

## EVALUATION OF INFORMAL GINGER SEED SYSTEM IN SOUTH-EASTERN NIGERIA.

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### ABSTRACT

The study was carried out in Abia and Imo states in southeastern Nigeria to evaluate the existing informal ginger seed system, examine farmers' practices of using ginger seed, identify seed flows with predominant sources of ginger and describe the roles of major actors in the seed system. A multistage sampling technique was adopted to select eighty (80) ginger farmers from two cooperative societies in each of the states. Information for the study was elicited through the use of interview schedules and well-structured questionnaire administered to individuals, key informants and focus group discussions. Descriptive and inferential statistics such as Means, Percentages, frequency distribution and Likert type of scale rating were employed in the data analyses. Results show that most of the ginger farmers were males (61.25%), married (80%) and educated up to secondary school level (47.5%). The farmers had high family sizes of an average of nine (9) persons in each household. They had a relatively low ginger farming experiences of 3years and an average farm size of 0.3 hectare. Most of the ginger farmers (57.5%) sourced their planting materials from the research institute (National Root Crops Research Institute Umudike). Major seed flows is reported to exist from contact farmer cooperative societies in Kaduna, Research institute (NRCRI) and ginger farmer cooperatives in Southeast in an informal and one way flow. Ginger farmers insoutheastern Nigeria plant both varieties of ginger (UG1 and UG2) with UG1production predominating (86.25%). Stakeholders in ginger seed system were identified to include: Research Institute (NRCRI Umudike), Ginger farmers, Cooperative societies, Seed retailers, Middlemen, Transporters and government agencies, with all complimenting the roles of each other. It was therefore concluded that ginger production in southeastern Nigeria is gaining prominence with a growing synergy between the farmers, research institute (NRCRI) and the ginger farmers cooperatives, however in an informal manner. Efforts should therefore be made to develop a formal ginger seed system using the already existing framework.

**Keywords:** ginger, seed, cooperatives, farmers, production, Nigeria

### BACKGROUND

Ginger is one of the world's most popular and useful plants, being used for centuries as spices for flavouring food and as a medicinal plant. About half

of its world's production comes from India, whereas, its cultivation is extended to China, Australia, Malaysia, Nigeria, Fiji, Brazil and Mexico (Sanderson *et al.*, 2002). Nigeria is one of the world's largest producers of ginger. Cultivation of the crops started since 1927 as a cash crop. Ever since then, two known varieties are widely cultivated: UG1 and UG 2 with UG1 dominating in most ginger farms. Ginger is basically an export crop because of its high demand in advanced medical and confectionary industries. About 10% of the produce is consumed locally as fresh ginger while the remaining 90% is dried for both local consumption and export. According to Ezeagu (2006), 20% of the dried ginger is consumed locally for various uses and 80% is exported. Ginger powder is a household kitchen item in Nigeria. Nigeria's ginger export is to four regional markets; Europe (51%); USA and Canada (29.5%), Asia (13%) and other parts of Africa especially to Burkina Faso (0.5%). Some transactions of fresh Ginger across the Nigeria- Cameroon border have been noticed.

Ginger is an important spice used as a condiment in vegetable preparations. It is also an important ingredient in herbal medicines for the treatment of rheumatism, nervous diseases, gingivitis, toothache, asthma, stroke, constipation and diabetes (Awang, 1992; Wang & Wang, 2005; Tapsell *et al.*, 2006). The oil and oleoresins obtained from ginger are also used in many food items, soft drinks and beverages (Singh *et al.*, 2008). Al-Achi (2007) reported that ginger is contraindicated in people suffering from gallstones, as the herb promotes the release of bile from the gall bladder. Also, Chen *et al* (2007) noted that ginger compounds are active against a form of diarrhea, which is the leading cause of infant death in developing countries. Ginger has been found effective for treating nausea caused by seasickness, morning sickness and chemotherapy (Ernst and Pittler 2000). Over the last decade, ginger has been found to be anti-carcinogenic through many different pathways. It has been shown to prevent initiation, promotion, and progression of various types of cancer (Bisset and Wichtl 1994).

