



Assessment of Maize Farmers' Knowledge and Level of Adoption of Improved Practices as well as Yield of Maize under Research-Extension-Farmers-Input-Linkage-System in Nigeria

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Abstract

The study assessed maize farmers' knowledge, adoption of improved practices and yield under Research-Extension-Farmers-Input-Linkage System (REFILS) in Nigeria. Multi-stage random sampling technique was used to select 198 maize farmers from 3 agricultural zones (Northwest, Northcentral and Southwest) in Nigeria. Data were collected using structured questionnaire. Descriptive statistics (frequencies, percentages and mean) were used to analyse the data, while inferential statistic (ANOVA) was used to test the hypotheses. Results showed that majority (67.7%) of the respondents were male, married (95.5%) and had more than 10 years of farming experience (72.7%). Farmers' knowledge and adoption of improved practices were high across the zones while the lowest yield was recorded in Southwest. There was no significant difference in maize farmers' knowledge of improved practices across the zones ($F=1.291$, $p=0.27$), while a significant difference existed in the level of maize production across the zones ($F=28.059$, $p=0.000$). The study concluded that REFILS has gone a long way in enhancing the capacity of farmers and therefore, concerted efforts should be made to improve the activities of REFILS in Nigeria.

Key words: Adoption, Assessment, Farmers' knowledge, REFILS in Nigeria, Yield

Introduction

Research-Extension-Farmers-Input-Linkage System (REFILS) is defined as the interplay of research, extension, farmers and input supply agencies in a cost-effective manner aimed at rapidly increasing agricultural production and productivity of resource-poor farmers (Adebowale and Amusat, 2005). Research-Extension-Farmers-Input-Linkage System represents the framework of the coordination of research and extension activities in all agricultural zones of the country. The REFILS strategy was initiated in order to minimize or eliminate identified constraints such as linear information flow, basic and upstream research, low adoption of technology, technology development without farmers' involvement and lack of feedback from farmers to research which affect effective research extension farmers'

linkages in the country (Tologbonse, 2012). Research-Extension-Farmers-Input-Linkage System was therefore predicated on the belief that farmers are involved in the whole process of technology development and application resulting from problem identification, technology generation, adaptation and dissemination. The REFILS as designed is expected to bring all the key stakeholders in agriculture together in participatory technology development, adaptation, dissemination and utilisation of sustainable agricultural development. However, it is confronted with several challenges as captured in the Agricultural Transformation Agenda document (FGN, 2012) as follow:

- a) Unfriendly policy environment, compounded by policy summersault and poor cum no incentives provided for the private sector thus, triggering

reduced investors' confidence. This has consequently resulted in reduced capital availability for local investors in agricultural development.

- b) A dormant, ineffective and inefficient public agricultural extension service that is characterised by a top-down, supply driven extension system compounded by serious structural, organisational and management challenges.
- c) Grossly inadequate, irregular and untimely release of funds to the agricultural and rural development sector and with concomitant negative effect on agricultural extension and advisory services.

Agricultural extension which is a “vital component” of REFILS has been one of the approaches used to improve agricultural productivity in Nigeria. The extension agencies function as a conduit for bringing agricultural innovations to farmers as well as taking farmers problem to the researchers. Therefore, extension system has been playing the vital role of disseminating various technologies on maize production to farmers in different agricultural zones of the country.

Technologies on maize production ranging from the type of soil, land preparation, improved varieties of maize, planting dates peculiar to different agro ecologies, treatment of maize seeds, spacing, plant population, fertilizer application, weed control methods, pests and diseases control strategies, harvesting and processing have been generated and disseminated under the coordination of REFILS teams and these have supposedly impacted positively on farmers knowledge, adoption of the technologies and consequently maize yield in Nigeria.

