



**ASSESSING INCREMENTAL YIELD OF LEGUME CROPS VALUE CHAIN
INTERVENTION OF KANO STATE AGRICULTURAL AND RURAL DEVELOPMENT
AUTHORITY/KANO STATE AGRO PASTORAL DEVELOPMENT PROJECT**

¹Sani, U. and ²Ibrahim, A.

¹Department of Agricultural Economics and Extension, Bayero University Kano, Nigeria

²Kano State Agricultural and Rural Development Authority

Corresponding Author's Email: saniubale51@gmail.com, **GSM:** +2348036078427

ABSTRACT

The study was carried out to assess the increase in output obtained by farmers along the three value chain crops (groundnut, cowpea and soybeans). Eighteen local government areas were selected across the three ADP zones. Eighteen beneficiaries were randomly selected from each local government constituting six ground nut, six cowpea and six soybeans' farmers in the ratio of 4:2 male and female making a total of one hundred and eight (108) groundnut, cowpea and soybeans farmers respectively. Data were collected electronically using Kobo collect and was analyzed using descriptive statistics. The findings revealed the average age of the three value chain crops farmers (groundnut, cowpea and soybeans) was 44.6, 43.6 and 45.7 years respectively. Also their average number of household size was 8, 7 and 7 members respectively. Their mean monthly income was ₦106,925.93, ₦106,648.15 and ₦108,759.26 respectively. The average total farm size owned by the farmers across the value chain crops were 1.9ha, 1.9ha and 1.8ha respectively. Majority (88.9%, 86.1% and 85.2%) were male and most (95.4%, 95.4% and 95.4%) married, respectively. They possess one form of education or the other with farming as one of the major means of livelihood 88.9%, 90.7% and 89.8% respectively. Majority (84.3%, 88.9% and 78.7%) of the respondents belongs to cooperative or farmers group, respectively. The level of adoption of good agronomic practices among the value chain crops were 89%, 92% and 82% respectively. Most (88.0%, 90.7% and 90.7%) of them reported increase in output since 2021 to 2024 as they continue to adopt the crop varieties and agronomic practices promoted. The yield increment observed during wet season were 0.46 ton/ha, 0.5ton/ha and 0.65ton/ha of groundnut, cowpea and soybeans respectively and for dry season were 0.48ton/ha and 0.56ton/ha for groundnut and cowpea respectively. Majority (69.4%, 67.6% and 65.7%) of the farmers were linked with agro input dealers and aggregators (73.1%, 70.4% and 71.3%) respectively. In conclusion, the yield of the farmers across the three value chain crops were increased above the baseline. It was recommended that linkage with financial institution and seed companies should be strengthen in the future.

Keywords: Yield, Legume, Intervention

INTRODUCTION

Increased agricultural intensification in developing countries is seen as a promising way to address global food needs and the yield-enhancing potential of new technologies is often a prime driver of diffusion efforts and agricultural research prioritization. The gap between potential attainable yields under high-input and optimal management and the actual yields realized under farmer conditions offer an important rationale for agricultural research. (Rachid *et al.*, 2020) and the ultimate goal of any farmer is to get maximum yield per unit area. To obtain high yield, effective crop management practices, which are otherwise known as cultural practices, appeared to be of paramount value. In fact, each crop has an established cultural practice that guides its production, which were developed by crop scientists through a series of experimentations. And for the inherent yield potential of that crop to be fully expressed, such management practices must be properly adopted and carried out accordingly (Karaye, *et al.*, 2017)

In Nigeria, however, crop production is lagging behind in terms of yield per hectare compared to international standard, perhaps due to the problems associated with poor crop management practices. To address this issue, Kano State Agro-Pastoral Development Project (KSADP) funded by the Islamic Development Bank, the Lives and Livelihood Funds, the Islamic Solidarity fund for development and



the government of Kano State, signed MOU with KNARDA as the implementer of the project with aimed at enhancing agricultural production, productivity and competitiveness along the value chain of legume crops namely, Groundnut, Cowpea and Soybean through improving agricultural production components, extension service delivery, capacity building, post-harvest/agro processing, value addition, access to markets and linkages to credit facilities among others. The aim of the survey is to assess the yield obtained by the beneficiaries due to the intervention of the project.

