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Full Length Research Paper

Comparative productivity under special crop programme in Benue State, Nigeria: A case of participant and non-participant soybean growers

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This study set out to analyze the scarce resource allocation in the special crop programme between farmers who participated in this programme and who did not. Data collected were analyzed using descriptive statistics, gross margin analysis, Z-test and regression analysis. The results of the study showed that most of the participant soybean farmers and non participant farmers were within the age bracket of 31 to 40 years. Most of the respondents were males for both soybeans. A significant difference in output was found between participant and non-participant farmers. The per hectare average cost of production for soybean participant farmers was ₦33,624. The gross margins per hectare N 26,734 soybean were found to be profitable. The results of the multiple regression analysis showed that 83 and 67% of the variations in soybean yield were explained by the combined effect of herbicide, fertilizer, seed and labor for participant and non-participant farmers respectively. Soybean farmers (both participants and non participants) were producing in stage two, the rational stage of production. The ratios of Marginal Value Product (MVP) **to marginal factor cost (MFC) were greater than unity, hence, they were economically inefficient in resource use. The major problems encountered by the farmers were inadequate storage facilities and inadequate quantity of fertilizer. The study concluded that participant and non-participant farmers in the special crop programme were inefficient in resource use. The study recommended that production inputs such as fertilizer and herbicide should be provided through institutional sources at the required time and quantity and they should be made affordable for the end users.**

Key words: Comparative, productivity, crop, programme, Nigeria, participant, non-participant.

INTRODUCTION

The Special Crop Programme was launched in 2001 production season and therefore had a short gestation period in Benue State. The programme objectives were to rapidly increase productivity and output of soybean, maize, rice, cassava and sesame (mandated crops) on an economically and environmentally sustainable basis and also to reduce year-to-year variability in the production of these mandated crops. These objectives were to be achieved through the implementation of specified activities. Soybean was selected for this study because it is one of the crops that the programme successfully implemented in the three senatorial zones at inception in 2001. Also, the demand for soybean for food and raw materials was high from government and private investors. In one instance, large quantities of soybean were imported to meet the Taraku soybean factory needs. Three sites, one in each senatorial district, were selected in the state and concrete action plan developed. In each of the sites, farmers were selected and given production inputs and technical assistance at concessional rates. Such categories of farmers form the participant group. The participant farmers cultivate soybean as sole crop. Other farmers in the community that were not selected to participate in the programme

constitute the non-participant farmers. The non-participant farmers also carry out specified activities intended for the participant farmers in anticipation of being recognized and incorporated into the programme as the activity expands. The non-participant farmers also cultivate soybean as sole crop.

The State Government undertook huge investment in procuring production inputs and technical assistance to participating farmers in the state. After five years of successful programme implementation, the objective of equilibrating the demand of soybean to supply was not achieved. This is evidenced by severe shortages experienced by government and private sector consumers of this crop. In one instance, the State Government imported large quantities of the crop to meet local demand. The performance of the programme as demonstrated by its failure to meet the demand for food and raw materials has been of much concern to government and agricultural researchers. Given this backdrop, this study set out to analyze how efficient farmers in the programme were allocating scarce resources and compare that to the farmers that are not participating in the programme. A pertinent question to ask is "what are the prospects of this new programme?" This question is pertinent in view of the many problems that led to the failure of previous programmes. Any agricultural programme should be based on clear understanding of the factors that prevail at the farm level. Soybean production is hindered by scarcity of productive resources and low productivity of available resources. Production relationship in traditional agriculture is subject to wide variation over time and space. This is because such natural and economic factors such as weather and prices, which influence these relationships, are not fixed. Thus it might be wrong to base present decisions and policies on past results. This study will address the following research questions: (1) what are the socioeconomic characteristics of soybean farmers in the study area? (2) Is the production of soybean under the special crop programme profitable? (3) Are the farmers under the special programme more efficient in their resource allocation than those outside the programme?

The objectives of this study were to:

1. Examine the socio-economic characteristics of soybean farmers.
2. Determine and compare costs and returns in the production of soybean under the Special Crop Programme.
3. Determine and compare the efficiency of the resource-use in the production of soybean under the special programme and those outside the programme.