Though, it has also been revealed that farmers in some rural communities have never benefitted from the extension service of the Agricultural Development Programs (ADPs) (NAERLS and NPFS, 2011), whereas it is an incontrovertible fact that the gate way to self-sufficiency and sustainable maize production in Nigeria is through adequate and effective agricultural extension delivery system. Adoption of technologies generated and disseminated without farmers' involvement is not encouraging. This has necessitated the introduction of the REFILS strategies which is seen as a concept that starts and ends with farmers. The operational activities of REFILS such as Monthly Technological Review Meeting (MTRM), diagnostic survey (field visits), Zonal REFILS workshop, Fortnightly Training (FNT), On Farm Adaptive Research, Small Plot Adoption Trial/Management Training Plot and media activities (print, radio/television) are presently not at their optimal performance and thereby calls for critical review (Kolo, 2012 and Oluwatosin, 2015). The operators of REFILS are confronted with unfriendly policy environment characterised by ineffective and inefficient public agricultural extension system coupled with poor linkage system among the stakeholders. This has negatively affected the major actors of REFILS especially maize farmers who are always at the receiving ends. The problem of poor linkage system, ineffective information flow and weak interaction among the stakeholders have been a threat to the effectiveness of REFILS for service delivery on maize production and as such detrimental to the overall development of maize farmers in Nigeria.

Since the inception of Research –Extension –Farmers –Inputs –Linkage

Systems over three decades ago, efforts have been made to understand the concept better for more effective delivery. The need for more studies on REFILS, especially its effect on maize production cannot be over emphasized as huge amount of money is being spent on the concept yearly and the attainment of food security depends greatly on the effectiveness of REFILS.

Based on the fact that effective REFILS is a prerequisite for increase in maize farmers' knowledge, adoption and consequently yield; it is imperative to assess maize farmers' knowledge, adoption of improved practices and yield in Nigeria.

Objectives of the study were to

1. determine the personal characteristics of maize farmers in Nigeria.
2. determine the level of knowledge of improved practices among maize farmers in the study area.
3. assess the adoption rate of different technologies on maize in the study area and
4. determine maize farmers yield in the study area.

Hypotheses of the study

Ho1: There is no significance difference in the maize farmers' knowledge of improved practices across the zones

Ho2: There is no significant difference in the production level of maize farmers across the zones.

Methodology

The population of the study consists of maize farmers in the six agricultural zones of the country out of which 50% of the zones were purposively sampled. These are

Northwest, Northcentral and Southwest zones. They were purposively sampled because the zones have comparative advantage in maize production compared to other zones (NAERLS & NPFS, 2011). Moreover, three states were also purposively selected from the three zones sampled (one state from each zone). Oyo state which belongs to South-west agricultural zone, Kaduna state in North-west agricultural zone and Niger state in Northcentral were sampled because of the intensity of maize production in the states. Multi-stage sampling procedure was used to select maize farmers for the study. The choice of maize farmers for the study was premised on the fact that technologies have been generated and disseminated on maize crop since inception of REFILS. The list of Agricultural Development Programmes (ADPs) registered maize farmers in the two states were obtained and selection was done as follows:

Random sampling of 50% of the zones in the selected states' ADPs was done. Then random sampling of 30% of the ADP blocks in the sampled zones was carried out to give a total of 14 blocks that contained 57 cells. This was followed by random sampling of 20% of the cells in the sampled blocks to give a total of 11 cells with 1989 farmers in the sampled cells. Lastly, 10 % of farmers in the randomly selected cells were sampled to give a total of 198 farmers across the states which were thus used for the study. Data for the study were collected through the administration of pretested questionnaire and analysed with descriptive and inferential statistics such as ANOVA.

Results and Discussion

Personal characteristics of respondents

Table 1 reveals that majority of the

respondents were males (67.7%). This implies that women are less involved in the basic agricultural enterprises involving maize production in the country. The age distribution as shown in Table 1 reveals that 59.6% of maize farmers were within the age bracket of 41-50 years. This is consistent with Onyegbula (2015) who reported the age bracket of 41-50 years for most farmers in rain forest and guinea savannah agro ecological zones of Nigeria. The data on age shows that most of the maize farmers are still in their active years, implying availability of physical strength and mental alertness in adopting improved technologies which is a core objective of Research-Extension-Farmers-Input-Linkage System (REFILS).

