

Assessment of cocoa growers' farm management practices in Ondo State, Nigeria

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Abstract

This study assesses the farm management practices of cocoa growers in Ondo State, southwestern Nigeria. One hundred and twenty three farmers were selected (using simple random sampling) from the list of cocoa farmers belonging to the Cocoa Farmers' Association of Nigeria (CFAN) in Ondo State. All were asked to complete a questionnaire on the farm hygiene and management practices they followed. The majority of respondents were married men who used family labour on their farms, and who had a varying number of years of farming experience. No significant relationships were found among age, marital status, years of farming experience and gender. However, the use of farm hygiene practices showed a significant relationship with educational status and grower attitude towards the adoption of appropriate crop growing practices. The majority of respondents commonly used chemicals rather than crop growing practices to ensure crop hygiene; few undertook practices such as pruning, the removal of diseased pods and mistletoe, the application of organic fertilizers, or the breaking of pods off-farm. A limited number combined crop growing practices with the use of chemicals to control pests and diseases. The lack of credit facilities, weeds, pests, diseases, parasites and marketing difficulties were all recognised as constraints limiting production. The present findings suggest that the Cocoa Research Institute of Nigeria (CRIN), the Ministry of Agriculture, and relevant non-governmental organizations should organize a sensitisation programme/training scheme to de-emphasize the use of chemicals and encourage the use of appropriate crop growing practices for improving farm hygiene.

Additional key words: adoption, attitude, crop, cultural, health, plantation, *Theobroma cacao*.

Resumen

Evaluación de las prácticas de cultivo de cacao en el Estado Ondo, Nigeria

En este trabajo se evaluaron las prácticas de los cultivadores de cacao en el Estado Ondo, al suroeste de Nigeria. Se seleccionaron al azar 123 agricultores de la Asociación de Cultivadores de Cacao de Nigeria (CFAN) pertenecientes a este estado y se les pidió rellenar un cuestionario sobre prácticas de vigilancia fitosanitaria y de gestión de las fincas. La mayoría eran hombres casados que utilizaban mano de obra familiar en sus fincas, y con un número variable de años de experiencia. No se encontraron relaciones significativas entre edad, sexo, estado civil y años de experiencia. Sin embargo, sí se observó una relación significativa entre la realización de prácticas fitosanitarias y el nivel de educación y la actitud del cultivador hacia la adopción de prácticas adecuadas de cultivo. Para el control de enfermedades y plagas, la mayoría utilizaba productos químicos y un número limitado combinaba prácticas de cultivo con productos químicos. Pocos podaban o eliminaban restos vegetales enfermos o aplicaban fertilizantes orgánicos. Se reconocieron como factores limitantes de la producción la falta de facilidades de crédito, malas hierbas, plagas, enfermedades, parásitos y dificultades de comercialización. Este estudio sugiere que el Instituto de Investigación del Cacao de Nigeria (CRIN), el Ministerio de Agricultura y organizaciones no gubernamentales deberían organizar un programa de sensibilización y formación encaminado a desaconsejar el uso de productos químicos y mejorar la sanidad de los cultivos mediante la realización de prácticas adecuadas.

Palabras clave adicionales: actitud, adopción, cultivo, cultural, plantación, sanidad vegetal, *Theobroma cacao*.

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Introduction

The production of cocoa (*Theobroma cacao* L.) in Nigeria, which generates foreign exchange earnings for financing capital projects, has declined. Cocoa, a plantation crop, was the dominant foreign exchange earner from the early 1960s through the 1970s, after which the discovery and exploitation of oil led to a shift away from the country's agrarian economy base. Cocoa remains, however, significant in terms of internal revenue generation, and at the grower level is important in terms of employment and income (Ajobo, 1980, p. 137). It also remains a major export crop; in 1998 a revenue of 7459.3 million Naira (US\$ 53,280 at 140 per US\$) was derived from dried cocoa beans (half of the income attributed to the total export of major agricultural products) (CBN, 1998, pp. 8-9).

