

## Sustainable Food Crop Production Through Multiple Cropping Patterns among Farmers in South Western Nigeria

O.P. Fawole and O.I. Oladele

*Department of Agricultural Extension and Rural Development, University of Ibadan, Ibadan, Nigeria*

**KEYWORDS** Cassava. Crop Mixture. Intercropping. Maize. Multiple Cropping. Yam

**ABSTRACT** This paper examined the medley of food crops among farmers as a method of evolved sustainable food crop production. Farmers from different groups were randomly selected and a structured questionnaire was administered on them to elicit information in the areas of crop mixtures and reasons for such mixtures. The result of the study indicates farmers' profile with a mean age of 53.4 years, with majority married (78%), having non-formal education (37%) and long years of farming experience (39%). Yam/maize crop mixture was the most prominent among farmers and the assurance of food security was the most prevailing reason for multiple cropping. The study has, thus, provided clear insight into the practise of multiple cropping by farmers in the study area and also a basis for a demand-led technology development for the improvement of production.

### INTRODUCTION

In Nigeria, about 75% of the population are peasant farmers living in the rural areas, which are the main stay of agricultural production. These farmers operate on small scale with farm holdings of 1-2 hectares, which are usually scattered over a wide area. According to Olayide et al. (1981), about 75% of Nigeria's land is under arable cultivation with land-human ratio of 58 persons per square kilometer in south western Nigeria. This shows that the average sizes of farmlands are very small.

The production practices of small-scale farmers are synonymous with their production characteristics such as subsistence level of production, low hectare due to tenurial rights. Other factors include poor access to credit and other production inputs, poor managerial ability and enterprise combination as informed by ecological considerations, available resources, taste and preferences of farm families. Olayide et al. (1981) stated that a truly diversified enterprise-oriented economy is typical feature of most rural economy. Another factor that informed the combination of enterprises is a great deal of uncertainty under which farmers produce. It could be inferred that the proximate risks experienced by small-scale farmers were sufficient to completely mask any differences in the household managerial ability. The risk of production and reliance on the market virtually force poorer producers to adopt subsistence-oriented strategies. It, therefore, implies that a

farming system had been evolved which emphasizes multiple cropping systems in order to hold forth for the risky nature, though subsistence becomes more pronounced.

In southwestern Nigeria, the predominant arable cropping system as described by NARP (1997) are cassava-based, yam-based, maize-based, rice-based, food legume-based and vegetable-based systems. Cassava is grown in mixtures with maize, cocoyam, okra, and tomatoes or relayed with yam. Yam is planted as sole crop but unusually intercropped with melon, pepper, okra and amaranths. Maize may be grown solely or intercropped with cassava in particular. Upland rice is usually cultivated sole, but may carry few rows of maize. Cowpea, pigeon pea and soyabean are the main legumes that are either intercropped with maize and cassava or grown as sole crops. Pigeon pea is usually intercropped with maize and cassava or relayed with yam. On the harvest of companion crops, it becomes a sole pigeon pea crop. In most cases, the fruit vegetables are planted as companion crops, however, tomatoes pepper and okra are in recent times grown as sole crops or pepper as avenue crop in a cassava/pepper intercrops.

The farming system described above has informed the application of the Farming System Research and Extension (FSRE) as a strategy for increasing the productivity of the area. FSRE is a focus for the International service for National Agricultural Research (ISNAR, 1988). This is to address the complex farming system

of the resource poor farmers vis-à-vis his production environment and the farm family household in a holistic manner. Because of the vastness of this research area, different organisations and individuals have tended to emphasis different aspects and have used different terminologies. These include "FSR *sensu lato*" (Simmonds, 1988); "Research with Farming System Perspective" (FSP) which includes on-farm research (Byerlee et al., 1982; Merrill-Sands, 1982); "Farmer-first-And Last (Chambers and Ghildya, 1985); "Cropping System Research" (Zandstra et al., 1981) and Beyond Farmer First (IIED, 1994). However, Farrington and Martins (1988) emphasized that the importance should be on the similarities between these methods rather than in adaptive research in which methods and procedures are selected based on their place in a particular research scheme.

