



Farmers' Attitudes toward Certified Rice Seeds in Ebonyi State, Nigeria

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Abstract

The study investigated farmers' attitudes towards certified rice seeds in Ebonyi State, Nigeria. It ascertained respondents' attitudes toward certified seeds, described their expectations and determined their constraints in cultivating certified seeds. One hundred and twenty

respondents were selected for the study through a multi-stage sampling procedure, while structured questionnaires were used for data collection. Data were analysed using percentages, means and regression analysis at $p=0.05$. Results show that farmers major expectations of certified rice seeds included increased yield (89%), increased income (78%), and ease of harvesting and processing (69%). Farmers' attitudes toward cultivating certified rice seeds were not very favourable ($\bar{x} = 2.10$). Weak role of agricultural extension ($\bar{x} = 2.9$), cost of seed ($\bar{x} = 2.9$) and lack of agricultural insurance ($\bar{x} = 2.8$) were constraints to their cultivation of certified rice seeds. Education ($\beta=2.325$), distance to the source of certified seed ($\beta=-1.274$) and access to extension services ($\beta=3.155$) were the factors that influenced farmers' attitudes toward certified rice seed. Farmers do not have a favourable attitude towards certified seeds. Certified seed distribution networks should be increased to reduce the distance covered by farmers while accessing certified seeds. Dissemination of information on certified seeds should be monitored to prevent misinformation and improve farmer's attitudes towards it.

Introduction

The increasing challenges of climate change, in addition to the growing world population and the need to provide affordable and nutritious food, have made it important to invent approaches to increasing food production. Where these approaches are not available, the threat of food insecurity will be worsened in the coming years. This has necessitated dynamism and innovativeness in crop variety production and resilience structure. To fill up the gap in adequate food production and avert the impending worsening food insecurity, stakeholders all over the world have accepted the cultivation of certified seeds (Mustafa et al., 2023; Izuogu et al., 2021).

Planting materials have over the years been subjected to advancements through the selection of purer breeding lines and this has continuously widened the range of improved varieties in a bid to eradicate certain characteristics of seeds that hinder their productive capacity; such attributes include susceptibility to pests and diseases, low yield, susceptibility to drought and flooding etc (Nyairo et al., 2022). The utilization of agricultural technology by farmers depends on the availability of advanced agricultural technologies. This supports the likelihood of increasing agricultural production and the standard of living of small-scale farming households who depend on their agricultural output for employment, food and income.

Rice, wheat and maize are the three essential food crops cultivated in Nigeria. Certified rice seeds can provide solutions to several problems that farmers are currently undergoing in rice production. Certified rice seeds offer such advantages as higher yield, pest resistance, drought resistance, and essential nutrients (Izuogu et al., 2023; Ogunkunle et al., 2022). Expected economic benefits such as an increase in yield have been reported to be among the essential variables that determine farmers' willingness to adopt the cultivation of certified rice seeds (Izuogu et al., 2023). Rahman & Connor (2022) reported that potential adopters of agricultural innovation expected an increase in income given a rise in yield and reduced cost of production. Certified rice seeds are expected to produce cheaper grains that are easily accessible due to increased yields and stable production (Okoro et al., 2023).

Improving the standard of living of smallholder farmers in rural areas cannot be accomplished until all the elements constraining increase in agricultural production are adequately taken into consideration. Attitude represents an indication of the intensity of farmers' approval or disapproval of an innovation. In the innovation adoption process, the decision-making stages a farmer experiences permit the assessment and

establishment of positive or negative convictions about innovation utilization. According to the theory of attitudinal foundation, it is usually difficult to assess the mode of belief formation, but attitudes can be ascertained by personal decisions (Nyairo et al., 2022). Farmers' ambiguity over the utilization of agricultural innovations is affected by their trial of the innovation, convictions about the innovation and prevailing network of information relating to the innovation (Olum et al., 2018).

It suffices to emphasize therefore that farmers' attitudes and perceptions are core determinants of adoption decision-making. It shows an inclination to respond positively or negatively to ideas, innovations etc. Certain sensitive, inspirational, rational, and intuitive factors constitute the structure of farmers' attitude as well as other elements within their physical environment. These elements come with several interacting phases of expectations, apprehensions, bias and other dispositions depending on the issues being considered (Nyairo et al., 2022).

