Economics of Labour Use in Selected Food Crop Farming in Ogun State, Nigeria

S. A. Adewuyi and A. M. Shittu

Department of Agricultural Economics & Farm Management Federal University of Agriculture, Abeokuta, Nigeria

O. E. Fapojuwo

Department of Agricultural Administration, Federal University of Agriculture, Abeokuta, Nigeria

S. H. Sowemimo

Department of Agricultural Economics & Farm Management Federal University of Agriculture, Abeokuta, Nigeria

Abstract

The study evaluates economic analysis of labour use in food crops production in Ogun state, Nigeria. Data were collected by the use of multistage random sampling with the help of well-structured questionnaire from a cross-section of 170 Food crop farmers and analysed using descriptive, budgetary and multiple regression. The socio-economic data of the respondents were analysed by descriptive statistics and the result revealed that majority (82.4%) of the food crop farmers were male, aged between 41 and 60 years. The mean household size was 4 persons. The mean farm size was 1.8ha with a mean farming experience of 25years. The result of the budgetary analysis reveals that for a hectare of farmland, a cost of ₦213, 60766 was incurred giving a revenue of ₦ 352,809.59 and a rate of investment (ROI) of 0.65. This shows for every ₦1 spent, there was corresponding profit of 65kobo. The study further revealed that farm size, labour (man-day) and cost of plant material significantly influence the revenue of farmers in the study area. The study concludes that food crop production is profitable but at a high cost of labour. The study recommends the adoption of labour savings technology as an alternative to increasing scarcity and high labour cost in the study area.

Keywords: Labour use, food crops, production, economics, Ogun state

Introduction

Food is one of the man's basic needs, for this reason and more, agricultural food production has taken a central place in the economic policies of most developing countries. Before the discovery of oil in commercial quantities in Nigeria, the agricultural sector was the bedrock of the Nigerian economy, relied upon for subsistence food and fibre supply, and foreign exchange.

The agricultural sector has the onerous challenges of meeting the food and fibre needs of the estimated 140 million people providing employment for over 75 percent of the economically active population (Okumadewa, 1997), a major source of foreign exchange,

Corresponding author's
Name: S. A Adewuyi
Email address: *elisam99@yahoo.com*

and a provision of raw material for the burgeoning industrial sector. The importance of this sector cannot be overemphasized. Despite the pride of place, in terms of total budgeted revenue and financing that the petroleum sector has received over the years, evidences now abound that oil wealth is not sustainable.

The relative contribution of the agricultural sector to the gross domestic product (GDP) declined steadily to the point where the country agricultural production has all but stagnated, and food prices have risen dramatically. This decline was due to the neglect of agriculture as a result of sudden 'oil boom' of the early 1970's (Olatunbosun, 2005). Nigeria is now totally economically dependent on oil.

One of the major problems confronting Nigeria is her inability to adequately feed her teeming population. It is in realization of this fact that programmes such as Operation Feed the Nation of 1976, Green Revolution of 1979, Directorate of Food Road and Rural Infrastructure of 1987, National Fadama II of 2004 were put in place to increase and sustain food production in the nation. (Adewuyi *et al.*, 2007). Nigeria is an agrarian society with about 70% of her over 140 million population engaged in agricultural production (CBN, 2006). The agricultural sector remains a dominant sector in the Nigeria economy in terms of its being a source of food and income to a large segment of the society (World Bank,1993). Most arable farmers, who are the back bone of the Nigeria economy, are peasants and poorly endowed in terms of resources, yet they account for up to 95% or more of food produced for consumption in the country (Olaitan, 2000).

However, rural-urban drift has impacted negatively on agriculture as it poses some problems in the rural communities. In most rural areas, the impact of rural-urban drift has been a rapid deterioration of the rural-economy leading to a chronic poverty and food insecurity (Mini, 2001). These arise mainly due to excessive drain of youth who constitute the largest percentage of labour from rural populace thus leaving only the older and aged members to constitute the labour force of the rural area. Young people within the active working age who are to cope with challenges of modernizing agricultural production are migrating to urban centre in search of white-collar jobs and improved standard of living. This development has not helped agricultural productivity as it has left farming in the hands of old and non literate farmers with very few who could not leave villages perhaps due to unavoidable circumstances (Adebayo, 1999).