METHODOLOGY

Study Area

Kano State lies between latitudes 10° 33' to 12° 37'N and longitude 07° 34' to 09° 25'E. It occupies a total land area of 20,131 square kilometers and has a population of 9,383,682 people according to the 2006 population census (NPC, 2006). With the increase of 3% annually, the population as at 2026 is 15,013,891. The people are mostly farmers and traders that involved in subsistence and commercial production, processing, and marketing of grains, legumes, vegetables, and livestock. The southern part of the state lies in the Northern Guinea Savannah, the central region is covered by the Sudan Savannah and the northern most tip is characterized by the arid Sudano-Sahel. The annual rainfall varies from 600 – 1200 mm in the Guinea Savannah to 400 – 600mm in the Sudan Savannah and 200-300mm in the Sudano-Sahel. The temperature in the state usually ranges from 15.8°C to 33°C in a year with a mean temperature of 26°C.

Sampling Techniques

The project was implemented in the entire forty-four (44) local government areas of the state. The state was divided in to three agricultural development project (ADP) zones. In line with this, six (6) local government areas were randomly selected from each zone. Equal numbers (6) of beneficiaries were randomly selected from each value chain crop (Ground nut, Cowpea and Soybeans) across the selected local government areas, given a total of one hundred and eight (108) beneficiaries for each value chain crop. This led to selection of three hundred and twenty-four (324) sample size used for the study.

Method of Data Collection and Analysis

Data were collected using questionnaire by trained enumerators. The questionnaire was developed and uploaded to Kobo tool box which is an electronic tool. Descriptive statistics was used to analyze the data obtained from the beneficiaries.

RESULTS AND DISCUSSION

Socio-economic Characteristic of the Beneficiaries

The results from Table 1 revealed that the minimum age of the groundnut farmers was 24 years, the maximum was 67 years and the average age was found to be 44.6 years. In related issue, the minimum age of cowpea farmers was found to be 23 years, the maximum was 62 years and the average was 43.6 years. Similarly, the findings also revealed that the minimum age of soybeans farmers was found to be 26 years, the maximum was 65 years and the average was found to be 45.7 years. Looking at the average age of the farmers across the three value chains, it was shown that the farmers were at their active age which indicates the possibility of making good decision in accepting innovative ideas that facilitate sustainability of production and productivity of the three value chain crops. Many related studies shows that farmers were at their active age in Nigeria. This is in line with the study of Ibrahim *et al* (2013) where majority of the farmers are at their active age of less than forty years of age.

The results also showed that the minimum number of household size among the groundnut farmers to be 1 member, the maximum was 18 members and the average household size was found to be 8 members. In addition, it was also revealed that the minimum household size of cowpea farmers was 1 member and maximum was 19 members while the average was 7 members. The findings further revealed that minimum household size of soybeans farmers was 1-member, maximum household size was 16 members and the average was 7 members. Household hold size contributes to the farming activities among the households through engagement in the production activities and processing of the produce. This finding implies that, the farming households of the three value chain crops has reasonable number of household members that can be used in the production and processing activities as family labor which



contributes in the reduction of cost of production and increase in the profitability of the enterprises. These findings agreed with that of Idris (2019) who stated that majority of the farmers had 1-13 household members.

