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The Impact of Covid-19 on Use of Certified Seeds and Grain Production of Cowpea and Sorghum Varieties in Northern Nigeria

Research Article

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Abstract

This study was conducted to evaluate the Impact of Covid-19 on certified seeds and grain production of cowpea and sorghum varieties in Northern Nigeria. Purposive sampling technique was employed in the selection of Nine (9) seed companies under the Accelerated Varietal Improvement and Seed Delivery of Legumes and Cereals in Africa (AVISA) project in Nigeria. The samples were randomly selected as follows; 400 farmers, 100 Agro dealers and 100 consumers from five States namely, Kano, Kaduna, Benue, Borno and Jigawa. Primary data were collected with the aid of a questionnaire and farmer group interviews and secondary data from the research desk. Data obtained were analyzed using inferential statistics (such as regression analysis, correlation coefficient, T-test statistics, and descriptive statistics such as mean, percentage, and charts. The results of the study revealed that the use of certified seeds by farmers has a strong positive correlation with the price of grains in the market at 0.01 significant level as well as the revenue at 0.05 significant level while the use of home saved seeds has a negative correlation with the price of grains at 0.05 significant level. The regression result shows that the higher the use of certified seeds by farmers for planting the higher their productivity at 0.05 significant level, whereas the use of home saved seeds has a negative relationship (-1219) with the revenue of the farmers at 0.05 significant level. Price of grains has a positive relationship with the quantity of grains purchased by consumers at 0.05 significant level. T-test results suggests that there is no significant difference between the volume of seed produced by seed companies across the three production years 2018 to 2020 {F2,18= (0.103), p>0.05}. Majority of farmers and consumers are males (83% and 75% respectively), with secondary school education (42% for farmers and 40% for consumers respectively. Majority of the farmers planted local varieties of cowpea (56%), sorghum (53%) and rice (36%). Faro 44 rice variety is the most widely grown. Most of the farmers admitted that the Covid-19 pandemic affected their production. (81%) of farmers make use of home saved seeds for production. Most of the seed companies had 25-50% reduction in seed sales volume compared to the previous year, also majority of the farmers could afford certified seeds, but they are sometimes unavailable. The study further revealed that most of the seed companies, farmers, and consumers did not receive government palliatives resulting from COVID-19 and didn't diversify to other activities. Therefore, the study recommends that farmers should always plant certified seeds as the major way to guarantee productivity and food security. The Ministry of Agriculture in partnership with private sector like Seed companies and Non-governmental organizations should urgently establish Agro-inputs-outlets (Farmers Hub)

in the rural areas to make seeds and other inputs available, accessible, and affordable to smallholder farmers. Also, Government at all level (Federal and States) should consider a legislative law that will direct Agricultural Development Projects (ADPs) to organize annual seed fair prior to planting season across the nation. Furthermore, Agricultural Policy makers should include scientist, farmers, Agro dealers, processors and consumers in the planning and execution of seed systems policy in Nigeria.

Keywords: Covid-19; Certified Seeds; Grains; Cowpea; Sorghum; Nigeria.

Introduction

Sorghum is the second most important cereal after maize with 22% of total cereal area, followed by millets (pearl and finger) with 19% of the total cereal land coverage (Macauley, 2015). The crop is a warm short cycle annual plant, drought resistant and adapted to withstand higher average temperatures compared to other cereal crops. It can be cultivated in almost all the Nigerian states but thrives better in the north where the arid and semi-arid temperatures are well suited for good yield. The major producing states include; Adamawa, Bauchi, Benue, Borno, Gombe, Jigawa, Kaduna, Kano, Katsina, Kebbi, Kogi, Kwara,Nasarawa, Niger, Plateau, Sokoto, Taraba, and Zamfara States. According to FAO Statistics (2019) Nigeria produced an estimated 6.7 million metric tonnes of sorghum, a quantity surpassed by only the U.S which produced 8.6 million tonnes of the crop, accounting for over 60 per cent of the total production in West Africa. It is most important cereal food in the northern region of Nigeria, including the Sahelien, Sudanian and Guinea Savannah ecological zones (Amuge, 2021).

Cowpea on the other hand, is an important legume crop growing across the world mainly in tropical and subtropical regions including Nigeria. The grains contain 25% protein and several vitamins and minerals, which makes it important in the diet of Nigerians. Presently, Nigeria produces over 7 million metric tonnes of cowpea with an average yield of 1642 kg ha^{-1} (FAO, 2019). Over 80% of this is grown in the Savannas, in the drier regions of northern parts of the country which has light rainfall. Traditionally the crop is grown as one of the components of a mixture on about 4 million hectares of land.

Agriculture is one of the sectors of focus for Nigeria's economic diversification drive. This is because of the role it plays in ensuring food security, promoting industrialization, providing jobs, stimulating strong resilience to external vulnerabilities, and fostering shared prosperity (PWC, 2020). The agricultural sector has the potential to be the industrial and economic platform from which the speedy development of a country takes off (Oluwaseyi, 2017).

