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Determinants That Affecting the Production of Haricot Bean by Small Holder Farmers in Oromia Region of Ethiopia

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Abstract: Haricot bean is an important pulse crop, which serves as consumption and basis for income, but its output and production are minima. So, this study aimed to analyze the factor affecting haricot bean producer smallholder farmers Oromia regional state of Ethiopia. The data for the analysis were obtained from the World Bank data published on their website in 2018. The result of the regression shows it is likely to rise production of haricot bean by increasing the source of seed, fertilizer or manure, education, total income, family size, and the land size these factors significantly affect production positively but the price is significantly influencing smallholder farmers production of haricot bean negatively. The program inferences of the results are to have to educate the smallholder farmers, encouraging using educated family, providing access haricot bean seed for smallholder producer farmers, setting minimum procurement price for inputs and providing input subsidies, ease delivery of inputs, encouraging and training ways allocating land for different haricot bean crop, diversified income sources should be created to increase the income of the farmers. The Government, Ministry of agriculture, the regional office of agriculture, Zonal agricultural office and woreda's Agricultural office, Non-governmental Organization, Investigators, and academicians are needed additional encourage the production of improved haricot beans by designing based on farmer's problems and need.

Keywords: Log-linear, Haricot Bean, Production, Oromia, Ethiopia

1. Introduction

Agriculture is a leading sector of Ethiopian development, which makes a great share contribution to the Gross Domestic Product (GDP), employ and external exchange earnings. The importance of agriculture in Ethiopia is evidenced by its share in GDP (40%), employment generation (85%), the share of export (77%) [9]. According to the study result of [10], Ethiopia is known as the homeland of several crop plants. It is ranked 13th among pulse producing countries in the World and also according to the finding of [2], pulse crops are important components of crop production in Ethiopia smallholder's agriculture, providing an economic advantage to small farm holders as an alternative source of protein and other nutrients, cash income that seeks to address food security. The data of [5] shows that Pulses had refined and consumed in big quantities in Ethiopia for many years and also it enclosed around 12.61% (1.6 million hectares (ha)) of the grain crop area and 9.73% to production (around 29.8 million quintals (qt) in 2017/18 production period. According to the data of [6], the haricot bean is the second-largest crop in pulse production and the third export commodity from the total export value of agriculture in Ethiopia [6].

According to the finding of [15, 13] Haricot bean has been an important export commodity for the Ethiopian economy for the last 40 years and it is the smallholder farmers in the low and mid-attitude zones of the country who use haricot beans, not only as of the basis of income but also as the source of nourishment. Haricot bean is one of the most important pulse crops and it is considered the main cash crop and the least expensive source of protein for the farmers in Ethiopia, but its production and productivity are low [5]. According to the empirical studies such as [3, 4, 7, 8, 10, 14] showed the driving factors that lead to the inefficiency of the haricot bean market and production includes incomplete or

absence of better seed access, price instability, high taxes, and numerous fees at diverse levels, overrated exchange rate, poor coordination skill amongst traders, lack of product quality standard, unfair trade practices imposed by brokers at the market place, lack of market information to producers, long market chain, and few market channel choices, limited grading and quality control systems, and asymmetry of price information that result in low market participation of producer and a low share of the price for producers (excessive margins from traders over producers). However, there is no extra observed data in the study area about the factors of the production of haricot beans production. So, the objective of the study is to analyze the factor affecting the production of haricot beans in the study area.

2. Methodology

2.1. Description of the Study Area

The study area lies in the Oromia Regional State of Ethiopia, where growing plants and rearing animals are equally dominant agricultural activities.

2.2. Data Type and Data Source

The data for the analysis of factors affecting haricot bean production was obtained from the Oromia regional state. The primary sources of data were from the Oromia regional state smallholder farmers collected by the world bank in 2018 GC. Secondary data was obtained from the internet, through the desk review; the study assessed the existing literature on determinants that affecting the production of haricot beans by smallholder farmers.

