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Trends in the Adoption of Inorganic Fertilizer by Rice Contact Farmers in the North Central Agro Ecological Zone of Nigeria.

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Abstract

Inorganic fertilizer that was introduced to Nigerian farmers in the late forties has undergone various levels of adoption as a result of different fertilizer policies put in place by the government at one regime or another. This study analyses trend in the adoption of inorganic fertilizer in the north central agro-ecological zone of Nigeria. Data on 302 contact rice farmers were collected and analyzed with the use of sigma method and Z – test at $P<0.05$ significance level. Fertilizer adoption levels were generally high between 2004 and 2008. There was a gradual increase in fertilizer adoption as the year progressed to 2008 (adoption levels of 68.57, 57.88, 64.90, 77.15 and 89.40 percents and adoption scores of 5.20, 5.16, 5.08, 5.42 and 5.73). There was however no significant difference between the outputs of improved and local rice under fertilizer uses. This study recommends that government should put in place agro-dealer network in the rural areas to ensure uninterrupted supply of inorganic fertilizer at affordable price to improve rice production in Nigeria.

Keywords: Innovation, Adoption, nutrient replacement, rice varieties, rice output.

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Introduction

Nigeria consumes about 5 million tons of rice annually and produces only about half of this. The balance is imported at a high cost. Nigeria imports over N600 billion worth of rice annually which could be conveniently produced locally (Rabiu, 2008). Sources for such additional increase are identified as increase in acreage under high yielding varieties and nutrient management technologies.

One of the most important ways of enhancing functional nutrient management is through the use of inorganic fertilizer. Experiments on the response of crops to elements such as nitrogen, phosphorus and potassium (NPK) were engaged upon by some local scientists in Nigeria between 1950 and 1970. The result of the experiment was positive and as such many farmers adopted fertilizer as an innovation to boost their rice production. Both the local and improved varieties of rice are found to be very responsive to inorganic fertilizer especially the improved varieties. Fertilizer as an innovation has since then undergone a lot of stages in the adoption.

An innovation is an idea, method or object which is regarded as new by an individual but which is not always the result of recent research (Rogers, 1983). In support of this assertion, Van den Ban and Hawkins, (1996) said that the metric system is still an innovation for some Anglo Saxon North Americans despite the fact that it was developed 200 years ago. Leauwis and Van den Ban, (2006) reported that there were thousands of studies conducted across the world between 1950 and 70, which sought to explain why and how people came to adopt or not, new agricultural technologies and practices. The purpose of those studies was to find a way of accelerating the adoption of relevant innovations.

Adoption research also revealed that innovations are not adopted by everyone at the same time. Adoption researchers typically classified people into five different categories according to their scores on an adoption index, (Rogers, 1983). These are innovators (2.5 percent), early adopters (13.5 percent), early majority (34.0 percent), late majority (34.0 percent) and laggards (16.0 percent). The percentages represent standardized average of percentages formed in different studies. Contact farmers are likely to adopt farm inputs such as fertilizer than other farmers. Contact farmers are usually selected from different agricultural extension zones for the purpose of receiving training in agricultural technology use. These farmers are usually opinion leaders selected based on the fact that idea flows to opinion leaders before the less active segments of the population.

Inorganic fertilizer adoption can be understood from the concept that continued nutrient removal without replacement would lead to yield loss. A land that is continuously cropped will lead to degeneration of soil organic matter. When farmers observe a specific nutrient stress in a growing plant, inorganic fertilizer can be applied to restore the removed nutrients. If a certain type and quantity of fertilizer can correctly or effectively replace the nutrient loss in the soil, optimum productivity of such a crop can be achieved. A farmer may therefore adopt an inorganic fertilizer that will best enhance the yield of his crops. Adoption of a new technology is usually modeled as a choice between two alternatives, either to continue with the traditional technology or the improved (Feleke and Zegeye, 2006). The continued use of inorganic fertilizer may depend on its ability to sustain increase crop yield of the farmers at an affordable price. Optimum yield may therefore not be achieved if fertilizer application does not effectively replace the nutrient removed from the soil. Douglas *et al*, (2005) reported that, during the 70s, 80s and 90s, fertilizer was the largest source of growth in food production in developing countries particularly in intensive rice and wheat systems.