Large scale production of ginger in Nigeria started in 1927; (Arene *et al* 1986) in Southern Kaduna (Guinea Savanna Agro Ecology), especially within the Jemma federated districts in the present Kaduna State (Kwoi, Kubacha, Kafanchan and Kagarko areas) and in the neighbouring parts of Plateau State. This occurred during the search for a crop to generate internal trade (Erinle 1988). Efforts were intensified

to increase and spread the cropping area and widen the genetic base. Considerable success was achieved in this area following the result of the ecological adaptation trials at the National Root Crops Research Institute Umudike. In recent times, ginger cultivation has been introduced into the rainforest agricultural zone of Nigeria.

The humid tropics are defined by bioclimates that are characterized by consistently high temperatures; abundant, at times seasonal, precipitation; and high relative humidity (Lugo and Brown, 1991). Annual precipitation exceeds or equals the potential return of moisture to the atmosphere through evaporation. Total annual rainfall amounts usually range from 1,500 mm to 2,500 mm, but levels of 6,000 mm or more are not uncommon. In general, seasons in the humid tropics are determined by variations in rainfall, not temperature. Most areas experience no more than 4 months with less than 200 mm of precipitation per year.

Seed is the fundamental life-blood of agriculture and the foundation of a successful farming for smallholder farmers in the tropics. The farmer does make arrangements for many farm inputs but the seed is the primary input. Good quality seeds, which have genetic and physical purity; health standards; high germination and moisture percentage, can increase farmer's production by about 20-30% (Mula et al 2013). Aside being the foundation of agriculture, Onunka et al (2016) sees seed as the most important input in the production process of most crops especially root and tuber crops. Seed systems vary widely on locality, market availability, and farmer knowledge, and can be informal, formal, or a combination of the two.

Available literature has provided descriptions of the different seed systems. Mula et al (2013) described the Formal seed system as a chain of demand and supply of seed which normally starts with plant breeding activities, through release of varieties, multiplication and certification, seed conditioning and the distribution (marketing) of the seed to the target farmers within a given agro-ecological or farming system. The formal seed sector can offer only a limited range of cultivars and operates within specified quality standards.

The informal seed system is characterized by non-regulation; the farmer is fully in control of seed selection, production and diffusion. The seed selection criteria may be based on the farmers' past farming experience or perceived yield potential. The selected seeds may be treated (through farmer's preferred method), stored for next planting, exchanged or bartered for other goods or commonly sold locally as seed (Mula et al 2013). Furthermore, the informal seed systems are

characterized by a lack of functional specialization. These systems are traditional and informal, operating mainly at the community level through exchange mechanisms, semi-structured, and may depend on indigenous knowledge of plant and seed selection, sourcing, retaining and management as well as local diffusion mechanisms.

In the informal seed system, approximately 80-90% of all seeds used is largely sourced from farmers' own-saved seed which involve saving seed from own harvest, and using seed for re-sowing, sharing, exchanging, bartering and selling. Farmers save seed and use this continuously for 3-4 years with low (2-3%) seed replacement ratio because the proportion of quality seed available each year is only 10-12%. The varieties used are mostly local landraces, and awareness about improved varieties, seed availability and seed access is very poor. Seed is procured off-farm (local markets, from other villages, relatives, other farmers and government relief agencies) only when necessary or as when own seed is not available due to drought, poverty or seed pests and diseases. However, these statements about the predominance of the informal sector cover significant differences between crops, villages, farmer groups and their socio-economic conditions. Traditional seed systems are location-specific and vary greatly within farmer communities (Mula et al 2013). Globally, the most common sources of crop seeds are local farmer systems (Almekinders & Louwaars, 2002; Louwaars, de Boef, & Edeme, 2013; Munyi & De Jonge, 2015)