Income contributes to the production activities and served as means of attaining livelihood requirement of the farmers and their households. The results also showed that the minimum monthly income obtained by groundnut farmers was found to be ₦10000, the maximum amount obtained was ₦450000 and, on the average, they obtained ₦106925.93 monthly. It was equally found that cowpea farmers obtained ₦10000 as minimum amount per month and (₦300000 as maximum. The average obtained was ₦106648.15. Similarly, soybeans farmers obtained a minimum of ₦10000 in a month and maximum of ₦500000. The average monthly income obtained by soybeans farmers was found to be ₦108759.26. This amount of income comprises of both farm and non-farm income. The findings implies that farmers across the three value chain crops obtained a reasonable amount of money that warrant them to provides for their household and saved certain amount for purchase of inputs for the next cropping season. This finding is in line with what was obtained from Oyegbami *et al.* (2020) where farmers obtained an average of twenty-three thousand, six hundred and eighty naira (₦23,680) monthly.

Farm size determine the scale of operation of the farmers. In addition, the findings from the study revealed that groundnut farmers had a minimum of 0.5ha, the maximum farm size among them was found to be 5ha with an average of 1.9ha. Considering the cowpea farmer, it was found that they had a minimum farm size of 0.5ha and the maximum was 7ha with an average farm size of 1.9ha. The result also shows the minimum of farm size of soybeans farmers as 0.25, the maximum was 5ha and the average was found to be 1.8940ha. Farm sizes revealed the operational scale of farmer whether he is small, medium or large scale. The findings revealed that the farmers across the value chain crops were small scale in terms of operation. This is based on the classification made by food and agriculture organization. The findings implies that mechanization among such farmers is difficulty due to the size of their farms. This will surely influence the production capacity of these value chain crops, because to obtained the optimum output, mechanization need to be embraced. These findings also agreed with that of Idris (2019) who reported that majority of the farmers considered were operating in small scale.

Table 1: Quantitative Socio-economic Characteristic of the Beneficiaries

Value Chain Crops Variables	Ground Nut	Cowpea	Soybeans
Age			
Minimum	24	23	26
Maximum	67	62	65
Mean	44.59	43.63	45.72
Standard Error	0.980	0.863	0.775
Household Size			
Minimum	1	1	1
Maximum	18	19	16
Mean	7.53	7.36	7.45
Standard Error	0.379	0.368	0.343
Average Monthly Income			
Minimum	10000	10000	10000
Maximum	450000	300000	500000
Mean	106925.93	106648.15	108759.26
Standard Error	6320.158	6386.294	7429.732
Total Farm Size			
Minimum	0.50	0.50	0.25
Maximum	5.00	7.00	5.00
Mean	1.9352	1.9056	1.8940
Standard Error	0.10935	0.11657	0.10317

Source: Field survey, 2024



Marriage is one of the religious and cultural obligations which has high recognition more especially among the people in the study locations. This is given the household head recognition as more responsible individual within the society. The findings from the survey in table 2 revealed that majority of the groundnut (95.4%), cowpea (95.4%) and soybeans (95.4%) farmers respectively were married. This implies that, they were shouldered with responsibility and this make them to engaged in agricultural production and other activities to be able earn means of living for the survival of the household. In addition, this will also give way for bearing children that could be used as family labor in agricultural activities. Similar finding was obtained from Idris (2019) were majority of the farmers considered in the study were male.

From the findings it was shown that majority of the groundnut (72.6%), cowpea (75.9%) and soybeans (68.5%) farmers had formal level of education. The education possessed enable them to read and write for understanding of knowledge, skills and innovative ideas developed and promoted by researchers that helps in improvement of production and productivity of the three value chain crops. This helps in increase output for improvement in livelihood of the beneficiaries and beyond. Idris (2019) finding with related to educational level is in contrary with this finding.

