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CONTRIBUTIONS OF CASSAVA MULTIPLICATION PROGRAMME TECHNOLOGIES ON THE PRODUCTIVITY OF COOPERATIVE FARMERS IN SOUTHERN NIGERIA

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Abstract

This study investigated the contributions of Cassava Multiplication Programme (CMP) technologies on the productivity of co-operative farmers in Southern Nigeria between 1999 and 2001. The CMP came into being in 1987 as a result of the International Fund for Agricultural Development's intervention in the cassava sub-sector. The decline in cassava production in late 1970's and early part of the 1980's coupled with the devastating attacks by cassava green spiderrnites (CGM) and cassava meal bugs (CM) facilitated this intervention through a loan of 12.5 Million US Dollars. This led to the development of high yield Tropical Manihot Selections (TMS). Three states one from each geo-political zone in Southern Nigeria were purposively sampled and

from them, 360 accessible co-operative farmers (males and females) were randomly sampled for the study. The Instrument was a Questionnaire previously validated by 13 experts and this was used to elicit information from the respondents. Data were analyzed using percentage, mean, Analysis of Variance (ANOVA) and Scheffe test. The hypothesis was tested at 0.05 level of significance. The findings revealed initial negative attitude and response to the adoption of the TMS by the farmers, positive contributions of CMP technologies on their aggregate yield, farmers' agreement on the inherent attributes of TMS like early bulking, ease of peeling and multiplicity of uses etc among others. ANOVA result revealed significant differences in the mean responses of the co-operative farmers in the three sampled states. Recommendations made include improvement in radio programmes to disseminate more information on TMS to the rural farmers, formation of more Co-operative farmers' societies, regular and functional educational and training programmes to the rural farmers etc.

Key words; Cassava Multiplication Programme, cassava green spidermites, cassava mealybugs, Tropical Manihot Selections.

Introduction

Cassava is a root tuber that is grown virtually in all parts of the Southern Nigeria and forms a considerable percentage of the basic staples consumed by the people particularly in the rural areas. It has over the years become one of the crops that farmers have so much reliance on in terms of stable and average income.

Cassava is a major source of dietary energy for low income consumers in many parts of tropical Africa, including major urban areas (Cock, 1985; Phillips, 1983; Nweke, 1981; Goering, 1979). Precise data on labour input and yields of cassava is not always available, but cultivation of cassava is thought to require less labour per unit of output than most other major African staples (Jones, 1959; Cock, 1985)

It is still a very labour intensive crop for most growers as mechanization is typically difficult because of small holdings and physically because of cultivation on slopes and uneven terrain. The nature of the plant itself also militates against easy mechanization. Planting pieces are bulky and irregular in form etc. Because of socio-economic and environmental constraints in most of the area where it is cultivated; growers have few options for alternative crops. Cassava is a key, sometimes the only key to economic and social opportunity for these poor farmers. Cassava as a crop has the potential for bridging the food gap in most Nigerian homes through the tubers that stores its food reserves. It is one of the dominant starchy staples in the diets of Africans and the second most important staples after rice(Nweke, 1996) and also the major attributes being that famine rarely occurs in areas where cassava is widely grown, since it provides a stable base for food production. It is by far the most widely grown of all the staples in the humid zone thus occupying over 25% of staple crop land area in the sub-humid zone.

Three continents produce cassava in large amounts; they are Africa, Asia and Latin America. African production accounts for more than 50% of World production. Asia and Latin America share less than 50% with

the rest of the world. African production is almost all used as food for humans within the domestic sector; Asian and Latin America production is mainly used as raw material for industries, as feed for livestock, or for export (Quin et al 1995).

Cassava is one of the most important crops in Nigeria. It is the most widely cultivated crop in the southern part of the country in terms of area devoted to it and number of farmers growing it. Indeed, it is grown by almost every household. Cassava has also grown in importance in the middle-belt in recent years. In all places, cassava has become very popular as food and cash crop and is fast replacing yam and other traditional staples of the area. In all over 4/5th of the cultivable land area is suitable for cassava growing.