However, Fakorede, (2001), in a farm level survey conducted all over Nigeria, asserted that non availability of fertilizer was ranked by 99 percent of the farmers as the first major problem to crop production while only 34 percent indicated that fertilizers were available but too expensive. Oboh and Nzenwa, (2005) also conducted another study on fertilizer use in Benue State Nigeria and came up with the findings that 82.5 percent of farmers could not procure fertilizer due to high price. However rice production has been found to require much of inorganic fertilizer (especially improved varieties) in the study area (FMARD, 2002). The main objectives of this study is determine the adoption level of inorganic fertilizer among farmers in the North Central agro-ecological zone of Nigeria and Compare the output of local and improved rice under inorganic fertilizer use.

Materials and Methods

The study covers Kogi and Benue states in the North central agroecological zone of Nigeria as represented in figure 1. Kogi state is popularly known as "the confluence state" because of the location of the state around the point where rivers Niger and Benue meet. The areas around the confluence of rivers Nigeri and Benue is characterized with alluvial fertile soil which is very good for crops such as rice, maize, sugar cane and so on. Kogi State has an area of 283, 124 square kilometers and a total population of 3, 278, 487 (FGN, 2007). Kogi State is located between latitude 6º30′N and 8º50′N and longitude 5º51′E and 8º00′E. It has maximum temperature of 33.2ºC.

Benue state is adjacent to Kogi State on the east and lies between longitude 7º and 10º E and between latitude 6º25′ of the equator. It has estimated land area of 927 340km^2. The state is bounded by Kogi state to the west, Taraba State to the north east and also shares a small part with the national boundary of the Republic of Cameroon in the southeast. Benue state has a population of 4,219,244 Federal Government of Nigeria (FGN, 2007). The state is largely agrarian and one of the largest producer of rice in the country. The large quantity of rice produced in this state was responsible for the location of rice milling industry in the state known as Olam milling industry. Other crops grown include maize, millet and yam while livestock such as cattle, pigs, sheep and poultry are kept in large quantity.

Benue State is made up of 23 local government areas. The total population of contact farmers spread across these local government was about 13,754 as at the time this study was conducted while Kogi state has 21 local government areas and about 13, 644 contact farmers. Six Local Government Areas each from Benue (Guma, Gwer-west, Apa, Agatu, Logo

and Katsina Ala) and Kogi (Ibaji, Idah, Bassa, Lokoja, Kogi and Omala) states were purposively selected. Two Local Government Areas were randomly chosen from each of the three agro extension zones in each of Kogi and Benue states. Of the 3,897 contact farmers available in the six selected local governments in Kogi state and 3,916 contact farmers in the six selected local government areas in Benue States, 4.0 percent were randomly selected from each of the selected local government areas to represent a sample size of 312 as revealed in Table 1.

4.0% of the population of contact farmers was selected because it is large enough to bring out findings that will be reliable and stand the test of time. Contact farmers are farmers selected for teaching and visit by agricultural extension agents in Kogi and Benue States. A total of 312 sets of questionnaires were administered using trained enumerators but 302 were retrieved while the remaining 10 respondents could not be reached.

Data generated from the administration of the questionnaire were subjected to descriptive analysis. The first objective was achieved using sigma method to calculate the adoption levels and adoption scores. The level of adoption was measured by percentage of adopters. That is farmers were requested to state whether they adopted inorganic fertilizer or not using the principle of yes or no with a score of 1 and 0 respectively. Adoption level, in this case connotes the percentage of the summation of all yes responses.

