



Research Article

Promotion of improved onion technology through FRG System in Fadis and Babile districts of East Haraghe Zone

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Abstract

Pre extension demonstration of onion varieties was conducted at Fadis and Babile districts of East Haraghe zone one kebele from one FRG established and 10 trial farmers. Both varieties were sown on 10*10 plot size of demonstration plots with full package technology. The training was given for farmers on onion agronomic practices to make full package technology. The bulb yield of the improved onion varieties (Red Bombay and local) were 22.86, 18.74ton/ha at Erer and 22.00, 17.92 ton/ha Ballina Arba Kebele respectively. The result showed that there was a significant difference between both varieties at <1% level. Red Bombay has a 22.37% yield advantage over local check.

Introduction

Onion (*Allium cepa L*) is an important vegetable crop, which has been produced worldwide including of Ethiopia for its daily uses and economic benefits [1]. The onion is recognized as one of the most important vegetable crops cultivated throughout the world since its introduction to the world [2]. It has grown mainly as a food source and used as cousins and value addition for different dishes. The chemical flavonoids, anthocyanins, fructo-oligosaccharides and organosulphur compounds found in the onion is considered as medicinal and health benefits to fight different diseases including cancer, heart and diabetic diseases [2]. The average annual onion production in Ethiopia is about 230,745.2 tons with a productivity of about 9.5 t ha⁻¹, which is very low compared to the potentials the country has (CSA) [3].

Despite its lower productivity, which brings below the world average, onion is becoming the source of livelihood for many peoples who have engaged in production and trading. The main reason for this lower productivity of the crop is most probably due to lack of improved onion, inappropriate agronomic practices and little-given attention to crop production [1].

However, the area under cultivation is increasing from time to time both under rain feed and irrigation conditions due to its economic profitability. Also, an inevitable yield and yield component improvement activities including plant nutrient management, crop water requirements and scheduling programs, plant population densities, and disease and insect pest control systems were identified [1].

The result of the Adaptation trial done by Fadis Agricultural Research Center showed that Melkam gave maximum bulb yield 294.64 qt/ha which means double of the standard check (132.58qt/ha) followed by Bombay Red 224.55qt/ha and Nasik Red 206.69qt/ha, respectively. Thus, Melkam showed good field performance and attractive bulb size and bulb color. However, Nasik has good quality. The objective of this study is to promote Red Bombay and local Onion technology with full package in Babile and fadis. This project aimed at alleviating the problems of low quality Onion obtained from informal seed sectors and ensures the benefits to be obtained from improved Onion varieties [4-7].

Specific objectives

- ✓ To promote full packaged improved onion technology.



- ✓ To increase the production of onion producer farmers in the study districts
- ✓ To improve farmers' knowledge and skill of onion producer farmers in the study districts.

Materials and methods

The description of the study of area

Fedis district has the altitude range is from 1200–1600m.a.s.l meters, with a prevalence of low lands. The area receives average annual rainfall of 400–804 mm. The mean monthly temperature of the area is 22.2°C and 32.5°C, respectively. The farm units are small family holdings with an average agricultural land area of less than one hectare. Agriculture is mainly rain-fed.

Babile is located on distance of 31 kms from Harar in the direction of county's Eastern part. It is bordered by Gursum in Northern, Fedis in south, sumale region in eastern, Harari region and Fedis in western and Jarso in Northwest district. Erer ibada and Ibada Gemechu are located on distance of 33 km from Harari region and Erer Ibada located at 09° 10' 41.5' north of latitude, 042° 15' 27.3' east of longitude and elevation 1274m a.s.l. The climatic condition of this area is almost dry land. It has bimodal nature of rainfall. The socio-economic character of the population in the study area depends on subsistence agriculture.

Site and farmers selection

The activity was conducted in the selected district of East Hararghe Zone for the consecutive two years of the cropping season. Fadis and Babile district were selected based on the potentiality of onion Production and accessibility for close monitoring. Erere Ibada from Babile and Ballina Arba from Fadis district were selected purposively in collaboration with experts and development agents of the Office of Agriculture and Natural resource.

From each kebeles, one FRG (Farmer Research Group) member considering gender and youth consisting of 15 farmers were established and Farmers Research Group (FRG) with the member of 15 (3 male trial farmers and 2 female trial farmers) and 10 farmers work with trial farmers. Member of FRG farmers were selected based on; their interest on technology, willingness to cost sharing like land provision, labor work and willingness innovative experience sharing for the members as well as non-members of target farmers.

Experimental design

One improved treatments Onion (Red Bombay and local) variety, replication-replicate across five trial farmers per PAs. One improved and one local variety were sown on 10 farmers. 10m*10m plot size used. Spacing 20cm between rows and 10cm between plants (10cm* 10cm) gives a higher yield. Fertilizer application rate 100 kg NPS and 150 kg Urea in split 30–45 days after planting is recommended and seed rate 4kg/ha.

Data collection

Both quantitative and qualitative data were collected

through personal field observation, individual interview by using checklist and datasheet. Quantitative data such as number of farmers who participated, yield performance, number of stakeholders who participated in training and field days were collected. Qualitative data such as farmers' feedback and perception toward the new technology were also collected.

Data analysis

Quantitative data was summarized using simple descriptive statistics (Mean, Frequency and Percentage), independent samples t-test. While the qualitative data collected using group discussion and key informant interviews, field observation and oral histories was analyzed using narrative explanation tools and argument. Finally, data from different sources was triangulated to get reliable information.