It was introduced into Central Africa from South America in the 16th century by the early Portuguese explorers (Jones, 1959). It was probably the emancipated slaves who introduced the cassava crop into Southern Nigeria, as they returned to the country from South America via the Island of Sao Tome and Fernando Po which at that time were Portuguese colonies off Nigeria's shores (Ekandem, 1962). "Cassava however did not become important in the country until the end of the 19th century when processing techniques were introduced as many more slaves returned home" (FMANR, 1999:17).

Percentage distribution of food crop cash income of households producing major crops

Food Crops	Cassava		Yam		Sweet Potato		Plantain		Maize		Rice	
	N	%	N	%	N	%	N	%	N	%	N	%
Cassava	329	21	269	23	90	14	176	26	315	19	124	14
Yam	269	15	276	18	75	14	168	16	266	13	93	13
Sweet Potato	90	1	75	1	95	1	43	1	94	0	59	0
Plantain	175	1	43	2	43	1	181	3	175	1	47	0
Maize	315	14	94	13	94	8	175	15	343	13	139	11
Rice	124	12	59	12	59	10	47	9	139	15	143	24
Others	-	34	-	31	-	52	-	30	-	39	-	38
Total	-	100	-	100	-	100	-	100	-	100	-	100

N- number of producers.
Others include millets, sorghum, beans and peas.
Source: *Nweke et al, 1997.*

From the COSCA study published in 1996, it was reported that the cassava root yield increased with cassava plant density up to a point beyond which the yield declined with further increase in the plant density. Mean plant density was approximately 8,000 stands/ha and the range 500 to 40,000 stands/ha. The cassava plant density was greater in areas of high than low population density, in peri-urban centres, and where market access was easy. In these areas, the plant density exceeded the level necessary for maximum root yield (Nweke, et al 1994). Similarly,

the cassava root yield increased with age of the cassava plant. Jones (1959) observed that some early bulking varieties of manioc form edible roots within six to eight months after planting and may be harvested then. However, most varieties were left in the ground for a longer period during competition for land or where crops were planted in the field annually; manioc was generally harvested within 12 months. The roots can survive underground for anywhere from 9-24 months or more after bulking (Onwueme 1978; Goering, 1979)."

Table:

Cassava root yield (t/ha) by improved and local varieties.

Statistics	Improved	Local
Mean	19.21	11.63
Minimum	4.25	1.23
Maximum	36.00	67.30
Standard deviation	8.04	7.56
No. of fields	33	366

Source: Nweke et al (1996) COSCA Working paper no. 13.

IITA obtained averages of 21.0t/ha in 1983, 23.5 t/ha in 1984 and 16.0t/ha in 1985 in researcher-managed on-farm trials with the improved varieties in three locations within the humid zone of Nigeria (IITA, 1986). The improved varieties out yielded the locals by a wide margin.

The farmers' need for early-bulking cassava varieties may be from demographic pressure and the commercialization of cassava products. This agrees with the contention that "comparison between cassava growing environments and actual cassava distribution in Nigeria and Ghana

demonstrates that the distribution of cassava could be primarily a function of population density rather than of agro-ecological consideration (Stroorvogel and Fresco, 1991).According to Nweke (1996), commercialization of production would affect desired age at harvest for two reasons. One is that a commercial producer is interested in rapid turnover; the shorter the bulking period, the higher the rate of turnover. The second is that middlemen, traders, or processors are particular about the quality of the product they purchase for resale or for processing. They would not buy old cassava (poor quality product); thus farmers who sell through the middlemen would be concerned with the bilking age of cassava varieties they cultivate.