Agriculture employs about two-thirds of the total labor force of Nigeria, contributes about 22% of the GDP and provides 88% of non-oil earnings. More than 90% of the agricultural output is accounted for by small scale farmers with less than 2 ha of farm holding. It is estimated that about 81% of the total land area has potential for agricultural activities, with about 33 million ha under cultivation. However, of the 79 million hectares of arable land that Nigeria has, only 32 million hectares are cultivated. Similarly, of the estimated 2 million ha irrigable land area, only about 220,000 ha (11%) is utilized, and over 90% of agricultural production in Nigeria is rain-fed (Nwajiuba, 2013).

Smallholders, mostly subsistence producers account for 80% of all farm holdings. Under small holder farming system, both crop and livestock productions remain below potentials. Inadequate access to and low uptake of high-quality seeds, low fertilizer use and inefficient production systems lead to this shortfall (Nwajiuba, 2013). The most important prerequisite for good crop production is the availability of good quality seeds of high yielding varieties, adapted to the growing area, and preferred by the farmers. The quality of seeds alone is known to account for an increase in productivity of at least 10–15% (Boukar and Ajeigbe, 2009). The class of good quality seeds of high yielding and adapted varieties for farmers use, and which carry the genetic potential to boost crop productivity, is the certified seed.

Certified seed is the progeny of foundation seed and it is produced under strict seed certification standards to maintain genetic varietal purity. Seed lots must also meet specified standards for other crop seeds, inert matter, free

from weed seeds, and have high germination percentages. There are four seed systems in Nigeria. These systems include farmer-saved seed, public- private certified seed production, public led systems, and private-led systems dominated by local seed companies. The farmer-saved seed system provides most of the seed volume (Capital, 2016). Smallholder farmers are aware of improved varieties, although the rate of adoption is low across most agro-ecological zones, as most smallholder farmers recycle seeds of improved varieties. Some fraction of farmers still buys improved seeds while others depend on free seeds acquired from door- or NGO-funded input intervention programs (Capital, 2016). As a key agricultural input, seeds play a fundamental role in developing the resilient agricultural sectors and food systems that underpins food security and nutrition and support the livelihood of farmers and other actors in the value chain (Gnych, 2020).

Nigeria continues to be a substantial net importer of grains. However, in 2013, maize and rice production became Nigeria's fastest-growing grain crops, which was partially a function of the government's efforts to decrease grain imports. As for legumes, groundnuts and cowpea are the two largest crops in Nigeria in terms of local production volume, but soybean has emerged as a crop targeted by the government to double its production because of its nutritional importance (Capital, 2016). Grain production is left in the hand of peasant farmers who toil with little resources and the result is production volume below the national needs. In addition, what is produced is lost due to spoilage or sold at giveaway price due to the rush to sell because of inadequate facilities for proper processing to attract higher price or poor storage facilities. However, adequate, and sustainable grain supply will guarantee the nation's economic stability by reducing poverty level, improving health conditions and enhance productivity (Ajayi and Ajanaku, 2007; Kalu and Tomasz, 2010).

Prior to the COVID-19 crisis, agriculture in Nigeria was experiencing several tempests. Some of which includes drought and flooding accompanied by climate change and widespread instability like Boko Haram crisis, cattle rustling in the North and farmer-herder clashes across the south and Middle Belt. The apprehension is that the outbreak of Covid-19 may further intensify the challenges of the country's agricultural sector, thereby impacting the nation's food security (PWC, 2020). After years of drought, many major growing regions including West Africa had high rainfall, which contributed to strong harvests in late 2019. Moreover, in East and West Africa, major planting seasons had largely begun before COVID-19 escalated, and agricultural inputs had already been distributed.

Nigerian goal of achieving sustainability in grain production has been challenged by the activities of the Boko Haram sect in the North Eastern region. The farmers are under the threat of insecurity posed by this sect. Also, the farmers and the herdsmen are constantly in conflict over grazing parts which most often lead to fatal interactions. The herdsmen and their cattle destroy large grain farms and with most of these farms uninsured, everything will be lost. Coming to COVID-19 and its multiplier effect, it disturbs the whole activities that link farm production to the final customer. In addition, it looks to have hit food and agriculture production and food value chains system. Restricting movement may lead to challenges in transporting basic food and entering processing units and markets, thereby affecting producers and consumers. This may result in reduced incomes of farmers, unstable food prices, and deviations from geographical and seasonal patterns, thereby creating uncertainty for producers and consumer (Nawab Khan, 2020).

Problem statement

The outbreak of the Covid-19 Pandemic and all that accompanied it, including the measures put in place to curtail its spread had obvious effect on the economy of Nigeria. The agricultural sector is of concern, particularly for food security. Some measures such as restriction in movement and lockdown of the entire economy hampered the flow of activities with negative impacts on availability and accessibility of certified seed and grains, as well as on the food value-chain from the production to the consumer. The farmers, seed companies, agro-dealers, and consumers involved in this chain had faced one distortion or the other during the Covid-19. It therefore becomes essential to address its existing and potential impacts on certified seed and grain in Nigeria market.

According to the Food and Agriculture Organization of the United Nation (FAO 2021), the world risks a looming food crisis unless urgent measures are taken to protect the most vulnerable, keep global food supply chains alive and mitigate the pandemic's impacts across the food chain. Also, coordinated policy responses are needed to support agribusiness and the livelihoods and working conditions of millions of agricultural workers (Graeys, 2021).