Majority (95.5%) of the total maize farmers were married as shown in Table 1. This illustrates the importance of marriage institution in the study area. The finding on maize farmers' educational attainment across the zones shows that 37.4% of the total maize farmers had no formal education, while 34.3% were educated up to secondary level. It was also revealed that 21.5% of farmers in Northwest had tertiary education compared to 2.8% in Northcentral and 8.1% in Southwest who also had tertiary education. On the whole, 62.6% of the respondents had education ranging from primary six to tertiary level. This implies that majority of the respondents are literates and this is in line with Oladeji (2011), who asserted that farmers are not totally illiterates but had one form of education or the other. The mean annual income for the maize farmers in the study area was N327,795.46. More than half of the farmers (53.2%) in Southwest had between N100,001- N300,000 as their annual income, while 36.9% and 54.9% of

respondents from Northwest and Northcentral zones, respectively had annual income ranged from N300,001- N500,000. This implies that respondents from Northwest and Northcentral zones realised more income from their maize production enterprise and would be able to earn better living conditions than their counterpart from Southwest zone. Table 1 reveals that majority of maize farmers in Northwest (61.5%) possessed farm sizes of between 4-6 hectares, while in Northcentral, a little above average (56.4%) and in Southwest majority (71.0%) possessed between 4-6 and 1-3 hectares, respectively. The average farm size was 3.54 ha. This implies that maize cultivation is still at subsistence level. The result on farming experience reveals that only 27.3% had below 10 years of experience. This infers that majority of farmers in the study area had reasonable years of farming experience.

Farmers' knowledge of improved practices on maize production

Possession of knowledge on maize production technologies by farmers will build their capacity on maize production and will consequently help them to adopt technologies which will improve their productivity. From the results across the study area (Table 2a), the knowledge of maize farmers was ranked first on the technology that 'farm hygiene can curb the incidence of disease outbreak and pest on the farm and this was followed by maize should be planted on a well-drained sandy loam /loamy soil while it is not necessary to carry out soil testing was ranked lowest. This is because majority of the maize farmers were small scale farmers who had never tested their soil for the nutrients it

Table 1: Distribution of maize farmers' personal characteristics

Variable	NW (n=65)		NC (n=71)		SW (n=62)		Total n= 198	
	F	%	F	%	F	%	F	%
Age								
= 30	8	12.3	1	1.4	1	1.6	10	5.1
31 – 40	12	1.85	21	29.6	8	12.9	41	20.7
41 – 50	37	56.9	42	59.2	39	62.9	118	59.6
51 – 60	5	7.7	5	7.0	13	21.0	23	11.6
> 60	3	4.6	2	2.8	1	1.6	6	3.0
Mean age	43.9±8.32		44.2±6.80		46.7±6.20		44.8±7.23	
Marital Status								
Single	2	3.1	-	0.0	2	3.2	4	2.0
Married	61	93.9	68	95.8	60	96.8	189	95.5
Divorced	1	1.5	1	1.4	-	0.0	2	1.0
Widowed	1	1.5	2	2.8	-	0.0	3	1.5
Educational level								
No formal	21	32.3	42	59.2	11	17.7	74	37.4
Primary	18	27.7	3	4.2	14	22.6	35	17.7
Secondary	12	18.5	24	33.8	32	51.6	68	34.3
Tertiary	14	21.5	2	2.8	5	8.1	21	10.6
Farm Income								
= 100,000	1	1.5	-	0.0	17	27.4	34	17.2
100,000 – 300,000	22	33.8	32	45.1	33	53.2	71	35.9
300,001 – 500,000	24	36.9	39	54.9	9	14.5	72	36.4
500,001 – 700,000	8	12.3	-	0.0	2	3.2	10	5.1
Above 700,000	10	15.4	-	0.0	1	1.6	11	5.4
Mean Annual income	N339,58		N385,31		N273,4		N332,7	
	5		0		90		95	
Farm size								
< 1 hect	10	15.4	1	1.4	-	0.0	11	5.6
1 – 3 hect	12	18.5	28	39.4	44	71.0	92	46.5
4 – 6 hect	40	61.5	40	56.4	8	12.9	80	40.4
> 6 hect	3	4.6	2	2.8	10	16.1	15	7.5
Mean							3.54	
Farming experience								
< 5 years	8	12.3	5	7.0	5	8.1	18	9.0
5 – 9 years	20	30.8	11	15.5	5	8.1	36	18.2
10 – 14 years	21	32.3	28	39.4	8	12.9	57	28.8
15 – 19 years	11	16.9	19	26.8	38	61.2	68	34.3
> 20 years	5	7.7	8	11.3	6	9.7	19	9.6
Mean	13.6		13.1		18.7		15.3	