Principally, two seed systems, the formal and informal seed systems exist with crops in Nigeria. However, for ginger the challenge of narrow genetic base has constrained the use of the crop to UG1 and UG2 as the only two varieties available for cultivation in commercial quantities in Nigeria. This implies that ginger seed system in Nigeria is not yet fully understood. At the moment, ginger farmers in the study area source their ginger from any available means. A previous study conducted by the National Root Crops Research Institute (NRCRI) Umudike in 2012, revealed that the farmers scarcely recognize ginger (*Zingiber officinale* Rosc.) in the study area. It appears that the informal seed system is operational and to develop an efficient seed system for a crop like ginger, it is necessary to undertake a study of the status of the existing seed system and the farmers use of ginger planting material with a view to understanding how the farmers source planting materials and challenges they face in the process. Generating baseline information on the informal ginger seed system is of great importance as such information will assist researcher to determine the suitable production package for seed ginger with a view to developing relevant protocols a formal ginger seed system in different agro ecologies.

Several studies show that farmers are still largely acquiring seed from the informal seed system (McGuire and Sperling 2016; Sperling and McGuire 2010). The complexity of seed systems, including its formal and informal actors and prevailing practices of farmers in multiplying and sourcing seed needs to be understood in order to archive a larger impact of formal seed interventions (Almekinders et al. 2019).

#### Specific Objectives

- i. Describe the socioeconomic characteristics of ginger farmers in southeastern Nigeria
- ii. Examine farmers' practices of using ginger seed

- iii. Identify and describe the roles of Major actors in the seed system
- iv. Identify seed flows and predominant sources of ginger seed to farmers and actors involved

#### Methodology

The study was conducted in two purposively selected states of Abia and Imo states in the southeast geopolitical zone of Nigeria. Abia State lies between Latitude 5<sup>0</sup>25'N and Longitude 7<sup>0</sup>30'E while Imo State lies between Latitude 5<sup>0</sup>29'N and Longitude 7<sup>0</sup>2'E ([www.wikipedia.org](http://www.wikipedia.org)).