FSR/E can be described as the development of research and extension programmes that are most effective in generating technologies appropriate to increasing the productivity of farming systems within the context of specific microenvironments. Farrington and Martins, (1988) assert that FSR/E is an applied problem-solving approach conducted by multi-disciplinary teams with a degree of farmer participation. These perspectives of technological change are assessed within a holistic framework. It focuses on homogenous groups of farmers within specific agro-climatic zones.

From the above definition, vital concepts that could be deduced about FSR/E includes: (i) farmer – oriented, (ii) system oriented, (iii) a problem-solving approach, (iv) inter-disciplinary, (v) tests of technology in on-farm trials, and (vi) FSR provides feedback from farmers (Merrill-Sands, 1986). FSR/E evolved to develop new or improved technologies through farmer's participation in the decision – making process of the researchers and extension officers. The goal is to maximize production and to develop improved systems that are compatible with each production environment that fits into each socio-economic and cultural milieu of farmers (ISNAR, 1988). Its stages are diagnostic survey, (DS) On-station Research (OSR) and On-Farm research (OFAR). FSR/E is important because the technology transfer approach of the conventional research typology has not enjoyed

success on marginal locations, with heterogeneous agricultural potential, uncertain production conditions and low resources smallholdings and farming households.

### OBJECTIVES OF THE STUDY

The objective of this paper is to analyse the sustainable use of multiple cropping patterns among farmers in south western Nigeria. Specifically the paper investigated personal characteristics, common food crop mixtures and their reasons for using multiple cropping patterns.

### METHODOLOGY

The study area consists of eight Nigeria states namely, Delta, Edo, Lagos, Ogun, Osun, Ondo, Ekiti and Oyo. The area lies between latitudes 4 and 14 south and longitude 2 and 8 east; they collectively cover 114,271 km<sup>2</sup>, which are approximately 12% of Nigeria's total area. The Atlantic Ocean, in the east binds it, in the south by River Niger, in the west by Republic of Benin and in the North by Kwara and Kogi States (NARP, 1995). Agricultural sector forms the base of the overall development thrusts of the zone, with farming as the main occupation of the people in the area. Food crops grown include maize, yam, cassava, cocoyam, melon, cowpea, and vegetables under mixed cropping practices. The Southwest zone is densely populated with a high degree of migrating people from other parts of the country.

The target population of this study consists of farmers. There are numerous farmer groups in the study area but only 160 farmers' groups were considered viable among those registered with the ADPs because they meet on a regular basis and have not been merged by the extension agents in charge. Each group has between 30 and 35 members. Ten – percent (16) of the registered and viable farmers' groups were randomly selected. These groups are made up of 542 members. Fifty percent of the members were randomly selected (271).

The data collection method was designed to be cross-sectional as samples were selected from only some of the population of the respondents, and studied at a particular time. Interview schedule was employed in obtaining information on demographic characteristics, common crop

mixtures and reasons for multiple cropping patterns. The instrument for data collection was subjected to pre-testing, validation and reliability tests, which gave a reliability coefficient of 0.76.

## RESULTS AND DISCUSSION

**Farmers' Personal Characteristics:** Majority of the farmers were male (81%) as presented in Table 1. This suggests that farming is still dominated by males in the study area. About 59% were between 40 and 59 years and their mean age was 53.4 years; which suggests that farming has become an occupation of the middle age. About 79% were married, which is a reflection of the age category majority of them belong. Marriage provides additional farm labour for the farmers.