Source: Field survey, 2015

contain, even though they were applying fertilizer to the soil. The result is corroborated by the research finding of IAR&T (2013) which stated that majority of farmers in Nigeria have not shown considerable interest in knowing the nutrient status of their soil despite continuous use of the land.

Table 2b reflects the knowledge level of

farmers on maize production practices. Generally, the result reveals that 70.2% of the respondents had high knowledge of maize production practices, while 29.8% had low knowledge. The result implies that most of the respondents are equipped with the recommended maize production packages emanated from research institutes and disseminated by extension personnel of

Table 2a: Distribution of respondents based on knowledge of improved practices on maize production

S/N	Knowledge Statements	North West n = 65	North Central n = 71	South West n = 62	Total n = 198	Rank
		Mean	Mean	Mean	Mean	
1.	Maize should be planted on a well-drained sandy loam /loamy soil	0.9	1.00	1.00	0.96	2nd
2.	Fertile soils with relatively flat topography are preferred for planting maize	0.83	1.00	1.00	0.94	5th
3.	In planting maize, farmers study as much as possible to incorporate residue of the existing plant into the soil	0.75	0.17	0.90	0.87	8th
4.	It is good to plant improved recommended varieties of maize	0.89	0.97	0.98	0.94	4th
5.	T2SR and DMR-LSR are some of the recommended varieties of maize	0.75	0.19	0.94	0.61	14th
6.	Is it true that maize can be planted on flat land	0.83	0.85	0.80	0.83	9th
7.	Depth of planting is 5 – 7cm	0.73	0.67	0.50	0.64	13th
8.	Undue delay in maize harvesting increases damage due to diseases, pest and possible seed germination on cob while on stock	0.83	0.91	0.93	0.89	6th
9.	It is not necessary to carry out soil testing before applying fertilizer on your maize farm	0.63	0.42	0.41	0.48	15th
10.	Phostoxin tablet is used for maize preservation during storage	0.92	0.98	0.98	0.96	3rd
11.	Farm hygiene can curb the incidences of diseases outbreak and pest on the farm	0.95	1.00	1.00	0.98	1st
12.	A farmer can realize 2 – 2.5 tons of maize on a well maintained farm	0.80	1.00	0.20	0.68	12th
13.	Maize on cobs should be stored in cribs using actellic 25EC at 200ml/10litres of water	0.84	0.73	0.83	0.80	10th
14.	Time to do first weeding on maize farm	0.24	0.05	0.79	0.34	16th
15.	Quantity of maize seed to plant on hectare of farm manually	0.47	0.18	1.00	0.22	11th
16.	Ability to mention two improved varieties in respondent's locality	0.75	0.91	0.74	0.88	7th

Source: Field survey, 2015.

