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 crop, which serves as a consumption and source of income, but its production and productivity is low. So, this study aimed to analyze the factor affecting haricot bean producer small holder 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 log linear regression shows it is possible to increase production of haricot bean by increasing the supply of seed, fertilizer, education, total income, family size and land size these variables citrus-paribus significantly influence production positively but price of significantly influences small holder farmers production of haricot bean negatively. The policy implications of the present findings are to have educating the small holder farmers, encouraging using educated family, providing access haricot bean seed for small holder 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 in order to increase 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 production of improved haricot bean by designing based on farmer's problem and need.

Keywords: Log linear, Haricot bean, production, Oromia, Ethiopia.

INTRODUCTION

Agriculture is a dominant sector of the Ethiopian economy, which makes a great share contribution to the Gross Domestic Product (GDP), employment and foreign exchange earnings. The importance of agriculture in Ethiopia is evidenced by its share in GDP (40%), employment generation (85%), the share of export (77%) [3]. Ethiopia is known as the homeland of several crop plants. It is ranked 13th among pulse producing countries in the World [4]. So, 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 [2].

Haricot bean has been an important export commodity for the Ethiopian economy for the last 40 years. It is the smallholder farmers in the low and mid-attitude zones of the country who use haricot bean, not only as source of income but also as source of food [7]. Haricot bean is one of the most important pulse crops and it is considered as the main cash crop and the least expensive source of protein for the farmers in Ethiopia, but its production and productivity is low [5]. However, there is no more empirical information in the study area about the determinants of the production of haricot bean production. Therefore, the objective of the study is to analysis the factor affecting the production of haricot bean in the study area.

METHODOLOGY

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.

Data type and data source

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

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.

Methods of Data Analysis

Descriptive statistics

Descriptive statistics include means or averages, standard deviations along with the minimum and maximum was used in analyzing the socioeconomic characteristics of the farmers, input and output variables and problems encountered by Haricot bean farmers in the study area.

Model estimation

A modified Cobb Douglas production function was used to determine the influence of different factors on the quantities of haricot bean produced by farm households. A Cobb-Douglas function estimates elasticity of production and marginal productivity of critical factors of production. The general form of Cobb-Douglas production function is presented in Equation 1[6].

$$\varphi í = \theta\lambda\,1\,\alpha1\lambda2\alpha2\,\lambda3\alpha3\,\lambda4\alpha4 \dots \lambda n\alpha n \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Where: $\varphi í$ = 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.

Estimation of constant and coefficients for the establishment of elasticity involved 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 with respect to 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 (Gujarati, 2004). This could also be used to explain the factors influencing the volume of beans produced in Equaton 2.

$$\ln\varphi = \ln\theta + \alpha1\ln\lambda1 + \alpha2\ln\lambda2 + \alpha3\ln\lambda3 + \alpha4\ln\lambda4 + \alpha5\ln\lambda5 + \dots \alpha6\ln\lambda6 +$$

$$\beta1\varphi1 + \beta2\varphi2 + \dots \beta n\varphi n + e \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

RESULTS AND DISCUSSION

Some of 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 2015/2016 production year (Table-1). Among these crops, haricot bean was the fourth dominant crop in terms of average production.

Table-1: Some of 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

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 to the modified Cobb-Douglas production function model and the coefficients of the variables are computed using 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 amount of haricot bean production and the explanatory variables included are age of the respondent, number 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 haricot bean production function model

Variable	Coef.	Std. Err.	t	P>t
LnAge	-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 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 bean increases by 2%.

The family sizes were significantly and positively affecting the production of haricot bean to the study area. The coefficient of the family size was 0.08 and as the number of family size increases by one unit the production of haricot bean increases by 8%. The result of this study fits with research by [1 and 7] which also reported labour availability has 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 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 [7].

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 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 use of Fertilizer, the amount of haricot bean production increases by 78% until applying amount of fertilizer per hectare reaches its optimum level. The present study's result is consistent with an earlier study by [7].

As the income of 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 level of production. As expected, the variable land, measured in terms of 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 bean compared with those with small farms.

CONCLUSION AND RECOMMENDATION

Conclusion

This study was conducted in 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 analysis of the determinant that affecting the production of haricot bean in Oromia region of Ethiopia. There are the constraints or factors which hindering the production of haricot bean by small holder farmers hence this study evaluated different factors that influence the production of haricot bean. The haricot bean quantity produced was positively influenced by education, family size, amount 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 price of seed was negatively influenced haricot bean production of small holder farmers.

Recommendation

The overall result calls for policy packages which focus on educating the small holder farmers, encouraging using educated family, providing access haricot bean seed for small holder 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 in order to increase 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 production of improved haricot bean by designing based on farmer's problem and need.

Conflict of interest: No conflict of interest

Statement of ethical approval: 'The present research work does not contain any studies performed on animals/humans' subjects by any of the authors.

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