Sequel to the above problems stated, Syngenta Foundation for Sustainable Agriculture, Nigeria, carried out the study to evaluate the impact of COVID-19 on certified seeds and grains of cowpea and sorghum varieties in Northern Nigeria.

Objectives of the study

The broad objective of the study was to Impact of Covid-19 on certified seeds and grain production of cowpea and sorghum varieties in Northern Nigeria.

The study hinges on the following specific objectives.

1. Identify the socio-economic characteristics of farmers and consumers of cowpea and sorghum grains in Northern Nigeria.
2. Identify the cowpea and sorghum varieties adopted by farmers before the pandemic
3. Analyze the Effect of COVID lockdown on total volume of certified seeds produced and sold by seed companies and how it impacted the revenue of the farmers
4. Determine COVID lock down effect on grain purchased by consumers, as influenced by their socio-economic characteristics
5. Identify the cuisine effects adopted by all actors in the grain market during the lockdown.

Methodology

The survey was conducted in some selected states (Kano, Kaduna, Jigawa, Benue and Borno) under the Accelerated Varietal Improvement and Seed Delivery of Legumes and Cereals in Africa (AVISA) project in Nigeria. Purposive sampling technique was used to select seven (7) seed companies under the AVISA project while multistage sampling was used in selecting 400 farmers across the five (5) states, the next stage involved the use of random sampling in selecting 20 farmers from four (4) local governments in each state. One hundred (100) Agro dealers were randomly selected from each state, twenty (20) from each state, and five (5) per local government. Also, one hundred (100) consumers were randomly selected from each state, twenty (20) from each state, and five (5) from each local government. Primary and secondary data were used in the study. Primary data was collected with the aid of questionnaire and farmer group interviews while secondary data was gotten from the research desk of seed companies. Descriptive statistics such as mean, frequency and charts and inferential statistics like regression analysis, correlation coefficients, and t-test statistics were used to analyze the survey

Table 1: Summary of Sampling Procedure

			Sampling size			
S/N	States	LGA	Seed companies	Farmers	Agro dealers	Consumers
1.	Benue	Buruku		20	5	5
		Markurdi	1	20	5	5
		Gboko		20	5	5
		Tarka		20	5	5
2.	Kaduna	Zaria	3	20	5	5
		Soba		20	5	5
		Igabi		20	5	5
		Kudan		20	5	5
3.	Borno	Biu	1	20	5	5
		Haw		20	5	5
		Kwaya Kusar		20	5	5
		Bayo		20	5	5
4.	Kano	Kura	4	20	5	5
		Bunkure		20	5	5
		Rano		20	5	5
		Garin mallam		20	5	5
5.	Jigawa	Dutse		20	5	5
		Kirkasama		20	5	5
		Langwani		20	5	5
		Birnin Kudu		20	5	5
	TOTAL		9	400	100	100

Figure 1: Map of the Nigeria indicating the selected states from which data was collected.

Table 2: Quantity of seeds produced and sold by seed companies from 2018-2020

QTY OF SEEDS PRODUCED (KG) 2018	QTY OF SEEDS PRODUCED (KG) 2019	QTY OF SEEDS PRODUCED (KG) 2020	TOTAL SALES (₦) 2018	TOTAL SALES (₦) 2019	TOTAL SALES (₦) 2020
25000	70000	20000	10,450,000.00	42,000,000.00	8,000,000.00
637000	703000	1150000	222,950,000.00	351,500,000.00	524,000,000.00
900000	1200000	700000	400,000,000.00	500,000,000.00	290,000,000.00
12600	15200	11300	4,378,700.00	6,878,400.00	3,712,996.00
4500000	2000000	5000000	500,000,000.00	1,000,000,000.00	1,200,000,000.00
4941335	3960377	3394414	1,645,339,614.00	1,303,247,942.00	1,267,019,141.00
3400	3000	1400	2,500,000.00	1,500,000.00	785,000.00

Model specification

a. T- test Hypothesis

H_1: There are significant differences in total production and sales of certified seeds by seed companies across the three years (2018-2020) due to the Covid-19 pandemic outbreak in 2020.

H_0= There are no significant differences in total production and sales of certified seeds by seed companies across the three years (2018-2020) due to the Covid-19 pandemic outbreak in 2020.

Decision: (Accept if p>0.05 and reject if p<0.05).

b. Regression coefficient equation

i. Farmers yield in 2020 (y)= c + β1G + β2F + β3C + β4H + e.

Where:

Y= Farmers yield in 2020 (Kg)

G= Gender

F= Farm size (Acre)

C= Use of certified seeds in 2020 (Kg)

H= Home saved seeds used for production (Kg)

ii. Quantity of grains purchased by consumers (y) = c + β1P + β2G + β3E + β4M + e

Where:

Y= Quantity of grains Purchased by consumers (Kg)

P= Price of grains (N)

G= Gender

E= Education

M= Marital status

The β represents the regression coefficients, representing the quantity that variable y changes when the corresponding variable changes.