2.3. Variables in the Study

The variables in this study were selected as those which were expected to be factors that may affect the production of haricot bean, based on past studies. Those are age, marital status, education, family size, fertilizer, seed, land size, total income, price of seed, and price of fertilizer and the dependent variable of the study is the quantity of haricot bean produced.

2.4. Methods of Data Analysis

2.4.1. Descriptive Statistics

Descriptive statistics were used in analyzing some of the major crops produced in the study area. The descriptive statistics used were means, standard deviations along with the minimum and maximum.

2.4.2. Model Estimation

According to the study of [12] a Cobb Douglas production function was used to regulate the influence of different factors on the amounts of haricot bean produced by farm households. A Cobb-Douglas function estimates the elasticity of production and marginal productivity of serious factors of production. The general form of the Cobb-Douglas production function is presented in Equation 1.

$$\varphi i=\theta\lambda\ 1\ \alpha 1\lambda 2\alpha 2\ \lambda 3\alpha 3\ \lambda 4\alpha 4\ \ldots\ \lambda n\alpha n \quad (1)$$

Where: φí=quantity of output I, λ=vector of variable resource with j=1, 2, 3 …. n,

θ=constant;

αk=coefficients with k=1, 2…n: which estimate the elasticity of transformation ratio for the inputs **λ**.

According to the study of [12] Estimation of constant and coefficients for the establishment of elasticity involved the transformation of Equation 1 to a logarithmic linear function specified in Equation 2. The Cobb-Douglass production function has some desirable properties, which make it more appropriate for this study. These include the use of αk to estimate the partial elasticity of bean output concerning the independent variables. In other words, it measures the percentage change in that particular variable while holding other variables constant. The quantities of beans produced could, therefore, be inferred using these coefficients. It is possible to calculate returns to scale, that is the response of **φ** to a proportionate change in inputs. This could also be used to explain the factors influencing the volume of beans produced in Equation 2.

$$\ln\varphi=\ln\theta + \alpha 1\ln\lambda 1 + \alpha 2\ln\lambda 2 + \alpha 3\ln\lambda 3 + \alpha 4\ln\lambda 4 + \alpha 5\ln\lambda 5 + \ldots \alpha 6\ln\lambda 6 + \beta 1\varphi 1 + \beta 2\varphi 2 + \ldots \beta n\varphi n + e \quad (2)$$

3. Results and Discussion

3.1. Some of the Major Crop Production of the Study Area

Some of the major crops grown in the study area are maize*, wheat, barley,* haricot bean, sorghum, and teff. The sample households, on average, produced 7,73 kg maize, 0.21kg haricot bean, 1.12 kg teff, 0.11 kg sorghum, 4.45 kg wheat, and 0.11 kg barley in the 2015/2016 production year (Table 1). Among these crops, the haricot bean was the fourth dominant crop in terms of average production.

Table 1. *Some of the major crop production of the study area.*

Variable	Mean	Std. Dev.	Min	Max
Maize qty	7.73	8.25	0	40
Haricot Qty	0.21	0.95	0	8
Teff qty	1.12	2.86	0	24
Sorghum Qty	0.11	0.56	0	5
Wheat qty	4.45	8.32	0	45
Barely qty	0.11	0.76	0	8

3.2. Determinant that Affecting Haricot Bean Production

Haricot bean as the cash crop in the study area, we then looked for the cause of its output determinant factors. Determinants of production are dependent on different socio-economic, farm, and institutional factors. Therefore the variables included in the model are those that are continuous and changed to log-linear form to fit the modified Cobb-Douglas production function model and the coefficients of the variables are computed using the Cobb-Douglas production function model.

Qp=f (Age, Education, Famsize, Tincomelastmnth, haricotfertAmt kg, harictfertvalue Br, haricotseedAmt kg, haricotseedvalue Br, cultlandsize10 a)

The dependent variable is the amount of haricot bean production and the explanatory variables included are the age of the respondent, amount of seed, education status of the household head, family size, amount of land owned, and amount of fertilizer used, Total income, price seed price of fertilizer.