The livelihood options found among the farmers was revealed and reported as follows that groundnut farmers engaged mostly in farming (88.9%) Trading (4.6%) Civil Servant (5.6%) and handcraft (0.9%). Similarly, cowpea farmers also engaged in these livelihood option as farming (90.7%), Trading (5.6%), Civil Servant (1.9%) and handcraft (1.9%). In addition, soybeans farmers also engaged in farming (89.8%) Trading (5.6 %) Civil Servant (2.8 %) and handcraft (1.9%). Farming is not the only livelihood option among the farmers of the three crops value chain but in addition they engaged in other income generating activities. Their engagement implies that farmers explored other options in earning means of living for their survival and that of household members for improvement in their production activities through obtaining quality inputs and other necessary activities that enhanced more output realization. This finding is also in line with Idris (2019) where farmers considered in their study engaged in many livelihood option such as farming, civil servant, trading and livestock rearing.

Table 2: Qualitative Socio-economic Characteristic of the Beneficiaries

Crop Value Chain Variables	Ground Nut		Cowpea		Soybeans	
	Frequency	%	Frequency	%	Frequency	%
Marital Status						
Single	4	3.7	4	3.7	1	.9
Married	103	95.4	103	95.4	103	95.4
Widow	0	0	1	.9	4	3.7
Divorce	1	.9	0	0	0	0
Level of Education						
No Formal Education	35	32.4	26	24.1	34	31.5
Primary	16	14.8	18	16.7	17	15.7
Secondary	35	32.4	49	45.4	35	32.4
Diploma	15	13.9	8	7.4	19	17.6
Degree/ Postgraduate	7	6.5	7	6.5	3	2.8
Livelihood Option						
Farming	96	88.9	98	90.7	97	89.8
Trading	5	4.6	6	5.6	6	5.6
Civil Servant	6	5.6	2	1.9	3	2.8
Handcraft	1	.9	2	1.9	2	1.9

Source: field survey, 2024

The finding from this study in figure1 revealed that majority of the respondents across the three value chain crops groundnut (88.9%), cowpea (86.1%) and soybeans (85.2%) were male with female accounting only (11.1%), (13.9%) and (14.8%) respectively. Engagement of women in farming

activities is did not still meet it expectation. This has to do with so many factors more importantly economic factors which hindered women participation in production of different crops. Though awareness is being created and with support of different projects on board, women are embracing agriculture either in the area of crop production or livestock. In addition, they are also engaging in other activities along the value chain. This finding is supported with that of Mohammed *et al* (2015) where majority of the farmers were male.