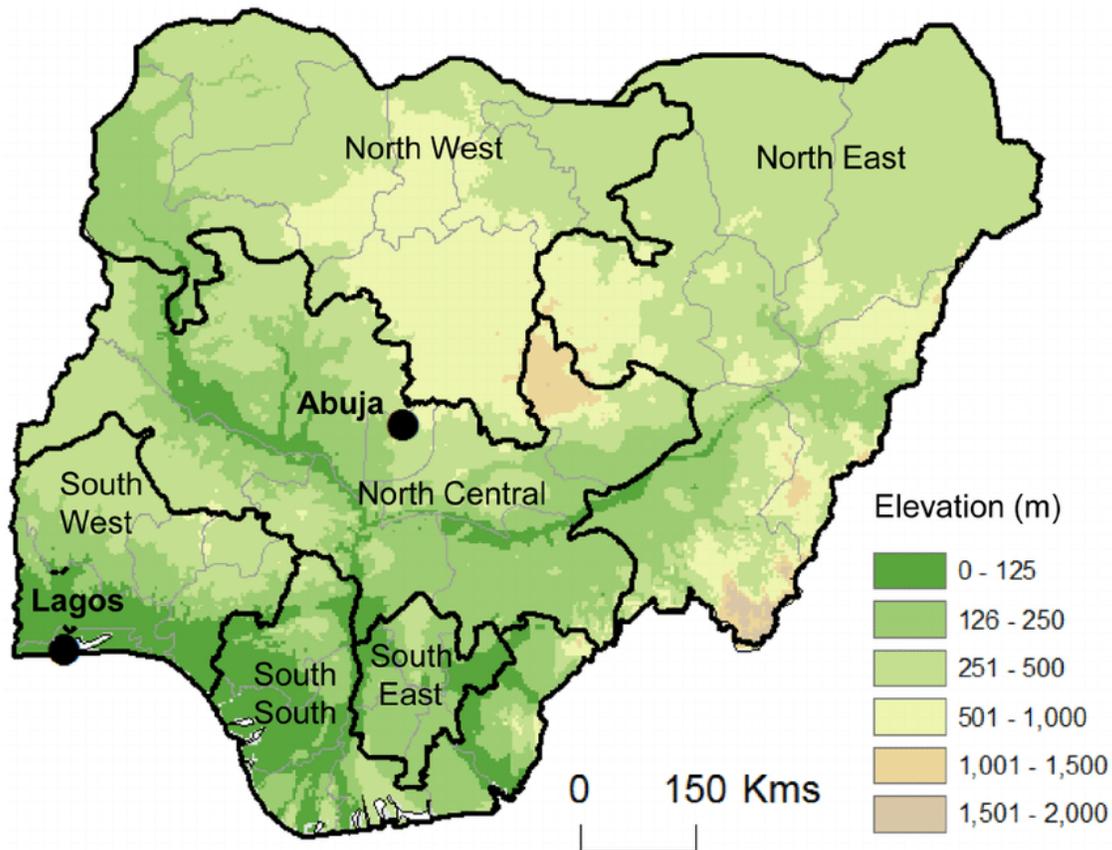


Figure 1. Map of Nigeria and its geopolitical zones.

Source: Okorie et al (2013)

The states were selected based on the confirmed existence of ginger cooperatives and available records of partnerships with the ginger farmers and Ginger research programme of NRCRI Umudike. Two ginger farmers' cooperative societies were selected from each state. At the cooperatives level, a list of the members of each cooperative was used as the sampling frame from where 20 ginger farmers were randomly selected from each cooperative to participate in the study. A total of 80 ginger farmers

were used for individual interviews. Focus group discussions (FGDs) and well-structured questionnaire were used to elicit information such as the socioeconomic characteristics of the ginger farmers, seed flows and use and the farmers' perception on planting among others. Data generated was analyzed using both descriptive and inferential statistics. These include: Frequency tables, charts and Likert type of scale.

## RESULTS AND DISCUSSION

### Socioeconomic characteristics of ginger farmers in the study area

The result of the socioeconomic indices of the respondents indicated that majority of the ginger farmers in the area are males (61.25%) while the remaining 38.75% were females. This result is in conformity with Adinoyi and Attanda (2016) who in their study of groundnut, reported that majority (94.4%) of groundnut farmers are male. This implies that men appear to be more innovative than women, because ginger production in the study area seem to be apparently new, more so, ginger is a cash crop and men appear to be more interested in cash, supporting the assertion of Gireiet *al* (2013), that in Africa, men are more in a crop that is perceived to have commercial value. Majority (80%) of the respondents were married while most of them had up to secondary school level of education. This means that the ginger farmers are able to read and write and as such are likely to understand and adopt innovations in line with the report of Mazzaet *al* (2019) that literate farmers will meaningfully engage in agricultural production which will impact on their lives positively. Formal education is a means of facilitating farmer's use of written information, and ways of increasing their knowledge and comprehension of new farm practices especially in ginger production (Okafor, 2012). The farmers had high family sizes of an average of nine (9) persons in each household. This implies that the farmers may

perhaps utilize members of the household as labour for some operations relating to production of ginger. Large household serves as proxy to cheap family labour in the farm (Lawal, 2009). The result of the socioeconomic characteristics of the ginger farmers is shown in table 1.