Adoption level was also used to compute adoption scores as explained by Agbamu, (2006). In this model percentage of farmers who adopted an innovation is obtained and a value known as sigma distance which is read from the statistical table of normal deviates is secured. Objective two was met by the use of Z-test two tailed at 0.05 significance levels to determine significant differences in output of local and improved rice under inorganic fertilizer use in the study area.

Results and Discussion

Table 2 shows the adoption levels and adoption scores for inorganic fertilizers by rice farmers in the north central zone of Nigeria. Generally speaking, rice farmers recorded very high adoption levels and adoption scores between 2004 and 2008 that is, the adoption level of 68.57 percent, 67.88 percent, 64.90 percent, 77.15 percent and 89.40 percent. This is in agreement with Awe *et al*, (2007) who said that more than 99.5 percent of farmers still depend on inorganic fertilizer to improve their soil condition in the north central zone of Nigeria. Figure 2 further clarified the trend as 2006 marked the year when inorganic fertilizer was least adopted by the rice farmers. There was however, a gradual increase in fertilizer adoption as the year progressed to 2008. It is therefore reasonable to say that inorganic fertilizer adoption has been on the increase in recent years.

The increase in adoption could be due to the favourable disposition of the federal and state governments to inorganic fertilizer through subsidy. This view was supported by Ayoola, (2009) as the reported that "The period between 1999 and 2006 featured the implementation of a fertilizer stabilization scheme, which involved the re-introduction of subsidy at 25 percent level and annual tenders by the federal government of Nigeria to purchase limited quantities of fertilizer from private importers, for direct delivery to states for onward sales to farmers at fixed prices".

Table 3 shows that there was no significant difference between the output of improved and local rice. This result is in contrary to *apriori* expectation. More yields or higher output is expected for improve rice than local rice. However, the indifference in the output could be due to the fact that improved varieties require higher quantity of fertilizer than the local – the unavailability or insufficient application of fertilizer to the improved varieties of rice might therefore not give the expected high yield.

Conclusion and Recommendations

The current trend in the adoption of inorganic fertilizer for rice production reveals that, adoption of fertilizer between 2004 and 2008 was consistently high and at its peak in 2008. This implies that farmers are more willing than ever to adopt inorganic fertilizer. Fertilizer companies and government of Nigeria (Federal, State and Local) should produce and distribute enough inorganic fertilizer to enable farmers access to the product at any point of need, Infrastructural facilities such as road, accessibility to credit in the rural community, and provision of improved seed should be encouraged to further improve on adoption level, The 2006 federal government policy on fertilizer use should be reviewed to provide room for agro-dealer networks in rural areas. This network is expected to function through supply of fertilizer to contact farmers for sale to other farmers as practiced in Malawi and The governments of Nigeria should remove all bottlenecks that will stand between farmers and fertilizer use in other to quickly bridge the gap between the quantities of rice produced and consumed in Nigeria, and save billions of Naira spent on rice importation.

References

Agbamu, J.U. **2006.** Essentials of Agricultural Communication in Nigeria. Malthouse Press Limited Publishers. 80 – 83pp.

Awe, O.A., T.K. Thogong, S.Y. Nzee, and M.A. Adegboye **2007**. Survey of soil fertility management techniques used by small holders on the Jos Plateau. Pp 522 - 526 In: O.O. Olufajo, D.F. Omokere, G.N. Akpa and S.A. Sanni (eds). *Reviving Agriculture for Sustainable National Growth and Stable Democracy,* Proceedings of the 41st Annual

Conference of the Agricultural Society of Nigeria (ASN) Held at IAR, Ahmadu Bello University Zaria, Nigeria. 22 – 26 October.

Ayoola, G.B. **2009**. Prodigies of Agricultural Economy and Policy. An Inaugural Lecture Delivered at University of Agriculture Makurdi on Wednesday May 20, 2009. Lecture Series: No.9: 29 – 30pp.

