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Research Article

Promotion of improved sesame technologies in selected agricultural growth program-II districts of harari region

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Abstract

Small holder farmers face the problem of dietary diversity and income generation in their living system. To alleviate this problem this research activity was conducted at Harari Region with objectives of demonstrate improved sesame varieties on farmers land develop the knowledge and skill of farmers and other stakeholders have on sesame food utilization and strengthen the institutional and other stakeholders linkages on agricultural research outputs. Two improved sesame variety Obsa and Dicho were evaluated and demonstrated on 10 farmers' fields on a plot sized 100 m^2 along with the local check. In Kile kebele, two Farmers Research Groups comprising of 15 farmers were established to evaluate and select the better yielding variety. The yield performance of the improved varieties (Dicho, Obsa and local) were 3.85 qt/ha, 3.65 qt/ha and 2.73 qt/ha at Sofi district respectively. The yield obtained has statistically significant difference at 1% probability level between improved and local variety. Obsa and Dicho varieties were preferred by farmers for its high yielding, disease tolerant, seed colors and test. The result indicated that Dicho and Obsa varies have yield advantage (3.85 qt/ha) and (3.65qt/ha) when compared with local check. Therefore; both Obsa and Dicho varieties were recommended for further scale up/out in Harari Region to widen the horizon of the technology in the area and to reach more number of farmers.

Introduction

Sesame (*Sesame indicum L.*) is an important crop and export commodity in Ethiopia, the production of both by small and large scale farmers; and. The total area, production and productivity during 2013 were 0.299 million ha, 0.220 million tonnes and 0.735 t ha-1, respectively; and the total area and production were increased by 61.23 % and 17.91 %, respectively, while the total productivity was decreased by 27.23 % when compared with in 2008 [1,2]. Sesame ranks first in total area and production from oil crops during 2013; and Tigray, Oromia, Amhara and Benshangul Gumuz regions are the major producers in Ethiopia. Due to its importance as a major export commodity the area coverage and production has increased in the last consecutive years in Ethiopia. There is an enormous potential to expand sesame seed production in Ethiopia through cultivation of additional new land. The government is enhancing the investment in the oilseeds sector with an extended package of incentives. Through transfer of technology and the provision of inputs, the increment of production and yield will be achieved strongly [3].

Availability of Virgin fertile new areas which can be cultivated on large scale, cheap and abundant labor is the key indicators of the future potential [4]. Sesame seeds are not only used for culinary purposes due to their nutritive, preventive and curative properties but also used in traditional medicines. Sesame oil seeds are sources for some phyto-nutrients such as flavonoid, phenolic anti-oxidants, omega-6 fatty acids, vitamins and dietary fiber with presented anti-cancer as well as health promoting properties [5]. Sesame is grown in hot and humid climate with temperature around 27 °c and annual precipitation of 625-1100 mm. The crop is intolerant to water logging or poor drainage and excessive rain fall.

Ethiopia has altitudes from below sea level up to 4500 meter above sea level with different climate zones which enables to

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grow a wide variety of oilseeds crops. Sesame is grown from sea level to altitudes of 1500 meters with uniformly distributed rainfall of about500-800 mm and temperature of 25- 30 Celsius [6]. In the study area lack of improved and high yielding varieties for different agro-ecologies with desirable agronomic qualities viz. non-shattering, diseases/pests resistance poor seed supply system lack of adequate knowledge of farming and post-harvest crop management affected production and productivity of sesame. Therefore, introducing improved sesame varieties (Obsa and Dicho) was indispensable by undertaking with the following objectives.

Objectives

- To demonstrate improved sesame technology on farmers land towards its profitability and productivity
- To develop the knowledge and skill farmers and other stakeholders have on sesame food utilization
- To strengthen the institutional and other stakeholders linkages on agricultural research outputs.

Materials and methods

This pre-extension demonstration of Obsa and Dicho varieties were conducted in selected districts of Harari Region.

Site and farmers selection

The Kebele as research site was selected purposively based on the potentiality, appropriateness of the area by considering lodging, slop's land escape, access to road, suit for repeatable monitoring and evaluation in progress of sowing to harvesting, accordingly, Kile kebele was selected. And also, farmers were selected based on their interest, innovation he/she has, land provision for this demonstration, interest in cost-sharing, willingness to share experiences for other farmers, and studying their profile Table 1.

Research design

Two improved (Obsa and Dicho) sesame varieties and one local check sown and replicated across ten trial farmers on10m*10m ha plot size of land from individual trial farmer for each experiment/ varieties were used. The recommended seed rate 5kg/ha, spacing 40cm between row and 5cm between plants and 50kg urea was applied.

Technology evaluation and demonstration methods/ technique

The evaluation and demonstration of the trials were implemented on farmers' fields to create awareness about the sesame varieties. The evaluation and demonstration of the trials followed process demonstration approach by involving Farmers Research Groups, development agents and experts at different growth stage of the crop. The activity was jointly monitored by Farmers Research Groups, researchers, experts and development agents.

Data collection

Qualitative data were collected through personal field observation, individual interview, Focus Group Discussion by using checklist and quantitative were collected through data sheet tools.

Data analysis

Quantitative data was summarized using simple descriptive statistics (Mean, Frequency and Percentage), iindependent samples t-test to compare the mean of one sample with the mean of another samples to see if there is a statistically significant difference between the two, while the qualitative data were analyzed using narrative.

Results and discussion

Agronomic and yield performance

The following table describes the yield performances of the demonstrated varieties across the study site. The yield performance of the improved varieties (Dicho, Obsa and local) were 3.85 qt/ha 3.65 qt/ha and 2.73 qt/ha at Kile kebele respectively. The yield obtained has statistically significant difference at 1% probability level between improved and local variety Tables 2,3.