The C is the constant, the ratio of the beta coefficients

e is the error term.

c. Pearson correlation decision

1= Positive correlation

0=Nothing (No correlation)

-1=Negative correlation

<3= Low correlation

3-5= Moderate

>5= Strong

Results and discussion

Socio-economic characteristic of farmers and consumers of grain in Northern Nigeria

Table 3: Socio economic characteristics of farmers and consumers

Socio-economic Variables	FARMERS		CONSUMERS	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Gender				
Male	323	83	74	75
Female	64	17	24	25
Marital status				
Single	17	4.4	4	4.1
Married	352	91	85	86.7
Widowed	6	1.6	7	7.1
Educational status				
Primary	89	23	24	25
Secondary	161	42	39	40
Tertiary	51	13	18	18
Qur'anic	69	18	17	17
Main source of income				
Farming	242	62.5	44	44.5
Agro- dealer	13	3.4	51	52
Other	120	31	3	3.1
None	1	0.3	0	0
Secondary source of income				
Farming	236	61	59	60.2
Agro dealer	18	4.7	10	10.2
Others	94	24.3	25	25.5
None	15	3.9	4	4.1

Source: Field survey, 2021

(Table 2) shows the socio-economic characteristic of consumers and producers, the result shows that they are mainly married men with secondary school educational qualification, this agrees with FAO (2019), which posited that, in most Nigerian farming systems both women and men provide farm labor, but there is gender stereotyping of roles. For example, weeding and post-harvest handling, where harvest losses accrue, are commonly the role of women. The educational level of the farmers in the area shows that the farmers are not altogether illiterates having different levels of education. The survey shows that 42% of the farmers and 40% of the consumers have secondary level education. With such levels of education, there will be no constraint in communicating with the farmers especially in areas of training. It will also be easy for farmers and consumers to get market information, new innovations etc. This agrees with Gabriel et al., (2021), who posited in a separate study that 32% of tomato farmers in the Northwest region of Nigeria had secondary level education, 29% has only primary education, 15% got up to tertiary level education and the remaining 24% of the farmers had Quranic education.

Table 3: Common grain varieties in the Market

CROP	VARIETY	FREQUENCY	PERCENTAGE
Cowpea	Sampea 11	4	2
	Sampea 14	9	5
	Other improved	61	36
	Local	94	56
Sorghum	Kaura	56	24
	Samsorg 17	47	20
	Local	123	53
	Other improved	8	3
Millet	Ex-Borno	5	9
	Sosat-C88	3	5
	Local	50	86
Rice	Faro 44	71	36
	Faro 45	17	9
	Faro 46	25	13
	Faro 59	28	14
	Faro 61	16	8
	CP	28	14
	Jamila and others Local	14	7
Soybean	TGX-1448	26	24
	Local	50	48
	Other Improved	28	27

Source: Field survey, 2021

(Table 3) shows the common variety of some selected crops, the table also shows the extent to which the smallholder farmers are exposed to improved varieties of these crops including the focus crops cowpea and sorghum in the northern area of Nigeria before the Pandemic. The result shows that more than 50% of farmers in the region used local cowpea, sorghum, millet, and Soybean varieties for planting while Faro 44 rice variety was the commonest improved variety adopted with 36%. 36% of farmers were using one improved cowpea variety or the other but did not know the specific variety while for Sorghum, 20% and 24% were using the improved varieties Kaura and Samsorg 17 varieties respectively. 3% of sorghum farmers were using local varieties as against 53% for cowpea. It can be deduced that the farmers get to use improved seed, but they are not knowledgeable on the specific variety they use. However, more farmers have adopted improved varieties of sorghum than cowpea. Most smallholder farmers recycle seeds of improved varieties. For instance, in 2016, only 30 percent of farmers' plots used seeds that were purchased (Olomola, 2018). That said, some farmers do buy improved seeds, while others depend upon free seeds acquired from donor- or NGO-funded input intervention programs.

(Table 4) shows the T-test result, the hypothesis tests if the quantity of certified seed production and sales differs across different production years (including 2020, the Covid-19 pandemic year). The production years were divided into three (2018, 2019 and 2020). The t-test results show that there is no significant difference between the volume of seed produced and sold by seed companies across the three production years. To check for individual differences between the production years, the test indicated that the there are no significant difference between the mean volume of seeds produced and sales by the seed companies for all the production years. The mean differences were not significant at the 0.05 level. This suggests that contrary to fears and realities of the Covid-19 lock down disruptions of the agricultural sector, activities of seed companies, farmers and consumers as pertains to cowpea and sorghum in northern Nigeria, were not negatively impacted to the degree to reduce productivity. This suggests strength and innovation to absorb shocks of this nature probably because most activities took place in the rural and suburban areas. Moreover, the AVISA project led by ICRISAT and partners (Syngenta Foundation and Federal Ministry of Agriculture and Rural Development) distributed certified seeds of crops including cowpea and

Table 4: T-test results

Total quantity of certified seeds produced by seed companies (2018-2020)			
Year	Significance	Mean	Critical t
2018-2019	.289	4.383	1.163
2018-2020	.699	1.060	.406
2019-2020	.500	-3.322	-.719
Total sales of certified seeds by seed companies (2018-2020)			
Year	Significance	Mean	Critical t
2018-2019	.546	-5.993	-.639
2018-2020	.594	-7.256	-.562
2019-2020	.818	-1.263	-.241

Source: Field survey, 2021

sorghum to farmers in May of 2020 prior to the planting season and strengthened seed companies' participation in the program in northern Nigeria (CGIAR, 2020).