Table 2b: Farmers' knowledge level of improved practices on maize production across the zones

Knowledge level	NorthWest (n=65)		NorthCentral (n=71)		SouthWest (n = 62)		Total (n =198)		
	F	%	F	%	F	%	F	%	
Low (0-7)	16	24.6	26	36.6	17	27.4	59	29.8	
High (8-16)	49	75.4	45	63.4	45	72.6	13	70.2	
Mean ± SD								8.11±1.86	

Source: Field survey, 2015

Agricultural Development Programmes (ADPs). Disaggregated data shows that majority of the respondents (75.4%, 63.4% and 72.6%) in Northwest, Northcentral and Southwest, respectively had high knowledge. This is expected because of the long years of farming experience of the respondents coupled with the fact that majority of the respondents have been participating in REFILS since its introduction about three decades ago. Also, majority of the respondents in the study area belong to formidable farmers' associations which are pivotal in the spread of agricultural innovation.

Farmers' adoption of improved practices on maize production

Various recommended practices (technologies) have been adopted by maize farmers over the years to improve maize production in the country. At present, Nigeria is the largest producer of maize in Africa and number ten in the world (IITA, 2010). The different recommended practices were ranked according to the mean values. According to Table 3a, the recommended practices for maize production ranged from land preparation to storage. The data in Table 3a reveals that planting maize on a well-drained sandy loam or loamy soil (0.92), early harvesting of maize to avoid damage due to diseases, pests and possible seed germination on cob while on stock (0.87) ranked 1st and 2nd, respectively in Northwest, while planting on a well-drained sandy loam or loamy soil (1.0), planting on a fertile soil with flat topography (1.00), early harvesting of maize to avoid damage due to diseases, pests and possible seed germination on cob while on stock (1.00) ranked 1st in Northcentral. In the same vein, planting on

a well-drained sandy loam or loamy soil (1.00), planting on a fertile soil with flat topography (1.00), incorporation of residue of the existing plants into the soil before planting maize (1.00); ranked 1st in the Southwest. Also, the practice on the use of one empty beer bottle cap of N.P.K fertilizer for two plants of maize (0.98) and carrying out soil testing before applying fertilizer on the maize farm (0.16) ranked 13th and 14th respectively in the Northwest while in the Northcentral planting of TZSR and DMR–LSR recommended varieties of maize and carrying out of soil testing before applying fertilizer (0.17), (0.14) ranked 14th and 13th, respectively.

In the same vein, planting of maize at a spacing of 75cm×40cm with hands (0.27) and carry out of soil testing before applying fertilizer on the maize farm (0.17) ranked 13th and 14th, respectively in Southwest. The result shows that the mean value of the practice on carrying out of soil testing before applying fertilizer on maize is consistently low in all the zones and ranked 14th, 13th and 14th in Northwest, Northcentral and Southwest, respectively. This might be due to the high cost of carrying out a soil test and non-availability of the laboratory for such in rural areas where farming is practised.

As shown in Table 3b there was an indication of high rate of adoption of maize recommended practices in all the zones in the following proportions; 69.2%, 76.1% and 82.3% in Northwest, Northcentral and Southwest, respectively. From the result, the adoption of recommended practices on maize is high across the zones. This is due to the fact that most of the respondents are highly experienced farmers who had been enjoying a robust relationship with researchers, extension practitioners and

input agents over a long period of time. Also, the extension services of government which disseminate recommended practices on maize production to farmers are also being complemented by private extension services which are being anchored by Non-Governmental Organizations (NGOs) such as Sasakawa Global 2000, USAID phase II, Japan and Korea International Cooperation Agency. According to NAERLS (2012), over fifty NGOs are involved in various types of agricultural extension programmes in Nigeria.