Results and discussion

The promoted onion varieties bulb yield across the study site

The bulb yield of the improved Red Bombay and local were variety 22.86, 18.74, 22.00 and 17.92 ton/ha at Ballina Arba and Erer Kebele respectively Table 1.

Independent t-test

Tables 2,3.

Economic analysis

Table 4.

Knowledge test before and after the interventions

Score of 1 is given for correct answers and 0 for incorrect answers. As one can observe from Table 5.

Table 1: The Onion bulb yield across the districts.

PA	Varieties	No	Std. Deviation	Mean (ton/ha)	Maximum	Minimum
Erer	Red Bombay	5	.66	22.86	23.40	21.70
	Local	5	.68	18.74	19.70	17.90
Ballina Arba	Red Bombay	5	.44	22.00	22.60	21.50
	Local	5	.63	17.92	18.70	17.10
Total		10	2.22	20.38	23.40	17.10

The average bulb yield of Red Bombay is higher than local at Ballina arba and Erer

Table 2: Sample 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	.05	.81	12.53	18	.00	4.10	.32

Statistically significant difference 1% probability level

Table 3: Yield Advantage.

Varieties	Average yield ton/ha	Yield difference ton/ha	Yield advantage (%)
Red Bombay	22.43	4.1	22.37
Local	18.33		



The mean score for knowledge test before intervention and after intervention is 5.3 and 6.4 respectively. The result of paired-sample t-test indicates a significant difference between the mean score for knowledge test before intervention and after intervention at 1% significant level. This implies an improvement of farmers' knowledge regarding the improved onion technologies due to technological intervention Table 6.

Farmers' opinion/perception

The farmers' criteria were early maturity, Yield, disease tolerance, leaf color, bulb size, bulb shape, bulb skin color and seed set Table 7.

Table 4: Financial analysis for Onion varieties across the districts.

Location	Babile(Erer)		Fedis (Ballina Arba)	
	Varieties		Varieties	
	Red Bombay	Local	Red Bombay	Local
Parameters				
Yield ton/ha(Y)	22.86	187.4	22.0	179.2
Price(P) per quintal	1500	1500	1500	1500
Total Revenue (TR)=TR=Y*P	342,900	281,100	330,000	268,800
Variable costs				
Seed cost	12,800	12,800	12,800	12,800
Fertilizer cost	1,418	1,418	1,418	1,418
Labor cost	35,000	35,000	35,000	35,000
Fuel Cost	10,000	10,000	10,000	10,000
Total Variable costs(TVC)	59,218	59,218	59,218	59,218
Fixed costs				
Cost of land	8000	8000	8000	8000
Total Fixed Costs (TFC)	8000	8000	8000	8000
Total Cost (TC) =TVC+TFC	67,218	67,218	67,218	67,218
Gross Margin (GM) = TR - TVC	283,682	221,882	270,782	209,582
Profit=GM-TFC	275,682	213,882	262,782	201,582

Table 5: Percentage of Respondents for each knowledge Items.

No	Test items	Respondents' percentages			
		Before		After	
		Correct	Incorrect	Correct	Incorrect
1	The Name of improved onion variety used	37	63	55.6	44.4
2	Ploughing frequency for onion	48.1	51.9	59.3	40.7
3	The recommended spacing of improved onion	44.4	55.6	48.1	51.9
4	Transplanting date of onion	40.7	59.3	51.9	48.1
5	The recommended seeding rate of improved onion	55.6	44.4	63	37
6	The Maturity date of onion	33.3	66.7	40.7	59.3
7	The symptom of disease that affect onion	51.9	48.1	51.9	48.1
8	The disease tolerant varieties	40.7	59.3	44.4	55.6
9	The chemical application frequency of onion	29.6	70.4	33.3	66.7
10	The chemical used for onion	25.9	74.1	37	63
11	Yield per hectare of improved onion	48.1	51.9	48.1	51.9
12	Market price of onion	37	63	40.7	59.3
13	Exact Source of improved onion seed	44.6	55.4	66.7	33.3

Source: from own computed data (2021)

Table 6: Paired-sample t-test.

	Mean	St.Dev	t-value
Total score before	5.3	1.69	4.34
Total score After	6.4	2.11	

Significance difference at 1% level before and after the intervention of the technology

Source: Computed from own data (2021)

Table 7: Ranks of the varieties.

Varieties	Farmers rank	Reasons
Red Bombay	1 st	Medium maturity, High Yield, diseases tolerance, Dark green leaf color, medium bulb size, flat Glob bulb shape, light red bulb skin color and seed set
Local	2 nd	Medium maturity, Low yield, low diseases tolerance, green leaf color, low bulb size, flat Glob bulb shape, red bulb skin color and seed set

Conclusion and recommendation

Generally, the bulb yield of Red Bombay and local variety were 22.86 and 18.74ton/ha at Erer, 22 and 17.92 ton/ha at Balina arba, respectively. The average yield performance of Bombay Red and local at both location was statistically significant difference at 1% across the location. The wider promotion of Red Bombay is recommended to reach more farmers and wider area. Based on its maturity, yield, diseases tolerance, Dark green leaf color, medium bulb size, flat Glob bulb shape, light red bulb skin color bombay red varieties was recommended for further scaling up.

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