Original Research Article

Assessment of Production and Utilization of Black Cumin (*Nigella sativa)* at the Oromia Regional State, Ethiopia

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ABSTRACT

Background and Objective: Black cumin seed for local consumption and other importance, such as oil and oil rosin for medicinal purposes, export market, crop diversification, income generation, reducing the risk of crop failure and others made it as a best alternative crop under Ethiopian smaller land holdings. The objectives of this study were to examine factors affecting farmer perception of the Black cumin production importance, and assess the crop utilization purpose by smallholder farmers and its income potential for the farmers in two districts of Bale zone of Oromia regional state in Ethiopia.

Materials and methods: The survey was conducted from January to May 2018 in two districts of Oromia region. Questionnaires, focus group discussion and field observation were used to collect data. A total of 180 Black cumin producers were selected randomly from 8 districts. The responses were analyzed by using descriptive statistics and Probit model in Stata version 13.

Results: The survey result indicated that the majority (95.56%) of the households perceived that production of Black cumin crop is important. The crop used as source of better income, medicinal crop and spice in the study area. From the total mean of agriculture income, Black cumin production contributes about 39.88% to the income the respondents. The Probit model shows that producers perception of the importance of Black cumin production was found to be statistically and significant affected by age of households, education level, availability of labor for farm activities, access to credit facilities, average income from Black cumin, and its productivity level through time. **Conclusion**: The agricultural policy should give emphases at all operational level to exploit more benefit from this crop and on the production enhancement strategies, so as to bring foreseen change in the lives of the producers.

Keywords: [Black cumin, perception, production, use, Tobit model, Ethiopia]

1. INTRODUCTION

Black cumin (*Nigella sativa* L.) belongs to the family Ranunculaceae. The crop is native to the Mediterranean region and it has been used for thousands of years by various cultures and civilizations. It grows to 20–30 cm (7.9–12 in) height, with finely divided, linear (but not

thread-like) leaves. The flowers are delicate, and usually coloured pale blue and white, with 5–10 petals. The fruit is a large and inflated capsule composed of 3–7 united follicles; each containing numerous seeds and the seed is used as a spice [1, 2, 3].

Black cumin is one the most revered medicinal seeds in history. Though Black cumin seeds are mentioned in the Bible as well as in the words of the Prophet Mohammed, they were not carefully researched until about 1550 many years ago. Since 1959, over 200 studies at international universities and articles published in various journals have shown remarkable results supporting its traditional uses recorded almost 1400 years ago [1,2,4]. Dioscoredes, a Greek physician of the century recorded that Black seeds were taken to treat headaches, nasal congestion, toothache, and intestinal worms. They were also used, he reported, as a diuretic to promote menstruation and increase milk production [1, 5]. Besides, Black Cumin has a long history of uses for food flavors, perfumes and medicinal values. Oil has been used for bringing smell to some medicines, sterilizing of surgical operation fiber, production of some veterinary and agricultural medicines and plastic components. Black Cumin seeds have an aromatic odor and bitter taste. They are used as an essential ingredient in soup component, sausages, cheese, cakes and candies [6].

The Ethiopian variety of cumin seed accumulate up to 50% thymol, a monocyclic phenolic compound. The presence of this compound makes cumin valuable source for health care Industry [7] and medicinal purposes [8]. Moreover, study on phytochemical analysis of Indian and Ethiopian Black cumin seeds, it was investigated that antioxidant capability and phenolic content are higher in Ethiopian Black cumin than the Indian origin; whereas phytochemical content varies in each part of the seed. Seed coats of the *Nigella sativa* are rich in phytochemicals rather than cotyledon as many chemical compounds are concentrated into seed coat. Hence, Black cumin confirms to be a medicinal plant rich in phytochemicals [9]. In Ethiopia, it is commonly used in Amharic "*Berbere*" in which it tends

to reduce its hotness [10], for preparation of curries, bread, katikala [1],"*Shamita*" [12], traditional Ethiopian stews, "*Wot*" and preservation of butter.

In Ethiopia, the weather makes a suitable environment for the growth of Black cumin seed. In the country, lot areas in Amara, Oromia, SNNP, and Gambiella regions are found in producing the Black cumin seed. Most Ethiopian people use as house holdings spice preparation. Studies, also confirms that the application of Black cumin seed for medicinal purpose for internal as well as external treatment problems. Besides its medicinal importance, Black cumin (*Nigella Sativa*) seed is also used for production of soap, perfumes and lotions, food flavorings, food preservation, nutraceuticals and cosmoceuticals from the Black cumin oil [1,4].