(Table 5) shows the connection between the yield of farmers and gender, farm size, price of certified seeds before lockdown and the use of home saved seeds. The R^2 value indicates that 31% of the variance in the revenue can be predicted from the independent variables (overall measure of the strength of association between the predictor and the predicted). The F-statistics is 41 with p-value associated with F-value is very small (0.00) which means that the independent variables can be used to reliably predict the dependent variable (Yield). From table 2, the constant coefficient gives a positive value of 3798 implying that if all independent variables are held constant, the speed at which the yield of farmers will increase by 3798 units.

The equation takes the shape of $\mathbf{y = c + \beta 1G + \beta 2F + \beta 3P + \beta 4H + e}$. The β represents the regression coefficients, representing the quantity that variable y changes when the corresponding variable changes. The c is the constant, the ratio of the beta coefficients over relative predictive power of the independent variables and e is the error term. Therefore, the multiple correlation equation of this study is revenue of farmers (y) = 3798 - 1327G - 9.0F + 0.027P – 1219.4H. Based on the result obtained the use of certified seeds in 2020 has foremost significant impact on the yield of farmers at 0.01 significant level. Also, gender and the use of home saved seeds has negative significant impact at 0.05 significant level on the quantity of grains produced by the farmers.

The result shows that there is a positive correlation between the revenue of the farmers and the use of certified seeds before, during and after COVID-19 lockdown and the price of grains sold in the market at 0.05 significance level. This shows that the higher the farmers make use of certified seeds for planting the higher their revenue and the higher the price of grains in the market the higher their revenue.

From the result also, there is a strong negative correlation between the use of home saved seeds for planting and the use of certified seeds for planting before, during and after Covid-19 lockdown at 0,01 significant level, this implies that the more the farmers make use of home saved seeds the less they patronize agro dealers/ seed companies for certified seeds. The result also shows that there is a negative correlation between the price of grains in the market and the use of home saved seeds at 0.05 significant level, it means that the more the farmers make use of home saved seeds for production the lesser the pricing in the market, home saved seeds produce undervalued grains hence, they are underpriced.

Table 5: Effect of Gender, farm size, use of certified seeds in 2020 and the use of home saved seeds on the quantity of grains production by the farmers in 2020

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
	(Constant)	3798.193	1161.897		3.269	.001
	GENDER	-1327.417	619.743	-.173	-2.142	.034*
	FARM SIZE	-9.072	12.728	-.057	-.713	.477
	USE OF CERTIFIED SEED IN 2020	.027	.009	.230	3.009	.003**
	USE OF HOME SAVED SEED FOR PLANTING IN 2020	-1219.421	609.588	-.156	-2.000	.047*

Source: Field survey, 2021

* = 0.05 significant level. ** = 0.01 significance level. R=0.31, Adjusted R^2=0.073, F-statistics=41

Table 6: Correlation coefficient between farmers revenue, use of home saved seeds for production, quantity of certified seeds used for planting, gender, farm size, quantity and price of grains sold after COVID-19 lockdown.

Parameters	Use of Home saved seeds in 2020	Farm size	Certified seeds used for planting before COVID-19 lockdown	Certified seeds used for planting during COVID-19 lockdown	Quantity of certified seeds used for planting in 2020	Quantity of grains sold after COVID-19 lockdown	Price of grains sold in the market after the lockdown
Revenue	0.034Ns	-0.056Ns	0.095Ns	0.128*	0.121*	0.056Ns	0.121Ns
Use of Home saved seeds in 2020	1	-0.542**	-0.014Ns	-0.135*	-0.075Ns	-0.124*	-0.146*
Quantity of certified seeds used for planting in 2020	-0.073Ns	0.411**	0.857**	0.89**	1	0.213**	0.279**

Source: Field survey, 2021

Ns = Not significant. * = 0.05 significant level. ** = 0.01 significance level.

Table 7: Effects of price and some socio-economic variables on the quantity of grains purchased by consumers

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Significance
	(Constant)	797.281	684.418		1.165	.247
	Price	.002	.001	.219	2.191	.031*
	Gender	287.942	239.312	.124	1.203	.232
	Education	14.298	119.421	.012	.120	.905
	Marital status	-470.443	228.577	-.206	-2.058	.042*
Source: Field survey, 2021 *0.05 = significance level. R=0.311, Adjusted R^2=0.057 F- statistics=24						

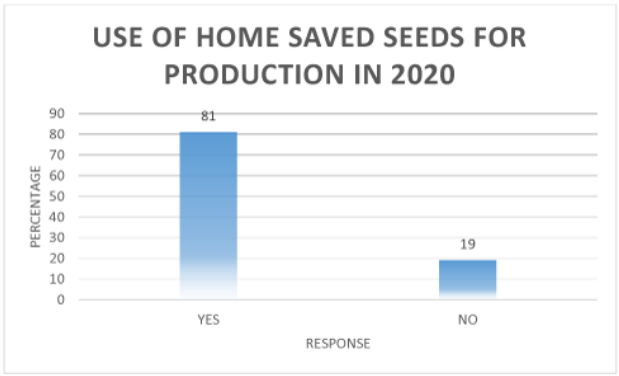

Figure 2: The use of Home saved seeds for Production

The result shows that certified seeds have a strong positive correlation with the price of grains in the market as well the revenue of the farmers at 0.01 significant level. This implies that the more the farmers make use of certified seeds for production, the higher the prices of the grains produced by the farmers in the market and invariably the higher their revenues.