Since the early 1980s, food demand in Sub-Saharan Africa has been growing faster than food production, resulting in a reduction in *per capita* food availability (Okpako, 2000, pp. 52-53) - yet cocoa production in Nigeria has become ever more untenable. Its exportation has declined in economic importance, and according to Mark (2000, p. 8) its contribution to Nigeria's external earnings is currently insignificant compared to that of crude oil (which has taken the crop's position as the mainstay of the economy). Socio-economic and structural factors associated with the fluctuating performance of cocoa production in Nigeria include the civil war of the late 1960s, the oil boom of the 1970s, and the severe droughts of the 1970s and 1980s. The pests, diseases and parasites of cocoa trees are epidemic in proportion and represent significant economic and environmental problems. The problems of weed control and of processing operations, such as fermentation and storage, have also affected the quality of cocoa, reducing its market value. Unfortunately, few farmers appear to be adopting farm hygiene and management techniques to minimize these problems.

The widening gap in cocoa demand and supply within Nigeria, largely due to pest and disease problems, shows the need to adopt more cost-effective methods of control. The adoption of certain crop growing practices that encourage farm hygiene would help reduce the incidence of these problems (Lucas, 1980, p. 92). The consequent reduction in the use of chemicals to combat diseases and pests would also

have positive effects on the environment and reduce production costs.

The governments of cocoa-producing countries, the cocoa industry, and international donors continue to invest in research into better, non-chemical management systems to control pests and diseases. However, much more needs to be done (Tony, 2004, p. 26). For example, Tony (2004, p. 32) reports concerns have been expressed by the food safety authorities of some EU countries regarding the presence of detectable levels of ochratoxin A (a mycotoxin) in some cocoa beans (although it should be noted that ochratoxin A is also present in many other foodstuffs and cocoa makes only a very small contribution to the acceptable daily intake).

Bateman *et al.* (2004, pp. 92-93) indicate that farmers need reliable, available remedies for pest and disease control. Crop growing practices have proven very useful and in some settings are often the first line of defence against diseases and insects. However, growers can often be reticent about their adoption. Vos *et al.* (2003, pp. 4-7) identified several crop growing methods that could be adopted by cocoa growers to address the problems of poor cocoa quality and pest control, including: a) pruning and shade management, b) soil nutrient management, c) pest management, d) pest-resistant cocoa varieties, and e) weed control.

Objectives of the study

To improve the quality of Nigerian cocoa it is imperative to know the farm hygiene and crop management practices followed and to identify those responsible for reducing the quantity and quality of beans produced. The general aim of this study was to assess cocoa growers' farm hygiene and management practices and to determine how these affect cocoa production in Idanre, a local government area of Ondo State. The specific objectives of the study were to: i) identify the personal characteristics (age, gender, marital status, educational level, religion, farming experience and leadership role) of cocoa growers; ii) examine the farm hygiene and management practices adopted by these growers; iii) identify the production constraints facing them; and iv) determine the attitude of cocoa growers towards the use of crop growing methods that would help ensure farm hygiene.

Methodology

Study area

Ondo State is the largest cocoa-producing state in Nigeria. It is commonly known as the cocoa belt or the land of cocoa farmers. The area has many local government producers, among them the Idanre Local Government. Its area of control, located between latitudes 06° 42' and 07° 42' north and 05° 00' and 05° 32' east, covers some 1832 km² (Adegeye, 1993, pp. 7-9) and is characterized by forests and rocky hills. It was one of the country's first intensive cocoa-producing areas (Ogunfiditimi, 1980, p 102) and formed the present study area. The temperature in this area averages around 78-83°F between January and July. The area is bound to the north by the Akure and Ifedore Local Government Areas, eastward by the Owo Local Government Area, westward by the Ondo and Ore-Odigbo Local Government Areas, and southward by Edo State.

Design of the interview

Primary field data were collected from December 2003 to March 2004 through the use of structured questionnaires with open- and closed-ended questions. The questionnaires were distributed to selected cocoa farmers (see below). A trained assistant who could communicate with the respondents in their native language collected the data alongside a group of agricultural development project (ADP) officers, all under the researchers' supervision.