Yield of maize production

Maize yield in Nigeria per hectare is 2,500 - 4,500kg of threshed grains depending on the level of inputs used (WAAPP, 2014). But for year 2011, NAERLS & NPFS report put the national average yield at 1,780 kg (1.78 tons). The result in Table 4 reveals the average maize yield in kilogram per hectare in the study area. Data gathered from the survey reveals that less than half of farmers (46.2%) in the Northwest recorded 2,501 - 4,000kg per hectare, while majority of respondents in the Southwest (88.7%) and

Table 3a: Distribution of farmers based on adoption of recommended practices on maize production

S/N	Adoption statement	North West n = 65	North Central n = 71	South West n = 62	Total n = 198	
		Mean	Mean	Mean	Mean	Rank
1.	Planting on a well-drained sandy loam or loamy soil	0.92	1.00	1.00	0.97	1st
2.	Planting on fertile soil with flat topography	0.86	1.00	1.00	0.95	2nd
3.	Incorporation of residue of the existing plants into the soil before planting	0.72	0.94	1.00	0.88	7th
4.	Planting of T2SR and DMR-LSR recommended maize varieties	0.63	0.14	0.96	0.54	11th
5.	Planting within the depth of 5 – 7 cm	0.73	0.64	0.58	0.65	9th
6.	Buying of seed from reliable/recommended source, e.g. agro-service centre	0.86	0.97	0.96	0.93	4th
7.	Planting of maize at a spacing of 75 x 40 cm with hand	0.67	0.69	0.27	0.55	12th
8.	Use of one empty beer bottle cap of NPK fertilizer for 2 stands of maize	0.98	0.32	0.58	0.48	13th
9.	Carrying out soil testing before fertilizer application on maize	0.30	0.16	0.17	0.21	14th
10.	Weeding of maize farm within 14 – 21 days of planting	0.86	1.00	0.77	0.88	8th
11.	Use of phostoxin tablet for maize storage	0.86	0.92	0.87	0.89	6th
12.	Use farm hygiene to curb pest and disease outbreak on the farm	0.84	0.98	0.96	0.93	5th
13.	Early harvesting of maize to avoid damage	0.87	1.00	0.95	0.94	3rd
14.	Storing of maize on curbs with actellic 25EC at 200ml/10litres of water	0.66	0.25	0.79	0.55	10th

Source: Field survey, 2015.

Table 3b. Farmers' level of adoption of improved practices on maize production across the zones

Adoption level	Score	North West n = 65		North Central n = 71		South West n = 62		Total n = 198	
		F	%	F	%	F	%	F	%
Low	0 – 9	20	30.8	17	23.9	11	17.7	48	24.2
High	10 – 14	45	69.2	54	76.1	51	82.3	150	75.8
Mean ± SD								10.42±2.18	

Source: Field survey, 2015

Table 4. Yield of maize production across the zones

Variable	North West (n = 65)		North Central (n = 71)		South West (n = 62)		Total n = 198	
	F	%	F	%	F	%	F	%
Yield								
= 1,000kg	4	6.2	-	0.0	6	9.7	10	5.1
1,001 – 2,500kg	28	43.1	69	97.2	55	88.7	152	76.8
2,501 – 4,000kg	30	46.2	2	2.8	1	1.6	33	16.6
> 4,001kg	3	4.6	-	0.0	-	0.0	3	1.5
Mean yield		2813.07± 2064.37		2176.05± 1324.90		1204.0± 1340.49		2080.80 ± 1374.3
Total	65	100.0	71	100.0	62	100.0	198	100

Source: Field survey, 2015.

North central (97.2%) recorded between 1,001 - 2500kg per hectare and 1,001 - 2,500kg per hectare, respectively. This shows that Northwest with maize yield average (2,813.07kg) had the highest yield among the three zones. This surpassed 1,780kg which was recorded as the national average in 2011 (NAERLS & NPFS 2011) and falls within the recommended national average of 2,500 - 4,500kg/ha (WAAPP, 2011). Respondents from Southwest had the lowest yield average (1,204.03 kg). This is due to the fact the Northern guinea savannah belt where North-west and Northeast belong supported the growth of maize better than the climatic area of

Southwest zone which is in the rainforest belt (USAID, 2010).

Test of difference in maize farmers' knowledge on improved maize production practices across the zones.

