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Exploring the Utilization of Cowpea Storage Mechanisms for Post-Harvest Loss Avoidance in Kuje Area Council, Abuja

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Abstract

The study was carried out to explore the utilization of Cowpea storage mechanisms for post–harvest loss avoidance by Cowpea Farmers in Kuje Area Council, Abuja. Purposive stage sampling technique was employed in sampling the 100 respondents used for the study. Primary data were used for the study and they were collected using well-structured questionnaires, and they were analysed using descriptive statistics. The result shows that majority (59%) of the cowpea farmers are male, while 42.2% within the age bracket of 36 and 45. Most (89.2%) of the cowpea farmers were married while 28.9% of the respondents had a household size between 6 and 10 persons, and this means that most of the farmers will likely to have access to family labour. The most widely utilized storage mechanism by cowpea farmers in the study area are Pirimiphos-methyl and Alluminium phosphate while the least widely used technology is crib. However, the PCI of the constraints the farmers face in the usage of cowpea storage technologies shows that inadequate capital, poor attitude of extension agents, unreliability of innovations, and inadequate extension services were the most prevalent challenges faced by the respondents in the study area. It was recommended that financial institutions should ensure that the process of acquiring agricultural loans and credits are simplified so that the farmers can easily have access to capitals for their agricultural activities, while also recommending the government and private organization involved in extension service delivery ensure that farmers are effectively equipped with the right information on available mechanism and their utilization.

Keywords: Cowpea, storage, mechanism, farmers

Introduction

Cowpea (*Vigna unguiculata*) is a native legume to sub-Saharan Africa and it is mostly grown in the dry savanna region as an intercrop with crops like sorghum, maize, millet, and groundnut. Cowpea is an important source of protein, and it is consumed in different forms in various parts of the tropics. It plays a major role in begetting income and ensuring food security for many small-scale producers (Abadassi, 2015). Nigeria is the both largest producer and consumer of cowpea in the world, accounting for about 45 percent of the world's cowpea production. Despite the large production of cowpea in the country, there is still a challenge of postharvest losses.

One of the major challenges of cowpea production is insect pests and disease invasion which results in enormous economic

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losses. The major storage problem in cowpea (*Vigna unguiculata*) storage around the world is pest's invasion. It has been guessed that about 4 percent of total annual production of cowpea or about 30,000 tonnes in Nigeria are lost annually (Fakayode*et al.,* 2014). *Callosobruchus maculatus* (beans weevil) is the most important storage pest of cowpea and severe infestation from weevils can lead to total grain loss in storage. Although, the grains initially protected from insects inside the harvested pods, the grains are exposed to post-harvest insect pests following the threshing of the grains, and become more vulnerable to these insects during storage (Murdock *et al.,* 2003). As stated by Murdock *et al.* (2012), Insect pests mutilate on cowpea can lead to as high as 80 to 100% loss if not properly managed.

In Nigeria, consumers abstain from damaged grain, especially cowpea, and this is further worsened by the simple fact that the storage of cowpea in Nigeria is mostly carried out by resource-poor small-scale farmers who have little or no access to knowledge and resources to acquire the relevant storage facilities and even chemicals to control pests (Murdock *et al.,* 2012). However, Ebuehi and Ojewole discovered that most Nigerians prefer to consume brown cowpea brands as compared to local white varieties (Sennuga*et al.,* 2021). The reason is that most Nigerian cowpea processors lack adequate technology of cowpea processing to meet international standard. The main goal of storage is to effectively manage the fluctuations in market demands and supply, within different seasons, by taking the produce off the market in when supplies are high, and introducing it back into the market in scarce seasons, when demands are high and supplies are low. This also ensures that fluctuations in market prices are checked out. But if the crops are stored without efficient storage techniques, they could become susceptible to insect pests, which pose a major threat to the shelf-life of stored grains. These insects reproduce rapidly, thus within a month, a few number of the insects can cause significant damage to large quantity of cowpeas. Hence, the need to explore the utilization of cowpea storage mechanism to avoid post-harvest losses among farmers in Kuje Area Council of Abuja Nigeria. Therefore, the purpose of the study is to explore the utilization of Cowpea storage mechanisms for post–harvest loss avoidance by Cowpea Farmers in Kuje Area Council, Abuja, Nigeria.

