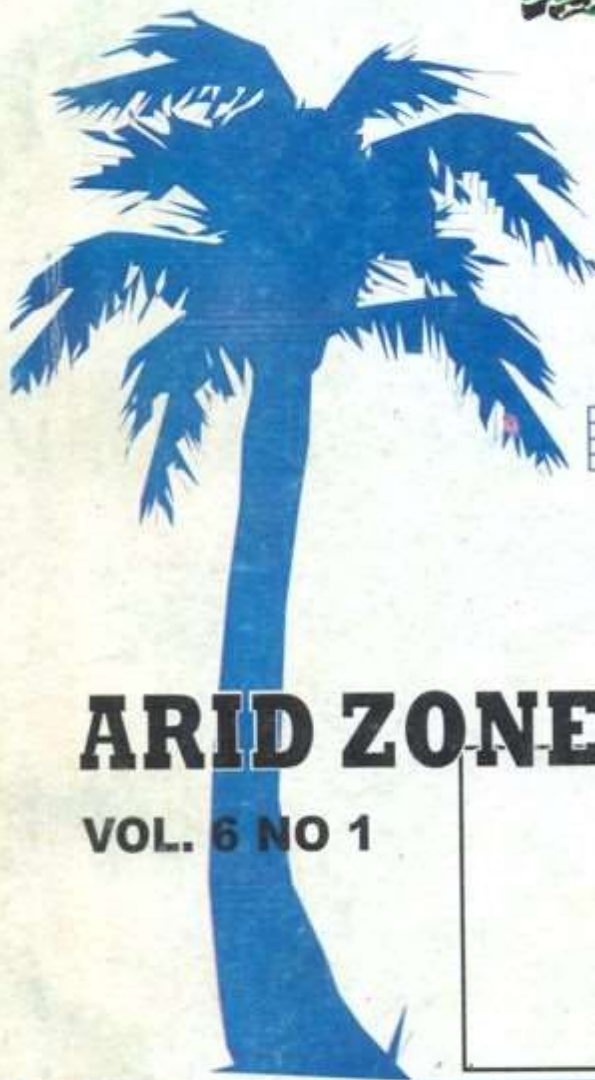




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# **COSTS AND RETURNS OF FIELD PEST MANAGEMENT TECHNIQUES FOR COWPEA PRODUCTION IN KUKAWA LOCAL GOVERNMENT AREA OF BORNO STATE, NIGERIA**

*By*

**Ahmed, A. A.<sup>1</sup>, Adeyemi S. B.<sup>2</sup> and Kasum S. A.<sup>3</sup>**

## **ABSTRACT**

*The study was conducted for the 2003 and 2004 growing seasons to determine the costs and returns of Field Pest Management Techniques on cowpea production in Kukawa Local Government Area of Borno state, Nigeria. Data were collected using structured questionnaire and oral interview schedule administered to 100 cowpea growers. Descriptive statistics, gross margin analysis, paired t-test and sample statistics were used to analyse the data. The result indicates that Chemical Field Pest Management was the commonest among farmers, followed by cultural method and then the integrated pest management. Majority (56%) of the farmers were illiterates, with farm sizes between 1-5 (52.5%) hectares and farming experience of 1-20 years (58%). Profitability analysis using gross margin shows that chemical pest management gave higher yields and profit margin of 225,760.00 naira per hectare compared with cultural technique (124,140.00 naira/ha), and the integrated field pest management techniques (70,492 naira/ha). The of field pest management techniques used was negatively correlated (-0.027) with the output. Output between field pest managed farms and non-field pest managed farms were significantly ( $P < 0.001$ ) different. Based on the findings, it was recommended that the government should restructure the extension service system and educate the farm society on use of field pest management techniques. Also farmers should be encouraged to control pests in their cowpea farms using chemical control technique.*

## **Introduction**

An estimation made by FAO (1986) and Singh et al (1978) shows that Cowpea is cultivated on at least 12.5 million hectares (ha) of land with an annual production of over 3 million tonnes worldwide. However, a substantial part of the cowpea production comes from the drier regions of the northern Nigeria (about 4 million ha, with 0.3 million tones), and North Eastern Brazil (about 1.9 million ha with 0.7 million tones).

Cowpea is mainly used as food, but could also be used as feed for livestock. Industrially, it is processed into products like beany flavour, yoghurt products, beverages and milk solids in ice cream, and a vital source of income to both the farmer and the nation at large.

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As the production and value of cowpea is on the increase, pests and related organisms of cowpea have also increased in population. Consequently, severe infestation due to the encroachment of draught desertification and some other pest multiplication factors have been on the increase, thus resulting in severe economic losses (Allen *et al.*, 1981). Cowpea is extremely attracted to insect pest, disease and parasitic weeds and, therefore, very difficult to yield at an economically profitable level without field pest control. The insect pests, unlike other groups of pests pose greater losses in cowpea yield (Singh and Allen, 1979). Although cowpea is attacked by a wide range of noxious insect pests often there is insufficient knowledge of their biology, epidemiology, damaging activities and the economics of the many factors of pest status and field pest management techniques (Singh, 1978; Ayoola, 1990; Okoro, 2002; Ekefan and Basil, 2002).