Furthermore, the farmers had a relatively low ginger farming experiences of 3 years compared to 12 years general farming experience. This shows that ginger production in the study area is relatively new compared to crops like cassava and yam which has been well known and cultivated by the people of southeast Nigeria. The table also revealed that, the respondents had average farm size of 0.3 hectare of ginger farms. This indicated that all the respondents sampled were small scale ginger farmers showing that land allocated to ginger production in the area is small. However, the small farm size could be attributed to the fact that the spread of ginger production is becoming gradual after an aggressive sensitization programme was carried out by National Root Crops Research Institute Umudike in 2014 with the inclusion of Ginger as one of the crops selected in the Agricultural Transformation Agenda of the federal government of Nigeria. During that period, a one hectare ginger demonstration farm was established each in Abia and Imo states. The aim of the demonstration farm is to stimulate interest in the production of crops as is the case of ginger production in the study area.

**Table 1: socioeconomic indices of ginger farmers in the study area**

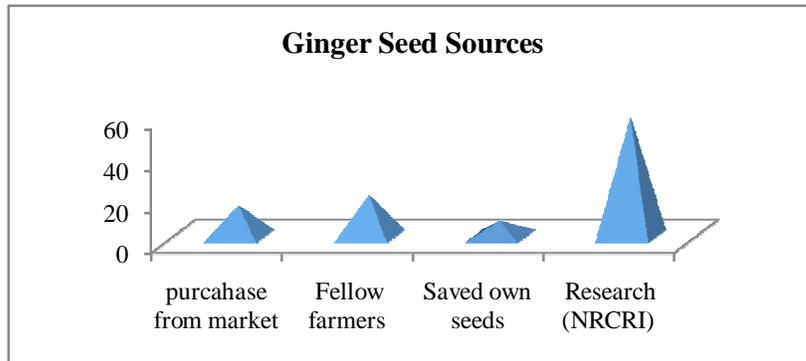
Variable	Frequency (No = 80)	Percentage	Mean
Sex	Males = 49 Females = 31	61.25 38.75	
Age (Years)	21 - 40 = 13 41 - 60 = 41 61 and above = 26	16.25 51.25 32.5	54.55
Marital status	Married = 64 Divorced = 1 Widowed = 1 Single = 14	80 1.25 1.25 17.5	
Level of education (No of years in school)	Primary (4-6yrs) = 17 Secondary (7-12yrs) = 38 Tertiary (13-18yrs) = 25	21.25 47.5 31.25	
Household size (No of persons eating from same pot)	3 - 8 = 45 9 - 15 = 33 16 and above = 2	56.25 41.25 2.5	9
Farming Experience (years)	1-10 = 43 11-20 = 30 21-30 = 2 31 and above = 5	53.75 37.5 2.5 6.25	12
Experience in ginger cultivation (years)	1 - 3 = 46 4 - 6 = 27 7 - 9 = 7	57.5 33.75 8.75	3.5
Ginger farm size (Ha)	0.01 - 0.3 = 50 0.4 - 0.6 = 9 0.7 - 1.0 = 21	62.5 11.25 26.25	0.32

Source: field survey, 2018

**Ginger seed sourcing behavior**

Ginger farmers in the study area had 4 main sources of seed ginger. These sources include:

- ✓ Research (NRCRI)
- ✓ Fellow farmers
- ✓ Purchase from market
- ✓ Saved own seeds



