

## **CROPPING SYSTEMS AND TRAINING NEEDS OF CITRUS FARMERS IN SOUTHWESTERN NIGERIA**

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### **ABSTRACT**

*A lot of well meaning training programmes organised for farmers to boost the level of productivity have not achieved the desired results because farmers' felt needs were not addressed in the training content. The study investigated the training needs and cropping systems of citrus farmers in Southwestern Nigeria. Three hundred and twenty one citrus farmers (CFs) from Oyo(76), Osun(76), Ondo(79) and Ekiti (90) were selected through multistage sampling technique. Data were analysed using frequency, percentage, chi-square and ANOVA. The result revealed that land used for citrus production by majority of the CFs (72.3 per cent) was inherited. Moreover, 40.2, 32.1 and 10.9 per cent of the CFs planted citrus trees in orchard, boundary and homestead forms, respectively. Majority (65.4 per cent) of the respondents use unbudded seedlings to set up their farms. Citrus trees were intercropped with other tree crops (43 per cent), arable crops (28.6 per cent) and vegetables (12.5 per cent). A high training need in pre-nursery activities exists for homestead (74.3 per cent) and boundary (59.2 per cent) citrus farmers. Also, significant relationship exists between cropping systems and training needs of respondents. Due consideration should be given for specific citrus based training programmes to address the identified gaps. Also, citrus technologies should fit into the uniqueness of farmers cropping system to encourage its adoption.*

### **Introduction**

Citrus is one of the most important fruit tree crops in Nigeria. It is utilised both for fresh consumption and industrial processing. They are subtropical to tropical in nature. Citrus is rated to be among the ten most important fruit tree crops in Nigeria, and so it is widely cultivated. Within a category of these types of oranges, there are many different varieties and the flavours vary a great deal. Each variety has

a different flavour, texture, sweetness, tanginess, peel thickness and quality (MSDTI, 2005; Adigun, 1992). Citrus trees are both permanent and cash crops with a lot of economic potentials. Citrus peel is a source of essential oils, useful flavour essences and perfumery. It also provides pectin, which is used to achieve setting in jams and marmalades. Citrus oil is useful in aromatherapy to uplift and relieve stress as well as surface conditioning of wooden

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furniture, grease removal and as a hand – cleansing agent. The Presidential Initiative on Tropical Fruits launched in 2005 and the recent focus of the Federal Government on non-oil exports further stresses the importance of this crop. However, there is a need to strengthen the human capital base because dissemination of citrus based technologies by extension agents has not enjoyed the kind of attention given to arable crops, thus there are training needs which have to be addressed to assist the Nigerian citrus industry meet up with current standards of citrus production globally. Farmers' needs are crop and locality specific and as such a high premium should be placed on their assessment before embarking on programmes to meet such needs so that resources invested in training programmes are not only justifiable, but that expected outcome from such programmes in terms of knowledge and skill development are achieved. Citrus as an economic crop requires the right kind of cropping system so as to maximise all these immense potentials since cropping systems affect productivity. Cropping systems in Nigeria vary within the different agro-ecologies that exist in the country. Citrus as a fruit tree is either planted as sole or intercrop. Food culture, age of orchard and agro-ecology influence the choice of intercrop. Types of intercrops include cereal, legumes, root and tuber crops, and even permanent crops like cocoa and coffee (Kintomo, 2000).

This study therefore, was to examine the cropping systems of citrus farmers and determine their training needs, which was achieved by the following objectives.

1. To analyse the existing cropping systems in citrus production
2. To determine the training needs of farmers in improved citrus nursery techniques, orchard establishment and management

3. To identify the social and personal characteristics of citrus farmers

*Hypotheses of the Study* : The following three null hypotheses were tested:

*Ho1* : There is no significant relationship between the cropping systems of citrus farmers and their training needs.

*Ho2* : There is no significant relationship between the socio-personal characteristics of citrus farmers and their training needs.

*Ho3* : There is no significant difference in the training needs of homestead, boundary and orchard citrus farmers.