Labour plays a central and crucial role in agricultural production, particularly under small scale peasant production system. The smallholder farmers contribute the largest proportion of total domestic agricultural output in their area. Thus, the hope of continuing supply of food need of ever growing population anchors very auspiciously on human labour.

Human labour is about the only form of farm labour available to small holder farmers. This form of labour accounts for up to 80 percent of total farm power (Chianu and Tsuji, 2004) and constitute between 80 and 90 percent of the cost of production in many farming systems (Awoyemi, 1981).

In Africa, there exist different types of labour arrangement for cash and food crops production. These labour arrangements were highly popularised during the pre-colonial and colonial time for the production of export crops such as cocoa, groundnut, coffee, cotton and oil palm. However, with the slowdown in cash crops production, there has been a shift in favour of food production such as cassava, yam and vegetable e. t. c with ready markets in urban and peri-urban centres. These production shifts provide employment for local and immigrant labour from others states and neighbouring countries in the form of contract for food crop production. According to Ezedinma (1999) labour is hired on a short term basis to complement or replace family labour. It was further reported that hired

labour is used for crop production in a greater proportion in villages located in the West Africa countries especially Nigeria, where labour is mostly hired from within the villages, neighbouring villages and countries. The constraints to the rapid growth of food production seem to mainly be that of high cost of production and low resource productivity. Raising the productivity and output of small farmers would not only increase their incomes and food security, but also stimulate the rest of the economy and contribute to broad - based food security and poverty alleviation (Upton, 1987).

In view of the Federal Government policy on food production that this research was conducted to determine the cost magnitude of food crop production in Ogun State. Specifically, the study estimates the cost and returns to food crop production; evaluate the quantity of labour (man-day) available under various labour arrangements and associated wages; determines the factors affecting revenue to food crop production in the area and determine the factors that influence the households' choice of labour use.

Methodology

The study was carried out in Ogun State, Nigeria. Primary data on household's farm activities used for the study were collected with the aid of questionnaire using a multistage sampling procedure. The State was divided into four agricultural zones of the Ogun State Agricultural Development Programme namely Abeokuta zone, Ikenne, Ilaro and Ijebu-Ode zone. In the first stage of the sampling procedure, 10 blocks in the Zones were randomly selected.

In the second stage, 25 percent of cells from each selected block (a total of 17 cells) were randomly selected making. This was followed by random selection of two (2) sub cells (a total of 34 cells). In the final stage, five (5) farm households were randomly selected given a total of 170 farm households and the household heads were interviewed. Data

collected were analyzed using descriptive statistics, multiple regression analysis and multinomial logit model.

Gross margin analysis
The budgetary technique which estimates the financial outcome and profitability of a particular enterprise or several alternatives was used to determine and analyze the cost and returns to factors of production.

$$GM \sum_{i=1}^{n} P_i Q_i \sum_{j=1}^{m} C_j X_j \dots\dots\dots\dots\dots\dots (1)$$

Where:
GM   = Gross Margin (₦)

P = Unit Farm gate price per unit of output i (₦)
Q = Quantity of output for crop; (kg)
C = Unit price of variable input (₦)
X = Quantity of variable input j
I   = Crop (n is the total number of cultivated crops)
J = Variable input (m is the total number of the variable input used in the farm enterprise)

Thus, Gross Margin

$$(GM) = TR - TVC \qquad (2)$$

$$GM = TR - TVC$$

$$II = GM - TFC \qquad (3)$$

Where:

GM = Gross Margin

TFC = Total Fixed Cost

Multiple regression analysis
Multiple regression analysis was employed for the determination of factors affecting farmers' revenue. In the implicit form, the regression model is represented by

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, U) \qquad (4)$$
Where:

Y_i = Total Revenue (₦)

X_1 = Farm size (ha)
X_2 = Labour ((₦)
X_3 = Cost of planting materials (₦).
X_4 = Cost of fertilizers (₦).
X_5 = Herbicide (₦)
X_6 = Tractor services (₦)
U = Error term

Multinomial logit model
This was used to estimate the factors that influence the household choice of labour. This model is specified below.

$$P_{ij} = Prob(Y = i/x) = e^{x'\beta}/1 + \sum_{J=1}^{J=1} e^{x'\beta} \ (8)$$

$j = 1.....n$

Where β is a vector of parameters that satisfies $\ln (P_{ij}/P_{ik}) = X' (\beta_j - \beta_k)$,
Differentiating equation (8) with respect to each of the explanatory variables provides marginal effects of the explanatory variables which are given as:

$$\delta pj/\delta xk = Pj(\beta kj - \sum_{j=1}^{j=1} Pj \ \beta kj) \ (9)$$

Where Y = 1…..4 mutually exclusive labour choices;