Table 1: Summary of selected site and farmers with area coverage of the experiment.

District	Kebele	No. of trial farmers	Area covered
Sofi	Kile	10	10mx10m for each plots
Total		10	

Table 2: Yield performance of improved sesame varieties at farmers' land level.

PA	Varieties	Mean(Qt/ha)	Std. Deviation	Maximum	Minimum
Sofi	Dicho	3.85	.275	4.30	3.50
	Obsa	3.65	.201	3.90	3.30
	local	2.73	.469	3.60	2.30

Table 3: Independent t-test.

	Test for equal variances		t-test for equality of means				
	F	Sig.	T	df	Sig. (2-tailed)	Mean difference	Std. Error Differences
Equal variances assumed	4.71	.044	5.69	18	.000	.920	.161

Yield advantage

The result indicated that Dicho and Obsa varies have better yield (3.85 qt/ha) and (3.65qt/ha) when compared with local check Table 4.

Yield advantage of the demonstrated varieties was calculated using the following formula.

$$\text{Yield advantage } \% = \frac{\text{Yield advantage of new variety} - \text{Yield advantage of standard check}}{\text{Yield advantage of standard check}} \text{X } 100$$

Farmers' perception/opinion

The opinion of farmers on varietal preference was collected

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from participants during variety demonstration. Farmers in the study area selected the best performing improved sesame varieties by using their own criteria. Farmers set these criteria after having know-how about the variety. The selections of the varieties were done at the harvest time. The criteria were ranked using pair wise ranking to understand which criteria were the major one .Thus, the major criteria used by farmers were high yielding, disease tolerant, tolerant to insect, seed color and test. Based on the above criteria's; farmers evaluated the varieties and ranked Dicho is first and Obsa is second followed by local.

Discussion

The highest average yield of the sesame varieties were recorded 3.85q/ha Dicho and 3.65/ha Obsa as compare to 2.73 q/ha local varieties across the sites. This indicates that this variety is very adaptable and suit with the existing environmental conditions in these sites. And there was yield difference of the varieties across the research sites due to rainfall, soil type and other climatic conditions. In addition there was yield advantage of Dico and Obsa varieties over local check that is 41.1% and 33.7% respectively as depicted in Table 4 since there was yield of 1.12 q/ha and 0.92q/ha respectively and statistically significance different at $p<0.01$, and economically feasible that obtained profit from Dicho variety 9,875 birr Obsa 9,115 birr and local variety 2,671 birr as depicted on Table 5.

Moreover, farmers evaluated these three varieties (Dicho, Obsa and local) at different stages based at farm level based on their own criteria: to high yield, diseases tolerant, tolerant to insect, white in color, good test, accordingly, ranked Dicho variety on first rank as compare to local as shown on Table 6, and even evaluated these criteria by pair-wise ranking, as result, ranked yield first with the rest as on Table 7. Based on these above result and discussion the following conclusion recommendations were derived.

Conclusion and recommendation

The yield performances of the demonstrated Sesame varieties across the study sites were 3.85q/ha for Dicho and 6.29 ton/ha for local variety with 3.03ton/ha yield difference in which Dicho and Obsa has more yield advantage 41.1% and 33.7% over local variety respectively. As a result, farmers selected Dicho variety on first rank due to high yield, diseases tolerant, tolerant to insect, white in color, good test because in these areas there is an opportunity of underground water availability, suitable soil, and other suit climate conditions that help them to produce this Dicho variety in these and similar agro-ecology.

Table 4: Summary of yield performance in study area.

Varieties	Average yield qt/ha	Yield difference qt/ha	Yield advantage over the local check (%)
Dicho	3.85	1.12	41.1
Obsa	3.65	0.92	33.7
Local	2.73		

Source: Own computation 2018/19.

Table 5: Financial analysis for sesame varieties at farm level.

Financial Analysis

Location : Sofi

Parameters	Varieties		
	Dicho	Obsa	Local
Yield qt/ha(Y)	3.85	3.65	2.73
Price(P) per quintal	3800	3800	2700
Total Revenue (TR)=TR=Y*P	14,630	13,870	7,371
Variable costs			
Seed cost	190	190	135
Fertilizer cost	565	565	565
Labor cost	2000	2000	2000
Total Variable costs(TVC)	2,755	2,755	2,700
Fixed costs			
Cost of land	2000	2000	2000
Total fixed costs (TFC)	2000	2000	2000
Total cost (TC) =TVC+TFC	4,755	4,755	4700
Gross Margin (GM) = TR - TVC	11,875	11,115	4,671
Profit=GM-TFC	9,875	9,115	2,671

Table 6: Direct Matrix Ranking of the varieties based on farmers' selection criteria.

Varieties	Rank	Reasons
Dicho	1st	High yield, diseases tolerant, tolerant to insect ,white in color, Good test
Obsa	2nd	High yield, diseases tolerant, tolerant to insect, white in color, good test
Local check	3rd	Medium yield, low diseases tolerant, tolerant to insect , red in color, bitter test

Table 7: Pair-wise ranking matrix result to rank variety traits.

Code no.	Traits	Yield	Diseases tolerance	Insect tolerant	Color	Test		Rank
1	Yield		1	1	1	1	4	1st
2	Diseases tolerance			2	4	5	1	4th
3	Insect tolerant				4	5	0	5th
4	Color					4	3	2nd
5	Test						2	3rd

Therefore, from this research finding it is recommended to promote further Dicho variety in similar agro-ecology is very important by government, Nongovernment and other stakeholders through their program to small holder farmers for enhancement of food security and income generation for small holder farmers.

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