The Specific objectives of this study are to:

i. describe the socio-economic characteristics of cowpea farmers utilizing cowpea storage mechanisms in study area.

ii. explore cowpea storage mechanisms utilized by cowpea farmers.

iii. identify the constraints in the utilization of cowpea storage mechanisms by cowpea farmers.

Methodology

Materials and Methods

Study Area

This study was conducted in Kuje Area Council of the Federal Capital Territory, Abuja. The area council is located at the North Central region of the FCT and lies between 80^{o} – 90^{o} East and 70^{o} North. On the North-east of the territory, it is bordered by the Municipal Area Council and to the west by Gwagwalada Area Council. Kuje has a total land area of 1,800sq km, which translates to about 23% of the Federal Capital Territory. The native people of the area

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council includes: Bassa, Hausa, Fulani, Gude and Gbagyi (who are believed to be the first settlers in the locality. The weather in the area council is typified by alternate wet and dry seasons with a mean annual rainfall ranging between 1000mm and 1500mm. The wet season starts from April to October while the dry season, which is usually accompanied with harmattan, is between October and March (Ekpetere & Faith, 2019).

Sampling Technique

Purposive sampling technique was used to select four (4) communities (Gawu, Pesali, Kwaku and Gadoro) who are the major cowpea farming communities in the study area. 25 respondents were randomly selected from each of the communities. This gave us a total 100 respondents used for the study.

Data Collection

Primary data was used for the study. These were collected using well-structured questionnaires. The questionnaires were administered with the help of well-trained enumerators who are familiar with the study area.

Data Analysis

Descriptive statistics was used to actualize the objectives of the study. Frequency and percentage were used to achieve objectives 1, which is to describe the socio economic characteristics of the respondent; and objective 2, which is to explore the utilization of cowpea storage mechanisms used by cowpea farmers; while objective 3, which is to discover the constraints in the utilization of cowpea storage mechanisms by cowpea farmers, was actualized using a problem confrontation index.

Problem Confrontation Index

With limited variation in factors, a problem confrontation index based on the Likert scale was utilized to discover the constraints in the utilization of cowpea storage mechanisms by cowpea farmers, was actualized using a problem confrontation index.

The Problem Confrontation Index is stated thus

$$\boldsymbol{PCI} = \boldsymbol{P_n L_0 + P_l L_1 + P_m L_2 + P_h L_3} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{1})$$

PCI= Problem Confrontation Index (Units)

P_n = The Frequency of farmers that say they haven't had any issues (Units)

P_l= Farmers who evaluated the challenges as minor in number (Units)

P_m= Farmers who evaluated the difficulties as moderate in frequency (Units)

P_h = The Frequency of farmers who evaluated the situation as severe. (Units)

Results and Discussion

Socioeconomic Characteristics of Respondents

Presented in Table 1 is the result of the socio economic characteristics of the cowpea farmers in the study area. The result shows that most (59%) of the respondents were male, which implies that males are more involved in cowpea farming that the females. However, from the result, 41% of the respondents were female, which means that a reasonable number of women are involved in cowpea production in the study area. The result for the age of the respondents shows that majority (42.2%) of the respondents were between the ages of 36 and 45 years old, while 27.7% of the respondent were between the ages of 20 and 35 years old. This means that most of the respondents are gainfully active person, and they possess the plasticity

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to cope with the physical demands of agriculture. This is in line with the findings of Chikezie *et al.* (2012). The result shows that 89.2% of the respondents were married while the remaining 10.8% were single. Table 1 further reveals that majority (37.7%) of the respondents had a household size of between 6-10 people, 28.9% of the respondents had a household size between 1 and 5 while 27.7% of the respondents had a household size between 11 and 15 people. Farmers with large household size are likely to take advantage of their household size to utilize family labour to effectively participate in production and post-harvest activities, and this aligns with Tambo & Abdoulaye (2013).

Table 1 shows that most (53%) of the respondents had secondary school education while 47% of them had primary school education. This is in line with the findings of Idu*et al.* (2020) which found that most of the respondents in their study had formal education. The result further shows that the major occupation among the respondents was farming according 74% of the respondents. The result for years of farming experience shows that 28.9% of the respondents had a farming experience of between 16-20 years while 26.5% had a farming experience of 6-10 years. According to Dossah& Mohammed (2016) the more a person does a particular job frequently, the better the get at it. In that same vein, the more years of experience a farmer has, the better they are at making important decision to better their enterprise. The result for farm size of respondents reveals that 39.8% of the respondents had between 11 to 15 hectares of farmland. Also, 22.9% of the respondents had between 6 to 10 hectares of farmland while 19.3% of the cowpea farmers had between 1 to 5 hectares of farmland. The annual income of the respondents as presented in Table shows that 41% of the farmers had an annual income between N201000 and N401000. Still in Table 1, the result reveals that most (75.9%) of the respondents were members of cooperative societies. Membership of cooperative societies affords the farmers access to information, credits, inputs, and the opportunity to have savings. Akpan (2010) stated that membership of cooperative societies helps in enhancing the level of participation in agricultural activities because it affords them the opportunity to enjoy privileges available to group members.