Douglas, G, M. Mornis, M and D. Byerleee **2005.** Technology adoption in intensive post-green revolution system. *American Journal of Agricultural Economics* 87:5 1311 – 1315.

Fakorede, M.A.B **2001.** Revolutionizing Nigerian Agriculture with the Golden Seed. Nigerian Universities Commission. Nigerian Universities Inaugural Lectures 2001. 51 – 78pp

Federal Ministry of Agriculture and Rural Development FMARD, **2002.** Fertilizer Use and Management Practices for Crops in Nigeria Pp 188-191 In: V.A. Aduayi, V.O. Chude, R.A. Adebusyi, and S.O. Olayiwola, (eds).

Federal Republic of Nigeria FGN, **2007.** Federal Republic of Nigeria Official Gazette 94: 24 182-183.

Feleke, S. and T. Zegege 2006. Adoption of improved maize varieties in Southern Ethopia. Factors and strategy options. Food Policy 31: 442 – 457.

Leauwis C; and A. Vandenben **2006.** Communication for Rural Innovation, Rethinking Agricultural Extension 3rd edition. Blackwell Publishing CTA. 129-132pp.

Oboh, V.U. and G.O. Nzenwa **2005**. Fertilizer subsidy removal and its effects on maize production in Benue State. Pp 319-321 In: A.M. Orheruata, S.O. Nwokoro, M.T. Ajayi, and G.N. Asumugha (eds) *Agricultural Rebirth for Improved Production in Nigeria* Proceeding of the 39th Annual Conference of the Agricultural Society Nigeria. Held at University of Benin, Benin City, Nigeria. October 9th – 13th.

Rabiu, R. **2008.** Nigeria imports N600 billion rice a year. Daily Trust Newspaper 21st June of p. 8.

Rogers, E.M. **1983**. Diffusion of Innovation 3rd Edition New York, Free Press. 22-24pp.

Van den Ban A. W and H.S. Hawkins **1996**. Agricultural Extension 2nd Edition 96-99pp.

Table 1: Selected Contact Farmers As Respondents For The Study.

State	Local government area	Population of Contact farmers	Sample size
Kogi	Kogi	640	26
	Lokoja	610	24
	Bassa`	703	28
	Omala	673	27
	Ibaji	633	25
	Idah	638	26
	Sub-Total	**3, 897**	**156 (149 retrieved)**
Benue	Guma	683	27
	Gwer-West	655	26
	Apa	630	25
	Agatu	643	26
	Logo	597	24
	Katsina-Ala	708	28
	Sub-Total	**3, 916**	**156 (153 retrieved)**
	Grand Total	**7, 813**	**312 (302 retrieved)**

Source: Field Survey, 2009

Table 2: Adoption levels and adoption scores for inorganic fertilizer by rice farmers between 2004 – 2008 (n = 302)

Year	No of Adopters	Percentage	Z-Distance	Z Distance (+2 x 2)	Adoption Score
2004	207	68.57	0.40	4.80	5.20
2005	205	67.88	0.42	4.84	5.16
2006	196	64.90	0.46	4.92	5.08
2007	233	77.15	0.29	4.58	5.42
2008	270	89.40	0.133	4.27	5.73

Source: Field Survey 2009

Table 3: Test of significant difference (z-test) in output of improved and local rice under inorganic fertilizer use in the study area (n = 302).