More recently a great deal of attention has given to the seed and oils yields of Black cumin. Due to this, their consumption has thus increased and Black cumin is the second cash crop exported next to ginger in Ethiopia. Ethiopian annual production of Black cumin seed is 18000 metric tons 2014/15 [13] and the national average of Black cumin productivity is 0.79 tons per hectare [14]. However, the crop is produced on fragmented land and soils having long cereal cropping history where crop residues are removed for various purposes without any chemical fertilizer application. Additionally, information regarding its response to fertilizer is insufficient in the country. Black cumin seed shows significant variations in days to flowering in the tested varieties at various locations [15]. The vast majority of Ethiopia's Black cumin exports go to Arabic countries, which together with other predominantly Muslim countries, accounted in 2008 for some 98% of national exports. It is uncertain how reliable this market is and whether exports can be maintained at current levels. Value-adding to cumin in Ethiopia is low, with all exports being made in the form of whole grain [16].

Moreover, the production and land coverage of Black cumin have been increasing; the productivity is still less than 300 kg per hector. Several problems including lack of improved seed, recommended fertilizer rate, lack of knowhow on postharvest handling; improved agriculture practices and extension system, marketing system, etc. are accountable for the continued low productivity and production of Black cumin [17]. Due to the increased demand of Black cumin seed for local consumption and other importance, such as oil and oil rosin for medicinal purposes, its export market, its potentiality in crop diversification, income generation and its importance to reduce the risk of crop failure and others made Black cumin as a best alternative crop under Ethiopian smaller land holdings [18].

Despite the country's favorable environmental condition for its production and importance in the economy, the Black cumin cropping system has been given a little attention to improve its production and productivity, and hence, it remained as an underutilized crop. The objectives of this study were to examine factors affecting farmers' perception of the Black cumin production importance, and assess the current status of the crop on smallholder farming sector focusing on its general utilization purpose, and income potential for the farmers in two districts of Bale zone of Oromia region in Ethiopia.

2. MATERIAL AND METHODS

2.1 Description of the Study Area

Bale zone is one of the 18 administrative zones in Oromia national regional state which is located in South-Eastern Ethiopia. It has borderlines with Arsi, Guji, West and East Hararge zones as well as Somali and Southern Nations and Nationalities and Peoples' Regional States. It has 18 districts out of which 9 are located in highland agro-ecology, whereas the remaining 9 are located in mid and lowland, respectively. The area receives an average annual rainfall of 400-2500mm; and minimum and maximum temperature of 3.5^0c and 35^0c and altitude range from 300 to 4377masl. Based on the figure from BZADO [19] report, Bale

zone has an estimated total population of 1,741,197 out of which 881,559 are male and 859,638 are female.

Goro and Ginir are the Districts in the Bale zone of Oromia Region of Ethiopia. Goro is bordered on the Southwest by Guradamole, on the west by Berbere, on the Northwest by Sinanana Dinsho, on the Northeast by Ginir, and on the Southeast by the Somali Region; it is separated from Guradamole and Berbere by the Gestro River (or Weyib River). Ginir is bordered on the south by the Gestro River (or Weyib River) which separates it from Goro, on the west by Sinanana Dinsho, on the Northwest by Gaserana Gololcha, on the Northeast by Seweyna, and on the East by Raytu.