## Methodology

*Area of Study* : This study was conducted in the southwestern part of Nigeria. The States of coverage include Delta, Edo, Lagos, Ondo, Ogun, Ekiti, Osun and Oyo which fall within southwestern agricultural zone lying between latitudes 5° and 9° N and longitude 2° and 7° E. The southwest zone has an area of 114, 271 km<sup>2</sup> representing 12 per cent of the country's total land area. Rainy season lasts up to 9 months with variation in the mean annual rainfall which varies from 2,600 mm in the coastal areas of Delta, Edo, Lagos and Ogun States to nearly 1200 mm in the northern areas of Ondo, Oyo and Osun States. There are distinct wet and dry seasons, and mean monthly temperature ranges during rainy and dry seasons are 18 - 24° C and 30 - 35° C, respectively (Shaib et al, 1997). The zone also has four distinct ecologies: swamp mangrove forest, moist and dry lowland forest, derived savannah and southern guinea savannah. Agriculture is the main source of livelihood of rural people in the zone, and the arable cropping systems are predominant. Large quantities of melon, okro, tomato, cocoyam, plantain, oil palm and rubber are also produced in the zone.

*Study Population, Sampling Procedure and Sample Size:* Four States (Ondo, Ekiti, Oyo and Osun) out of the eight States in southwestern zone were purposively selected because 60 – 70 per cent of citrus produced in the zone come from those States. Citrus farmers from selected four States made up the study population. The existing zoning system of the national extension outfit (Agricultural Development Programme – ADP) was employed to draw the sample. The zoning system has classified each State in the country into zones, blocks and cells. Thus, a multistage sampling procedure was used to select 321 citrus farmers randomly from Ondo (79), Ekiti (90), Osun (76) and Oyo (76) States.

*Measurement of Variables :* The dependent variable for this study is training needs of citrus farmers. This was measured in terms of knowledge, skill and attitude. Knowledge was measured by using job analysis. Skill was measured by using task analysis while attitude was measured by positive and negative attitudinal statements on a 5-point Likert scale. Independent variables measured were cropping system and personal characteristics of respondents which include age, educational attainment, marital status, and membership of social organisation. In measuring cropping system, respondents were asked to mention type of citrus farming practised, whether homestead, boundary or orchard. Also, respondents were asked to indicate type of citrus seedlings planted, whether budded or unbudded, as well as whether planted as sole or intercrop. Farmers were requested to list intercrops grown with citrus. This was later grouped into tree crops, vegetables and arable crops.

*Method of Data Collection and Analysis:* Primary data used in the study were collected with interview schedule while secondary data were obtained from literature. Descriptive and inferential statistics were used in analysing the

data collected which include frequency count, percentages, chi-square and ANOVA.

## Results and Discussion

*Personal Characteristics of Respondents:* Findings on personal characteristics reveal that 96 per cent of citrus farmers are married, while only very few are either divorced or single. Farm families provide labour for farm operations. Since citrus is perennial in nature with potential for revenue generation, it will require continuous and constant management which the family labour can supply.

Results presented in Table 1 also reveal the age of respondents as ranging from 21 years to above 60 years. Majority of the farmers (58.3 per cent) are between 51 to above 60 years of age. The mean age of respondents is 50 years. Earlier findings by NIHORT (1995) revealed that the average age of existing citrus trees ranges between 40 and 45 years. This implies that younger generation of farmers are not actively involved in citrus production. This trend is not good enough for the citrus industry because the older generation will gradually ease out of the system. Adeola (1998) affirms that increase in farmers' age reduces their ability to cope with many farm operations. This calls for the encouragement of younger generation of farmers to ensure continuity and sustenance of the citrus industry.

Education assists in broadening the scope of learning of an individual. Table 1 shows that farmers who had no formal education were 38.3 per cent while those who had some form of formal education up to secondary school were 48.9 per cent. Those exposed to higher level of formal education in tertiary institutions were only 12.8 per cent. The level of literacy may affect comprehension during training programmes.

Social organisations are avenues where farmers can focus on common interests

affecting them as it relates to farming. As shown in Table 1, citrus farmers who belong to one or more social organisations were 51.4 per cent. The organisations most of the farmers belong to include Cooperative Society (16.5 per cent), Farmers' Congress (15.9 per cent) and Growers' Association (19.0 per cent). Membership of social organisations could assist farmers pool their resources together to attract external intervention.