Few studies (Raheem et al., 2023, Chijioke & Akaninyene, 2019) relating to farmers' adoption of certified rice seeds have focused on the extrinsic variables that concern socioeconomic characteristics while neglecting such intrinsic factors as expectations, attitude, perception and constraints which are also contributory factors to rice farmer's decision to cultivate certified seeds. Farmer's attitude as well as their perceived benefits from the cultivation are expected to influence their willingness to cultivate certified rice seeds (Astrid et al., 2021). Concerns regarding certified rice seeds such as the tendency of multinationals to monopolise the Nigerian seed sector, the cost of purchasing certified seed, as well as the engagement of certified rice seed technologies to guarantee food security, may also influence farmers' willingness to cultivate certified seeds. Many have argued that certified seeds pose threats to sustainable rice production, indigenous seed varieties, independence of the national agricultural sector etc. These have induced arguments regarding the acceptance of these seeds and invariably slowed down adoption (Mustafa et al., 2023).

Given the significance of the cultivation of improved varieties of seeds in agricultural production (Izuogu et al., 2023), this study attempted to ascertain the expectations and attitudes of rice farmers in the cultivation of certified rice seeds in Ebonyi State. The state is of the essence given the high level of rice production especially among smallholder farmers. It is therefore important to secure a deeper understanding of farmers' attitudes toward the cultivation of certified rice seed. The study

- i. described respondents' expectations of certified rice seeds,
- ii. ascertained their attitude towards certified rice seeds., and
- iii. determined their constraints in the cultivation of certified rice seeds.

The study hypothesised that the socio-economic characteristics of the farmers do not influence their attitude towards the cultivation of certified rice seeds.

Methodology

Ebonyi state is one of the states located in the South-Eastern part of Nigeria. It is located at latitude $6^{\circ}31'1''N$ and longitude $8^{\circ}15'1''E$ (Onyeneke et al., 2020). The state ranks fourth among the rice-producing states in Nigeria (FAO 2020). The nearest national seed centre to Ebonyi state is the National Agricultural Seed Council centre in Umudike, Abia state.

The study used a cross-sectional survey design with a multi-stage sampling procedure for the selection of respondents. Data was collected using a structured questionnaire.

The first stage involved the purposive selection of two agricultural zones in the state based on their active involvement in rice production. In the second stage, two Agricultural Development Programme (ADP) blocks were selected from the eight blocks that made up each of the zones to give a total of four blocks. The third stage involved the selection of three circles from each of the blocks for twelve circles. At the final stage, a proportionate sampling procedure was used as seventy-five percent of rice farmers that cultivate certified seeds were selected from each of the circles to give a total of 120 respondents that participated in the study.

Data were collected from respondents on their socioeconomic characteristics such as age, level of education, farm size, access to extension services, household size and marital status. Also, the questionnaire was used to seek data on distance from sources of seed, attitude toward certified seeds, expectations from the cultivation of certified seeds and constraints in cultivating certified seeds. Respondents were experienced rice farmers who could express their expectations, attitudes and challenges associated with the cultivation of certified rice seeds. Information on farmers' attitudes towards the cultivation of certified rice seed was collected using a Likert-type scale with questions in closed and open-ended questions presented to the respondents to ascertain their expectations and cultivation constraints.

Farmers' expectations of certified rice seeds and their constraints in the cultivation of certified rice seeds were measured at a nominal level of Yes and No, with scores of 1 and 0 assigned, respectively. Percentages were used to analyse the data.

Attitude in this study implies farmers' feelings and actions towards certified rice seed and was assessed on four major constructs economic, social, nutritional and traditional. Data on respondents' attitudes towards certified rice seeds was collected on a 4-point Likert-type scale of strongly agree, agree, strongly disagree and disagree. These were assigned weights of 4,3,2 and 1, respectively and analysed with mean scores. A mid-point of 2.5 and above demonstrated a very favourable attitude (0) while scores below 2.5 imply a not very favourable attitude (1). Other variables were measured as:

- X₁ = Sex (1= male, 0= female)
- X₂ = Age (number of years)
- X₃ = Household size (actual number of persons living in the household)
- X₄ = Level of education (years spent in school)
- X₅ = Farm size (hectares)
- X₆ = Access to extension (1=yes, 0=no)
- X₇ = Distance to source of seed (kilometres)
- X₈ = Marital status (1= Married, 0 = Otherwise)

Results and Discussion

Cultivation Expectation

Results in Table 1 show that 89.0% of the respondents expected an increase in yield when they cultivated certified rice seeds. This conforms with the findings of Ritchie

(2022) who reported that yield levels in sub-Saharan Africa are far below those in nations with advanced agricultural practices as farmers utilize improved seed varieties; hence enhancing food security will require seed system formalization for effective delivery of high-yielding varieties in the sub-Saharan region.

More than two-thirds (78.0%) of rice farmers who cultivated certified seeds looked forward to additional income, while 69% expected ease of harvesting and processing. Sujianto et al. (2022) reported that higher income is a motivation for adopting certified rice seeds, while Rana et al. (2022) and Akintunde et al. (2021) identified poor seed quality and widespread uncertified varieties which results in low yield as major factors that lead to a decline in farmers income. This creates shortages which may give rise to an increase in market prices with the local economy facing the outcome in the form of persistent inflation.