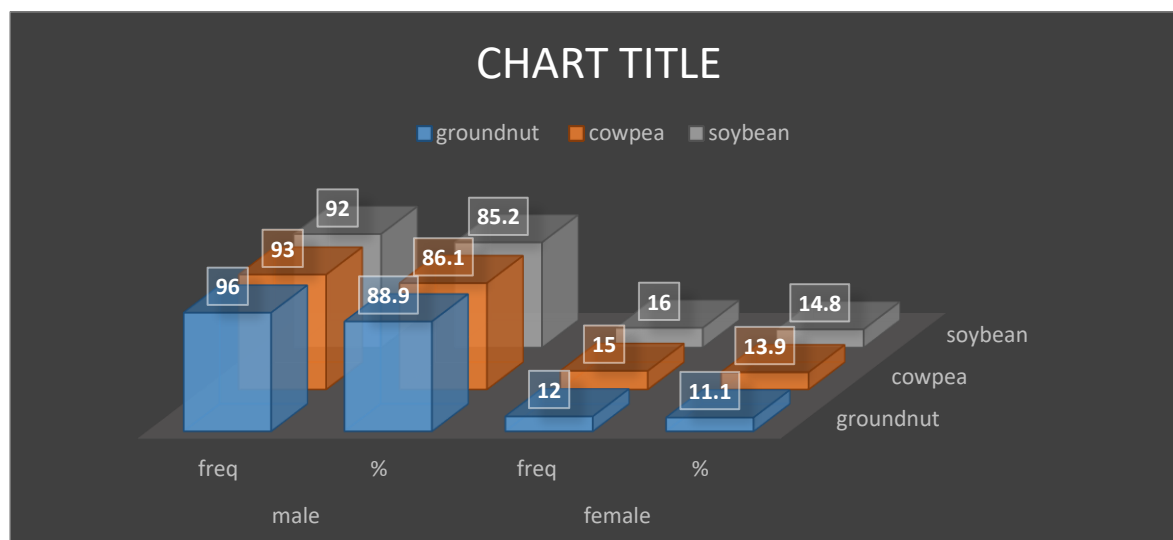


Figure 1: Sex of the Farmers

Farmer Group

As revealed by the finding of the survey in figure 2, majority of the groundnut (84.3%), cowpea (88.9%) and soybeans (78.7%) farmers belong to cooperative association or farmers group. One of the advocacies by many projects is to make farmers to form group for ease of address and the benefits associated with coming to work in group. As shown by the result, farmers along the three value chain crops derived a lot of benefit been a member of cooperative group which assisted them in getting all the support provided by the project leading to increase in their output. This has direct effect on their livelihood. Idris (2019) reported that almost all the farmers belong to cooperative associations.

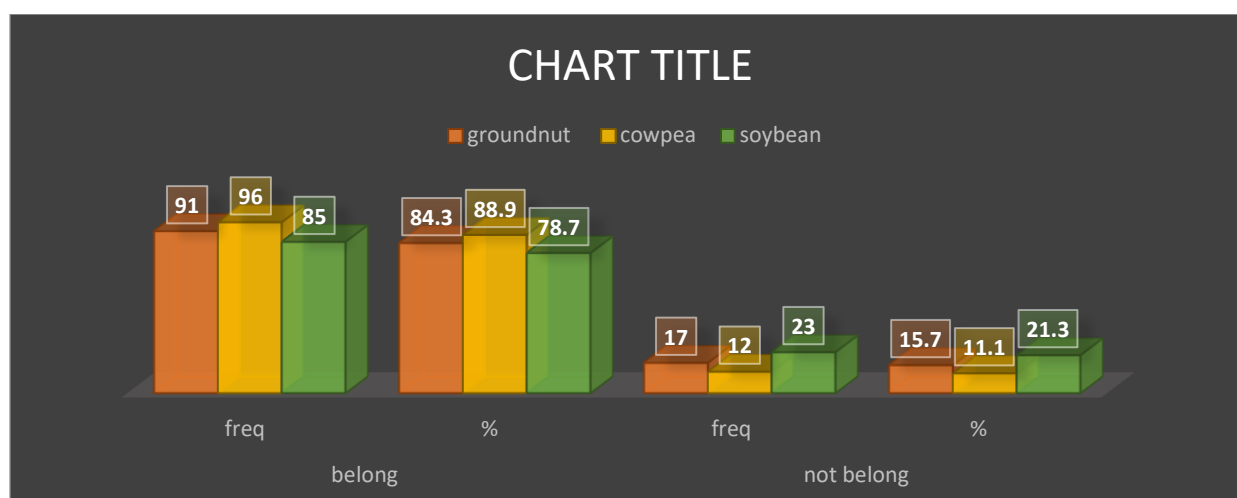


Figure 2: Farmers Group



Good Agronomic Practices (GAP) Adopted by Farmers

Groundnut farmers

Base on the findings on the adoption of good agronomic practices promoted by the project on production of groundnut, it was found that following the adoption stages, 91% of the good agronomic practices were adopted by the farmers. Adoption of these good agronomic practices contributed significantly on the output obtained by the farmers. This implies that, recommended agronomic practices attached to improved variety of crops promoted by researchers after trials on different geographical location under different ecological condition, contributed significantly to ward obtaining expected output from the crop.