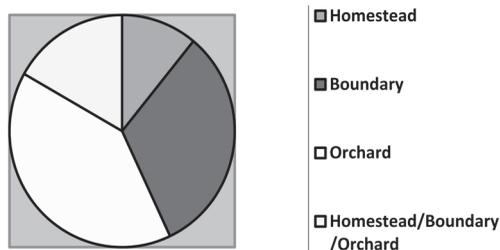
**Table 1 : Personal Characteristics of Citrus Farmers (N = 321)**

Variable	Frequency	Percentage
<b>Marital status</b>		
Single	2	0.6
Married	309	96.3
Widowed/Divorced	7	2.2
No response	3	0.9
<b>Age (in years)</b>		
< 40	39	12.1
41-50	63	19.6
51-60	84	26.2
>60	103	32.1
No response	32	10.0
<b>Educational attainment</b>		
No formal education	123	38.3
Completed secondary school	157	48.6
Tertiary education	41	12.8
<b>Membership of social organisation</b>		
Cooperative Society	53	16.5
Farmers' Congress	51	15.9
Growers Association	61	19.0
No response	156	48.6

*Type of Citrus Farming Practised* : Citrus farming being practised are of different types

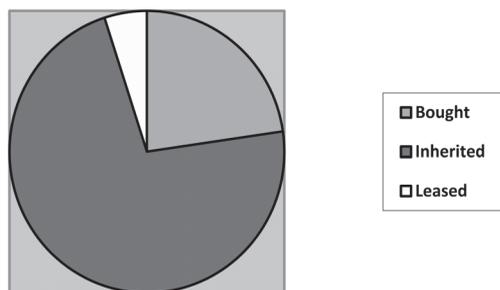
and combinations. The three main types of citrus farming are homestead, boundary and orchard. Figure 1 shows that citrus growers who have citrus trees at the backyard of their houses and practised homestead gardening were only 10.9 per cent of the farmers. Those who had citrus trees grown along farm boundaries for plot demarcation constitute 32.1 per cent. Citrus farmers who planted citrus trees in orchard form were 40.2 per cent of the total citrus growers, while the remaining 16.8 per cent of the farmers combined the practice of the three types of citrus farming. Citrus trees planted within the homestead are used to satisfy subsistence needs, while trees grown on bigger farmlands are committed to commercial purpose. Kintomo (2000) affirms that citrus features within cropping systems such as food plots, small scale plantations and multistoried homestead.

**Figure 1: Percentage Distribution of Farmers Showing Type of Citrus Farming Practised**



*Land Tenure Status* : Figure 2 shows that a higher proportion of citrus farmers (72.3 per cent) had obtained their land through inheritance. Some of the farmers (22.7 per cent) bought the land being used for citrus production and 5 per cent leased land for citrus production. Akande and Lawal (2004) stated that land tenure system influences the use to which land is put for economic and social development. This suggests that the extent of citrus cultivation is influenced by the kind of prevailing land tenure status since citrus trees are permanent cash crops.

**Figure 2: Percentage Distribution of Farmers Showing Land Tenure System**



*Types of Citrus Seedlings Planted* : Citrus seedlings can either be budded or unbudded. Table 2 shows that a greater percentage of citrus farmers (65.4 per cent) grow citrus trees from unbudded seedlings. Another 13.1 per cent of farmers had both budded and unbudded trees on their farms, while only 21.5 per cent of citrus farmers planted only budded citrus seedlings. The planting material used to establish a citrus farm to a large extent will determine productivity. Farmers who planted unbudded seedlings do not take advantage of the desirable qualities of the budded citrus seedling which include high yield, earliness of fruiting, reduced tree size and regular fruiting pattern (Olaniyan, 2000). Aiyelaagbe *et al.*, (1999) stated that farmers in the southwest zone obtain their seedlings from sources other than established nurseries of government agencies. Many of the existing citrus orchards were established several years ago with seedling trees, hence prevalence of unbudded seedlings and the resultant effect of low yielding trees.

*Type of Citrus Planting* : Citrus as a fruit tree can either be planted sole or intercrop. Results in Table 2 reveal that intercropping of citrus trees with other crops was favoured by most of the farmers (78.2 per cent). Farmers who planted citrus trees as sole crops were only 16.2 per cent ,while 5 per cent of the farmers practised both sole and intercropping.