**Fig. 2: Ginger seed sourcing behavior of the farmers**

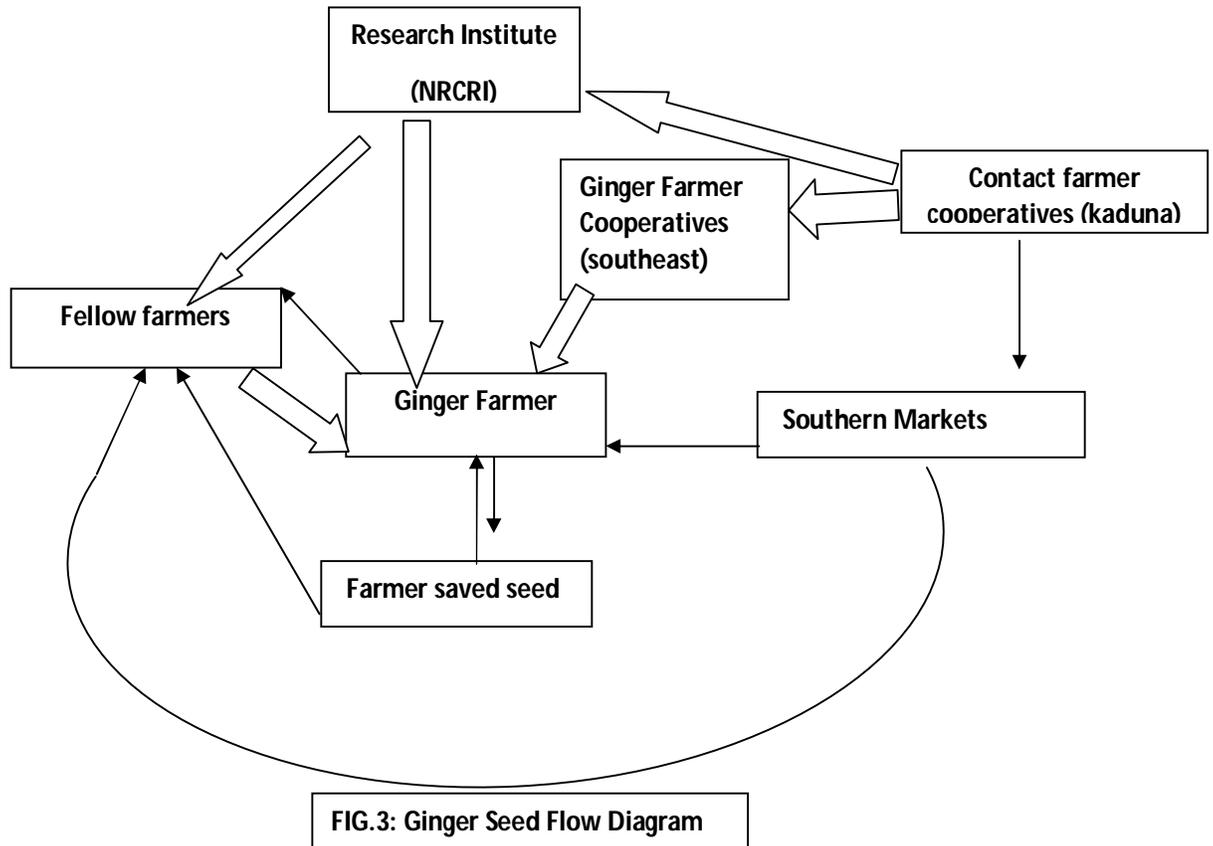
Most of the ginger farmers (57.5%) sourced their planting materials from the research institute (NRCRI). This is mainly because they want to be sure that the ginger they are planting is the good variety. Again, the sensitization programme carried out in 2014 on ginger production in southeast Nigeria is paying off. The ginger farmers can conveniently distinguish the correct ginger from the other substance that is robust, watery and non-pungent but look like ginger. Also, the farmers source seed from their fellow farmers (20%) who sell to them. Others source the ginger they plant from the open market (15%) where the traders buy most of their ginger from the northern part of the country, but the possibility of buying a mix up of the good and bad varieties is high. Only very few (7.5%) of the farmers use their own saved seed as planting material. This result indicates a huge reliance on research institute for sourcing of seedginger by farmers which is in line with previous reports by Adam et al. (2018); Almekinders et al. (2019); Kansime and Mastenbroek(2016) and McGuire and Sperling (2016) that smallholder farmers in Africarelly substantially on off-farm sourcing of seed.

**Ginger Seed Flow**

Seed flows in the ginger seed system shows that the major flows is from research institute (NRCRI), which on one hand make ginger seed (planting materials) available to farmers from their ginger ban and on the other hand rely on their contact farmer

cooperative societies mostly located in southern part of Kaduna State wherethe ginger out station of the institute is located. These contact farmercooperative societies, through the link provided by research institute, supply seed ginger to the cooperatives who will in turn distribute to their members.