Table 3: Level of Adoption of Good Agronomic Practices by Beneficiaries (Groundnut)

Adoption stages	Awareness	Interest	Trial	Evaluation	Adoption	Total
Variables						
Seed Rate	108	108	108	108	108	108
Seed Dressing	108	90	90	90	90	90
Sowing Date	108	100	100	97	97	97
Spacing	108	97	97	97	97	97
Recommended Fertilizer Rate	108	92	92	92	92	92
Recommended Fertilizer	108	96	96	96	96	96
Application Date						
Recommended Weeding	108	99	94	94	94	94
Total	756	682	677	674	674	674
Level of Adoption	$674/756 = 0.89 = 89\%$					

Cowpea farmers

In related issue, based on the findings on the adoption of good agronomic practices promoted by the project on production of cowpea, it was found that following the adoption stages, 92% of the good agronomic practices were adopted by the farmers. Adoption of these good agronomic practices contributed significantly on the output obtained by the farmers. This implies that, recommended agronomic practices attached to improved variety of crops promoted by researchers after trials on different geographical location under different ecological condition, contributed significantly to ward obtaining expected output from the crop.

Table 4: Level of Adoption of Good Agronomic Practices by Beneficiaries (Cowpea)

Adoption stages	Awareness	Interest	Trial	Evaluation	Adoption	Total
Variables						
Seed Rate	108	103	103	103	103	103
Seed Dressing	108	108	108	108	108	108
Sowing Date	108	100	100	97	97	97
Spacing	108	108	108	108	108	108
Recommended Fertilizer Rate	108	92	92	92	92	92
Recommended Fertilizer	108	95	95	95	95	95
Application Date						
Recommended Weeding	108	99	94	93	93	93
Total	756	705	700	696	696	696
Level of adoption	$696/756 = 0.92 = 92\%$					

Soybean farmers

The results further revealed that the adoption of good agronomic practices promoted by the project on production of soybean was found that following the adoption stages, 82% of the good agronomic practices were adopted by the farmers. Adoption of these good agronomic practices contributed significantly on the output obtained by the farmers. This implies that, recommended agronomic practices attached to improved variety of crops promoted by researchers after trials on



different geographical location under different ecological condition, contributed significantly to ward obtaining expected output from the crop.

Table 5: Level of Adoption of Good Agronomic Practices by Beneficiaries (Soybeans)

Adoption Stages	Awareness	Interest	Trial	Evaluation	Adoption	Total
Variables						
Seed Rate	108	87	87	79	79	79
Seed Dressing	108	83	80	80	80	80
Sowing Date	108	108	108	108	108	108
Spacing	108	108	83	83	83	83
Recommended Fertilizer Rate	108	77	75	75	75	75
Recommended Fertilizer	108	108	103	103	103	103
Application Date						
Recommended Weeding	108	100	92	92	92	92
Total	756	671	628	620	620	620
Level of adoption	620/756= 0.82 = 82%					

Farmers' Yield Increment

Wet Season

Findings of incremental yield as far three value chain crops under wet season revealed that in Groundnut production, there is 35% increase in output which is above the target of (20%) increase by the project with an increase of 0.46 tons per hectare against on top of the baseline of 1.3tones per hectare. The percentage increase varies with years as indicated in the table 7. In related issue, cowpea production also observed remarkable increase in output compare to baseline with an increase of 0.5 ton per hectare and fifty (50) percent increase which is above the target of thirty (30) percent by the project. Similarly, the percentage increase varies with the years as indicated by the result in table 7. Soybean's production was not left behind often which an increase of sixty-five (65) percent was recorded which above the target of thirty (30) percent. The output obtained was 1.65 ton/ha against the base line of 1 ton per hectare. An increase of 0.65ton per hectare was recorded. The increase varies with years from the inception to the end of the project. These remarkable achievements were as a result of the intervention of different kind supported by the project in ensuring the target has been achieved.