**Table 2 : Type of Citrus Seedlings Planted and Citrus Cropping System (N = 321)**

Variable	Frequency	Percentage
<b>Type of citrus seedlings</b>		
Budded	69	21.5
Unbudded	210	65.4
Both	42	13.1
<b>Type of citrus planting</b>		
Sole	52	16.2
Intercrop	251	78.2
Both	16	5.0
No response	2	0.6
<b>Intercrop grown with citrus</b>		
Cocoa,oilpalm	138	43.0
Yam, cassava,cocoyam	92	28.6
Tomatoes,pepper, Celosia, Amaranthus, Corchorus olitorius	40	12.5
No response	51	15.9

Sole planting of citrus is a concept which the farmers have not really embraced. Citrus, being a permanent crop spur farmers to plant other intercrops to both generate cash and provide food security for the farm family before the trees come into fruiting. Intercropping also encourage the farmers to maintain the young trees and serve as a buffer in instances of crop failure (Kintomo, 2000). Tree crops such as cocoa and oilpalm were intercropped with citrus by 43 per cent of the farmers, while 28.6 per cent intercropped citrus with yam, cassava and cocoyam (Table 2). This farmers' practice is not in line with recommendation on choice of intercrops for citrus production reported by Kintomo (2000) which include vegetable and specified arable crops. Citrus farmers who planted vegetable

crops such as tomatoes, pepper, Celosia, Amaranthus and Corchorus olitorius within the alleys were 12.5 per cent. The prevalent cropping system which is either yam or cassava based is also connected to the food culture of the farmers. Aiyelaagbe *et al.*, (1999) affirms that agro-ecology and culture of farmers influence preference of intercrops by farmers.

*Training Needs of Citrus Farmers:* Homestead (74.3 per cent) and boundary (59.2 per cent) citrus farmers have high need for training in pre-nursery activities. Fifty seven point four per cent of orchard farmers have low training need in pre-nursery techniques suggesting that most orchard farmers may not be interested in pre-nursery activities. Thus, orchard farmers should be encouraged to embrace pre-nursery. This will help to ensure that farmers use good citrus seedlings as foundation stock for their farms because performance of citrus seedlings is linked to whether or not the seedlings were poorly raised.

Furthermore, homestead (60 per cent), boundary (52.4 per cent) and orchard (62.8 per cent) citrus farmers have high need for training in citrus main nursery techniques. This suggests that any training programmes targeted at citrus farmers should place emphasis on main nursery techniques. Table 3 also shows that majority of citrus farmers, whether homestead, boundary or orchard farmers have a low need for training in orchard practices. The probable explanation for this could be that farmers have been managing the citrus trees over the years and may not have seen the need for new thinking in orchard management. Thus, they may have devised various management strategies. Also, more technologies in orchard practices have been disseminated to farmers by extension agents (South West Zonal Extension Proceedings, 1995-2002).

**Table 3 : Training Needs of Categories of Citrus Farmers in Nursery and Orchard Practices (N = 321)**

Categories of farmers	Level of training needs	
	Low	High
Pre-nursery		
Homestead	9 (25.7)*	26 (74.3)
Boundary	42 (40.8)	61 (59.2)
Orchard	74 (57.4)	55 (42.6)
Homestead + Boundary+ Orchard	29 (53.7)	25 (46.3)
Main nursery		
Homestead	14 (40.0)*	21 (60.0)
Boundary	49 (47.6)	54 (52.4)
Orchard	48 (37.2)	81 (62.8)
Homestead+ Boundary+ Orchard	33 (61.1)	21 (38.9)
Orchard		
Homestead	22 (62.9)*	13 (37.1)
Boundary	59 (57.3)	44 (42.7)
Orchard	97 (75.2)	32 (24.8)
Homestead + Boundary+ Orchard	37 (68.5)	17 (31.5)

\* Figures in parentheses are percentages.

**Test of Hypotheses**

*Ho1* : There is no significant relationship between cropping systems of citrus farmers and their training needs.

As shown in Table 4 there is a significant relationship between cropping systems and training needs. This implies that type of citrus farming the farmer practises will influence his training needs. A farmer who plants in the homestead may have different training needs compared to the one who has a citrus orchard. This could be because, their purpose of going into production, whether subsistence or commercial, may differ. The homestead citrus grower may grow citrus mainly for subsistence

while the orchard grower maintains an orchard for pure economic/commercial purpose. Choice of intercrops used within the alleys by farmers differ, so also are the requirements of such intercrops. Intercrops could be cereals, legumes, vegetables and even tree crops. The different requirements of growing specific crops may influence the training needs of citrus farmers. Citrus seedlings could be budded or unbudded. Land tenure system and type of planting, whether as sole crops or with intercrops, did not significantly affect citrus farmers' training needs. This implies that the mode of land procurement for citrus production does not influence training needs. Land does not differ in terms of whether it is leased, rented or bought.