1= Family labour only
2= Family/daily paid contract labour
3= Family/ job specific contract labour
4 = Family/annual contract labour
X = (j *1) = Vector of respondents socio-economic and farm characteristics such as sex, age, education, level, farm size, household size, farm distance etc which affect labour choice
β = 1 * j vector of coefficient of X

Results and discussion

The socio – economic variables investigated are the age, gender, and household size, educational level, farming experience, farm size and source of farmland. The socio economics characteristics of the farm household heads had significant influence in their decision making process in relation to farm production activities, as well as how resources are used for effective and efficient farm activities and non- farm activities. The results are summarized in Table 1below.

Table 1: Distribution of respondents by personal / household characteristic

Characteristics	Frequency	Percentage Mean
Age(years)		
30 – 40	43	25.3
41 – 50	47	27.6
51 – 60	66	38.8 48.1
Above 60	14	8.2
Total	170	100.00
Gender		
Male	140	82.4
Female	30	17.6
Total	170	100.00
Marital status		
Married	149	87.65
Divorce	5	2.94
Widow	16	9.41
Total	170	100.00
Educational level		
No formal education	15	8.8
Primary education	69	40.6
Secondary education	47	27.6

Tertiary education	39	22.9
Total	170	100.00
Secondary occupation		
Artisan	6	3.5
Civil / Public servant	21	12.4
Trading	10	5.9
None	133	78.2
Farming experience		
10years or less	44	25.9
11 – 20	38	22.4
21 – 30	35	20.6
		24.5
Above 30 years	53	31.2
Total	170	100.00
Household size group		
< 5 persons	121	71.2
5-8 persons	42	24.7
9-12 persons	7	4.1
Total	170	100.00
Mean	4.02	
Farm size group		
1ha or less	96	56.5
1.01 – 2.0ha	39	22.9
2.01 – 3.0ha	12	7.6
		1.88
3.01 – 4.0ha	10	5.9
Above 4.0ha	13	7.6
Total	170	100.00
Source of land		
Inheritance	91	53.5
Purchased	13	7.6
Leased	66	38.8
Total	170	100.00

Source: Field survey, 2011

Age is a very important factor in farming activities as younger farmers (youths) are believed to commit more energy into production activities as well as having the potential to cope with challenges of modernizing agriculture through mechanization. Table 2 shows that cumulative percentage of 91.8 were within the age bracket of 30-60 years which is considered as economically active age, while 8.2 percent were above 60 years of age. This implies that most crop farmers belong to the economically active age; hence they possess ability to earn some revenue in food crop production.

The Gender distribution shows that food crop production in the study area is male dominated, as the distribution of the household head shows that majority (82.4%) were males, while 17.6% were females. This corroborates the findings of Kareem (2004), that crop farming is more attractive to male. Table 1 equally shows that majority (87.6%) of household was headed by married persons. The widowed and divorced were negligible, accounting for only 2.9% and 9.4% respectively.

The distribution of the household heads by educational level shows that most of the sampled respondents (40.6%) had primary education. The implication of this result is that it will be easier for these farmers to adopt

innovations and modern agricultural practices requiring basic level of education that will increase their productivity and efficiency.

Experience is considered to be an important factor in any undertaking, be it farming or non farming activities as people that are well grounded in the best practices of their chosen carriers stand better chances for improved and efficient production. Table 1 shows that cumulative percentage of 68.9 had up to 30 years of farming experiences, thus they possess substantial wealth of experience in crop production. By implication, farmers with many years of experience on certain crop(s) within less varied environmental/climatic and prevailing farming practices stand the better chances for improved and efficient production.

Table 1 shows that majority (71.2%) of the sampled households had an average of 5 members in a household. This corroborates the findings of Adebayo (1999) that less number of people is residing in rural areas. By implication, agricultural production activities being labour intensive, large household can provide farming labour at least or no cost. Also, a cumulative percentage of 79.4% of the sampled household cultivated no more than two hectares of land with an average farm size of 1.88 hectares indicating that food crop production is based on subsistence practice/ objective.