Table 2. *The log-linear regression of the haricot bean production function model.*

Variable	Coef.	Std. Err.	t	P>t
Lange	-0.04959	0.0330	-1.5	0.13
LnEducation	0.024693	0.0106	2.34	0.02**
LnFamsize	0.07937	0.0208	3.81	0.00***
LnTincomelastMnth	0.03031	0.0031	9.73	0.00***
LnHaricotFertAmt_kg	0.784909	0.1353	5.8	0.00***
LnHaricotFertValue_Br	-0.03628	0.0766	-0.47	0.64
LnHaricotseedAmt_kg	0.37661	0.1070	3.52	0.00***
LnHaricotSeedValue_Br	-0.362474	0.0458	-7.91	0.00***
LnCultlandsize10_a	0.086179	0.0136	6.33	0.00***
_cons	0.120428	0.1131	1.07	0.29

F=0.0000 R2=0.5850
***, **, Significant at 1% and 5% level of significance, respectively

In explaining the relationship between the amount of production and education, it was often expected that educated farmers are better able to process information and search for appropriate technologies and methods to alleviate their farming and production constraints. The results showed that as the education increases by one year production of haricot beans increases by 2%.

The family sizes were significantly and positively affecting the production of haricot beans to the study area. The coefficient of the family size was 0.08 and as the number of families, size increases by one unit the production of haricot bean increases by 8%. The result of this study fits with research by [1, 15] which also reported labor availability has a positive and significant effect on production.

Seed amount measured in kilograms, was found to be significantly positive. The elasticity (coefficient) of seed in this study was 0,38, implying that as there is a unit increase in the quantity of seed, production will increase by 38% up to the point where applying population density of seed reaches its optimum level. The present study's result is consistent with an earlier study by [15].

The price of seed measured in birr, was found to be significantly negative. The elasticity (coefficient) of price in this study was 0,36, implying that as there is a unit increase in the quantity of price, production will decrease by 36% up to the point where applying population density of seed reaches its minimum level.

The relationship between fertilizer and production was significantly positive. For a unit increase in the use of Fertilizer, the amount of haricot bean production increases by 78% until applying the amount of fertilizer per hectare reaches its optimum level. The present study's result is consistent with an earlier study by [15].

As the income increased, it was expected to see an increase in output level. Farmers would have more capital to purchase new technologies and other inputs like fertilizer and improved seeds that assist production. The coefficient of income was 0.03 which implies that as income changes by a unit output level will be changed by 3%.

Total land owned by the households was assumed to be positively assisted in changing the level of production. As expected, the variable land, measured in terms of a hectare, was significantly positive. The size of the farm is a factor that is often argued as important in affecting production decisions. It is frequently argued that farmers with larger farms are more likely to produce haricot beans compared with those with small farms.

4. Conclusion and Recommendation

4.1. Conclusion

This study was conducted in the Oromia region, which is located in Ethiopia. In the area, haricot bean is an important crop, which serves as a consumption and source of income. The main objective of this study was the analysis of the determinant that affecting the production of haricot beans in the Oromia region of Ethiopia. Constraints or factors are hindering the production of haricot beans by smallholder farmers hence this study evaluated different factors that influence the production of haricot beans. The haricot bean quantity produced was positively influenced by education, family size, amount of seed, fertilizer, total income, and land size indicating that those all the need for enabling environment for increasing smallholders' ability to produce quality haricot beans but the price of seed was negatively influenced haricot bean production of smallholder farmers.

4.2. Recommendation

The overall result calls for policy packages which focus on educating the smallholder farmers, encouraging using

educated family, providing access haricot bean seed for smallholder producer farmers, setting minimum procurement price for inputs and providing input subsidies, ease delivery of inputs, encouraging and training ways allocating land for different haricot bean crop, diversified income sources should be created to increase the income of the farmers. The Government, Ministry of Agriculture, Regional Agricultural office, Zonal and woreda's Agricultural office, NGO, Researchers, and scholars are needed to further promote the production of improved haricot beans by designing based on farmer's problems and need.

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