Thirty-seven percent of the farmers had adult literacy which may be due to the intervention activities of non-governments organisations (NGO), Federal and State governments' mass literacy campaigns, and university adult functional literacy classes, while only 34% had

**Table 1: Farmers' personal characteristics (n=271)**

Variables	Frequency	Percentage
<i>Gender</i>		
Male	220	81.2
Female	51	18.8
Total	271	100
<i>Age</i>		
20-29	2	0.7
30-39	43	15.9
40-49	87	32.1
50-59	74	27.3
60-69	57	21.0
70 and above	8	2.9
Total	271	100
<i>Marital Status</i>		
Single	6	2.2
Widowed	15	5.5
Separated	24	8.9
Married	213	78.6
Divorced	12	4.4
Total	271	100
<i>Education</i>		
Formal	93	34.6
Non-formal	101	37.5
Not educated	75	27.9
Total	271	100
<i>Farming Experience</i>		
Less than 10 years	37	13.7
10-19 years	108	39.9
20-29 years	83	30.6
30-39 years	22	8.1
above 40 years	21	7.7
Total	270	100

formal education and 27% were not educated. Many of them (71%) have been farming for 10 to 19 years; this is followed by those who have been farming for 20 – 29 years (31%). The long years of farming may be accounted for by the rural-urban drift of young people that would have been engaged in farming since the free primary education of Western Nigeria and the oil boom era.

**Crop Mixture:** Crop mixture is a common feature of crop production across the study area. Intercropping of yam and maize was ranked as the first. This may be due to the fact that the two crops are major staples in the study area. Cassava as an insurance crop is usually intercropped with

**Table 2: Common crop mixture among farmers**

Crop mixtures	Frequency*	Rank
Yam/Maize	170	1
Cassava/maize	152	2
Maize/yam/vegetables	102	3
Maize/yam/cassava/melon	100	4
Maize/yam/cassava	99	5
Maize/yam/cassava/vegetables	90	6
Maize/cocoyam/cassava	88	7
Maize/cocoyam	85	8
Cassava/yam	78	9
Maize/cassava/cocoyam/vegetables	72	10
Maize/vegetables/cocoyam	66	11
Maize/yam/cassava/cocoyam	65	12
Cassava/yam/melon	57	13
Maize/rice	55	14
Maize/cassava/vegetable	54	15
Maize/cassava/cowpea	47	16
Cassava/tomatoes/pepper	38	17

\* Multiple responses

**Table 3: Reasons for crop mixtures among farmers**

Reasons	Frequency*	Rank
Household food security	150	1
Soil conservation	80	2
Crop compatibility	71	3
Reduced cultural practices	64	4
Measure against crop failure	60	5
Crop insurance	55	6
Tastes and preferences	50	7
Cultural reasons	40	8
Harvesting at different times	30	9
Nutrient enhancement	22	10
Adapted agroforestry practices	19	11
Incorporation of 'women crop'	14	12
Ecological reasons	10	13

\* Multiple responses

maize. This combination was ranked second. This may be attributed to the importance of cassava as a source of cheap calories. It is also processed and consumed in various forms. Its usage as a source of ethanol for fuel, energy in animal feeds and starch for industry is increasing (IITA, 1990).

The third place combination on the ranking list is maize/yam/vegetables. A plausible reason for this may be because of the incorporation of vegetables, which are normally referred to as “women crops” on the main farm. While several crop combinations acquired differing positions in Table 2, maize/cassava/cowpea combination was ranked as the least popular mixture among farmers in the study area. Cowpea, as a grain legume, requires many agronomic practices, which entail the use of inputs that are not easy to come by for the farmers. Its inclusion then in the crop medley is not widely practiced among the respondents.

**Reasons for Crop Mixture:** The frequency counts of the multiple responses of the farmers were ranked to identify their reasons for multiple cropping patterns. Table 3 shows that ensuring food security for the farm families was the major reason for the multiple cropping patterns. Household food security was implied in this way as having food available round the year (off-season and during the season). Soil conservation came next in the order of importance. This reason may be inferred from the crop rotation principles that tend to allow for soil rejuvenation when crops with different demand on the soil are grown in sequence. The fact that cassava is used as a fallow crop may justify its inclusion in the cropping system.