Table 1: Distribution of Respondents by their Socio-Economic Characteristics (N = 100)

Variable	Frequency	Percent (%)
Gender		
Male	49	59
Female	34	41
Age (years)		
20-35	23	27.7
36-45	35	42.2
46-55	17	20.5
56-65	8	9.6
Marital Status		
Single	9	10.8
Married	74	89.2
Household Size		

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1-5	24	28.9
6-10	28	33.7
11-15	23	27.7
16-20	5	6.0
21 and above	3	3.6
Level of Education		
No formal education		
Primary education	39	47.0
Secondary education	44	53.0
Tertiary education		
Years of Experience		
1-5	15	18.1
6-10	22	26.5
11-15	8	9.6
16-20	24	28.9
21-25	6	7.2
26 and above	8	9.6
Farm Size		
1-5	16	19.3
6-10	19	22.9
11-15	33	39.8
16-20	14	16.9
21 and above	1	1.2
Annual Income (N)		
100000 and below	3	3.6
101000-200000	7	8.4
201000-300000	17	20.5
301000-400000	17	20.5
401000-500000	34	41.0
501000-600000	5	6.0
Cooperative Society		
Yes	63	75.9
No	20	24.1

Storage Mechanisms Used by Cowpea Farmers in the Study Area

Table 2 shows the storage mechanisms utilized by cowpea farmers in the study area. From the result, we see that most (24%) of the respondents make use of Pirimiphos-methyl to store their cowpea in the study area. This is in line with the findings of Anku-Tsede (2000) who noticed a significant increase in the perception and use of Pirimiphos-methyl among cowpea farmers in Volta region of Ghana. Also, alluminium phosphate (22%), 17% of the cowpea farmers in the study area make use of containers for storing cowpea which agrees with the discovery of Osei-Boahen (2016) who opine that, the farmers tend to use empty containers as storage utensils for their cowpea. The result further shows that (15%) of the respondents use hermetic sacks mechanism

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to store cowpea in the study area. While (14%) of respondents make use of storage bags for cowpea storage and (8%) of the respondents used cribs. This confirms with Fakayode*et al.* (2018) who endorse that the use of crib mechanism to store cowpea is a widely adopted practice in Kwara State. The pictorial representation of the storage mechanisms used by the farmers is presented in table 2. It shows that the most widely used cowpea storage mechanisms are Pirimiphos-methyl and Alluminium phosphate while the least widely used mechanism is crib. Based on the findings in the study area.

Table 2: Storage Mechanisms Used by Cowpea Farmers in the Study Area

Storage Technology	**Percent (%)**
Pirimiphos-methyl	24
Alluminium phosphate	22
Containers	17
Hermetic sacks	15
Crib	8
Storage bags	14