Research Items	Sample Size	Mean	STD. Dev. Known Variance	Z - score	Decision
Output of Improved Rice in study area	302	722.68	1908578.33	Cal = - 4.88	Accept H_{o1}
Output of Local Rice in study area	302	1392.06	3752992.35	Tab = 1.06	

Source: Field Survey, 2009

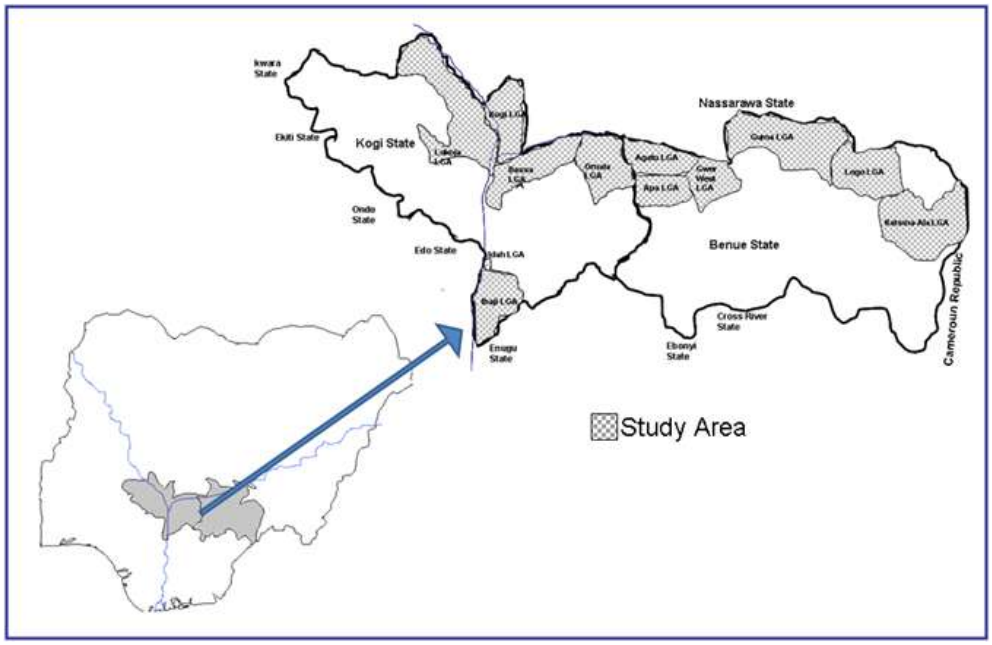

Fig. 1: Map of Nigeria showing the study area (shaded)

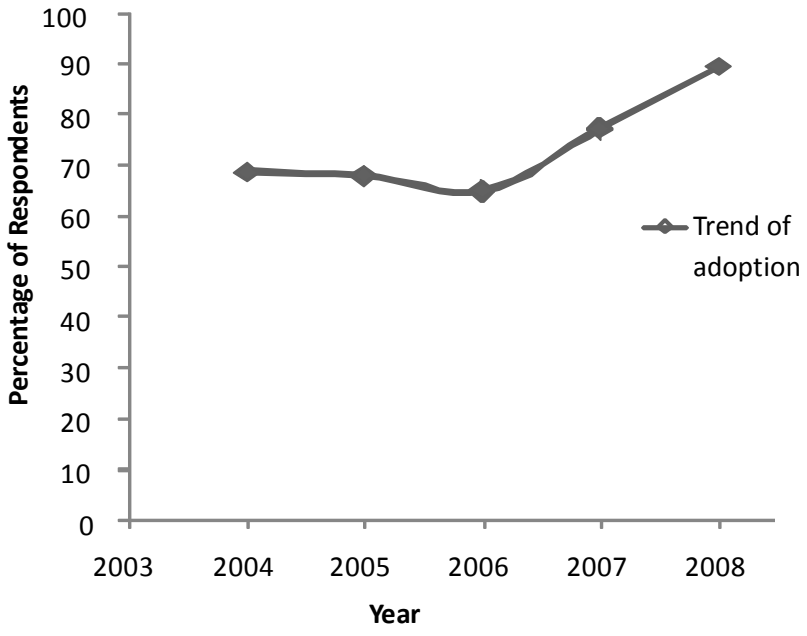

Fig. 2: Shows the trend of inorganic fertilizer adoption between 2004 and 2008