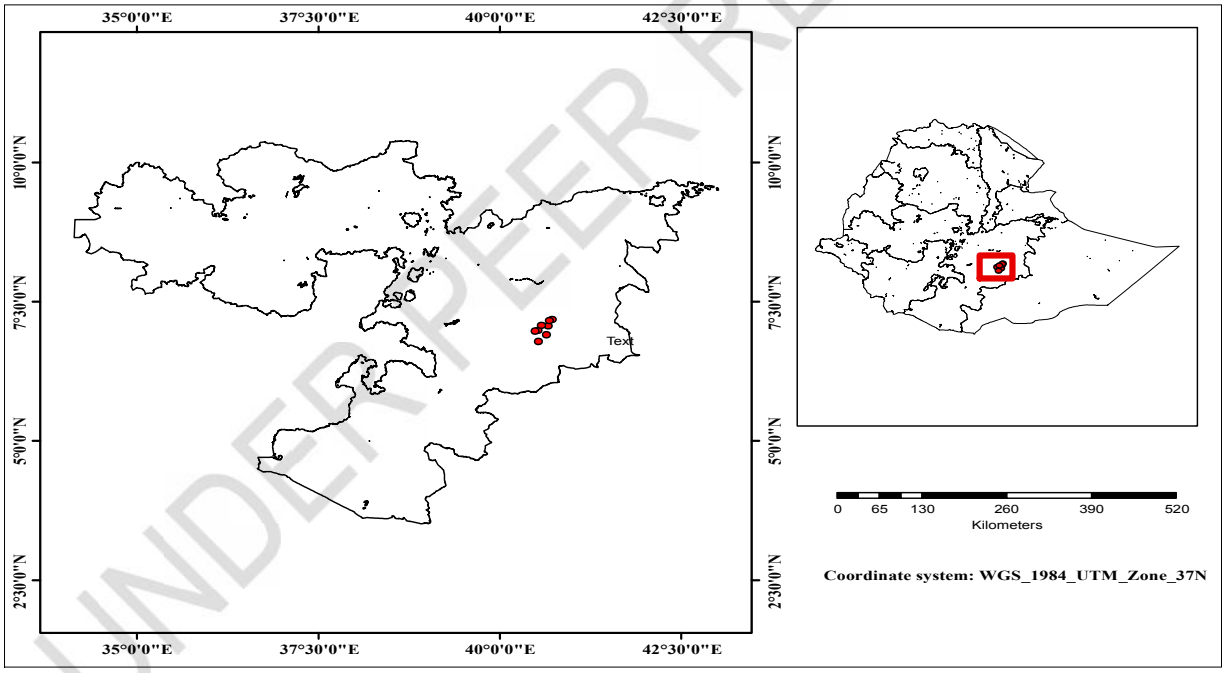

Figure1. *Map of the study area.*

2.2. Sampling Techniques and Sample Size

In this study, a multistage sampling technique was used. In the first stage, from Oromia regional state, Bale Zone was selected purposely based on the production potential of the Black cumin crop. In the second stage, from Bale Zone, two Districts (Ginir and Goro

districts) were selected based on production potential of Black cumin. In the third stage, eight (8) rural Kebeles were selected randomly from the existing Kebeles of the Ginir and Goro districts. Fourthly, farm households were selected by using the probability to proportional to size using simple random sampling technique from selected kebles of the two districts. Finally, a total of 180 households were randomly selected for the analysis this study.

2.3. Types and Method of Data Collection

Both primary and secondary data were used for this study. The primary data was collected from sample respondents through face to face interview by structured questionnaire, focus group discussion and field observation. The questionnaires included the socio-economic characteristics, institutional factors, biophysical factors and other related issues with the production, marketing and utilization of Black cumin. Secondary data was collected from agricultural office, kebele administration office, books, and journals. Finally, office documents were also consulted to supplement the whole research work.

2.4 Data Analysis

In order to analyze the data, both descriptive statistics and econometric model were employed. Econometric model was applied to examine factors affecting the farmer's perception of the importance of Black cumin production in the study area. In order to provide a detailed analysis of the perception on the importance of producing Black cumin, perceived it as important or not, we applied a discrete choice Probit model for binary choice (yes, no) responses to the importance Black cumin production perception question. Probit model is a statistical probability model with two categories in the dependent variable [20]. Probit analysis is based on the cumulative normal probability distribution. The binary dependent variable y takes on the values of zero and one [21]. The Probit analysis provides statistically significant findings of which demographics increase or decrease the probability of consumption.

In the binary Probit model, perceived it as important to produce was taken as 1, while not perceived it as important as 0. It is assumed that the i^{th} household obtains maximum utility; it has perceived it as important to produce rather than not to produce the crop. The probability p_i of choosing any alternative over not choosing, where φ represents the cumulative distribution of a standard normal random variable [22]:

$$\mathrm{Pi} = \mathrm{prob}[\mathrm{Yi} = 1|\mathrm{X}] = \int_{-\infty}^{\mathrm{Xi}'\beta} (2\pi^{-1/2} \exp\left(-\frac{t^2}{2}\right) \mathrm{dt} \quad (1)$$

$$= \Phi(\mathrm{Xi}'\beta) \quad (2)$$

The relationship between a specific variable (x_i) and the outcome of the probability is interpreted by means of the marginal effect, which accounts for the partial change in the probability. The marginal effect associated with continuous explanatory variables X_k on the probability P (Y_i = 1 | X), holding the other variables constant, can be derived as follows [22]:

$$\frac{\partial P_i}{\partial X_{ik}} = \emptyset(\mathrm{Xi}'\beta)\beta_k \quad (3)$$