This finding also agrees with Rana et al. (2022) who ascertained that certified seed varieties reduce the cost of harvesting crops by managing plant height and ripening period. Shorter plants are easier to harvest while the reduction in the ripening periods ensures that crops do not stay on the field for a longer time and this necessitates lesser agronomic practices such as weeding. Cultivation expectation is a dynamic process that can influence farmers' attitudes towards certified seeds.

Table 1: Farmers' expectations in cultivating certified rice seeds

Items	Percentage (n=120)
Increased yield	89.0
Additional income	78.0
Ease of harvesting and processing	69.0
Early maturing	62.0
On-farm rice disease resistance	54.0
Assured market	54.0
Low organic fertilizer requirement	48.0
Drought resistant	47.0
Optimize vitamins and oil	39.0

Source: Field survey, 2023

Farmers' Attitude towards Certified Seeds

Results in Table 2 show that overall, farmers' attitudes were not very unfavourable ($\bar{x} = 2.10$) towards certified rice seeds. However, on the nutritional construct, it shows that farmers' attitudes toward certified rice seeds were very favourable ($\bar{x} = 2.83$). Mustafa et al. (2023) reported that the cultivation of improved seed varieties can eradicate hunger and advance household nutritional status. These responses are essential in advancing food security for rural households and communities with many dependents and fragmented agricultural plots. One of the advantages of certified seeds is their biofortification which ensures that minerals, vitamins etc are made readily available to farming households through the consumption of these crops. This approach has proved effective in addressing the challenges of hidden hunger among farmers in rural areas (Onyeneke et al., 2020).

The economic construct also showed that consumers' attitudes toward certified seeds were not very favourable ($\bar{x} = 2.42$). These findings agree with Mustafa et al. (2023) that the challenges associated with the cost of raising seeds are essentially through the purchase of cultivars that cannot be regrown. Though they identified some of the

economic benefits of the cultivation of certified seeds as reduced cost of purchasing food arising from increased harvest as well as factory jobs, they reported however that farmers thought that these gains would be more profitable to foreign companies. The cultivation of certified seeds demands that farmers procure seeds every cropping season. Before the introduction of certified seeds, many farmers cultivated their seeds across planting seasons which they secured from previous farming seasons or friends at little or no cost (Okoro et al., 2023).

From Table 2, the traditional construct shows that farmers' attitudes toward certified rice seeds were also not very favourable ($\bar{x} = 1.55$). Certified seed genes may interact with indigenous crop varieties leading to loss of indigenous germplasm (Mustafa et al., 2023). This threatens the availability of pure varieties of indigenous crops.

Table 2: Attitudes toward certified rice seed

Construct	List	Mean	SD
Economic	Requires less labour cost	3.70	0.78
	Require fewer farm inputs like fertilizer, insecticides, weedicides etc	3.57	1.02
	Ensures higher quality of the rice harvest	3.52	1.12
	Benefits of cultivation of certified seeds are for domestic companies	1.80	1.01
	Smallholder farmers will gain from certified seed cultivation	1.70	1.01
	Imply lower cost of seed purchase	1.52	0.94
	Less risk is involved in the cultivation of certified rice seeds	1.14	1.18
		2.42	
Social	It does not pose environmental risks	2.45	1.16
	Reduces attachment to Indigenous seeds	1.78	0.43
	Requires lesser social capacity to cultivate	1.10	0.54
	Discourages dependence on multi-nationals	1.01	1.72
		1.59	
Nutritional	Healthy source of family nutrition	3.67	1.22
	Improves family food sufficiency	3.24	0.65
	Not dangerous to health	3.15	1.20
	Meets family nutritional needs	3.12	0.87
	Certified seeds are as tasty as Indigenous crops	1.67	0.32
		2.83	
Traditional	Certified seeds are ethical	2.11	1.24
	Certified seeds are wholly natural	1.86	1.17
	Compatible with farming system	1.48	1.03
	Will not decrease the use of Indigenous seed	1.45	0.77
	Not against traditional beliefs	1.02	1.08
		1.55	
	Grand Mean	2.10	

Source: Field survey, 2023

Constraints with the Cultivation of Certified Rice Seeds

From Table 3, the weak role of agricultural extension ($\bar{x} = 2.9$), high cost of seed ($\bar{x} = 2.9$) and the absence of agricultural insurance ($\bar{x} = 2.8$) are the severe production constraints in the cultivation of certified rice varieties and this may be responsible for farmers' unwillingness to take the risk ($\bar{x} = 2.6$). The absence of credible information on the cultivation of certified rice seed is connected to inadequate access to extension services by farm households. Extension service providers are the primary source of information for most smallholder farmers in Nigeria (Raheem et al., 2023). The inability

of agricultural extension to persuade farmers and educate them on the need for the adoption of certified seeds has negatively influenced their decision to adopt certified seeds (Izuogu et al., 2023). As the gap between farmers and agricultural extension service providers widens over cropping seasons, information on certified rice seeds will be inadequate.