RESEARCH METHODOLOGY

This study was conducted in Benue State, Nigeria. The state is situated in the middle belt region of Nigeria between longitude 7°44 E and 9°55' E and between latitude 6° 29' N and 8°7' N of the' equator (MANR, 1984). It is to the east of the rivers Niger-Benue confluence. The state shares boundaries with Nasarawa state to the North, Kogi state to the west, Cross River state to the south and Enugu state to the southwest. The state also shares an international boundary with the Republic of Cameroon in the southeast. The predominant vegetation in the state is the southern Guinea Savannah. The state covers total landmass of 33,706 km^2 with a population of 2,780,398 people (NPC, 2006). The predominant ethnic groups are Tiv and Idoma other indigenous ethnic groups are the Igedes and Etulos.

This study used a purposive random sampling technique in the selection of respondents from the three geo-political zones. The first stage is to get the list of the participating and non-participating farmers in each zone. It was found that there were fifty participant soybean farmers in each zone. From the list of the fifty participant farmers from each of the zone, a random sample of twenty (20) soybean farmers participating in the programme was drawn. The non-participant farmers are more in number but for the sake of comparative analysis, twenty (20) soybean growers were selected. In total there were 60 growers in each group (participant and non-participant) in three zones. Data were collected with the assistance of the Divisional Agricultural officers of the Ministry of Agriculture and staff of the Benue Agricultural and Rural Development Authority (BNARDA).

Primary data were collected from sampled farmers for the three cropping seasons of 2002, 2003, and 2004. The instruments for the data collection include sets of questionnaire and interview schedules. Simple descriptive statistics, Gross margin, regression analysis and Z-test were employed in this study. The functional forms of the regression considered were the linear production function, quadratic production function and the Cobb Douglass functions.

The linear production function with five variable inputs namely land, herbicide, fertilizer, seed and labour is expressed as:

$$Y = b_o + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + e$$

where, Y = crop output (kg); X_1 = total land (ha); X_2 = total quantity of herbicide (lit); X_3 = total quantity of fertilizer (kg); X_4 =. Total quantity of seed input (kg); X_5 = total labour (mandays); e = error term; b_1, b_2- - -b_5 are regression coefficients to be estimated

The linear production function assumes a linear relationship between the output and the inputs as well as constant marginal productivities of resources used. Various studies have fitted them into all kinds of agricultural production data, each subject to its assumptions and limitations.

The quadratic production, for a five-input case is expressed as:

$$Y = b_o + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_1^2 + b_7X_2^2 + b_8X_3^2 + b_9X_4^2 + b_{10}X_5^2 + b_{11}X_1X_2 + b_{12}X_1X_3 + b_{13}X_1X_4 + b_{14}X_1X_5 + b_{15}X_2X_3 + b_{16}X_2X_4 + b_{17}X_2X_5 + b_{18}X_3X_4 + b_{19}X_3X_5 + b_{20}X_4X_5 + b_{21}X_1X_2X_3X_4X_5 + e$$

Where X_1 - X_5 is defined as in the linear production function.
X_iX_j = interaction terms of variables i and j ,b_0= constant term
$b_1 - b_{21}$ = Regression coefficients.

The quadratic function can have a distinct peak, denoting maximum output for a single combination of factors and the elasticity of production is not constant, but declines with input magnitude. The advantages of using this model were mainly to ease the estimation and the fact that it shows whether there is increasing or decreasing return to factors of production. Among its disadvantages, it cannot show both diminishing and increasing return to factor in a single curve. At very high or low levels of inputs, the function may predict a negative total product. This form usually requires a large number of regression coefficients to be estimated for a given number of

variable inputs. Thus, it generally leads to loss of many degrees of freedom and often results in too many regression coefficients not being significant in a profitable sense. The Cobb Douglass production which is amongst the several forms fitted is specified as:

$$\text{Log } Y = \text{Log } a + b_1 \text{Log} X_1 + b_2 \text{Log} X_2 + b_3 \text{Log} X_3 + b_4 \text{Log} X_4 + b_5 \text{Log} X_5 + \text{Log } E$$

where, Y = crop output (kg); X_1 = total land (ha); X_2 = total quantity of herbicide (lit); X_3 = total quantity of fertilizer (kg); X_4 = Total quantity of seed input (kg); X_5 = total labour (mandays); E = error term; b_1, b_2- - -b_5 are regression coefficients to be estimated.