**Table 4 : Chi – square and Contingency Analysis Showing Relationship Between Cropping Systems and Training Needs of Citrus Farmers in the Study Area**

Variables	X <sup>2</sup>	df	p	cc
Type of citrus cropping systems	19.49	3	0.0002	0.24

Significant :  $p < 0.05$

cc – Contingency coefficient

*Ho2* : There is no significant relationship between the selected personal characteristics and training needs of citrus farmers in the study area.

In Table 5, only age of respondents was significantly related to farmers' training needs. Farmers still in their active years may have

more need for training to boost their productivity whereas an ageing farmer may feel training is of little use with advancement in age. Other personal characteristics of the citrus farmers such as marital status, educational attainment and land tenure system practised were not significantly related to their training needs.

**Table 5 : Chi – square and Contingency Analysis Showing Relationship Between Selected Personal Characteristics and Training Needs of Citrus Farmers in the Study Area**

Variables	X <sup>2</sup>	df	p	cc
(i) Land tenure system	1.22	2	0.54 NS	0.14
(ii) Marital status	1.901	2	0.39 NS	0.018
(iii) Age	10.37*	3	0.02* S	0.18
(iv) Educational attainment	0.47	2	0.79 NS	0.04
(v) Membership of farm organisation	0.86	1	0.35 NS	0.05

\* Significant;  $p < 0.05$

NS = Not significant;  $p > 0.05$

cc – Contingency coefficient

*Ho3* : There is no significant difference in the training needs of homestead, boundary and orchard citrus farmers in the study area.

The results presented in Table 6 show that significant difference exists in the training

needs of homestead, boundary and orchard citrus farmers. Duncan Multiple Range Test (DMRT) was used to further determine which group means are different from one another. Results imply that differences exist, and type of training needs differ.

**Table 6 : One-way Analysis of Variance Showing Difference in the Training Needs of Homestead, Boundary and Orchard Citrus Farmers**

Training Needs	Sum of Squares	df	Mean Square	F	p
Between groups	53693.72	3	17897.91	4.35	0.005*
Within groups	1299179.83	316	4111.33		
Total	1352873.55	319			
Duncan Rating of Means					
Orchard	158.95a				
Homestead+Boundary+Orchard	150.11ab				
Boundary	132.97bc				
Homestead	126.17c				

\* Significant;  $p < 0.0$

### Conclusions and Recommendations

The following conclusions were drawn based on the findings of the study:

- 1) Majority of respondents are married, had some level of formal education and are members of different farm organisations. Mean age of respondents is 50 years.
- 2) Three main forms of citrus farming being practised are homestead, boundary and orchard.
- 3) Farmland used for citrus production by majority of the farmers are inherited.
- 4) Majority of the respondents established their citrus farms with unbudded seedlings.
- 5) Citrus was planted as intercrop by majority of the respondents. Intercrops grown with citrus include cocoa, oilpalm, yam, cassava and cocoyam.
- 6) Homestead and boundary citrus farmers have high need for training in pre-nursery activities.
- 7) Significant relationship exists between cropping systems and training needs of citrus farmers.
- 8) Significant relationship exists between age and training needs of respondents.

- 9) Significant differences exist in the training needs of homestead, boundary and orchard farmers.

Based on the outcome of the study, the following recommendations are made:

- 1) Farmers in their active years should be encouraged to produce citrus.
- 2) Citrus farmers need enlightenment on choice of compatible crops for intercropping to ensure maximum returns from the crop mixture without any deleterious effect on the main crop which is citrus.
- 3) Capacity building programmes should be organised for farmers to train them on technicalities needed for growing improved varieties as well as to demonstrate superiority of budded seedlings in order to encourage its adoption.
- 4) Budded seedlings should be popularised through exhibitions, print and electronic media, and also seedlings should be readily available for purchase.
- 5) Training programme modules should be drawn up based on specific identified needs of each category of farmers.
- 6) More trainings should be concentrated on farmers who are still in their active years.

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