The marginal effect on dummy variables should be estimated differently from continuous variables. Discrete changes in the predicted probabilities constitute an alternative to the marginal effect when evaluating the influence of a dummy variable. Such an effect can be derived from the following [22]:

$$\Delta = \Phi(\bar{X}\beta, d = 0) - \Phi(\bar{X}\beta, d = 0) \quad (4)$$

The marginal effects provide insights into how the explanatory variables shift the probability of frequency of Black cumin production. Using the econometric software Stata 13, marginal effects were calculated for each variable while holding other variables constant at their sample mean values.

3. RESULT AND DISCUSSION

3.1. Socio-Economic Characteristics of study farmers

In Table 1, the survey result indicated that the mean age of the respondents was 39.68 year with its minimum 20 and followed by maximum of 78 years. This shows that the majority of

the respondents were found in economical active age category and which, inturn, helps to accelerate the production of Black cumin in the study area. An average education level of household head in year of schooling was 4.92. The minimum level of education of respondents was zero grade and the maximum was 10+3 (diploma). This implies that studied households comprise both educated and non-educated categories. The survey also indicted that the maximum family size was 20, the minimum was 3 and an average family size was 7.53 in number. The result implies that for the production of Black cumin in the study area, the labor availability is not a problem, since in countries like Ethiopia agricultural activities needs more labor. The average land holding of the sample respondents was 2.37 hectares. This is greater than the average land holding (1.37 hectare) level of the Ethiopian farmers [23] and this, in turns, has its own good implication on increasing the production of Black cumin crop. Furthermore, the mean livestock in Tropical livestock Unit of respondents in the study area was 4.96. This was varied from zero (minimum) to 14.83 Tropical Livestock Unit TLU.

Table 1. Socio-economic and demographic characteristics of the Sample households

Variables	OBS	Mean	Std. Dev.	Min	Max
Age	180	39.68	11.74	20	78
Education	180	4.92	3.06	0	13
Family size	180	7.53	3.06	3	20
Land	180	2.37	1.13	0.66	8
TLU	180	4.96	2.87	0	14.83

Sources: Own survey, 2018

3.2. Land characteristics of Black cumin producers

Land related characteristics are important features for the farmers as a whole. These characteristics of land include soil fertility status and productivity of land; that are important factors influencing agricultural production in general and Black cumin production in particular. The majority (82.22%) of the respondents responded that their land soil fertility

status was medium, followed by very fertile status. Only few respondents (6.11%) said that their land categorized as low fertile. Therefore, this result implies that, in study area, there is a good opportunity to increase the Black cumin crop production activities. Also, most (75 %) of the respondents revealed that the productivity of land was declining through time and about 11.11% said that their land productivity was increasing through time. Moreover, 8.33% of respondents were responded that their land productivity might increase or decrease depending on their farm work activity, rainfall availability and input usage. Only few (5.56 %) respondents said that there was no change in productivity of land over the time (Table 2).

Table 2. Land characteristics of the sample producers of the Black cumin

Variable		Frequency	Percentage
Soil fertility status	Low fertile	11	6.11
	Medium	148	82.22
	Very fertile	21	11.67
	Total	180	100
Productivity of land	Declining	135	75.00
	No change	10	5.56
	Increasing	20	11.11
	Increase or decrease	15	8.33
	Total	180	100

Source: Own survey, 2018

3.3. Access to Extension, Credit and Market services for producers of Black cumin

Access to development agents for training/advice is important institutional factor which has a vital implication on agricultural activities. High proportions (55 %) of farmers were not visited by development agents for advice and training on Black cumin production activities (Table, 3).This implies that for the studied farmers during the study period, little emphases was given for extension service provided by development agents on Black cumin production

and utilization opportunity. With regard to credit access, the majority (93.33%) of the sample respondents reported that they were not received credit. Only very few (6.67%) respondents received credit to purchase livestock and farm input (fertilizer and improved seed). Additionally, factors like access to market and distance from the market are crucial for farmers to sell and buy agricultural products and inputs. The result revealed that most of (87.78 %) respondents had access to market. The majority (50.56%) of sampled respondents revealed that the average distance from the market to their home was 10 to 30 minutes and which followed (33.89) by 31 to 60 minutes. Most (71.11%) of the respondents also perceived that the distance of market from their residence was near and about 27.78% perceived the distance as far (Table 3).