Nigeria is currently the largest producer of cassava in the world with an annual output of over 34 million tones of tuberous roots Cassava production has been increasing for the past 20 or more years in areas cultivated and in yield/ha. On the average, the harvested land areas were over 80% higher in 1990-1993 than 1974-1977 (FMANR, 1998).Yields of cassava are difficult to measure accurately given the farmers' practice of harvesting little by little, and published data rarely states the method of measurement used (World Bank, 1985). There are no reliable aggregate data on the total quantity of cassava sold in most African countries, but micro-level evidence indicates that even poor farmers often sell a significant proportion of their crop. Women farmers in Southern Zaire sold 20-40 per cent of their cassava (Fresco, 1982). In the more prosperous rural economy of South Western Nigeria, sales ranged from 2/3 to 90% of women's cassava output (Spiro, 1980). In addition, in Nigeria, Zaire and

elsewhere, there are both large and small-scale farms on which cassava is grown entirely for sale, by both full and part-time farmers (Okuneye and Igben 1981; Adam, 1980; Kayser et al 1981).

Given these problems, it is not surprising that production data are inconsistent. According to Berry (1993:7), "different sources may give quite different figures for the same country. For both Nigeria and Cameroon, the FAO not only gives different levels of cassava output from those provided by National sources, but to use data from field surveys, but their figures are considered low, even by the Nigeria Central Bank. The bank has adjusted the Federal office of Statistics data upward, to take account of commercial farms and of unpublished information supplied by agents of the Federal Department of Agriculture. These figures have been criticized, in turn, by the Food and Agriculture Organisation (FAO) and the United States Department for Agriculture (USDA), both of which derive their production figures from estimates of per capital consumption which range from 75 to 386kg. However, as population censuses in Nigeria have been the subject of intense political conflict since independence, it is not clear how such confidence can be attached to these figures either". "Cultivation in India is concentrated in the Southern states of Kerala and Tamil Nadu. The country is distinguished by the World highest average yields- about 23 tons/ha. These high yields are accomplished by intensive cultivation, and, in Tamil Nadu, by irrigation. In Kerala much of the production is consumed as boiled roots, one of the few regions in Asia where this is common. Cooking quality is one of the principal criteria farmers use in selecting varieties for cultivation. In Tamil Nadu, nearly all

of the production is for starch" (CIAT, 1999:18).African farmers are continually introducing new landraces i.e. the TMS with desired attributes into their cropping systems. Such attributes include early bulking, high root yield, weed suppression, good in-ground storability, disease and pest tolerance, good processing qualities, desirable branching habits, low HCN potential, good cooking qualities, and others including good yield of planting material (Nweke, 1996)Table 3:Attributes of the 17 cassava varieties released for cultivation in Nigeria

Cassava Variety	Branching Habit	Canopy Develop-ment	Ecological Adaptation	Pest and disease tolerance	Fresh root yield t/ha	Dry matter yield (80 C 24 h)	Gari yield%	Starch yield %	HCN Products (mg/100g)
TMS 90257	Profuse	Moderate	Wide	High	43	25	23	23	15.5
TMS 84537	Moderate	Sparse	Wide	High	35	28	18	27	6.3
TMS 82/00058	Profuse	Moderate	Wide .	High	35	28	21	26	6.4
TMS 82/00661	Profuse	Moderate	Wide	High	39	30	22	26	4.1
NR 8212	Profuse	Moderate	Wide	High	27	37	25	21	High
NR 8082	Profuse	Moderate	Wide	High	32	32	22	19	High
TMS 50395	Moderate	Moderate	Wide	Moderate	36	29	24	12	High
TMS 30001	Moderate	Moderate	Wide	Moderate	16	28	23	22	Low
NR 8208	Profuse	Moderate	Wide	Moderate	26	32	25	23	High
NR 8683	Profuse	Moderate	Wide	High	31	43	36	25	High
NR 83107	Profuse	Moderate	Wide	High	22	31	22	19	High
TMS 81/00110	Profuse	Moderate	Wide	High	28	31	24	25	4.5
TMS 91934	Moderate	Sparse	Wide	Moderate	32	34	26	21	High

TMS 30572	Profuse	Profuse	Wide	Moderate	27	34	25	24	750
TMS 421425	Moderate	Profuse	Savanna	Moderate	26	36	25	22	31
TMS 30555	Moderate	Profuse	Wide	Moderate	17	32	24	20	High
NR 41044	Moderate	Profuse	Wide	Moderate	37	34	25	23	High

Research Questions

The following research questions guided the study;

1. What are the factors that prompted farmers to adopt the TMS on their farms?
2. What is the level of contributions of the Cassava Multiplication Programme (CMP) technologies regarding the productivity (aggregate yield) of co-operative farmers in Southern Nigeria?