The coefficient table is an important table used to elucidate the connection between some socio-economic variables, prices and total volume of grains purchased. The R^2 value indicates that 31% of the variance in the total volume of grains purchased can be predicted from the independent variables (overall measure of the strength of association between the predictor and the predicted). The F-statistics is 24 with p-value associated with F-value very small (0.05) which means that the independent variables can be used to reliably predict the dependent variable (Total volume of grains purchased). From table 2, the constant coefficient gives a positive value of 797 implying that if all independent variables are held constant, the speed at which the consumers volume of grains purchased will increase by 797 units.

The equation takes the shape of $\mathbf{y = c + \beta 1P + \beta 2G + \beta 3E + \beta 4M + e}$. The β represents the regression coefficients, representing the quantity that variable y changes when the corresponding variable changes. The c is the constant, the ratio of the beta coefficients is that the ratio of the relative predictive power of the independent variables and e is the error term. Therefore, the multiple correlation equation of this study is volume of grains purchased by consumers (y) = 797+ 0.002P + 287G – 14.29E – 470.4M. Based on the result obtained, the price of grains in the market and marital status has the foremost significant impact at 0.05 on the volume of grain purchased by the consumers. This

agrees with FAO (2021), which posited that prolonged economic shock would affect the purchasing capacity of farmers for inputs and other foods that they do not produce. Likewise, the effective demands by consumers, which spur production, may also be lost thereby removing a critical incentive for farming (FAO, 2020).

(Figure 2) shows the percentage of the use of home saved seeds for production. For cowpea production, 81% of the farmers had to use homemade seeds during the covid-19 pandemic outbreak. For sorghum production, 64.7% of the farmers had to use home saved seeds. All this points out to one thing, that is the fact that the availability, accessibility, and affordability of the seeds to the farmers was affected during the covid-19 lockdown. Farmer-saved seed represents most of the seed volume. The public and private sectors produce the largest proportion of early generation seed volume, while farmer-saved seeds and farmer-to-farmer seed exchanges dominate the informal seed sector (FAO, 2016; World Bank, 2016).

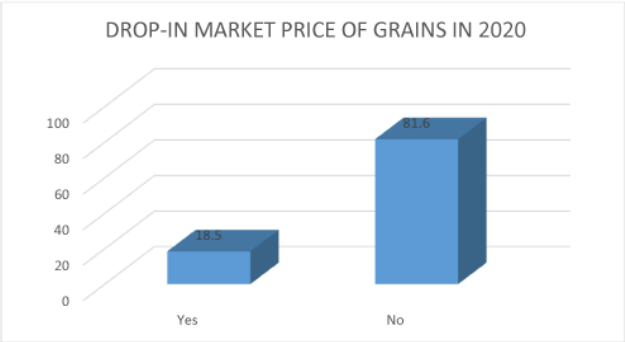

Figure 3: Drop in grain price in the market in 2020

Source: Field survey, 2021

In (Figure 3) farmers were asked if they had experienced a drop in the market price of cowpea and sorghum grains in comparison to the previous year. Majority (82%) of the farmers reported not to have experienced a fall in price within the two years. Therefore, on the contrary, the price of the above crops increased in 2020, that is, during the lockdown. According to Daedal Research (2020), the global seed market has observed consistent growth in the past few years and is anticipated that the market would witness moderate growth over the forecasted period (2020-2024) owing to spread of pandemic disease COVID-19. Moreover, the market would observe moderate growth owing to various growth augmenting factors such as budding

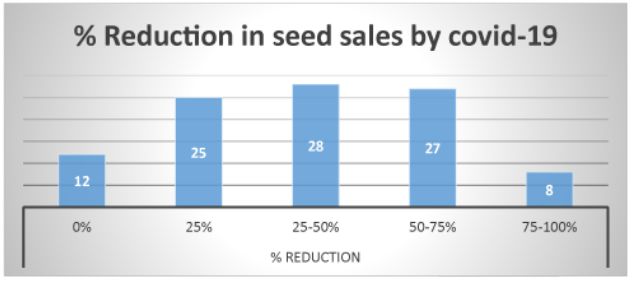

Figure 4: Effects of Covid-19 on seed sales by seed companies

Source: Field survey, 2021

global population, escalating organic farming, increasing agricultural production, spike in demand for plant-based proteins, surging demand for biofuel and upsurge in government initiatives (Daedal Research, 2020).

