perceived pesticides application as difficult to understand and used followed by (18.0%) seed dressing/treatment. This implies that the respondents lack the technical know-how of the technologies due to poor extension communication/diffusion as well as complexity of the innovation which is one of the

reasons for low adoption of an innovation despite its numerous potentials. The result of the analysis on divisibility also revealed that (23.0%) perceived cowpea varieties as a technology that can be experimented with small units. Others include seed rate, insect resistance and recommended spacing which constitutes (21.0%), (17.0%) and (15.0%) of the respondents respectively. The result on observe-ability as an attribute to adoption of an innovation also shows that (22.0%) of the respondent perceived pesticide while (21.0%) perceived cowpea varieties as the technologies that contributes immensely to adoption. This implies that the effects of both technologies are visible to other farmers in the adoption categories and would contribute to adoption of cowpea production technologies in the study area.

### Factors that Influenced the Adoption of Cowpea Production Technologies

#### Result

**Table 3:** Factors that Influenced the Adoption of Cowpea Production Technologies

Technologies	Frequency (f)	Percentage (%)	Mean ( $\pi$ )
Creation of awareness	33	33.0	
Efforts of extension personnel	19	19.0	
Increased output/income	28	28.0	25
Intervention from government and other institutions	9	9.0	
Market demand	11	11.0	

Source: field survey, 2020.

\*Multiple responses

### Discussion

The result of the analysis on factors that influence the adoption of cowpea production technologies are presented in Table 3. The result shows that majority (33.0%) of the respondents indicated creation of awareness as a factor that influenced the adoption of cowpea production technologies. The result also revealed that increased output/income had (28.0%), effort of extension workers (19.0%) while market demand and intervention from government and other institution had (11.0%) and (9.0%) respectively. This implies that the creation of awareness increased in output/income and effort of extension personnel are the major factors that influence farmers' decision to adopt the technologies. This is due to the fact that awareness is a vital stage in the adoption of an innovation that pave way for farmers to either accept or reject the technology. This agrees with the findings of [3] who observed that awareness had higher probability of influencing the adoption of cowpea production technologies. According to [13], the desired factors that contribute to adoption of improved cowpea varieties among farmers in the study area. The farmers indicated desire for high income (94.7%), high yield (89.7%) resistance to drought (56.3%), early maturing (72.3), household food security (61.7) and diversified food products from cowpea (65.3%) as the major factors they grow and adopt improved cowpea production technologies.

### Constraints to Adoption of Improved Cowpea Technologies

#### Result

**Table 4:** Constraints to Adoption of Improved Cowpea Technologies

Key Constraints	Frequency (f)	Percentage (%)	Mean ( $\pi$ )
Lack of finance	27	27.0	
Labor cost	5	5.0	
Inadequate access to certify seed	18	18.0	
Insect attack	6	6.0	25
High cost of storage facilities	11	11.0	
Inadequate awareness on the availability of the technologies	20	20.0	
Poor contact with extension agent	13	13.0	

Source: field survey, 2020.

\*Multiple responses

### Discussion

The result in Table 4 shows that majority (27.0%) of the respondents indicated lack of finance as a major constraint to adoption of cowpea production technology in the study area. The result also revealed that (20.0%) considered lack of awareness to be another challenge against farmers' likelihood to adoption of the technology followed by inadequate access to certify seed (18.0%), poor contact with extension agent (13.0%) and high cost of storage facilities (11.0%) while the least perceived constraint include insect attack (6.0%) and labor cost (5.0%). This implies that majority of the respondents were experiencing one challenge or the other that hindered them from adopting the recommended technologies. This study is in tandem with the findings of [11], who observed that lack of awareness, high cost of input and labor were the major constraints to adoption of maize production technologies among farmers in Kwara state, Nigeria. Moreover, [13] revealed that the major constraints to adoption of improved cowpea varieties were: non-availability of seeds when needed (68.0%), non-availability of fertilizer (54.3%), high cost of fertilizer (59.3%), diseases (70.3%) and pests (79.3%). According to [11], the limited use of improved

varieties in a predominantly cowpea growing region may be due to several factors; lack of information on improved cowpea varieties, unavailability of seed, or the unacceptability of new varieties due to low market values or unsuitability for the farming system. In spite of the potential for further yield increases in output as a result of adoption of improved technologies, cowpea production faces serious problems including insect pest attack, *Striga* spp parasitism, disease, drought, low and erratic rainfall [17, 9].

### 4. Conclusion

The study concludes that cowpea varieties and pesticides were available to most of the respondents in the study area but there are a lot to be provided for farmers at their disposal in order to adopt the required technologies. The perceived attributes has contributed significantly to adoption of cowpea production technologies particularly those that were frequently aired through appropriate media outlet or as a result of the effort of extension personnel and desired for increased output /income. Cowpea production technologies have a lot of complexity problem which serve as constraining factors that hindered the adoption of the innovations. Lack of

finance, lack of awareness on the availability of the technology, inadequate access to certify seed and poor contact with extension agent were considered to be the challenges against farmers' likelihood to adoption of the technology. This suggest the need for government, extension personnel/organization, researchers, policy makers and other institutions to develop effective strategies that will address those issue and increase the adoption of cowpea production technologies in the study area.

### 5. Recommendation

The following recommendations were made based on the research findings:

1. Extension personnel should create adequate awareness on the technologies and conduct demonstration as a tool for farmers to learn the practice and observed the effect of the technologies on their farms.
2. Government should develop an effective strategy for the provision of credit facilities to farmers at low cost and longer tenure.
3. Extension organization must ensure that farmers have access to certify seed at least cost possible.
4. Government and other concern institutions should ensure that improved cowpea production technologies should be made readily available to farmers before the onset of rain.
5. Frequent supervision should be carried out by the change agent to ensure proper utilization and adoption of the technologies.
6. Improved storage facilities should be introduced to farmers at least cost in order to reduce post-harvest loss.

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