Field data analysis, 2021

*Multiple responses allowed

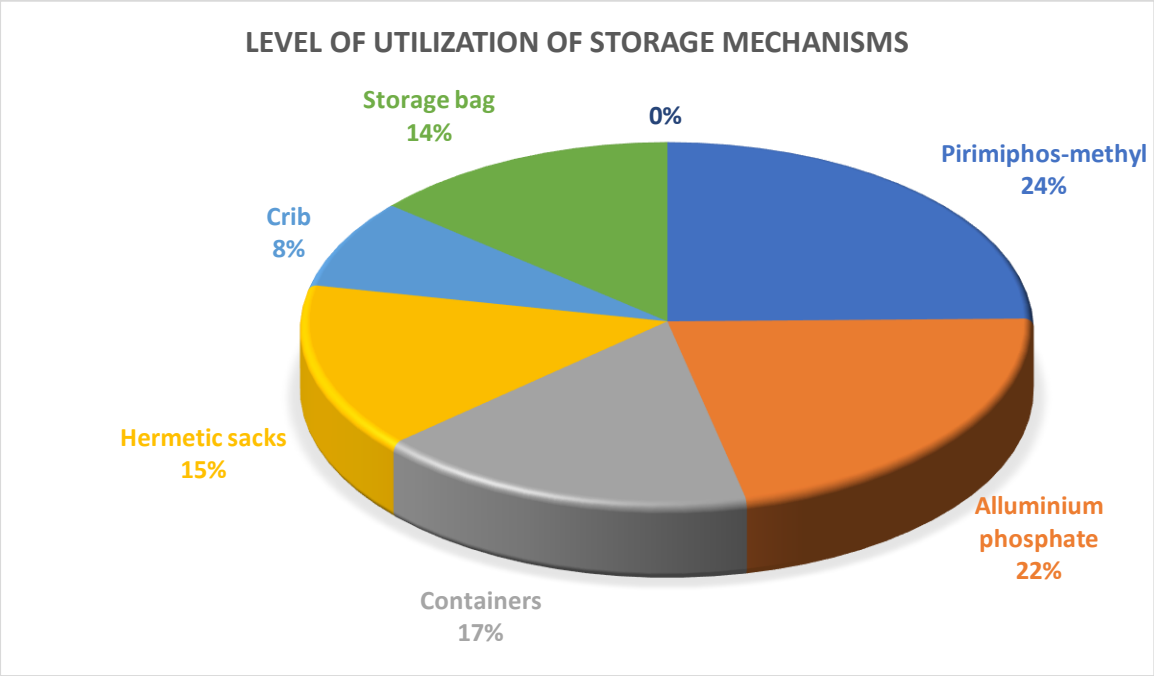

Fig 1: Level of utilization of cowpea storage mechanisms

Constraints in the Utilization of Cowpea Storage Mechanisms by Cowpea Farmers

Table 3 shows the result for the problem confrontation index for the respondents. The result shows that "inadequate capital" got the highest score (PCI-286) and was therefore considered as the 1st ranked problem. Capital is important in production, as it makes it easier to acquire and control other factors of production. Capital can be in different forms but the most common form of capital is money. Availability of fund ensures that the farmers are able to access the available mechanisms and practices. This finding agrees with the claim of Owach*et al.* (2017) who found out that, access to capital is one of the factors that affect cowpea utilization storage by cowpea farmers. The result shows that "Poor attitude of extension agents" got the 2nd highest scores (PCI-284) which was considered as the 2nd ranked problem. Also, "Unreliability of the innovation" got the 3rd highest scores (PCI-279) and hence it was considered as the 3rd ranked problem. This aligns with Abebe *et al.* (2013) who postulate that farmers tend to be conservative about adopting new innovations because of their perceived unreliability of new technologies. Inadequate extension services, with a PCI of 278, ranked 4th and this implied that it was the 4th most severe problem faced by the farmers in the use of cowpea storage technologies in the study area. Extension services help to create awareness for the farmers on available technologies. If these services are lacking or not efficient, then the farmers may be struggling to store their beans grains using old methods because they are unaware of the availability of new technologies. This is in line with the findings of Alene and Manyong (2006) who confirm that one of the challenges to the usage of improved cowpea storage mechanism was the lack of quality

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extension services. The result shows that "Delay in distribution of subsidized farm inputs" (PCI-265), "Inadequate processing and storage facilities" (PCI-239), and "High cost of agro chemicals" (PCI-218) are the 5th, 6th and 7th ranked problem faced by the respondents in the use of cowpea storage technologies in the study area. Meanwhile the result shows that "Inaccessibility of technology" with a PCI of 175 is the least serious challenge faced by the respondents in the use of cowpea storage technologies in the study area.

Table 3: Constraints in the Utilization of Cowpea Storage Mechanism by Cowpea Farmers in the Study Area

	Extent of problem confrontation					**Rank**
Constraint	**Not a problem**	**Fairly serious**	**Serious**	**Very serious**	**PCI**	**Order**
Inadequate capital	6	34	66	180	286	1
Poor attitude of extension agents introducing technology	6	18	120	140	284	2
Unreliability of the innovation	4	28	123	124	279	3
Inadequate extension services	12	30	48	188	278	4
Delay in distribution of subsidised farm inputs	9	36	96	124	265	5
Inadequate processing and storage facilities	11	56	96	76	239	6
High cost of agro chemicals	16	66	84	52	218	7
Poor market price of cowpea	11	88	75	40	214	8
Low level of education	23	76	72	20	191	9
Complexity of the technology	30	64	66	24	184	10
Inaccessibility of technology	35	66	42	32	175	11