Several field pest management techniques have been recommended as control remedies for regulating pests population to an economic tolerance level that gives room for profit maximization. These techniques include chemical, biological, physical and cultural and have been recorded to be effective in most semi-arid and arid zones of the northern Nigeria and Borno state in particular.

In spite of records of the occurrence and control of various pest organism (Pathak, 1974; Ayoola, 1990), not much is known about the economic impact of field pest management techniques on the yield component and quality of crops grown in some parts of Africa and in Borno state of Nigeria. This study, therefore, evaluated the costs and returns of field pest management techniques adapted for cowpea production in Kukawa Local Government Area of Borno State, Nigeria, towards providing useful information to farmers, processors, marketers and consumers of cowpea products.

#### **Objectives of the study**

The main objective of the study was to determine the costs and returns of field pest management techniques on cowpea production in Kukawa Local government area of Borno state, Nigeria. Specifically the study sought to:

- i. examine the socio-economic characteristics of the farmers ;
- ii. identify the various field pest management techniques used by the farmers;
- iii. compare the costs and returns of field pest managed farms; and
- iv. determine the relationship between the number of field pests management techniques used and output of the farmers.

#### **Hypothesis**

The hypotheses postulated for testing were that;

- i. there is no significant differences in output levels of the various field pest management techniques; and
- ii. there is no significant differences in output levels of field pest managed and non-field pest managed farms.



## **Methodology**

### **The study area**

The study was conducted in Kukawa Local Government Area of Borno State Nigeria. Kukawa Local Government Area lies on the north-eastern fringes of the state and bounded to the north by the Republic of Niger, to the south by Kaga Local Government area, to the west by Geidar Local Government area, to the east by Lake Chad, and to the south west by Monguno Local Government area. It occupies the major area of the Sahel zone and is mostly prone to severe draught-desertification with a recurrent period of 7-11 years. This stretches between 121-122°E of the equator 10°N of the Greenwich Meridian.

The area is endowed with rich farming occupation like crop farming, fish and animal farming although traces of commercial activities are available in the underdeveloped markets of the study area. The area is populated by 140,027 inhabitants (2002 projection estimate), spread over an area of 14,100 square kilometers, taking up 12.10% of the total landmass of the state (69,43sqkm). The Kanuri, Fulani and Hausas inhabit it.

### **Sampling Technique and Data Collection**

The selection of farmers was done through stratified sampling techniques. Kukawa local government area, which formed the study area, was initially split into two, encompassing Lake Chad Basin and Baga districts respectively. These districts were considered to be mostly prone to drought-desertification and consequently insect pest attack. Then fifty farmers were selected at random from each of the two ecological zones of Kukawa for the study.

Primary data for the study were collected using structured questionnaire, administered to the respondents. Cowpea yield and price data were collected for two cropping seasons (2003 and 2004). Other primary data collected include the occurrence of pest, nature of pest damage, available technique for field pest management and the rudiments involved in the effective utilization of field pest management technique for profit maximization. Secondary sources of data include journals, book, etc.

### **Analytical Techniques**

Descriptive statistics, gross margin analysis and paired sample t-test were used to analyze the data collected. Descriptive statistics such as means and percentages were used to examine the socio-economic characteristics of the farmers and the various field pest management techniques used.

The gross margin analysis was used to compare differences between the mean costs and returns for field pest management techniques per hectare for the two cropping seasons. It is expressed as:  
 $GM = TR - TVC$

Where GM = Gross Margin in Naira/ha

TR = Total Revenue in Naira/ha

TVC = Total Variable Cost in Naira/ha

The gross margin analysis was used under the assumption that fixed costs of production were negligible (Avav, 2000; Obi, 2002; Iheanacho and Philip, 2002). The paired sample t-test was used to determine the relationship between the number of field pests management techniques per hectare and output of the farmers.

## **Results and Discussion**

### **Socio-economic Characteristics of respondents**

The socio-economic characteristics of the cowpea farmers in the study area studied are presented on table 1

**Table 1: Socio-economic Characteristics of the Respondents (n=100)**

Socio-economic variables	Frequency	Percentage	Mean
<b>Age</b>			
20-39	56	53	53
40-59	40	39	39
60-79	4	8	8
<b>Farming Experience:</b>			
1-20	60	58	58
21-40	36	36	36
≥ 41	4	6	6
<b>Educational Level completed:</b>			
No formal education	59	56	56
Primary education	31	34	34
Secondary education	6	5	5
Tertiary education	4	5	5
<b>Household size:</b>			
1-5	45	44	44
6-10	46	46	46
11-15	9	10	10
<b>Farm size (hectare):</b>			
1-5	50	52.5	52.5
6-10	24	22	22
11-15	12	16	16
Above 15	14	9.5	9.5

Source: *Field Survey, 2004*

The analysis revealed that cowpea farmers in the study area were all male (100%) with no traces of feminine respondents. This was because females in the study area are confined and pre-occupied with household activities during the dry season farming.