Table 3. Access to different institutional services for the sample farmers

Variable		**Frequency**	**Percentage**
Contact by Extension agents	Yes	81	45.00
	No	99	55.00
	Total	180	100
Access to Credit	Yes	12	6.67
	No	168	93.33
	Total	180	100
Market access	Yes	158	87.78
	No	22	12.22
	Total	180	100
Average distance of market from residence	<10 min	16	8.89
	10-30 min	91	50.56
	31-60 min	57	31.67
	>60 min	16	8.89
	Total	180	100
Perceive the distance of market from your residence	Near	128	71.11
	Far	50	27.78
	Very far	2	1.11
	Total	180	100

Source: Own survey, 2018

3.4. Black cumin producer's farm input usage and its source

Farm input like fertilizer and improved seed help farmers to increase the production and productivity of the farm. The result in (Table 4) revealed that the majority (73.33% and 68.33%) of the respondents were using fertilizer and improved seed for their farm production activities, respectively. The respondents replied that they got fertilizer from farmers union in the form of direct purchase, and the improved seed from the agricultural office and neighboring farmers in the form of direct purchase. However, 26.67 % and 31.67% of the framers were not using fertilizer and improved for their farm activities, respectively. For this case, some of the farmers responded that their land doesn't require fertilizer. Hence, this implied that there should be much emphasis on awareness creation for fertilizer and improved seed usage to increase production and productivity of the farm.

Table 4. Respondents' farm input use and the source

Variable		Frequency	Percentage
Fertilizer use	Yes	132	73.33
	No	48	26.67
	Total	180	100.00
Improved seed	Yes	123	68.33
	No	57	31.67
	Total	180	100.00

Source: Own survey, 208

3.5. Sample Households income from Black cumin and others sources

In the study area, sample respondents engaged in different activities to generate their income. These activities include farm crop production, livestock rearing and livestock products sale, engagement in non-farm and off-farm activities. The major crop includes wheat, *teff,* Black cumin, barley, garlic; and livestock includes cow, oxen, sheep and donkey. The major non-farm income sources are remittance, petty trade, and hand craft. Similarly, the off-farm activity includes daily labor work, renting assets and firewood sale. Accordingly, Table 5 presents the mean annual income of 2018 from these activities in ETB. The result

243 indicated that the mean annual income from crop was 59,348.19 ETB, livestock and its
244 product sale was 1,779.22 ETB. Hence, the total agriculture mean was 59,802.97 ETB.
245 Moreover, the mean annual income of the same year from non-farm and off-farm activities
246 earned was 1,442.22 ETB and 747.78 ETB, respectively (Table 5).
247
248 The Table also revealed that the mean income from Black cumin production and sale was
249 ***23,666.67*** or **39.88%** of the total mean income of all crop production activities. It implies that
250 this crop alone contributes high proportion of all crop income and the producers fetch higher
251 income. Therefore, it is a good opportunity for marginal farmers to cultivate and earn more
252 income from this crop. Thus, this confirms that in both of the study Districts there is potential
253 for Black cumin production. Hence, this paves the way for the inclusion of this crop in
254 agricultural policy to exploit more benefit, sustainable use and production enhancement
255 strategies. Besides, the result indicates that the higher mean annual income earned from
256 crop and followed by livestock and its products sales. The size of mean income from non-
257 farm activities was found next to livestock and its products. Thus, these imply that, in the
258 study area, the major livelihood and/or income source for households was crop production
259 activities.