All the above explanatory variables were included based on the assumptions that they were the only common resources and that they all contributed positively to crop output. Therefore, all their coefficients were expected to have positive signs.

From the estimated regression coefficients $\{b_1\}$, beta coefficients $\{b_1\}$ were computed for each of all the resources. The beta coefficient $\{b_1\}$ is a standardized measure of the relative importance of individual explanatory variables, irrespective of the units in which the regression coefficients were measured. The marginal value product {MVP} of each resource was calculated as:

$$MVP_x = MPPx.Py$$

where $MPPx = b_i \, Y/X_i$

This value {MVP} was compared with the cost of one unit of the particular resource to make inference on resource-use efficiency.

To achieve the efficiency of resource use in a factor-product relationship, the optimal level of variable input must be determined as well as its optimum level output equivalent theoretically, this is obtained when the MVP equates the unit price of the input or when the ratio of MVP to MFC equates, that is MVP/MFC-1 (Olukosi and Ogungbile, 1982).

The choice of the better functional form to use for result interpretation was based on the relative magnitude of the adjusted coefficient of multiple determinations (R^2) in relation to the statistical significance of the regression coefficients, the appropriateness of the signs of the regression coefficients and the relative conforming of the various parameters estimates to reality.

The Cobb Douglas production function was selected as the lead equation for further analysis. The choice of the Cobb Douglas was informed by the fact that it gave the highest adjusted coefficient of multiple determinations (R^2) for both soybean and maize (participant and non-participant) farmers, all the coefficients were positive and most of them were statistically significant for all the category of farmers.

The linear production function had relatively low values of adjusted coefficient of multiple determinations (R^2). In the non-participant farmer group, b_0 (constant) was found to be negative. The quadratic production function had insignificant t-values for most of the coefficient for soybean and maize non-participant farmers.

RESULTS AND DISCUSSION

Socio-economic characteristics of soybean farmers

The various elements of the farmers' environment often have pronounced influence on farming decisions and output. Some of these elements include farmers' socio-economic characteristics, their resource endowment, climatic conditions and government policies. It is for the purpose of understanding the prevalent farming conditions during the survey years that this section discusses the farmers' socio-economic characteristics and their production problems.

Age distribution of respondents

Most of the farmers in these two groups (participant and non-participants to special crop programme) were within the age brackets of 31 to 40 years with an average age of 32 years and 34 years respectively for soybean participants and non-participant farmers respectively. Table 1 clearly illustrates the age distribution of respondents. In the non-participant farmer category, farmers below the age of twenty years were found. Age is one of the influencing socio-demographic attributes that affects the adoption of innovations responsible for higher farm outputs. In this study area, because of very nature of labour intensive farming, the relatively younger person will have more strength and work output to crop more area of land relatively to an old age group. In both participant and non-participant groups, farmers above the age of seventy were found.

Sex distribution

Male domination in farming in both groups has been noticed. The commonly held belief in this study area shows that soybean was perceived as male crops. This perception stems from the fact that the crops were cultivated mainly for cash. It is only recently that soybean was being processed for household consumption. Sex distribution, as a social construct, had so much to do with roles and task to carry out in the course of soybean production. Notwithstanding that the majority of the farms were owned by men, women have major contributions in terms of weeding and other harvest and post harvest activities. Tables 2 show the sex distribution of soybean farmers.

Household size

The household size influences labour availability. Given that the mode of soybean production rely so much on family labour, basic cultural practices such as weeding depends so much on family labour. The average household size ranged from six to ten residents with an average of seven and nine, six and ten residents respectively for the participant and non-participant farmers. This figures agrees with the findings of Edache et al. (1998) who found the average households to range between six to ten members. Tables 3 show the distribution of soybean farmers according to household size.

Level of education

Education positively affects adoption of innovation. The

Table 1. The age distribution of soybean farmers.

Age (years)	Participant soybean farmers	%	Non-Participant soybean farmers	%
	Number of respondents		Number of respondents	
< 20	-	-	10	16.67
21- 30	5	8.33	8	13.33
31- 40	37	61.67	22	36.67
41-50	8	13.33	12	20.00
51- 60	7	11.67	6	10.00
> 70	3	5.00	2	3.33
Total	60	100.00	60	100.00

Table 2. Sex distribution of soybean participant and non-participant farmers.