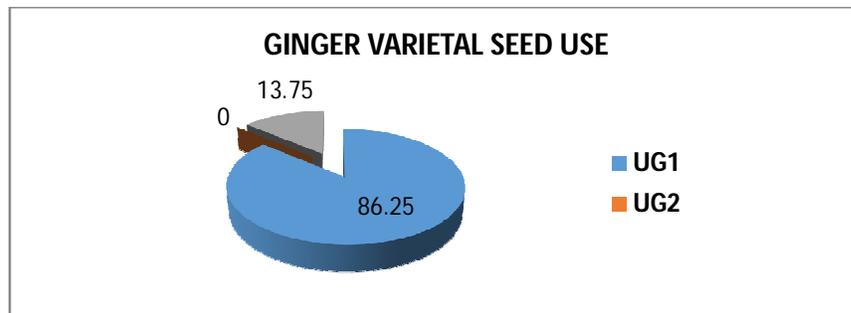
From figure 3, major seed flows (Represented by the big arrow) exist between contact farmer cooperative societies in Kaduna, Research institute (NRCRI) and ginger farmer cooperatives in Southeast and these flows are majorly a one way flow. This means that the major sources of ginger in the southeast Nigeria, are the ginger cooperatives in southern kaduna state and NRCRI Umudike through the ginger farmers cooperatives in the southeast and fellow farmers who have the capacity to source ginger directly from NRCRI and or Ginger farmers cooperatives from kaduna state.Also minor seed flows exist between the actors. Some are one way whereas the others may be 2 way as indicated in figure 3. Single minor flows indicates that the sourcing of ginger seed is from one direction and quantity of ginger seed involved is small and irregular as observed in the ginger seed sales from ginger cooperative societies to southern markets, from southern markets to ginger farmers who are members of the cooperative society and other farmers (fellow farmers). On the other hand, ginger farmers use their own saved seeds whereas some acquire from their colleagues to save and plane during the coming season.



**Ginger varieties planted**

The study revealed that ginger farmers in the study area plant UG1 and UG2 varieties of ginger. From the result of the field study, the farmers plant predominantly only UG1 (86.25%). Few of the farmers plant a combination of UG1 and UG2

(13.75%). None of the farmers planted only UG2, implying that the ginger seed system is dominated by UG1 variety. Furthermore none of the farmers had any knowledge of exotic varieties present in the seed system.



**Fig. 4: Ginger varietal seed use in Imo and Abia**

**Farmers' perception of ginger seed quality**

The result of the perception of ginger farmers on quality and field performance of ginger seed in distribution in the study area is presented in table 2.

From the result, the farmers perceived that the process of obtaining ginger seed was easy with a score of 4.35, ranking 1. This implies that the farmers are satisfied with the channel of ginger seed

distribution in southeast Nigeria. On quality, they accepted that the rhizomes were very healthy (Score of 4.25). Although they acknowledged that some of the ginger rhizomes were showing visible signs of dryness, this did not affect their acceptance of the rhizomes since the ginger maintained its strong pungent taste. The sign of dryness could be as a result of the long period of storage after harvest from

the source and lack of an efficient storage methods of ginger in the study area. At harvest the farmers were apparently satisfied with the yield and rhizome size. On processing, the farmers agreed that ginger processing is cumbersome. Aside these, other issues on the quality of ginger rhizomes had scores below the mean of 3.0 implying that those issues were not accepted and therefore not important to the farmers.

