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Resource-use Efficiency in Tomato Production in the Dangme West District, Ghana

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Introduction

Tomato forms a very important component of food consumed in Ghana and this is evident in the fact that many Ghanaian dishes have tomatoes as a component ingredient. Tomato production in Ghana is mainly a smallholder activity. In a bid to help farmers increase productivity, the focus is usually on whether farmers are using better and improved technologies. It is however necessary to investigate whether these farmers are even making maximum use of what is available to them in terms of inputs so that the stakeholders involved in agriculture will be convinced that the new technologies they intend to introduce to farmers will be used efficiently and cost—effectively to boost output. Farmers might use resources rationally but not at the economic optimal level. As farmers aim at maximizing profit whiles minimising cost, it is pertinent to determine the efficiency of resource use.

This study seeks to describe the socio-economic characteristics of tomato farmers in the district, estimate the farm production function of tomato with a view of deriving the marginal factor productivity so as to estimate how efficiently the tomato farmers in the district are using their resources.

Analytical methods

Ordinary Least Squares was used to obtain the farm production function. The efficiency of resource use, r, was estimated as:

$$r = \frac{Marginal\ Value\ Product}{Marginal\ \text{Factor Cost}}$$

The decision rule for the efficiency analysis is if:
r = 1; resource is been used efficiently
r >1; resource is under utilization and increased utilization will increase output.
r <1; resource is over utilized and reduction in its usage would lead to maximization of profit

Study area

The Dangme West district is forms about 41.5% of the landmass of the Greater Accra Region of Ghana and is an important center where crop production is done for both the domestic market and also for export. A wide variety of crops are grown there because of the suitable climatic conditions. The crops produced there include fruits (e.g. pineapple, watermelon and mango), vegetables (e.g. tomatoes, pepper and cabbage) and staples like cassava and maize.

Data collection

Primary data was collected with the aid of a well structured questionnaire. The data were collected using multi-stage sampling technique. The three towns in the Dangme West District, Dodowa, Kpong Bawaleshie and Ayikumah were purposeful selected based on intensive tomato cultivation in these areas. The second stage involved simple random selection of 20 respondents from each of the towns. Baseline information on socio-economic characteristics such as age, family size, and marital status, source of finance for the farm, farm size, and extension contact were obtained. Also, data on input use and output levels as well as their unit prices were collected. Data collected was for the 2007 farming season.

Conclusions

➢Findings from the study indicate that most of the farmers are in contact on a regular basis with extension agents. Tomato farming in the district is a male dominant activity The farmers do not receive financial assistance in form of credit from formal sources. They depend mostly on their personal savings.

➢Hired labour, pesticide and farm size (land) were observed to affect tomato output significantly. The farmers were inefficient in the use of resources. Seed, land, hired labour, fertilizer and pesticide were underutilized. Enough potential therefore exist for increased production of tomato in the study area.

➢The findings of the study implies that financial institutions in the area should consider making loans available and accessible to the farmers so that they can afford to increase the use of the inputs that are currently being underutilized. Also, there is the need for extension officers in the study area to educate the farmers to increase the use of land, hired labour and seed and also the right quantities of pesticide and fertilizer in order to boost profitability of the business.

Results

The results from the study indicate that tomato farmers were mainly smallholder farmers who cultivate between 3 to 4 acres with an average farm size of 2.5acres. Also, majority of the farmers (87%) were in contact with extension agents. There are also more men (88%) than women having tomato farms at the study area. Only 24% of the farmers have access to credit for farming and it is mainly obtained from relatives which are of small amount.

Estimated Cobb-Douglas production function for tomato production

Dependent Variable: LOG(OUTPUT)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(SEED)	0.091643	0.070642	1.297297	0.2004
LOG(LAND)	0.328145	0.084417	3.887218	0.0003***
LOG(PESTICIDE)	0.128016	0.053976	2.371694	0.0215**
LOG(HIRED_LABOU	0.043624	0.018499	2.358245	0.0222**
LOG(FERTILIZER)	0.033103	0.037784	0.876091	0.3851
LOG(FAMILY_LABO	-0.001540	0.020546	-0.074937	0.9406
C	6.583790	0.192585	34.18634	0.0000
R-squared	0.739061	F-statistic		24.0746
Adjusted R-squared	0.708362	Prob(F-statistic)		0.0000

From the regression results, hired labour, pesticide and farm size were observed to affect tomato output significantly and hence are the determinants of tomato production in the study area. Farm size was significant at 1% whereas pesticide and hired labour were significant at 5%.

Efficiency analysis of resource – use in tomato production

Resource / Input	Coefficient	MVP (GH¢)	MFC (GH¢)	r
Seed	0.091643	73.31	6.0	12.22
Land	0.328145	262.52	30.0	8.75
Fertilizer	0.033103	26.48	7.0	3.78
Pesticide	0.128016	102.41	8.0	12.80
Family labour	-0.001540	-1.23	5.0	-0.25
Hired labour	0.043624	34.90	5.0	6.98

The use of family labour was found to have a negative efficiency coefficient. This indicates an extreme use of family labour by the farmers which in turn leads to reduction in profit obtained. On the other hand, seed, land, hired labour, fertilizer and pesticide were the inputs being underutilized as their efficiency coefficient is greater than one. To increase output, there is the need for the farmers to increase the utilization of seed, land, hired labour, fertilizer and pesticide.

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Acknowledgement

The first author is very grateful to AGRINATURA for the travel grant to attend the conference.