The hypothesis tested, revealed no significant difference in the mean responses of farmers in Ogun, Delta and Enugu States on the level of contributions of the CMP technologies regarding their productivity.(aggregate yield) on the farms.

Research Methods

The study adopted a descriptive survey design to determine the level of the contributions of the CMP technologies regarding the productivity (aggregate yield) on the farms of the cooperative farmers. The study presented some rational analyses using location, educational background, yielding capacity, adoption rate, sex, income and socio-economic status, cultural background among others as independent variables to ensure equal representation of the samples.

The study covered three states each purposively sampled from the three geo-political zones – Ogun, Delta and Enugu States. A total of 360 accessible cooperative farmers were sampled for the study. A structured questionnaire developed by the researcher and validated by 13 experts in cassava development was used to elicit information from the respondents. A Cronbach alpha reliability co-efficient of 0.92 was got. 331 copies of the questionnaire were completed and returned. Data were analyzed through descriptive statistics techniques of frequencies, percentage and mean scores; and inferential statistics techniques of Analysis of Variance (ANOVA) and multiple comparisons of Scheffe method to locate pairs of groups means significantly different.

Presentation and Analysis of Data

Distribution of respondents by educational qualifications

S/N	Educational Qualifications	Frequency (No.)	Percentage
1.	No Schooling	165	49.8
2.	Primarily Schooling below class six	35	10.6
3.	Primary six certificate	22	6.6
4.	Secondary education below school certificate	42	12.7
5.	School Certificate, OND, NCE, HND etc.	52	15.7
6.	University Degree holders	15	4.4
	Total	331	100.0

Distribution of respondents in terms of what prompted them to adopt TMS on their farms

S/N	Prompts (Reasons)	Frequency No		Percentages	
		1st	2nd	1st	2nd
1.	Constant crop losses and failure	29	3	8.8	0.9
2.	Weeds, pets and diseases attack on old varieties	236	9	71.3	2.7
3.	For experimental trial only	47	8	14.2	2.4
4.	The love for exploration	11	4	3.3	1.2
5.	To join the majority	4	0	1.2	0
6.	For increased production	4	307	1.2	92.7
	Total	331	331	100	100

Contributions of CMP to Productivity

Items	CMP technologies on production systems, productivity and yielding capacity	Mean X	Remarks
1.	Keeping of relevant data on production and yielding capacity of cassava affect my farm record.	2.71	High
2.	Cassava is major source of energy dietary intake in my household as well as for others.	3.44	High
3.	Cassava is important and cultivated in my area by subsistence farmers.	3.55	High
4.	Cassava through the CMP technology is now serving as a famine prevention crop in most parts of my area.	3.39	High
5.	Cassava through the CMP technology is generating cash income because of its early bulking attribute for the producing	2.96	High

	household and as such should be classified as a cash crop.		
6.	The early bulking attribute of cassava through CMP technology because of its quick turnover is an important factor in terms of cash generation to me.	2.93	High
7.	Early bulking attribute of cassava and ease of harvesting are good qualifies of TMS which will encourage production and increase yield as well.	2.98	High
8.	CMP technology has helped ne to maintain an average period up to harvesting during every planting season. After harvesting of the TMS tubers on the farm, to what extent is a large percentage because of the inherent qualities.	2.87	High
9.	Sold for cash	3.24	High
10.	Consumed in homes	3.04	High
11.	Processed into variety of products for sale.	3.00	High

Hypothesis

ANOVA of mean responses of cooperative farmers on the level of contributions of the CMP technologies regarding productivity (aggregate yield) on their farms

Source of variation	Sum of squares	df	Mean square	F-cal	F-tab	Remarks
Between groups	14.416	2	7.208			
				64.926	3.00	Sig,
Within groups	36.415	328	.111			
Total	50.831	330				

Note = significant of P<.05

The results in table 28 Shows that the calculated F-value of 64.926 was greater than the critical F-value of 3.00 at 2 and 328 degrees of freedom at P<..05. From the values, there were significant differences in the mean responses of respondents on the level of contribution of the Cassava Multiplication Programme technologies regarding their productivity (aggregate yield). The null hypothesis of no significant difference was therefore rejected and the alternative of significant difference was accepted.