(Figure 4) shows the percentage reduction of seeds sold during the covid-19. 12% of the seed company reported that their seed sales were not affected by the pandemic, 25% of them reported that they experienced 25% reduction in their seed sales. 28% experienced 20-50% reduction in their seed sold. 27% of the seed company experienced 50-75% reduction in the number of seed sold during the covid-19. And lastly, 8% of the seed company experienced 75-100% reduction in the sales of seed during the covid-19. Under the COVID-19 scenarios, agricultural commodity prices are projected to drop by more than 10% below baseline level in 2020-21 which in turn would affect seed sales. This projected decline is more pronounced than that witnessed during the first half of 2020 partly because the model assumes that the effect is evenly distributed across the year and not monthly or staged by countries (OECD, 2020)

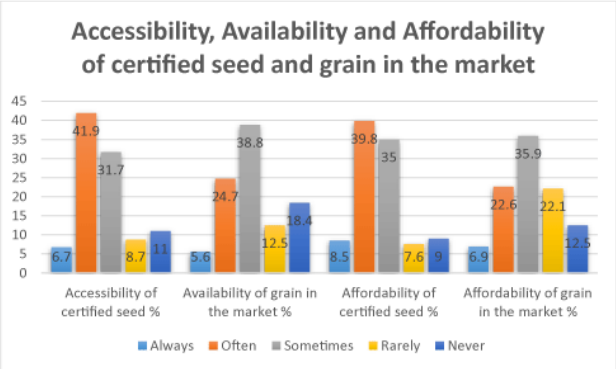

Figure 5: Accessibility, Availability and affordability of certified seeds and grains in the market to farmers in 2020

Source: Field survey, 2021

(Figure 5) shows accessibility and affordability of certified seed during the covid-19 pandemic. The highest percentage of the farmers reported that certified seed was often accessible during the lockdown and they were often affordable too. Some other 31-35% noted that they were sometimes accessible and affordable. Thus, the availability and affordability of certified seed and grain in the market was rarely affected by the covid-19 pandemic. Access to genuinely certified seed continues to be a challenge for smallholder farmers in Nigeria. Farmers, especially those in rural areas are underserved with respect to functional agro-dealers because they tend to concentrate in cities that are far away from farmers (AGRA, 2017).

(Table 8) shows the cuisine effects employed by the actors in seed grain industry in Nigeria. Although government gave out palliatives to farmers. However, only 27% of the farmers reported to have received palliatives from the government which helped them to cuisine the effect of the lockdown during the pandemic. The remaining 73% of the farmers did not receive palliative. 77% of the farmers did not get relieve material from NGO. Only 49% of the farmers borrowed from friends during the pandemic, 45% of the farmers had to sell their farmlands and belongings to cope. 43% of farmers used stored grains that last during the season of the pandemic. Also, 50% of the farmers had to diversify from farming into other things to cuisine the effect of the lockdown during the pandemic.

Table 8: Cuisine effects adopted by the actors during the lock-down

		Seed companies		Farmers		Agro-dealers		Consumers	
CUISINE EFFECTS		**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Government palliative	True	0	0	106	27	9	9	39	40
	False	8	100	284	73	89	91	59	60
Relieve material from NGOs	True	1	12	90	23	16	16	4	4
	False	7	88	300	77	82	84	94	96
Borrowed from friends and family	True	2	25	192	49	61	62	46	47
	False	6	75	198	51	37	38	52	53
Sales of my farmland & belongings	True	3	38	175	45	53	54	40	41
	False	5	62	215	55	45	46	58	59

Source: Field survey, 2021

The seed companies employed several strategies apart from government palliative which none of them received. 12% of them received relieve materials from NGO, 25% borrowed from friends and family, 38% sold their farmland and belongings while 38% had to diversify into selling other seeds. For the agro dealers, majority 62% of them borrowed from friends and family to cope during the pandemic. 54% of them had to sell their farmlands and belongings. The consumer of grains also made use of several strategy to cope during the covid-19 pandemic lockdown. The cuisine effects adopted by the consumer is the consumption of an alternative grain during the lockdown, 40% of the consumer received palliative from government while 47% borrowed from friends and family and 40% of them received palliatives from government. According to PPRC-BIGD Rapid Response Research (2020), reported that while personal coping strategies were the dominant coping strategies, some degree of social and institutional support also contributed to households coping with their food security crisis. Social support came from friends, relatives, and neighbors. Twenty-five percent of urban respondents and 10% of rural respondents cited such social support as a coping strategy to cuisine the effect of the lockdown during the pandemic period. In terms of income grouping, 17-20% of the poor and extreme poor cited such social support.

Conclusion and Recommendations

The study revealed that:

1. The use of home saved seeds has negative relationship with the farmers yield, implying that the more the farmers make use of home saved seeds for production, the less their productivity.
2. The regression result shows that the higher the use of certified seeds by famers for planting the higher their revenue from farming, whereas the use of home saved seeds has a negative relationship with the revenue of the farmers. This means that the use of certified seeds for production will increase the price of the grain produced in the market which will invariably increase their revenue more than the use of home saved seeds.
3. There are no significant differences between the mean volume of seeds produced and sold by the seed companies for all the production years.
4. Majority of both farmers and consumers are married men and are not stark illiterates since they have secondary education and as such it will be easy for them to get market information via market digital platforms, open to new innovations and trainings etc.