260 **Table 5. Sources and mean annual income for sample households at 2018 in ETB**

Variables	Obs	Mean	Std. Dev.	Min	Max
Total Crop income	180	59,348.19	40,063.71	6,650.00	202,800.00
Income from Black cumin	*180*	*23,666.67 (39.88 %)**	*25,316.20*	*0*	*198,000.00*
Livestock and its products	180	1,779.22	3,911.06	0	16,000.00
Total agriculture income	180	59,802.97	39,961.41	6,500.00	213,000.00
Off-farm income	180	747.78	4,714.16	0	60,000.00
Non-farm income	180	1,442.22	6,602.52	0	60,000.00

261 *Source: Own survey, 2018*
262 ** Income share of Black cumin from the total income of crops produced by the respondents*
263

3.6. Households Perception of Black cumin importance and Usage

Sustainable production and conservation of resources are possible if the users have knowledge on the importance of the resource and give the value for the resources. In line with this, the study households were asked to express their perception for Black cumin importance, utilization purpose of the crop, productivity and market demand of Black cumin through time. The result indicated that the majority (95.56%) of the households perceived that production of Black cumin is important in the study area. The major reasons that households said producing the crop is important were that the crop is a source of better income, better in market price than other crops in kg, and most of their livelihood is based on Black cumin. Also, during the focus group discussion participants expressed that the seed is used as medicinal crop for common cold, headache, diarrhea, asthmatic problem; and spice. Moreover, they added that relatively Black cumin crop adapted with the local environment, give better yield with low rainfall and better market price than other crops in terms of kg. The result also showed that about 83.89% (high proportion) of the sampled households were allocated their farm land for production of Black cumin during the study cropping year (2018).

Table 6, result also revealed that the majority (80.00%) of the study respondents replied that the production of Black cumin through time in the study area was deceasing. The major reasons for production decline were rainfall scarcity, disease, pests and absence of improved variety. But, some (14.44%) respondents responded that the production of Black may increase or decrease depending on the availability of rainfall and level of farm work. This means that if there is a good rainfall and better farm work during the production season the yield will be higher and vice-versa. Additionally, the result showed that the majority (90%) of respondents revealed that market demand for Black cumin through time in study area was declining. The respondents justified that the major problem for this case were unethical connection of local traders with brokers and central market, poor infrastructures and

declining of production amount (this leads to declining the traders coming to collect and load at farm gate/site).

Table 6. Respondents' perception about Black cumin importance and rated concepts

Variable		Frequency	Percentage
Perceive that Black cumin production is important	Yes	172	95.56
	No	8	4.44
	Total	180	100
Farmland allocate to Black cumin production	Yes	151	83.89
	No	29	16.11
	Total	180	100
Black cumin productivity through time in the study area	Increasing	12	6.67
	Decreasing	144	80.00
	Increase or decrease	26	14.44
	Total	180	100
Market demand for Black cumin increasing though time in study area	Yes	18	10.00
	No	162	90.00
	Total	180	100

Source: Own survey, 2018

3.7. Economic Model result on Factor affecting the producer's perception

Table 7 presents the econometric model result of factor affecting the perception of producers on the importance of producing Black cumin in the study area. The maximum likelihood estimates of the Probit model showed that, out of 13 explanatory variables six variables were found to be statistically and significantly affected the perception of producers of the importance of producing Black cumin. The chi-square results revealed that likelihood ratio statistics were highly significant ($P<0.001$), suggesting the model has a strong explanatory power. Accordingly, the interpretation and discussion of the variables were provided as follows:

Age of Respondents: The marginal effect (dy/dx) revealed that the age and perception of producers of the importance of producing Black cumin has positive and statistically significant relationship at ($P < 0.01$). As age of farmers increase by one year, the probability of perception of the importance of producing Black cumin will rise by 1.68 %. This is plausible since adult producers might have more know-how and experience of both producing and importance of farm crops than the young producers. Study in Ethiopia has indeed shown a positive relationship between number of years of experience in agriculture and farmers' perception for expansion of crops [24].

Education: As per our expectation, the famer's level of education and perception of the importance of producing Black cumin crop has positive and significant correlation statistically at (P=.05). The increase in educational attainment of the producers by one grade increases the probability of perception of the importance of producing Black cumin crop by 2.28 %. The logical analysis behand this is that the more producers have an educational opportunity the more they have knowledge of agricultural production system than the counterpart. Similarly, previous studies of [25, 26, 27] have also found that, farmers with better education have more exposure to new ideas and information, and thus have better knowledge to effectively analyze and use available information, and indeed it helps to decided or perceive the important crop variety production.