The distribution of household based on source of farm land shows that majority (53.5%) inherited their farmland, while 28.8% were leased and 7.6% purchased their farm land. By implication, with majority (53.5%) farming on inherited land, this might led to fragmentation of farm holding thereby discouraging commercial production objectives of most farmers.

Table 2: Cost, return and profit profile of the average farmer per hectare

	Family labour only	Family/Hired labour	Pooled
Revenue items	Mean Value(₦)	Mean Value(₦)	Mean Value(₦)
Cassava	113,831.15 (41.80)	210,498.17 (52.90)	175.811.77 (49.83)
Maize	79,201.64 (29.09)	148,803.03 (37.40)	123,828.41 (35.10)
Yam	3278.69 (1.20)	11,522.94 (2.90)	8,564.71 (2.43)
Paddy rice	4,877.05 (1.79)	688.07 (0.17)	2191.18 (0.02)
Melon	-	1,669.72 (0.42)	1070.59 (0.30)
Fruit Veg.	4,254.10 (1.56)	14,266.06 (3.59)	10673.53 (3.01)
Leafy Veg.	55,295.08 (20.31)	8,310.09 (2.09)	25,169.41 (7.13)
Plantain	11,557.38 (4.24)	2,110.09 (0.53)	5500.00 (1.56)
Total Rev	272295.08 (100)	397,868.17 (100.00)	352,809.59 (100.00)
Planting materials	23,666.57 (19.34)	34,400.99 (13.00)	30,549.23 (14.30)
Labour	70,038.52 (57.23)	170,406.17 (64.39)	134,391.90 (62.92)
Fertilizer	6,765.57 (5.53)	9,455.50 (3.57)	8,490.29 (3.97)

Agro. Chemicals	2,706.56 (2.21)	4,894.63 (1.85)	4,109.51 (1.92)
Transport	614.75 (0.50)	2,244.04 (0.85)	1,659.41 (0.78)
Feeding	2,028.69 (1.66)	11,759.17 (4.44)	8,267.65 (3.87)
TVC	105,820.67 (86.47)	233,160.52 (88.10)	187,467.99 (87.76)
Land	7,991.80 (6.53)	17,768.81 (6.71)	14,260.59 (6.68)
Depreciation	8,567.08 (7.00)	13,732.59 (5.19)	11,879.08 (5.56)
TFC	16,558.89 (13.53)	31,501.39 (11.90)	26,139.67 (12.24)
TC	122,379.55 (100.00)	264,661.92 (100.00)	213,607.66 (100.00)
GM/HA	166,474.41	164,707.65	165,341.60
PROFIT/HA	149,915.52	133,206.26	139,201.93
ROI	1.23	0.50	0.65
Sample size (N)	61	109	170

Source: Field survey, 2011

The budgetary analysis (Table 2) showed that total variable cost (TVC) form the bulk (87.76) percent of the total cost (TC) while the total fixed cost (TFC) was just 12.24%, this implies that a farmer who want to be cost efficient would have to reduce total variable cost especially labour cost which accounted for more than three quarter of the total variable cost (TVC).The total fixed cost (TFC) is small (12.24%), this may be due to the low cost of land rent (3.04%) which is typical of core rural communities in South western Nigeria where most land are held by inheritance as reflected in the result. Table 3 also shows the revenue, total variable cost, total fixed cost, gross margin and net farm income across family labour and hired labour uses category. Labour cost accounts for a larger share of the total cost (TC) for both categories; 57.23 percent for family and 64.39 percent for hired.

The mean cost of production incurred by farmers using household labour only was N122, 379.55 per hectare with mean revenue of N272, 295.08 and realised a net profit of N149, 915.52 per hectare. Consequently, the rate of return on investment (ROI) value of 1.23 indicates that for every one naira (N1) invested in cropping enterprise in the area, a return (net profit) of N1.23k was realized. Similarly, the total cost and returns to crop farming among hired labour users in the study area revealed an average farmer incurred a total cost N264, 661.92 per hectare earn a total revenue of N397, 868.17 per hectare with a net profit of N133, 206.26 per hectare/annum and a low rate of return (0.50), the low rate of return (ROI) may be attributed to the high cost of labour which impinged on the net profit of the farmer.