Sex	Participant soybean farmers	%	Non-Participant soybean farmers	%
	Number of respondents		Number of respondents	
Male	45	75.00	39	65.00
Female	15	25.00	21	35.00
Total	60	100.00	60	100.00

Table 3. Distribution of soybean participant and non-participant farmers according to household size.

Household size	Participant soybean farmers	%	Non-Participant soybean farmers	%
	Number of respondents		Number of respondents	
1-5	11	18.33	9	15.00
6-10	34	56.67	42	70.00
11-15	7	11.67	7	11.67
16-20	5	8.33	2	3.33
21-25	3	5.00	-	-
Total	60	100.00	60	100.00

use of recommended farming practices are important managerial concern. Skills are acquired to implement specific instructions. Education facilitates the understanding and skill acquisition. Education makes the farmer favorably disposed to receive advice from extension agents. The most of the respondents had primary, secondary, tertiary or adult education. Only negligible number of farmers in both participant and non-participant categories had no formal education. Table 4 shows the distribution of soybean farmers according to level of education.

Farming experience

Majority of the farmers had between 11 to 15 years of experience with an average experience of 13 years for participant soybean farmers, 12 years for non-participant soybean farmers. There is no difference between participant and non-participant farmers in terms of farming experience. Farming experience counts given that the individual farmer possesses value, makes choices and takes action. This implies that the individual farmer takes his own decisions regarding his resources and output guided by the desire to maximize his utility in time and space. Farming experience therefore facilitates good decision-making. Table 5 shows the distribution of soybean farmers according to farming experience.

Land acquisition

Land is an important means of production. Most of the farmers acquired their farmlands through inheritance and same was concluded by Allen and Lenk (1998). Most of the respondents have one field for the production of soybean. The average land under soybean cultivation was 5.0 ha for participant farmers and 4.13 ha for non-participant farmers in 2002. In 2003, the average land under soybean cultivation was 5.03 ha for participant farmer and 4.13 for non-participant farmers. In 2004, the average land under soybean cultivation was 6.75 ha for

Table 4. Distribution of soybean participant and non-participant farmers according to level of education.

Level of education	Participant soybean farmers	%	Non-Participant soybean farmers	%
	Number of respondents		Number of respondents	
Primary education	22	36.67	31	51.67
Secondary education	14	23.33	9	15.00
Tertiary education	8	13.33	7	11.67
Adult education	6	10.00	3	5.00
No formal education	10	16.67	10	16.67
Total	60	100.00	60	100.00

Table 5. Distribution of soybean participant and non-participant farmers according to farming experience.

Farming experience in years	Participant soybean farmers	%	Non-Participant soybean farmers	%
	Number of respondents		Number of respondents	
<5	3	5.00	-	-
6-10	11	18.33	8	13.33
11-15	32	53.33	28	46.67
16-20	8	13.33	12	20.00
21-25	4	6.67	10	16.67
26-30	2	3.34	2	3.33
Total	60	100.00	60	100.00

participant farmers and 5.63 ha for non-participant farmers. On account of increase in population, the Tiv communities overlap into neighboring Taraba and Nassarawa States. Agriculture is the main economic activity in these areas. The mode of agricultural practice in this study area is the type that requires more land to be cultivated in order to get more output. Due to the increase in population density, the number of persons per square kilometer increases and the attendant consequence is a decrease in size of farmland. Table 6 shows the distribution of soybean farmers.

Cost of production and returns for soybean

The total revenue and cost per hectare were calculated for soybean farmers with the special crop programme and those not participating in the programme. These were then compared to determine the profitability of soybean under the programme. The Z-statistic showed a significant difference at 5% level between the gross margin per hectare and the total cost per hectare for soybean production under the programme. The average cost and revenue and the gross margin per hectare for soybean participant farmers were ₦33,830, ₦59,844 and ₦26,782 respectively. The average cost, the average revenue and the gross margin per hectare for soybean non-participant farmers were ₦39,251.70, ₦67,891.70 and ₦28,640, respectively. Tables 7 and 8 show detailed breakdown of cost and return for soybean, hence, soybean under the special crop programme was found profitable.