The study population consisted of male and female cocoa growers. Of the 10 political wards in the Idanre Local Government area, six (Idale Ward I, II, and III, Isalu Ward I and II, and Uroho) were selected because the prevailing conditions in these areas are suitable for cocoa production - and indeed it is common. Forty percent of the registered cocoa growers of each ward were selected by simple random sampling of the lists provided by the Cocoa Farmers' Association (totals = 65, 53, 70, 33, 54 and 36 growers for each ward respectively; 26, 21, 28, 13, 21 and 14 were finally selected). The final sample size was 123 respondents.

Reliability and validity of the data collection method

The reliability of data collection method was tested by the test-retest method using a sample of 50 respondents randomly drawn from Oyo State (i.e., another Nigerian State). Scores were assigned to questions relating to the demographic characteristic of the respondents. The totals for the test-retest answer periods were calculated, and the Pearson correlation test used to determine the agreement between them. A reliability coefficient above 0.8 was chosen to certify the data collection method as reliable. Values below this would have required the questions be revised.

Validity is an important attribute of the research procedure adopted since it questions whether the data meet the purpose for which they were gathered. Validity is always specific to a particular situation and particular purpose: an instrument that is valid in one situation may not be valid in another because of differences in objective or environment. There are in fact three types of validity: (a) content validity, (b) construct validity, and (c) face validity. In this study, content validity was used to determine the adequacy of the content of the questionnaire. The items on the questionnaires were prepared on the basis of the objectives of the study and on personal discussions with experts in agricultural biology, agronomy, sociology, rural development and agricultural extension. The questions in the questionnaire measured the variables related to the objective of the study.

Results

Personal characteristics of the farmers

The personal characteristics of the cocoa growers examined were: age, farming experience, marital status, farm size, land acquisition pattern, membership of a farmers' organization, leadership role and source of labour.

Approximately, 82.5% of the respondents were male and 17.5% female, whose age ranged between 21 and 78 years; 10.8% (12) were aged 21-30 years, 13.3% (16) were aged 31-40 years, 32.5% (39) were aged 41-50 years, 27.5% (33) were aged 51-60 years, and 16.7% (20) were 61 years of age or older.

Table 1. Farmers' personal characteristics: frequency distribution

	Frequency	Percentage
<i>Farming experience (in years)</i>		
1-10	31	25.0
11-20	64	52.5
≥ 21	27	22.5
Total	123	100.0
<i>Farm size (m²)</i>		
< 1600	15	11.7
1600-3200	62	50.8
3200-6400	46	37.5
Total	123	100.0
<i>Land acquisition</i>		
Tenant	15	12.5
Gift	8	5.8
Inheritance	54	45.0
Purchase	27	21.7
Leasehold	19	15.0
Total	123	100.0
<i>Farmers organisation</i>		
None	27	21.7
One	70	58.3
Two	15	11.7
Three	11	8.3
Total	123	100.0
<i>Source of labour</i>		
Family	58	48.3
Self	45	36.7
Hired	11	8.3
Hired and self	9	6.7
Total	123	100.0

Source: Field survey, 2004.

Table 1 shows that 52.5% of the growers had between 11 and 20 years experience of cocoa cultivation, 22.5% had 21 years experience, and 25.0% had less than 10 years experience.

Some 11.7% cultivated less than 1600 m² of cocoa land, 50.8% had 1600-3200 m², and 37.5% cultivated 3200 m² or more. Table 1 shows that 45.0% of the growers acquired their land by inheritance, 21.7% had purchased their land, 15.0% had a leasehold, 12.5% were tenant farmers, and 5.8% acquired their land as a gift.

Some 48.3% used family labour, closely followed (36.7%) by self-labour, 8.3% used hired labour, and 6.7 hired labour to compliment self-labour.

Some 22.5% of the farmers had no education, 48.3% had completed primary school, 25% attended secondary school, and 1.7% had the Nigerian Certificate in Education/Ordinary National Diploma (NCE/OND). Twenty five percent had attended adult education classes. None of the respondents had a university education.