Table 3: Distribution of respondents by labour (man-day) and associated wages per hectare

Labour Types	Frequency	Percentage	Mean man-day	Mean wage
Family labour only	61	35.88	70.04	70,038.52
Family/daily paid contract labour	27	15.88	49.14	71,769.24
			(9.33)	(10653.74)

Family/job specific contract labour	38	22.35	68.58 (9.72)	167,292.9 (20297.23)
Family/annual contract labour	44	25.88	93.85 (13.14)	233,622.09 (24944.32)
Pooled	170	100	72.56 (5.29)	134,391.90 (10076.88)

Numbers in parenthesis are standard errors of mean.
Source: Field survey, 2011

Table 3 shows the distribution of farm household by the number of labour (man-day) and labour cost per hectare associated with labour category. The table revealed that the mean labour use by the farmers in the sample was 72.6 manday/ha; 34 percent of which were supplied by household members, 33.5 percent by labour hired on annual contract (AC), 22 percent by labour hired on job specific contract (JSC) and the rest (10.8 percent) by daily paid contract (DPC). However, the table revealed that farm household that utilised daily paid contract (DPC) for farming activities spent least man-day (49 man-day) while that of family/annual labour (AC) recorded the highest man-day (94 man-day). On the basis of labour cost, household head that accomplished farm operation with family labour had the least cost of ₦70, 038.52 while that of family/annual labour recorded the highest cost of ₦233, 622.08.

Regression result of factors affecting revenue from crop farming in the study area.

$lnY = 6.667*** + 0.174** lnX_1 + 0.134*$
$\quad (9.84) \qquad (2.41) \qquad (1.88)$
$lnX_2 + 0.532*** lnX_3 + -0.31 lnX_6$
$\qquad (8.46) \qquad\qquad (1.27)$
$+ 0.075 lnX_5 + 0.11 lnX_6$
$\quad (1.81) \qquad (0.48)$

$R^2 = 0.51$; Adj.$R^2 = 0.49$; F-value = 28.06

The lead equation chosen was double – log function. The function has three of its variables significantly different from zero, with relatively high R^2 and F-values. Though the semi-log function and linear functions also have three of their variables significant at 10 percent and 1 percent level respectively, but the relatively lower values of coefficient of determination R^2 and adjusted R^2 value when compared with the value recorded for the double log function (51%) and (49%), conferred the choice of equation of best fit on the double log function. The result also showed that three of the parameters b_1, b_2 and b_3 significantly different from zero at 1%, 5% and 10% probability level respectively. The overall significance of all variables used in the models were reflected in their F – values which were 13.33 (linear), 14.39 (semi-log) and 28.06 (double log), df (5,169) at 1% level of significance.

The adjusted R^2 value of the lead equation of (0.49) despite being lowed implies that 49% of the total variation in the total revenue is explained by the regressors-farm size, labour, planting material (₦), fertilizer (₦),herbicides (₦),tractor service (₦) while the remaining 51% is unexplained by the estimated model. The significance of the F- value implies that all the significant variables had impact on the total revenue of the respondents in the study area.

The result further showed that increase in farm size (ha), labour (man –day) and cost of planting materials (₦) would lead to significant increase in respondents' total revenue. The coefficient of 0.174, 0.134 and 0.532 shows that 5%, 10% and 1% increase in farm size, labour and cost of planting materials respectively is associated with 0.174, 0.134 and 0.532 increase in farmers' income respectively.

The elasticity of production with respect to each input was given as the regression coefficient of input while return to scale were obtained by adding together all the elasticities

of production. Return to scale measures the proportionate change in output provided all inputs are change simultaneously by one percent. It represents the sum of all the elasticities of production with respect to all the inputs.

The return to scale (RTS) in the study area is 0.84.This implies that, if all the explanatory variables are simultaneously increased by 1%, the total physical product will increase by 0.84%, thus increasing farmers revenue by the same percentage. The result showed that the food crop farmers are operating at decreasing return to scale, which implies that they are operating in region three of the production function.