The hypothesis that soybean under the special crop programme was not profitable is thus rejected

Efficiency of resource use in soybean production by participant and non participant farmers

Data collected from the respondents were analyzed to determine the relationship between inputs (land, herbicides, fertilizer, seeds and total labour) and output of soybean. Several functional forms were fitted but the Cobb Douglas gave the best fit. It is reported in Table 9.

$$Y=58.47X_1^{0.19}X_2^{0.34}X_3^{0.17}X_4^{0.27}$$

The production function for the soybean production by participant farmers is given by:

$$\text{Log } Y=\log 58.47+ 0.19 \log X_1+ 0.34\log X_2 +0.17\log X_3+ 0.27\text{og } X_4$$

The regression results indicate that 83% of the variations in soybean yield among the sampled farmers were explained by the factor inputs included in the model. The signs of the coefficients estimated were positive for all inputs and statistically significant at 5% level of probability in the case of the participant farmers. The Average Physical Product (APP) of herbicide, fertilizer, seed and

Table 6. Distribution of soybean participant and non-participant farmers according to mode of land acquisition.

Tenure system	Participant soybean farmers	%	Non-Participant soybean farmers	%
	Number of respondents		Number of respondents	
Inheritance	38	63.33	44	73.33
Rents	10	16.67	5	8.33
Purchase	8	13.33	4	6.67
Allocation	4	6.67	7	11.67
Total	60	100.00	60	100.00

Table 7. Costs and returns for soybean under the special crop programme.

Variable	Total revenue(N/Ha)	Total costs (N/Ha)	Gross margin (N/Ha)
Maximum	79.350	48.000	45.350
Minimum	15.633	25.000	- 17.000
Average	59.844	33.830	26.782
Std. dev.	11.016	2.210	10.113
Z-Statistic	24.68*		

*N = Naira. 1 US$ = N150

Table 8. Costs and returns per hectare for soybean participant and non-participant farmers.

Variable	Participant farmer (₦)	Non-participant farmer (₦)
Herbicide	2,716.00	3,654.00
Fertilizer	8,625.00	10,902.50
Seeds	2745.60	2,695.20
Labour	19,743.40	22,000.00
Total variable cost	33,830.00	39,251.70
Total revenue	59,844.00	67,891.70
Gross margin	26,782.00	28,640.00

Table 9. Regression coefficients for soybean production: Participant and non- participant farmers.

Variable	Participant farmers	Non-participant farmers
	Regression coefficients	Regression coefficients
Constant	58.47 (6.54)*	38.24 (4.32)*
Herbicide (x_1)	0.19 (2.11)*	0.16 (1.72)*
Fertilizer ($x_{2)}$	0.34 (4.36)*	0.29 (2.80)*
Seed ($x_{3)}$	0.17 (1.96)*	0.21 (2.01)*
Labour (x_4)	0.27 (2.53)	0.33 (4.20)*
R^2	0.83	0.67
F	195.83*	137.26*

Figures in brackets are t-values; *Significant at 5%.

labour were computed as 405.54, 5.82, 36.45 and 18.40, respectively. The Marginal Physical Product (MPP) of Herbicide, fertilizer, seed and labour were estimated as to be 77, 1.98, 6.20 and 4.96, respectively.

The Marginal Physical Product of inputs was valued at the prevailing product price of soybean, that is, ₦35/kg weight of Soybean. Thus, the MVPs of herbicide, fertilizer, seed and labour were estimated as ₦2695, ₦69.26, ₦217 and ₦173.60, respectively. Table 10 gives the details. The MFC for herbicide, fertilizer, seeds and

Table 10. Average and marginal productivity values and efficiency ratios for soybean farmers with the programme.

Variable	APP	MPP	MVP	MFC	MVP/MFC
Herbicide	405.54	77.00	2695.00	700	3.85
Fertilizer	5.82	1.98	69.26	30	2.31
Seed	36.45	6.20	217.00	35	6.20
Labour	18.40	4.96	173.60	850	0.02

Table 11. Average and marginal productivity values and efficiency ratios for non participating soybean farmers.

Variable	APP	MPP	MVP	MFC	MVP/MFC
Herbicide	317.72	50.84	1779.40	700	2.54
Fertilizer	5.87	1.70	59.50	30	1.98
Seeds	31.58	6.63	232.05	35	6.63
Labour	22.57	7.44	260.40	850	3.06

Source: Field survey (2004).

labour were estimated as N700 /L, ₦30 /kg, ₦35 /kg and ₦850 /man-day, respectively. The return to scale which is (0.97) the sum of elasticity in a Cobb-Douglass production suggests diminishing return to scale, implying that soybean farmers were producing in stage two. The comparison of APP and MPP values also confirms that the farmers were producing in stage two. That is, all values of APP were greater than those of MPP while MPP values are all positive (0 ≤ MPP ≤ APP). Gordon and Dadidovan,2004, Doran, 1985, Rahman et al., 1998 and Helfand and Levine, 2004 employed similar approaches in their studies.