Crop compatibility was identified as the third reason. This might have been the product of their own indigenous practices over years. This is closely followed by the reduction in the cultural practices that multiple cropping enhances. Farmers reported that they do less of weeding when multiple cropping is practiced as against sole cropping. This has gone a long way to reduce the menace of weed infestation that is often responsible for yield reduction. Other reasons given by the farmers include that multiple cropping acts as measure against crop failure such that different crop would survive varying ecological stress and pest attack. Tastes and preferences as well as other as other cultural reasons were ranked.

Some of these crops serve as insurance such

that they can be harvested at anytime to make up for debt or some other sudden needs. This is true of cassava in particular. Another reason of interest for conventional research is the fact that farmers have improvised some of the agroforestry practices by changing the peculiar species for other food crops perceived to be performing similar functions with those recommended by the scientists.

## CONCLUSION

The study clearly shows that crop mixtures as a practice of multiple cropping goes beyond a conservative attitude of local farmers but has proved to be an effective means of evolving sustainable livelihoods for the farm families. This is so because scientist recommendations are always based on “ifs”, the implications of which is risk prone. It would therefore be necessary to take cognizance of these cropping patterns if the technology generation would not merely be supply driven- a clear case of publish or perish syndrome.

## REFERENCES

- Byerlee, D.L. Harrington, L. and Winkleman, D.L.: Farming Systems Research: Issues in Research Strategy and Technology Design. *American Journal of Agricultural Economics*, **64**: 897-904 (1982).
- Chambers, R. and Ghildyal, B.P.: Agricultural Research for Resource – Poor Farmers: The Farmer – First-and-Last Model. Overseas Development Institute, *Agricultural Administration Unit Occasional Paper No. 20* Pp. 85 (1985).
- Farrington, J and Martins, A.: Farmer participation in Agricultural Research: A Review of Concepts and Practices. Overseas Development Institute, *Agricultural Administration Unit Occasional Paper No. 9* Pp. 12. (1988)
- International Institute for Environmental and Development (IIED): *Beyond Farmer First: Rural People's Knowledge, Agriculture, Research and Extension Practice*. I. Scoones and J. Thompson (Eds). Intermediate Technology Publication Ltd. Pp. 27-30 (1994)
- International Institute of Tropical Agriculture (IITA): *Cassava: Production and Processing*, International Institute for Tropical Agriculture publication. Ibadan, Nigerian. Pp. 4-10 (1990)
- International Service for National Agricultural Research (ISNAR): *Human Resource Management in National Agricultural Research*. Report of a 7-11 November The Hague. The Netherlands (1988).
- Kaimowitz, D.K.: Research and Technology in one Organisation: Two Experiences from Colombia. *Linkage Discussion Papers ISNAR*, The Hague, Netherlands. Pp 25-45 (1988).

- Merill-Sands-D.: *Linkage Mechanism An Overview*. The Hague: ISNAR. Pp. 7-9 (1986).
- National Agricultural Research Project (NARP): *Human Resources Development Plan*. Volume II. Nigeria Government, Nigeria. Pp. 10 – 24 (1995).
- National Agricultural Research Project (NARP): *National Strategic Research Plan on South Western Nigeria*. A. Shuaib and J. Aliyu (Eds.). Federal Ministry of Agriculture and Natural Resources Abuja, Nigeria. Pp. 35-60 (1997).
- Olayide, S.O., Olayemi, J.K. and Eweka, J.A.: *Perspectives in Benin-Owena River Basin Development by Centre for Agricultural and Rural Development Department of Agricultural Economics*. University of Ibadan, Ibadan, Nigeria. Pp. 25-50 (1981).
- Rhoades, R.E and Booth, P.H.: Farmer back to farmer: A model for generating acceptable Agricultural Technology. *Agricultural Administration*, October Applied Science Publishers Ltd., England. **11 (2)**: 127-137 (1982).
- Simmonds, N.W.: Observations on Induced diffusion of innovation as a component of tropical agricultural extension systems. *Agricultural Administration and Extension*, **28**: 207-16 (1988).
- Zandstra, H., Swanberg, K, Zulberth, C. and Nestle, B. Caqueza: *Living Rural Development*. IDRC, Ottawa, Pp. 27-32 (1981)