**Table 2: Perception of ginger farmers on the quality field performance of ginger seed in the study area.**

S/N	Quality of ginger rhizome planted	SA	A	UD	D	SD	Total	mean	Rank
1	Ginger rhizomes for planting were easy to obtain	38 (190)	37 (148)	0 (0)	5 (10)	0 (0)	348	4.35	1
2	The ginger rhizomes planted were very healthy	37 (185)	33 (132)	4 (12)	5 (10)	1 (1)	348	4.25	2
3	Some of the rhizomes were having symptoms of disease infestation	6 (30)	14 (56)	18 (54)	22 (44)	20 (20)	204	2.55	10
4	Most of the rhizomes were rotten	4 (20)	9 (36)	19 (57)	32 (64)	16 (16)	193	2.41	11
5	Some of the ginger rhizomes were showing signs of dryness	25 (125)	37 (148)	0 (0)	13 (26)	5 (5)	304	3.80	3
6	The rhizomes had poor germination rate	7 (35)	14 (56)	18 (54)	34 (68)	7 (7)	220	2.75	9
7	The yield was poor	5 (25)	9 (36)	3 (9)	39 (78)	24 (24)	172	2.15	12
8	The rhizomes fingers were very big at harvest	9 (45)	27 (108)	26 (78)	12 (24)	6 (6)	261	3.26	6
9	The rhizomes had a strong pungent taste comparable to ginger in the market	35 (175)	6 (24)	22 (66)	10 (20)	7 (7)	292	3.65	4
10	My ginger rhizome size is very big but the pungency is not strong	11 (55)	27 (108)	1 (3)	29 (58)	12 (12)	236	2.95	8
11	The moisture content of my ginger rhizome is too high even at over 8 MAP	11 (55)	30 (120)	14 (42)	21 (42)	4 (4)	263	3.29	5
12	Processing ginger is cumbersome	18 (90)	22 (88)	2 (6)	18 (36)	20 (20)	240	3.00	7

Source: Field Survey, 2018

Statement is accepted (Significant)  $\geq 3.00$ ,  
Statement is rejected (Not Significant)  $< 3.00$ .  
Mean score 3.00

#### Actors in seed ginger system

The study identified the actors in the ginger seed system. This presented in table 3.

**Table 3: Major actors in the ginger seed system and their roles**

Actors	Roles
Research Institute (NRCRI)	<ul style="list-style-type: none"> <li>➤ Development and popularization of varieties</li> <li>➤ GAP on the agronomy of ginger</li> <li>➤ Identification of varietal traits and processing qualities</li> <li>➤ Production and processing technology development and transfer</li> <li>➤ Extension services</li> <li>➤ Training of farmers etc.</li> </ul>
Ginger Farmers	<ul style="list-style-type: none"> <li>➤ Production, processing and marketing</li> </ul>
Cooperatives	<ul style="list-style-type: none"> <li>➤ Farmers organization</li> <li>➤ Sensitization and Popularization of ginger farming</li> <li>➤ Distribution of quality seed ginger</li> <li>➤ Facilitation of financial assistance to ginger farmers</li> <li>➤ Marketing and market linkages for ginger</li> </ul>
Ginger seed retailers	<ul style="list-style-type: none"> <li>➤ Buying and selling of ginger seed in the markets</li> </ul>
Middle men	<ul style="list-style-type: none"> <li>➤ Bulk buying and distribution of ginger seed</li> </ul>

Transporters	➤ Haulage of ginger seed
Governments and funding Agencies	➤ Support ginger research through policy and funding

### CONCLUSION

Ginger seed system in the study area is gradually getting organized because of the recent interest and active participation of cooperative societies in the study area. Two varieties are known to the farmers but the UG1 variety is most known and used. Ginger seed is mostly sourced from research institute through their contact farmers who are well organized in cooperative societies both in Kaduna State and Southeast Nigeria, where major flows of ginger seed is currently observed. It was noted also that minor flows exist among the farmers themselves. Cooperative societies play important role in ensuring that ginger farmers plant the correct species of ginger. The major actors identified in the ginger seed system were Research institution (NRCRI), ginger farmers,

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