The Marginal Values Product were compared with unit input price to determine how close the farmers were to the theoretical optimum performance of MVP = P = MFC. The MVPs of herbicide, fertilizer and seeds computed as ₦2695, ₦69.26 and ₦217 respectively were greater than the cost of obtaining additional units of these inputs (N700, N30 and N35) respectively.

However, the ratio of MVP to MFC for labour is far less than one (0.02). The result indicates under utilization for land, herbicide, fertilizer, and seeds and over utilization for labour.

In the case of the non participant farmers, data from this group were analyzed to determine the relationship between inputs (herbicide, fertilizer, seeds and total labour and the output) of soybean. For this group, the general equation is specified as:

$$Y = 38.24X_1^{0.16} X_2^{0.29} X_3^{0.21} X_4^{0.33}$$

Linearizing the equation to get:

$$\text{Log}Y = \text{Log } 38.24 + 0.16 \text{ Log } X_1 + 0.29 \text{ Log } X_2 + 0.21 \text{Log } X_3 + 0.33 \text{ Log } X_4$$

The regression result indicates that 67% of the variations in soybean yield among the sampled fields were explained by the factor inputs included in the model. The signs of the coefficients estimated were positive for all inputs and statistically significant at 5% level of probability.

Average Physical Products (APP) of herbicides, fertilizers, seeds and labour were computed as 317.72, 5.87, 31.58 and 22.57, respectively. The Marginal Physical Product (MPP) of herbicides, fertilizers, seeds and labour were estimated to be 50.84, 1.70, 6.63 and 7.74, respectively. The Marginal Physical Product of inputs was valued at prevailing product price of ₦35/kg weight of soybean. The Marginal Value Product (MVP) of herbicides, fertilizer, seed and labour were estimated as ₦1779.40, ₦59.50, ₦232.05, and ₦ 260 .40, respectively as shown in Table 11

The sum of elasticity which is the return to scale is 0.99, suggesting a diminishing return to scale. This further implies that the farmers were operating in stage two. The comparison of the APP and MPP values also confirms that the farmers were operating in stage two, that is, all values of APP were greater than those of MPP. In other words, this implies that the soybean farmers were technically efficient in their use of resources.

The marginal value product when compared with unit input price to determine how close the farmer is to the theoretical optimum performance of MVP= P = MFC. The MVPs of herbicides, fertilizer, seeds and labour were substantially greater than the cost of obtaining additional units of these inputs respectively. Both categories of farmers (participants and non participants) producing soybean were found to be technically efficient. This was evidenced from the fact that both were operating in stage two. However, the non participants' farmers were more

Table 12. Efficiency ratios for soybean participant and non-participant farmers.

Variable	Participants farmers MVP/MFC	Non-participants farmers MVP/MFC
Herbicide	3.85	2.54
Fertilizer	2.31	1.98
Seeds	6.20	6.63
Labour	0.02	3.06

efficient as their ratios of MVP to MFC for all inputs except seed and total labour were lower than those of the participant's farmers.

Table 12 clearly shows that the non-participant farmers were more efficient than the participating farmers. This is contrary to expectation. It was expected that the participant farmers who have received production inputs at subsidized rates and taught modern methods should be more efficient than the non-participating farmers. The participant farmers relied on the state to provide all the inputs. However, these inputs apparently were not provided on time, and when provided, the quantities were inadequate. The shortage was not augmented. Also, there were occasional cases of inputs supplied being diverted and resold. From the foregoing, participant farmers did not use their inputs timely and neither managed their farms in terms of timely weeding and application of fertilizer and herbicide as the non participating farmers.

Conclusion

The study concludes that soybean production under the special crop programme is profitable. The farmers, both participant and non participants were found to be efficient in their resource allocation. This was evident from the ratios of APP greater than MPP. The non participant farmers were more efficient comparatively to the participant group. This study recommends that more farmers should be networked into the special crop programme.

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