Sujianto et al. (2022) identified reluctance to take risk, and unavailable compensation cash support as the major production constraints in the cultivation of improved rice varieties. According to Izuogu et al (2023), the absence of an agricultural production insurance scheme, seed multiplication and marketing pose severe challenges to the adoption of certified seed.

Table 3: Cultivation constraints

Items	Mean	SD
Weak role of agricultural extension	2.9	0.32
High cost of seed	2.9	0.23
Lack of agricultural insurance	2.8	0.82
Reluctant to take risk	2.6	0.54
Lack of public awareness	2.4	0.42
No initial cash support	2.2	1.32
Lack of skill	2.1	1.03
Lack of fertilizer	1.8	0.56
Unsuitable climate	1.8	1.03
Non-availability of seed	1.6	0.78
Lack of appropriate production inputs (fertilizer etc)	1.6	0.58
Lack of knowledge of seed source	1.4	0.54
Lack of acceptance by peer group members	1.4	0.24
Labour requirement	1.3	0.12
Lack of clear policies to support certified seed production	1.2	1.05

Source: Field survey, 2023

Determinants of Attitudes towards Certified Seeds

Respondents' age ($\beta=-0.417$) had a significant negative influence on their attitudes toward certified rice seed. This implies that the older the respondents grew, the more the likelihood of not having a favourable attitude towards certified rice seeds. This agrees with the findings of Setshedi & Modirwa (2020) who reported that younger farmers demonstrate a more favourable attitude towards innovative agricultural practices given that they are strong and agile with a higher capacity to gain information from the internet and other mass media on the successes recorded through the adoption of innovations by other farmers.

Level of education ($\beta=2.325$), was significant and had a positive influence on respondents' attitudes toward certified seeds. This implies that the more educated farmers are, the more the likelihood of their expressing favourable attitudes toward the cultivation of certified seeds. This result agrees with Kibwika et al. (2021) who reported that education positively influenced farmers' attitudes toward improved agricultural practices. Education enables farmers to come in contact with trained professionals in the agricultural sector hence improving their attitudes toward agricultural innovations.

Table 4 further shows that access to agricultural extension services ($\beta=3.155$) was a significant and positive determinant of respondents' attitudes toward the cultivation of

certified seeds. Mukherjee et al. (2022) identified extension contact to be positively correlated to farmers' attitudes toward agricultural innovations. Agricultural extension service is a credible source of advice to farmers (Izuogu et al., 2021). Extension usually stimulates farmers to identify solutions to their problems. It does this through various educational processes that influence farmers' attitudes positively.

Distance covered by respondents in procuring certified seeds ($\beta=-1.274$) had a significant negative influence on rice farmers' attitudes toward the cultivation of certified seeds. Mulugeta et al. (2024) reported that smallholder farmers' attitude regarding agricultural inputs was negatively influenced by the distance between their location and sources of input. When farmers cover longer distances to secure certified seeds, it competes with their time for other household and personal engagements. Alternatively, farmers may decide to use faster means of movement such as motorcycles, cars etc but this will increase the net cost of acquiring the seeds and generate a negative attitude towards the cultivation of certified seeds.

Determinants of attitude towards certified seeds

Variable	Co-efficient
Age	-0.417
Level of education	2.325**
Farm size	1.132
Access to extension	3.155***
Distance to the source of seed	-1.274**
Marital status	-0.352
Log-likelihood function	102.272
Likelihood ratio chi-square	53.103
Pseudo R square	0.527

* $P \leq 0.05$

Conclusion and Recommendations

Farmers expected increased yield, additional income, and ease of harvesting from the cultivation of certified rice seeds although their attitude towards certified seed was unfavourable as they held a belief that the benefits from the cultivation of certified seeds as portrayed, are for foreign companies to make local rice farmers dependent on these companies. The weak role of the agricultural extension services and lack of insurance policies were severe cultivation constraints. Access to agricultural extension services, education, and distance covered to secure seeds influenced farmers' attitudes toward certified seeds.

To boost farmers' positive attitudes toward certified seeds, multiple approaches including establishment of demonstration plots to create a better understanding of certified rice seeds should be implemented. The mechanism of disseminating information on certified seeds should be monitored to prevent misinformation and improve farmers' attitudes towards it. More extension workers should be mobilized to ensure adequate dissemination of information on certified rice seeds. The government should ensure that farmers access quality certified rice seeds that will meet their expectations. Certified seed distributors should widen their network to reduce the distance farmers cover in sourcing certified seeds.

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