Field data analysis, 2021

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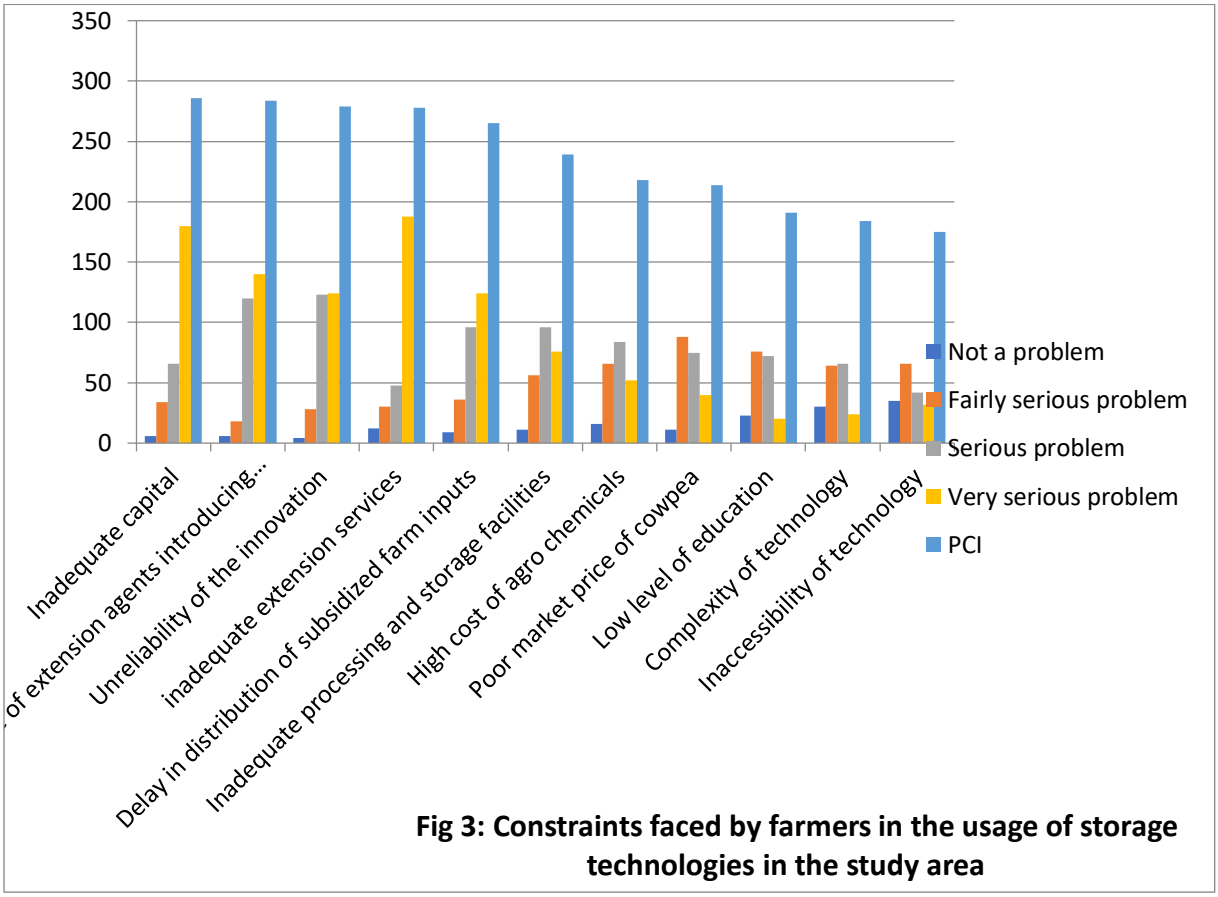

Fig 3: Constraints faced by farmers in the usage of storage technologies in the study area

Conclusion and Recommendation

Based on the findings of this study, it was concluded that majority of the cowpea farmers are male within the economically active age. Most of the cowpea farmers were married with a household size between 6 and 10 persons, and this means that most of the farmers will likely to have access to family labour. Most of the cowpea farmers had secondary education and most of them had a farming experience of 16-20 years and a farm size of 11-15 ha while majority of the farmers had an annual income between N201,00-N400,000 annually. This indicates that they are mostly smallholder farmers. The most widely used storage techniques by cowpea farmers in the study area are Pirimiphos-methyl and Alluminium phosphate while the least widely used technology is the crib. However, the most prevalent constraints the farmers face in the usage of cowpea storage technologies is inadequate capital, poor attitude of extension agents, unreliability of innovations, and inadequate extension services.