Further analysis to identify groups significantly different in the mean responses on the level of contributions of the Cassava Multiplication Programme was conducted using Scheffe test. Post hoc test with Scheffe's multiple range method (P<.05) revealed that mean responses of co-operative farmers in Enugu, Ogun and Delta States differ significantly among themselves. The results are presented altogether in a summary in

Table 33.

Hypothesis	States	No. of farmers	Standard deviation	Subset for alpha = .05			Farmers in Groups sig. Different
HO3	Enugu	109	.3454	2.8357			All the
Level of	Ogun	111	.3134		3.1327		states.
contributions	Delta	111	.341			3.3456	
of CMP. Sig.				1.000	1.000	1.000	

Respondents group means on the level of contributions of the CMP technologies regarding productivity (aggregate yield) significantly differ in all the three states with Enugu, Ogun and Delta having high, higher and highest means respectively.

Discussion of Findings

The findings from this study revealed the importance of cassava as a major staple food and source of dietary energy intake for low income consumers and that substicence farmers cultivate it. These are in line with studies by cock (1985), Philips (1983), Nweke (1981), and Goering (1979). The findings of the study are also in line with that of Fresco (1993) that cassava's tolerance of adverse conditions, and its flexibility with respect to the timing of both planting and harvesting makes it ideal for famine situations. The tubers are harvested all year round and as such may be used for a variety of products that are consumed by populace. Also in line with the above, Romanoff and lynam (1992) argued that cassava plays a famine prevention role; where cassava is widely grown, famine rarely occurs because cassava provides a stable base to the food production system. For these reasons, the co-operative farmers agreed that the crops support their food supplies all year round and that it also generates cash income as it poses an early bulking attribute. This is in line with previous studies by Nweke (1996) that commercialisation of production would affect age at harvest for two reasons; one is that a commercial producer is interested in rapid turnover; the shorter the bulking period, the higher the rate of turnover. The second is that middlemen, traders, or processors are particular about the quality of products they purchase for resale or for processing. They would not buy old cassava, thus farmers who sell through the middlemen would be concerned with the bulking age of cassava varieties they cultivate.

These explain why majority of the farmers maintain an average period of 10 months to harvesting of tubers because of the pressure to

utilize them in exchange for cash to purchase products to be consumed in homes. This agrees with previous studies by Fresco (1982), Spiro (1980), Okuneye and Igben (1981), and Adam (1980). This is also in line with the studies by Berry (1993) who reported that in Nigeria and Congo Democratic Republic and elsewhere, there are both large and small scale farms on which cassava is grown entirely for sale by both full and part-time farmers. This agrees with previous COSCA studies in some selected African countries in (1996) that more households earned cash income from cassava than from any other commodity. The crop is harvested all year round and sales from the crops make cash readily available to the producing farmers all year round. In addition, several uses could be made of the tubers to solve domestic problems among the farmer's households.

Recommendations

1. There is the need for further awareness programme on the TMS of the CMP to the rural farmers in local dialects on radio and television. In addition, publications like posters, bulletins etc in local dialects should be further distributed among the producers.
2. More NGO's should explore new avenues for collaboration with the cooperative societies particularly those dealing in cassava production and processing and new ones should be encouraged to go into cassava production and processing.
3. More of the new varieties should be released to the cassava farmers on regular basis so that farmers can take advantage of their attributes on the farms.

4. Research Institutes concerned with cassava development in Nigeria should intensify efforts into mechanization techniques for all the farm operations particularly in the processing and storage of produce and make them affordable to the cooperative farmers..

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