The result in Table 5 indicates that there was no significant difference in maize farmers' knowledge on improved management practices across the zones (F=1.291, p=0.277). This means that the management practices adopted on maize production are similar across the various agricultural zones in Nigeria. This may be due to the fact that maize farmers all over the zones were exposed to agricultural extension services

Table 5: Analysis of variance of maize farmers' knowledge of improved practices across the zones

	Sum of Squares	Df	Mean square	F-value	Sig
Between groups	9.976	2	4.988	1.291	0.277
Within groups	753.479	195	3.864		
Total	763.455	197			

Source: Field study, 2015

and there has been a central coordinating unit on maize production at the national level for a very long time where similar knowledge on maize production practices is shared (Ogunbodede, 2011).

Test of difference in the production level (Yield) of maize farmers across the zones.

The ANOVA result in Table 6a shows a significant difference in the respondents' level of maize production across the zones ($F=28.059$, $p=0.000$). This finding can be attributed to the fact that the three zones which constituted the study area are not under the same agro-ecology. It can be inferred that maize thrives better in Guinea savannah to which Northcentral and

Northwest zones belong, thus the high level of maize production from those zones. This is opposed to the maize production level in Southwest which falls under rainforest/derived savannah. Additionally, the concentration of seed companies, large maize markets especially uptakers of maize and NGOs in Northwest and Northcentral that assist in the provision of agro-inputs to maize farmers could also have accounted for the difference in maize production across the zones since agro-input usage is known to boost agricultural production. This is in line with USAID (2010) that reported that the guinea savannah zones provide the best ecological condition for maize cultivation.

Table 6a. Analysis of Variance on production level (yield) of maize across the zones

	Sum of Squares	Df	Mean square	F-value	Sig
Between groups	831598.382	2	41579949.191	28.059	0.000
Within groups	288967.326	195	1481882.935		
Total	372127070.707	197			

Source: Field study, 2015

The result of Duncan test presented on Table 6b shows the mean score of maize farmers in Northwest as 2813.0769, which is statistically greater than the mean score of Northcentral and Southwest which were 2176.0563 and 1204.0323, respectively. Maize farmers in Northwest thus contributed more to the significant difference that is noticed in the DMRT table, while Southwest had the least significant difference. This result indicates that farmers from Northwest had higher maize yield than their counterparts from Northcentral and Southwest. This may be due to the involvement of Non-Governmental Organisations in maize production activities in the Southwest zone. And the advantage of USAID market phase II which provided the benefit of buying back policy for farmers in the zone. Furthermore, the biggest markets for grains were also located in the Northwest zone.

Conclusions and Recommendations

The study reveals that larger percentage of maize farmers were male, married, had one form of education or the other, reasonable years of experience with farm size of 1-3 hectares and participated actively in REFILS. Maize farmers in Northwest and Northcentral realized better yield and income than their counterpart in Southwest

Nigeria. The study further observes that Research-Extension-Farmers-Input-Linkage system which was introduced to Nigeria over 3 decades ago has gone a long way in enhancing capacity of maize farmers in the country by increasing their knowledge on improved agronomic practices on maize production, enhancing their adoption of maize production technologies and consequently impacting positively on the yield.

Based on the findings of this study, it is recommended that concerted efforts should be made to improve on the activities of REFILS in Nigeria so as consolidate on the benefits of farmers' enhancement of knowledge and adoption of improved agronomic practices on maize production. There is need for more collaboration between research and extension practitioners in Nigeria under REFILS to generate and disseminate adoptable technologies on soil management techniques which was generally low so as to update farmers' knowledge on sustainable maize production. Researchers should concentrate more on breeding disease resistant, high yielding maize varieties capable of improving farmers' yield particularly in Southwest zone where the lowest yield was recorded.

Table 6b: Distribution of farmers by Post hoc (Duncan Multiple Range Test DMRT) on yield of maize production across the zones

Zones	N	Subset for alpha = 0.05		
		1	2	3
South west	62	1204.0323		
North central	71		2176.0563	
North west	65			2813.0769

Source: Field work, 2015.

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