The majority of farmers (70.0%) were married, 8.3% were divorced, 6.7% were widowed, and 9.2% were single. Six percent did not respond to this question.

Table 2 shows data relating to the use of crop growing practices. The majority of respondents (83%) frequently used chemicals to ensure farm hygiene; very few (7%) claimed to use chemicals only rarely. With

Table 2. Hygiene practices used to control pests, diseases and parasites: frequency distribution

Farmers' practices	Rarely	%	Frequently	%	Very frequently	%
Removal of diseased pods	72	60	25	21	23	18
Removal of mistletoe	65	54	35	29	20	17
Regular pruning	80	67	25	21	15	13
Application of organic fertilizer	63	53	29	24	28	23
Off-farm breaking of pods	95	79	9	8	16	13
Application of chemicals	8	7	12	10	100	83

Source: Field survey, 2004.

respect to the removal of diseased pods and mistletoe, regular pruning, application of organic fertilizer and off-farm pod breaking - actions that help maintain farm hygiene - the majority (72%, 65%, 80%, 63%, and 95% respectively) claimed to rarely perform such operations.

The growers interviewed used chemicals such as Perenox, Kocide and Bourdeaux mixture to control black pod disease (*Phytophthora palmivora*) and other cocoa fungi. Lindance, Capsitox, Diazinon, Propoxur, Basudin 600EC were used as an alternative to Gammalin 20EC and other related organochlorine insecticides to control mirid and mealy bugs, carriers of cocoa swollen shoot virus.

Few farmers used crop growing practices to compliment the use of chemicals for controlling the disease, pests and parasites on their cocoa trees. When they were employed, frequent harvesting and removal of infested pods were used to control black pod diseases, and mealy bugs and pod borers (which have been implicated in the spread of black pod disease)

were controlled through frequent weeding and good hygiene practices.

Table 3 shows that respondents emphasized the key barriers to cocoa production to be pests, diseases and parasites, closely followed by weeds. Only 2.5% did not perceive pests, diseases and parasites as serious constraints. Others identified problems such as a lack of credit facilities, inadequate input (money, seedlings, tools, fertilizers etc.), a lack of subsidies and incentives for fertilizer, the high price of agrochemicals, and the low price demanded by their products due to poor marketing systems.

Table 4 shows the degree of association (significance set at $P < 0.05$) between farmers' personal characteristics and farm hygiene and maintenance practices. Neither grower gender ($\chi^2 = 5.61$), age ($\chi^2 = 4.48$), marital status ($\chi^2 \text{ cal} = 3.81$) nor farming experience ($\chi^2 = 2.15$) had any significant relationship with farm hygiene and maintenance practices; a significant relationship was seen, however, with educational status ($\chi^2 \text{ cal} = 6.62$).

Table 3. Cited constraints limiting productivity and reducing the market quality of cocoa beans: frequency distribution

Constraints	Serious (F)	Not serious (F)
Aging of farmers and cocoa trees	2(1.7)	4(3.3)
Pest diseases and parasites	38(31.7)	3(2.5)
Processing techniques	12(10.0)	5(4.2)
Weeds	15(12.5)	7(5.8)
Inadequate inputs	3(2.5)	6(5.0)
Marketing	5(4.2)	2(1.7)
Inadequate credit facilities	13(10.8)	5(4.2)
Total	F=123	%=100

Source: Field survey, 2004.

Table 4. Personal characteristics of growers and their farm hygiene and management practices: Chi-squared analysis

Personal and socioeconomic characteristics	χ^2_{cal}	<i>df</i>	χ^2_{tab}	<i>P</i>	Remark
Gender	5.61	4	9.94	0.05	NS
Age	4.48	4	9.49	0.05	NS
Marital status	3.81	4	9.49	0.05	NS
Educational status	6.62	5	11.07	0.05	S
Farming experience	2.15	2	5.99	0.05	NS

NS: not significant. S: significant. *Source:* Field survey, 2004.

Table 5 shows the attitude of the respondents towards the use of indigenous and modern farm practices to be significantly related to cocoa production practices ($\chi^2 = 9.66$) significance set at $P < 0.05$).