Table 6: Percentage Increase in Crop Yield

Period	Base line (tones/ha)	2021	2022	2023	2024
Crops					
Groundnut	1.3	1.405 (22.8%)	1.53(27.2%)	1.645(25%)	1.76 (25%)
Cowpea	1	1.11 (22%)	1.24 (26%)	1.375 (27%)	1.5 (25%)
Soybeans	1	1.16 (24.6%)	1.325(25.4%)	1.485(24.6%)	1.65(25.4%)

Dry Season

Findings of incremental yield as far three value chain crops under dry season production revealed that in Groundnut production, there is 37% increase in output which is above the target of (20%) increase by the project with an increase of 0.48 tons per hectare against on top of the baseline of 1.3tones per hectare. The percentage increase varies with years as indicated in the table 8. In related issue, cowpea production also observed remarkable increase in output compare to baseline with an increase of 0.56 ton per hectare and fifty (56) percent increase which is above the target of thirty (30) percent by the project. Similarly, the percentage increase varies with the years as indicated by the result in table 8. These remarkable achievements were as a result of the intervention of different kind supported by the project in ensuring the target has been achieved.



Table 7: Percentage Increase in Crop Yield

Period	Base line (tones/ha)	2021	2022	2023	2024
Crops					
Groundnut	1.3	-	1.567(55.3%)	1.668(21.0%)	1.782(23.7%)
Cowpea	1	-	1.296 (52.9%)	1.397(18.0%)	1.56(29.1%)
Soybeans	1	-	-	-	-

Perception on Percentage Change in Crop Yield

The findings from the survey revealed that most of the groundnut (88%), cowpea (90.7%) and soybeans (90.7%) farmers respectively agreed that there is increase in the output obtained from the inception of the project to in 2021 to 2024. The increase in the output was attributed to the support given by the project legume production intervention in terms of training, recommended good agronomic practices for the legumes crops production, linkages made with input dealers where farmers obtained quality inputs and aggregators where premium prices were obtained which increases the chances of investing more in the production of the crops and improvement in livelihood. In related development, farmers of the three value chain crops expressed their view as far the percentage of increase in the output obtained from the inception years 2021 of the intervention to the year 2024 where majority of them groundnut (51.8%), cowpea (52.8%) and soybean (52.8%) reported that there is an increase of more than twenty (20) and thirty (30) percent increase in output due to the intervention. This really increase the productivity of these crops and at the same time improve the livelihood of the farmers.

Table 8: Perception on Percentage Change in Crop Yield

Crops	Ground Nut		Cowpea		Soybeans	
Increase in output from 2021 to 2024	Freq	%	Freq	%	Freq	%
Increased	95	88.0	98	90.7	98	90.7
No increase	13	12.0	10	9.3	10	9.3
Percentages increased						
1-10%	17	15.7	25	23.1	19	17.6
11-20%	22	20.4	16	14.8	22	20.4
21-30%	28	25.9	28	25.9	23	21.3
above 30%	28	25.9	29	26.9	34	31.5

Linking Beneficiaries with Institutions

The project linked farmers with other institutions that also played significant role toward improving production and productivity of the legume value chain crops (Groundnut, Cowpea and Soybean). In line with this, the findings from the survey revealed that most of the beneficiaries as far the three crops groundnut (69.4%), cowpea (67.6%) and soybean (65.7%) respectively were linked with agro-input dealers for accessing good quality seed and other agro-chemicals that are not adulterated. Similarly, most of the groundnut (73.1%), Cowpea (70.4%) and soybeans (71.3%) farmers respectively were linked with aggregators for obtaining premium price of their produce and reduces the cost of transporting their produce to market which increases the cost of production. In addition, the linkages with financial institutions and seed companies were found to be low compared to agro-input dealers and aggregators. As revealed by the result, only 26.9%, 33.3% and 24.1% of groundnut, cowpea and soybean farmers respectively were linked with financial institutions. This may be attributed to the conditions set by the financial institutions regarding money lending which are very difficult for farmers to fulfill. In line with linking the farmers with seed companies it was equally found that 27.8%, 29.6% and 26.9% of the groundnut, cowpea and soybean farmers respectively were linked with the seed companies. The low linkage with seed companies is associated with the linking the farmers with agro input dealers which are usually closer to them than seed companies and can access the seed from the agro input dealers.