Table 4: Determinants of Labour type used in crop production in the study area

Variables	Daily paid contract		Job specific contract		Annual contract	
	Coefficient	Marginal effects	Coefficient	Marginal effects	Coefficient	Marginal effects
Intercept	-1.221 (1.508)	0.157	-3.577** (1.479)	-0.320	-4.373*** (1.401)	-0.583
Age	-0.008 (0.026)	-0.003	0.035 (0.024)	0.005	0.023 (0.022)	0.003
Sex	0.726 (0.660)	0.022	1.082* (0.619)	0.120	0.761 (0.634)	0.050
Educational level	0.022 (0.052)	-0.006	0.054 (0.048)	-0.001	0.152*** (0.04)	0.026
Household size	-0.036 (0.127)	-0.008	-0.092 (0.117)	-0.025	0.149 (0.100)	0.037
Farm size	0.361*** (0.145)	-0.021	0.361*** (0.143)	0.033	0.293 (0.145)	0.019
Farm distance	-0.037 (0.581)	-0.006	0.017 (0.014)	0.003	0.151 (0.014)	0.003
Off-farm income	0.356E-05 (0.240E-05)	0.165E-06	0.5088E-05 (0.220E-05)	0.625E-06	0.2611E-05 (0.220E-05)	0.350E-06

Standard errors are in parenthesis
*** Coefficients significant at 1%, ** coefficients significant at 5%, * coefficients significant at 10

Multinomial Logit Model was used in this study to determine the factors that influence the households' choice of labour type use. Four labour choices were identified as earlier enumerated. The reference category for the multinomial logit analysis is family labour and the result is presented in Table 5. The chi – square value of 48.688 associated with log likelihood ratio was significant (P<0.01) suggesting strong explanatory power of the model. The explanatory variables considered in the model are; age, sex, educational level, household size, farm size, farm distance, and off farm income.

The result revealed that the explanatory variables in the model that significantly explained the choices were farm size, sex, off-farm income and educational level. The coefficient of farm size is positively significant (P<0.005) for contract labour users (DPC, JSC and AC), this implies that the likelihood of choosing any of these contract labour type (JSC/AC) increases as farm size increases but decreases the choice of DPC.

The result further showed that the marginal affect (the effect of a unit change in each independent variable on the likelihood of choice of labour) of farm size were 0.019, 0.033 and -0.021 for AC, JSC and DPC respectively. This shows that a unit increase in this variable (farm size) will increase the probability that the respondent will choose each of these choices by 0.019, 0.033 but decreases DPC by 0.021 respectively.

Similarly, the coefficient of educational level is positively significant (P<0.01) for respondents using annual contract labour implying that the likelihood of choosing annual contract labour increases as the level of education increases. This could be attributable to the ability of respondent to make wise decision toward efficient use of AC labour. The marginal effect of educational level was 0.026 indicating that a unit increase in this variable will increase the likelihood of respondent choosing this form of contract type by 0.026. It is believed that higher level of education is associated with access to and adoption to improved technology and productivity.

Furthermore, the coefficient of off - farm income was found to be positively significant (P<0.05) in the case JSC labour users, implying that the likelihood of choosing JSC type of labour increases as off-farm increases. This could be due to the fact that this form of labour are being utilized by farmers having access to other financial source. The marginal effect of off-farm income was 0.625E-06 indicating that a unit increase in this variable will increase the likelihood of choosing farm of contract type by 0.625E-06. Also, sex is positively significant (P<0.10) for respondent using JSC. The choice of this type of contract labour is significantly higher in male household than their female counterpart.

Conclusion and recommendation

The research study examined the economic analysis of food crop production in Ogun State, Nigeria. Particular attention was paid on the determinant of magnitude of production cost and factors affecting the revenue accrue to food crop production in the study area.

The result of budgetary analysis showed that labour cost accounted for more than three-quarter of the total variable cost (TVC). With a profit of ₦ 139,201.93/ha and percent profit of 66 percent, while the rate of return on investment (ROI) revealed that a farmer that invested ₦ 1 realized a marginal return of

₦0.65. It showed that food crop production was profitable in the study area.

The result further showed that increase in farm size (ha), labour (man –day) and cost of planting materials (₦) would lead to significant increase in respondents' total revenue. The study conclude that food crop production is profitable but at a high cost of labour.

The following recommendations were made: Farmers should be sensitised on labour – saving technology as an alternative to increasing scarcity of labour, reduce the high cost of labour and mitigate the problem of labour shortage during farming seasons.

The use of daily paid contract (DPC) labour for farm activities is recommended as this is associated with least man day per hectare of farm operation.

Government should provide rural infrastructure in rural communities to stem the movement of young people away from rural communities as this will enable farm household to have access to labour for farm activities.

Farmers should increase their farm size as this is associated with significant increase in income.

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