Discussion

The present findings show that cocoa farming is a male dominated profession and that most farms in the study area were inherited by male children. Some 40.0% of the farmers were aged 21-40 years and 60.0% were in the range 41-60 years. Table 1 shows that 75% of the growers had more than 11 years experience in cocoa cultivation; therefore, some might be expected to have considerable knowledge about farm hygiene and the maintenance of cocoa trees. The farm sizes shown are the sums of all farmland possessed in different locations. Some 37.5% of the respondents had > 3200 m² of land while 62.5% of the respondents had small farms of < 3200 m² that produced only a small annual tonnage of cocoa. The use of hired labour might be connected with rural-urban drift; the children of growers are leaving to look for white-collar jobs outside their villages. Education level determines how much information on cocoa production a grower may possess or have access to: this no doubt affects their receptivity to innovation.

Most married growers relied on family labour, reducing the requirement to hire labour and thereby reducing their financial obligations.

The study showed that many farmers still believe in the use of chemicals to ensure the control of pests, diseases and parasites (Table 2). Little emphasis was placed on crop growing practices. The constraints limiting productivity and reducing the quality and market value of cocoa were regarded as pests, diseases, parasites, a lack of credit facilities, inadequate input (money, seedlings, tools, fertilizer, etc.), the lack of subsidies and incentives, the high price of fertilizer and agrochemicals, and the low price demanded by the final product due to poor marketing systems.

Neither the gender, marital status nor the age of cocoa growers significantly influenced the hygiene and maintenance practices followed. These were also independent of the growers' years of experience.

Table 5 shows that the grower attitudes influence their farm management practices. The contingency coefficient (*C*) of 0.27 shows that though there is a relationship between the two variables it is rather weak.

Implications of the study findings

Efficient farm management practices are an essential ingredient in the production of quality cocoa. On the

Table 5. Farmers' attitudes towards the use of crop growing methods that ensure farm hygiene: Chi-squared analysis

Management practices on cocoa trees	χ^2_{cal}	<i>df</i>	χ^2_{tab}	<i>P</i>	Remark	Contingence coefficient
Farm hygiene	9.66	4	9.49	0.05	S	0.27

S: significant. *Source:* Field survey, 2004.

world market, great importance is attached to quality, which determines the price obtained.

In Nigeria, low prices are offered to cocoa farmers due to the poor quality of their products. Good management practices could therefore have a positive impact on cocoa quality and the price it attracts. The use of inappropriate management practices results in poorer quality cocoa, which has a negative effect on demand. Consequently, grower revenue declines. The need to produce good quality cocoa cannot, therefore, be overemphasized. Emphasis is now being placed on the use of crop growing methods to control pests and diseases; the residues left by chemicals on cocoa beans and the high production costs associated with these chemicals are responsible for this.

Despite the favourable environment for cocoa production in the Idanre Local Government Area, productivity is yet to be maximised. This is further aggravated by constraints such as pests, diseases and parasites, weeds and inadequate input etc. In addition, the farmers and cocoa trees in the study area are aging, access to the growers' land is difficult (the roads are poor), and the fluctuating market price of cocoa has reduced farm income in recent years. This in turn has discouraged farmers from producing high quality cocoa beans. It is not surprising, therefore, to note the growing prevalence of part-time farming; growers are taking off-farm employment to supplement their income.

The results of the Chi-square analysis show that grower attitude to the use of crop growing practices has a significant effect on farm hygiene. With the exception of educational status, personal characteristics have no significant effect.

As recommendations: i) the Cocoa Research Institute of Nigeria (CRIN) and the extension agents of Agricultural Development Projects (ADPs) should embark on sensitisation programmes to educate farmers about the need to place more emphasis on crop growing methods to control pests and diseases; ii) efforts should be made to encourage young people to take up cocoa farming since most of the growers

interviewed were aging; iii) the presence of old cocoa trees on cocoa farms calls for immediate attention; government, through the CRIN, should provide improved varieties of cocoa to growers at highly subsidized prices.

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