Labour availability: The result revealed that as the availability of labor for farm activity increases by one unit (number), the probability of perception of the importance of producing Black cumin crop rise by 11.50%. In this study, labor contributes positively and significantly for perception of the importance of producing Black cumin crop at (P=.1). The rational justification for this case might be households with high number of family member within working age group might not face the problem of labor availability to be engaged in agricultural activities than small size family member, given that the agricultural crop

production is more labor demanding. Similarly, [28] has found that *Nigella sativa* requires extensive labor in collection and harvest as the capsules (fruit) tend to shatter at maturity because its post-harvest management of the fruits usually involves their harvest, one by one, by hand and dry storage till natural dehiscence.

Aces to credit: The survey finding indicated that access to credit for the producers and perception of importance of producing Black cumin in the study area has positive and significant relationship at (P=.01) statistical level. Marginal analysis revealed that having access to credit for the farmers increases the probability of the perceiving the importance of producing Black cumin by 19.43%. This is true that for having credit facilities help the farmers to buy farm inputs and run their farm activities smoothly. Previous findings also confirmed that credit access facilitates the purchase of inputs, especially improved seed varieties and inorganic fertilizers if linked to well-developed input supply and market access infrastructures [29, 30, 31].

Income from Black cumin: As it was hypothesized the income received from Black cumin production and perception of its continual production importance has positive and statistically significant relation at (P<0.01) level. As the income gained from producing Black cumin rises by one Birr (ETB) the probability of perceiving the value of crop production will rise by 0.06%. The possible reason here is that the rational producers give more value to crop which has more return from its farm activity. Study conducted by the same authors [18] confirmed that the average income from the total farm activity and participation for Black cumin conservation has positive and significant correlation.

Productivity trend of the crop: Similar to the expected hypothesis, productivity has positive and statistically significant association with producers perception of the importance of producing Black cumin at (P=.01) level. Marginal effect showed that as amount of output

from a given level of input used [productivity] increases through time, the probability of perceiving the importance of producing Black cumin by farmers will increase by 2.89%. The Possible implication is that if the farmers get more return from the farm activity, it encourages them to invest more on that activity and build positive perception for production the crop.

Table 7: Probit model result of factor affecting the perception producers on the importance of producing Black cumin

Variables	Coefficients	SD	Z-value	Marginal effect (dy/dx)
Age	.0966	.0202	4.78***	.0168
Education	.1308	.0559	2.34**	.0228
Total family size	.0116	.04957	0.23	.0020
Land holding	.0492	.16130	0.31	.0085
Labour availability	.6600	.35984	1.83*	.1150
Extension services	-.2242	.14924	-1.50	-.0391
Aces to credit	1.1145	.6352	1.75*	.1943
Market distance	.2747	.1987	1.38	.0479
TLU	-.0637	.0598	-1.06	-.0111
Black cumin income	.0054	.00001	3.33***	.00062
Productivity trend	.1663	.07107	2.34**	.0289
Market demand	-.0979	.16292	-0.60	.0170
Land productivity	-.06769	.055019	-1.23	-.0118
Constant	-7.6762	1.9282	-3.98***	
Number of obs = 180	Log likelihood = -58.5191			
LR chi2(13) = 93.73	Pseudo R2 = 0.4447			
Prob > chi2 =0.0000				

Source: Own computation, 2018
****, ** and * means statistically significant at 1%, 5% and 10% level*

4. CONCLUSION

The survey result indicated that the mean age of the respondents was 39.68 year, education level in year of schooling was 4.92 and the family size was 7.53 in number. The average land holding of the sample respondents was 2.37 hectare and the livestock in TLU was 4.96. Furthermore, from the total mean of agriculture income (59,802.97 ETB), Black cumin production contributes about 39.88% for the study respondents. The majority (95.56%) of the households perceived that production of Black cumin crop is important in the study area. The major importance and utilization of producing Black cumin crop for study households were as source of better income, better market price than other crops in kg, and their major livelihood source; and used as medicinal crop for common cold, headache, diarrhea, asthmatic problem; and spice.

The Probit model showed that producers perception of the importance of black cumin production were found to be statistically and significantly affected by age of households, education level, availability of labor for farm activities, access to credit facilities, average income from Black cumin, and Black cumin productivity trend through time. Hence, agricultural policy should give emphases at all operational level to exploit more benefit from this crop and production enhancement strategies, so as to bring foreseen change in the lives of producers.

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COMPETING INTERESTS

"Authors have declared that no competing interests exist."

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