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The Economic Effect of Spray Pesticides on Cowpea (*Vigna unguiculata* L. Walp.) Production in Adamawa State of Nigeria

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Abstract: Present research focused on the economic effect of spray pesticides on cowpea production in Adamawa State. The research used both primary and secondary data, obtained via pre-tested questionnaires by interview method. The study employed descriptive statistics (such as techniques to draw conclusions on the Socio-economic profile of the farmers. Gross margin analysis established the economic effect of pesticides application on cowpea production. Also, ordinary least square regression analysis was adopted to isolate the variables affecting cowpea output in the area. The study revealed that factors dictating the output of cowpea are quantity of seeds sown man-labor supplied and expenditure on insecticides applied in the area. It also confirmed the fact that economic profitability in the production of cowpea is a function of the adoption of spray insecticides application. The study recommended that farmers should embrace the insecticide application since it is accompanied by more economic gains in terms of outputs and cash returns to the farmers and well articulated extension services, of storages, market and loans facilities be provided to the farmers.

Key words: Spray pesticides, production, technology, cowpea, profitability, adoption

INTRODUCTION

Cowpea originated in Africa and it's widely grown in Africa, Latin America, South-East and in the Southern part of United States (Devis, 1991). The crop is an important source of cheap and available plant protein in Nigeria. Its popularity stems from variety of dishes that are made from it. Cowpea production is mostly found in the Savannah ecological zone where it is traditionally grown as sole crop or intercropped with cereal crops such as millet, maize and sorghum (Adewuyi and Okunmadewa, 2005).

Cowpea was mostly cultivated by small size farmers in the last decades, but now the crop is cultivated in a relatively larger farm size and with adoption of technology in Cowpea pest crop will help in obtaining high yield and expansion of Cowpea farm size (Mohammed, 1989). Okike *et al.* (2007) also stressed that there is a significant increase in cowpea production with adoption of spray pesticides by farmers in northern Nigeria.

Singh *et al.* (1996) stressed that cowpea is an important crop to the livelihood of millions of relatively poor people in Nigeria. From the crop, rural families derive food, animal feeds and cash together with spill over benefits to their farm lands. It is a cheap source of plant protein to many who cannot afford enough of the expensive animal protein. Gongula and Garjila (2005) said that the crop yield are generally low as a result of insect pest and diseases, draught, excessive mixture, weeds and mixed crops with a yield on farmers plot are usually less than 1000 kg ha⁻¹. However, pest and diseases were considered to be the major problem to Cowpea yield. It is in this regard that (IITA, 1994) urged entomology at National and International research centers to develop ecological sustainable pest control strategies that are affordable and accessible to small scale farmers.

The economic benefits of pesticides application in cowpea are not popular among the farmers because of inadequate records to portray the profitability of pesticides application in the study area. This study was designed to assess whether it is worth while using pesticides in cowpea production in the area.

The main objective of the study is to determine the economic effect of spray pesticides on cowpea production in the Adamawa State of Nigeria. The specific objectives of the study are to determine the Socio-economic profile of cowpea farmers in the area, the yield of cowpea using pesticides as pest control measures during the production period and profitability of pesticide application in cowpea production in the study area.

MATERIALS AND METHODS

The study area is Adamawa State of Nigeria. The study was carried out in 2003 and 2004 cropping season and covered four local government areas in Adamawa State. Two local government areas were purposively selected in the Southern and Northern parts of the State since they constitute areas where cowpea is intensively cultivated. Three villages were randomly selected in each of the four local government areas, making a total of 12 villages randomly selected from each village. From each village, 10 Cowpea farmers were randomly selected to which the questionnaires were administered. This brings to a total of 120 respondents for the study.

Both primary and secondary data were used for the study. The primary data were collected based on 2003 cropping season through the use of well structured pre-tested questionnaires and oral interview schedules. While secondary source of data were obtained from the publications of the Adamawa State Agricultural Development Project, Local Government Agricultural and Natural Resources Departments and State Ministry of Agriculture. Descriptive statistics was employed to analyze the data obtained from the field which includes percentages, means ranking and budgetary techniques. The budgetary technique used was the gross margin analysis that forms the basis for costs and returns analysis.