Table 9: Linking Beneficiaries with Institutions

Crops Institutions	Ground Nut		Cowpea		Soybeans	
	Freq	%	Freq	%	Freq	%
Financial Institution	29	26.9	36	33.3	26	24.1
Agro Input Dealers	75	69.4	73	67.6	71	65.7
Seed Companies	30	27.8	32	29.6	29	26.9
Aggregators	79	73.1	76	70.4	77	71.3

CONCLUSION AND RECOMMENDATIONS

In conclusion, the yield of the farmers across the three value chain crops (groundnut, cowpea and soybean) were increased compared to what is obtainable before the intervention of the project. The increase was attributed to the adoption of good agronomic practices promoted by the project in line with the production of the value chain crops. The adoption level was attributed to the trainings offered by the project on application of these good agronomic practices and the various demonstration plots made. Equally linking farmers with the institutions (financial, agro input dealers, seed companies' aggregators) contributed immensely toward realizing the output obtained. It was recommended that linking beneficiaries with financial institution and seed companies should be strengthen in the future. Efforts should be double by project implementers to link farmers with financial institutions and seed companies for ease of accessing credit and quality seed.

REFERENCES

- Ibrahim, U., Ayinde, B.T., Dauda, H. and Mukhtar, A.A. (2013) Socio-Economic Factors Affecting Groundnut Production In Sabongari Local Government of Kaduna State, Nigeria *International Journal of Food and Agricultural Economics*, **1**(1): 41-48.
- Idris, R.Y. (2019) Economic Analysis of Legume Production in Kano State, Nigeria: A Gender Perspective. Unpublished Dissertation Submitted to the Department of Agricultural Economics and Extension, Faculty of Agriculture, Bayero University, Kano, Pp 1-136
- Karaye A. K, Sabo B. B., Chamo, A. M. Rabi, A.M. (2017) Influence of Agronomic Practices on Crop Production. *International Journal of Sciences Basic and Applied Research*, **31**(1): 61-66.
- Nurudeen, A. M. and Shaufique, F.A. S, (2019). Determinants of Food Security among Households in Nigeria. *Pakistan Journal of Nutrition*, **18**: 1042-1052.
- Oyegbami, A., Fadairo, A. O. and Oyedokun, M. O. (2020) Women's Knowledge of the Nutritional Benefits and Perceived Constraints in Soybean Utilization in Oyo State, Nigeria. *S. Afr. J. Agric. Ext.* **48**(2): 166 – 175.
- Pimmental, D., J. H and Preiss, E. (1997). Water Resources, Agriculture, the Environment, and Society. *Bioscience* **47**: 97–106.
- Price, C. (1999) "Sales of Meals and Snacks Away from Home Continue to Increase." *Food Review* 21.
- Rachid, L, Karen, M, Cargele, M, Moses, T and Bernard, V. (2020) Reconciling Yield Gains in Agronomic Trials with Returns under African Smallholder Conditions. Scientific Report. DOI: 10.1038/s41598-020-71155-y
- Sani, T. P. And Baba, K. M. (2018) Analysis of Farm Household Income Distribution among Yam Farmers in Niger State, Nigeria. *JABU International Journal of Agriculture and Food Science (IJAFS)*: **8**: 1-12.
- Venner M. (1988) Adjustment, coping and defense mechanisms--deciding factors in the therapeutic process. *Z Gesamte PubMed*. **43**(2): 40-3.
- Wudil, A.H., Daneji, M.I., Jibrin. M. J., Hussaini, M.A. & Mohammed, I.B. (2015). Economics of On-Farm Sorghum – Legume Strip Cropping System in Kano State, Nigeria. *Journal of Agriculture and Sustainability*. **7**(1): 99-113.