The results of age distribution and years of farming experience however, show that 53% of the respondents were within the age bracket of 20-39 years, 39%(40-59) while 8% were between 60-70years. The minimum age of the respondents was 22 years with a maximum age of 74 years and a mean age of 48 years. Analytically over 92% of the respondents can be considered to be within the labour force bracket.

Relatively, 58% of the respondents had a farming experience of between 1 and 20 years, 36%(21-40 years), while 6% recorded above 41years of farming experience. The minimum was

2 years with maximum (48 years) and mean (25 years). Majority of the farmers were therefore experienced.

Primary, secondary, and tertiary educations were the common forms of education attended by the respondents. Only 5% had tertiary education. The vast majority of the respondents (56%) had no formal education followed by these with primary education (34%). Majority of the farmers were illiterates.

The household size of the respondents shows that 46% had a household size of between 6 and 10 persons, 44% (1-5 persons), while 10% had 11-15 persons. Large household size implies that the share of family labour to farming activities will be more.

The minimum farm size of the respondents was 1 ha with maximum of 6 hectares and a mean farm size of 8ha. Majority (52.5%) were small scale farmers, with a farm size of between 1 and 5 ha, while 22% had an appreciable land scale of between 6 and 10 ha, 16% (11-15 ha) and 10% (17ha)

#### **Field Pest Management Techniques**

The result of the field pests management techniques available in the study area is presented on table 2.

**Table 2: Field Pest management Techniques**

Field Pest management Techniques	Frequency	Percentage
Cultural Control	30	30
Chemical Control	45	45
Integrated Pest Management	25	25
Total	100	100

Source: Field Survey, 2004

The result shows that 45% of the cowpea farmers adopted the chemical control method, 30% adopted the cultural method, while 25% adopted the integrated pests management technique. Majority of the farmers used the chemical control method because insecticides are considered to be timely available and specific.

#### **Profitability of Field Pests Management Techniques**

The gross margin analysis of field pests management techniques is presented on table3.

**Table 3: Mean Gross margins per hectare of field pest management techniques**

Field Pest management Techniques	Total Variable Cost	Total Revenue	Gross Margin
Physical	1000	10,000	9000
Cultural	2300	126,440	124,140
Integrated Pets Management	2228	72720	70492
Chemical	1171.98	225760	224588.0

Source: Field Survey, 2004



The result shows that cultural technique had a gross margin of 124,140 naira per hectare. This is relatively high compared with the integrated Pest Management (IPM) with a gross margin of 70,492 naira. The physical control technique recorded the lowest output per naira value of 9,000 naira. The chemical control technique recorded the highest gross margin of 224,588 naira. This could be associated with timeliness and host specific nature of insecticides and also the cost-effectiveness of the chemical control technique.

**Test of Differences in output between Field and Non-field Pest Managed Farms.**

*Table 4 present the results of output differences between field pests managed farms and non-field pest managed farms*

**Table 4: Paired t-test Output difference between field and non-field pest managed farms**

Item	Frequency Mean	Standard Deviation	Standard Error	T-Value	d.f.
		Mean			
Field and non-field Pest Management Techniques	1414.0200	491.41331	49.14133	28.77599	

The paired sample statistics model was used. The paired sample test (t-test) result shows that there was a high significant ( $P < 0.001$ ) difference between field pests managed farms and non-field pests managed farms.

**Output and Number of Field Pest management Techniques.**

The relationship between the number of field pest management techniques used per cowpea farm (in hectares) and the output obtained was negatively correlated (-0.27). This means that as the number of field pests management techniques increased there was a corresponding decrease in the output per hectare of cowpea cultivated. This may be due to wrong application of the principles behind these management techniques, since majority of the farmers were considered to be illiterates.

**Conclusion and Recommendations**

Analysis of the study has shown that chemical field pest management is more common in this part of the country, and it gives higher yield and economic benefits to the farm society than the cultural and integrated pest management techniques. The socio-economic characteristic such as educational status, gender, age and farming experience may have been responsible for this scenario, since chemical control has been an age long practice.

It is therefore, recommended that extension officers and resident supervisors should endeavour to embark on awareness, sensitization and dissemination of viable research information to educate the farmers on the principles and use of other field pest management technique such as the integrated pest management, cultural, biological and physical control methods. Small-scale farmers should be encouraged to form effective co-operatives to enable them receive training on effective pests management and training on field pests management techniques in Borno state.

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