Ordinary test of least square regression analysis to get the functional dependence that best fit cowpea production. The model adapted was implicit form as follows:

$$y_1 = f(x_1, x_2, x_3)$$

$$y_1 = a + b_1x_1 + b_2x_2 + b_3x_3 + e$$

Where,

y_1 = output of cowpea in kg ha^{-1}

x_1 = Quantity of seeds sown in kg ha^{-1}

x_2 = Labour in Monday ha^{-1}

x_3 = Expenditure on pesticide application in Naira ha^{-1}

e = Stochastic error term

RESULTS AND DISCUSSION

Socio-Economic Profiles of Cowpea Farmers

Table 1 shows that majority of the farmers are within the age of 36-45 years. Thus, they are strong, capable of making good production decision and have potential for greater productivity. Hence, they are likely to be more efficient in agricultural production than older and younger ones.

Table 1: Socio-economic characteristics of respondents

Variables	No. of respondents	Percentage
Age		
15-25	6	5.0
26-35	10	8.0
36-45	86	72.0
>45	18	15.0
Total	120	100
Gender		
Male	93	77.5
Female	27	22.5
Total	120	100
Education qualification		
Illiterate	35	28.0
Primary school leaver	12	10
Secondary school leaver	67	56
Tertiary school graduate	7	6
Adult education	120	100
Family size		
<5	4	3.0
5-10	60	50.0
11-15	38	32.0
>15	18	15.0
Income level		
<₦100, 000.00	34	28.0
₦100, 000.00 -₦ 250, 000.00	78	65.0
₦250, 000.00 -₦500, 000.00	5	4.0
>₦500, 000.00	3	3.0
Total	120	100

Source: Field Survey (2004)

Overwhelming majority of the respondents are males constituting about 77.5% i.e., males engaged more in cowpea production than the female counterparts.

On education, most of the farmers were educated (72.0%) and any increase in agricultural productivity by farmers of non-formal education could be as a result of accumulated experiences in farming. On family size, most of the families are relatively large and nuclear in nature which provides readily labour for timely execution of farming activities; Income profile of the farmers per annum revealed that most of the farmers are within income link of ₦100, 000.00 to ₦250, 000.00.

As in Table 2, the gross margin of N28, 333.3 and N10, 333.3 was obtained individual farmer⁻¹ ha⁻¹ for cowpea with pesticide and without pesticides application respectively. Hence, cowpea production under pesticides application is very much more profitable about 73.28% ha⁻¹. It revealed that high profitability of using pesticides over the non-using of pesticides in cowpea production. The findings confirm Alghali (2006) records that yields and income levels increase with the adoption of pesticides in cowpea production.

From the multiple regression analysis as contained in Table 3, the double log function was selected as the best fit based on the magnitude of the coefficient of determination (R²) and statistics significance of the estimated regression values. The R² indicated that 96.90% variation in yield was explained by the specified independent variables. This is confirmed by ANOVA, the F-ratio calculated of 119.98 is greater than tabulated F-ratio of 3.95.

While in the test statistical significant, the calculated t* ratio of 4.17, 2.84 and 11.33 for quantity of seeds sown, labour and expenditure on pesticides applied, respectively are greater than the t-value tabulated of 1.684 at 1.0% level of significant. Indicating that the output of cowpea is principally dictated by the variables (seeds, labour and expenditure) as defined model specified above. The coefficients of the independent variables indicates that seeds (0.233), labour (0.635) and pesticides

Table 2: Farmers' gross margin analysis per hectare

Treatments	GR (N)	TVC (N)	GM (N)	GM (%)
Cowpea with pesticides	53,125.00	24,791.69	28,333.37	73.28
Cowpea without pesticides	24,000.00	13,666.67	10,333.30	26.72
Total	77,125.00	38,458.34	38,666.60	100.00

Source: Computed from Field Survey, data (2004)

Table 3: Regression estimates of coefficient of inputs in cowpea production of double log function

Variables	Coefficient	t-value
Seeds	0.233	4.17**
Labour	0.635	2.84**
Pesticides	1.209	11.33**
R ² -0.9690		
R-0.9682		
F-1198.77		

**Significant at 1 % level. Source: Computed From Field Survey data (2004)

(1.209) are positively and significantly different from zero at 1.0% level i.e., a 1% increase in the amount of seeds, planted labour supply to the production and pesticides applied per hectare under cowpea production will raise cowpea output by 0.233, 0.635 and 1.209, respectively.

CONCLUSIONS/POLICY RECOMMENDATION

The study revealed that cowpea production without pesticides is not economically profitable like that with pesticides application. It also shows that the determinants of cowpea output are the quarterly seeds sown, amount of labour supplied and expenditure on pesticides. Present study recommended that storage, markets and loan facilities be made available to the small scale farmers that will strengthen the production base of the small scale farmers.

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