In line with the findings of the study, the following recommendations were made:

i. Financial institutions should ensure that the process of acquiring agricultural loans and credits are simplified so that the farmers can easily have access to capitals for their agricultural activities.

ii. The government and private organization involved in extension service delivery should ensure that farmers are effectively equipped with the right information on available mechanisms and how they are utilized.

iii. Farmers should be properly educated to follow the controlled dosage when using chemical substances for storing cowpea.

References

Abadassi, J. (2015). Cowpea (Vigna unguiculata (L.) Walp.) agronomic traits needed in tropical zone. Int. J. Pure Appl. Biosci., 3, 158–165.

Abebe, G. K., Bijman, J., Pascucci, S., &Omta, O. (2013). Adoption of improved potato varieties in Ethiopia: The role of agricultural knowledge and innovation system and smallholder farmers' quality assessment. Agricultural Systems, 122, 22-32.

Akpan, S. B. (2010). Encouraging Youth Involvement in Agricultural Production and Processing in Nigeria: International Food Policy Research Institute, Washington, D.C. IFPRI Policy Note No. 29.

Alene, A. D., &Manyong, V. M. (2006). Farmer-to-farmer technology diffusion and yield variation among adopters: the case of improved cowpea in northern Nigeria. Agricultural Economics, 35(2), 203-211.

Anku-Tsede, C. (2000). Adoption of Improved Cowpea Preservation Technologies in Theakatsi District of the Volta Region, Ghana. Thesis (MPhil) - University of Ghana.

Chikezie, N. P., Chikaire, J., Osuagwu, C. O., Ihenacho, R.A., Ejiogu, N., Oguegbuchulam, M. N. & Obi K.U. (2012). Factors Constraining Rural Youths Involvement in Cassava Production in Onu – Imo Local Government Area of Imo State, Nigeria. Global Advanced Research Journal of Agricultural Science, 1(8), 223-232.

Dossah, O.B., & Mohammed, I.U., (2016). Evaluation of Gender Differences in Resource Utilization and Technical Efficiency of Irrigated Vegetable Farming in Plateau State, Nigeria European Journal of Basic and Applied Sciences, 3(2), 1-14.

Ebuehi, C. O. &Ojewole, S. J. (2009) Toward a green revolution in Africa: what would it achieve, and what would it require? Agricultural Economics 39: 539-550.

Ekpetere, K. & Faith, E. (2019). The Impact of Urbanization on Farm Sizes in Kuje Area Council of the FCT (2010-2017). Global Journal of Advanced Research, 6(3), 101-111.

Fakayode, B. S., Omotesho, A. O. & Adebayo, T. Z. (2014). An economic survey of cowpea (Vigna unguiculata) storage practices in Kwara State, Nigeria. Bangladesh Journal of Agricultural Research, 39(1), 47–57.

Idu, E. E., Fadiji, T. O. &Evinemi, C. A. (2020). Socioeconomic Determinants of Youth's Participation in Rice Production Activities in Kogi and Nasarawa States. Direct Research Journal of Agriculture and Food Science, 8(6), 151-157.

Murdock, L. L., Margam, V., Baoua, I., Belfe, S. & Shade, R. E. (2012). Death by desiccation: Effects of hermetic storage on cowpea bruchids. Journal of Stored Products Research, 40, 166-170.

Owach, C., Bahiigwa, G. &Elepu, G. (2016). Factors influencing the use of food storage structures by agrarian communities in Northern Uganda. Journal of Agriculture, Food Systems, and Community Development, 7(2), 127-144.

Sennuga, S. O., Adeniran B. T. &Olorunniyi A. A. (2021) Assessment of the Constraints Associated with the Processing of Paddy Rice: A Case Study of Smallholder Farmers in Gwagwalada, Abuja. Journal of Current Trends in Agriculture, Environment and Sustainability 2(1): 1- 7.

Tambo, J. A. & Abdoulaye, T., (2013). Smallholder Farmers' Perceptions and Adaptations to Climate Change in the Nigerian Savanna. Regional Environmental