5. The use of local varieties for cowpea and sorghum production showed that most of the farmers are not producing optimally due to inadequate awareness and inaccessibility of improved seeds for production.
6. Seed companies surveyed had 25-50% reduction of seed sales compared to the previous year but there was no fall in the prices of cowpea and sorghum in the market during the lockdown.
7. In addition, Social support as a coping strategy didn't help to salvage the effect of the lockdown as most of the seed companies, farmers, and consumers didn't receive government palliatives, relieve materials from NGO's and didn't diversify, but most of Agro dealers borrowed from families and friends and sold their belongings as a cuisine effect during the lockdown

Therefore, from this study the following recommendations were made:

1. Farmers should always grow certified seeds as a major way to guarantee productivity and food security.
2. Ministry of Agriculture, NGOs and Seed companies should urgently establish Agro-inputs-outlets (Farmers Hub) in the rural areas to make seeds and other inputs available, accessible, and affordable to smallholder farmers.
3. Government at all levels (Federal and States) should enact a legislative law that mandates Agricultural Development Project (ADP) to organize annual seed fair prior to planting season across the nation.
4. Agricultural Policy makers should include scientists, Agro dealers, farmers, processors and consumers in the planning and execution of seed systems policy in Nigeria for holistic effect.
5. Government at all levels should develop mechanisms that would allow social interventions in form of palliatives and relieve materials get to the grassroots by making use of farmers' cooperative groups, working with local opinion leaders and traditional rulers.

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References

1. AGRA, Africa Agriculture Status Report: The Business of Smallholder Agriculture in Sub-Saharan Africa (Issue 5). Nairobi, Kenya: Alliance for a Green Revolution in Africa (AGRA), Issue No. 5 of 2017.
2. Ajayi, O. O., and K. O. Ajanaku. 2007. Nigeria's energy challenge and power development: the way forward. *Bulletin of Science Association of Nigeria*. 28: 1-3.
3. Boukar, O. and Ajeigbe, H.A. (2009). Cowpea and groundnut seed production practices. In: Legume and cereal seed production for improved crop yields in Nigeria. Ajeigbe, H.A., T. Abdoulaye, and D. Chikoye (editors).Proceedings of the Training Workshop on Production of Legume and Cereal Seeds held on 24 January–10 February 2008 at IITA-Kano Station, Kano, Nigeria. Sponsored by the Arab Bank for Economic Development and Reconstruction, and organized by IITA and the National Program for Food Security. Pp: 8-10
4. Capital, C. N. (2016). *Nigeria Early Genenration Seed Study.* Nigeria: Build the Future: Buliding Capacity for African Agricultural Transformation project (African lead).
5. Daedal research. (2020). *Global Seed Market: Size & forcast with impact analysis of Covid-19 (2020-2024).*
6. FAO. (2020). *Sustainable crop production and COVID-19.* Italy.
7. Gnych, S. (2020, July 16). Covid-19 and the seed sector: How countries are navigating challenges. *Trade for Development News*.
8. Graeys, P. &. (2021, January 14). Nigeria: Assessing The Potential Impact Of Agriculture In Nigeria's Post Covid-19 Economic Recovery . *MondaqConnecting Knowledge and People*, pp. 1-3.
9. Gabriel I, Frank O.E, Michael B. (2021). Smallholder farmers' perception on tomato (*Solanum lycopersicum*) seedlings technology in the northwest zone of nigeria. *International Journal of Agricultural Extension*, 79-89.
10. Nawab Khan, B. N. (2020). Drastic impacts of COVID-19 on food, agriculture and economy . *Pure Apple Biol.*, 10(1): 62-68.
11. Nigeria Early Generation Seed Study, World Bank 2016. https://www.africaleadftf.org/wp-content/uploads/2016/09/Nigeria-EGSStudy-Final-Report-August-2016.pdf
12. Nwajiuba, P. C. (2013). Nigeria's Agriculture and Food Security Challenges . *Agriculture and Food Security*, 45-50.
13. OECD. (December 2020). *The impact of COVID-19 on agricultural markets and GHG emissions.* Paris: OECD Publishing. Retrieved from https://www.oecd.org/coronavirus/policy-responses/the-impact-of-covid-19-on-agricultural-markets-and-ghg-emissions-57e5eb53/
14. S. Olomola and M. Nwafor, Nigeria Agriculture Sector Performance Review, 2018. https://www.researchgate.net/publication/327666294_NIGERIA_AGRICULTURE_SECTOR_PERFORMANCE_REVIEW_2017.
15. Oluwaseyi, A. B. (2017). The Prospects of Agriculture in Nigeria: How Our Fathers Lost Their Way - A Review . *Asian Journal Economics, Business and Accounting*, 1-30.
16. PPRC-BIGD. (2020). *PPRC, BIGD conduct survey to assess COVID-19 impact.* Bangladesh: The Financial Express.
17. PWC. (2020). *Responding to the impact of covid-19 on food security and agriculture in nigeria.* lagos: pricewaterhousecoopers Limited.
18. Macauley, H. (2015). Cereal Crops: Rice, Maize, Millet, Sorghum, Wheat. Feeding Africa. 21-23 October 2015. Dakar, Senegal
19. Amuge, O. (2021). Exploring wealth potential in Nigeria's sorghum production. Business a.m.