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Pre-extension Demonstration of Groundnut Technology in Babile and Fedis Districts of East Hararghe Zone

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Abstract: The study was conducted at Fedis and Babile districts which are major food insecure districts found in East Hararghe Zone that due to shortage and unevenly distribution of rainfall pattern in the area to demonstrate and create awareness on improved ground nut technology. Introducing drought tolerate crops are an option to reduce food insecurity problems. Three groundnut varieties namely Shulamiz, Bable-2 and local check were demonstrated with its full packages on 10*10m^2 on ten trial farmers field at Fadis and Babile districts for two consecutive years (2019-2020). Two FRGs having 30 farmers were established at both kebele. The average yield performances of the shulamiz, Babile-2 and local were 12.02, 12.02 and 7.6 quintals/ha at Bishan Bahe and 11.68, 10.44 and 7.6quintal/ha at Ballina Arba respectively. The net benefit that were obtained from Shulamiz, Babile-2 and local were 29,892, 24,312, 11,892 ETB at balina araba and 31, 422, 31,422, 11,532ETB at bishan babile respectively. Accordingly, the yield advantage of Shulamiz and Babile-2 variety over the local check were 55.1% and 46.98% over local check. While farmers' don't select local check because of its low yield. Finally it is better to promote Shulamiz varieties more fully on the larger scales for scale up.

Keywords: Demonstration, Shulamiz, Fadis and Babile

1. Introduction

Groundnut (*Arachis hypogaea* L.) is the sixth most important oilseed crop in the world. China, India and the United States were the three largest producers of groundnut. USD 2012. Groundnut was grown on nearly 25.45 million hactar worldwide with the total production of 45.23 million tons and an average yield of 1.777 tons/ha [7, 15]. In Ethiopia groundnut is grown and covered nearly about 40,000 hectares of arable land per annum and the major growing areas were; Eastern Hararghe, Metekel zone, and Eastern Wellega but currently this figure was doubled. Major groundnut producing areas in Ethiopia specifically are Babile, Gursum, Beles, Didessa, Gambella and Pawe. Gamu Gofa, Illubabor, Gojam, Wello and Wellega are identified as potential production areas [6, 10]. It covers 79,947.03 hectares and annual production of 112,088.724 tons with a productivity of 1.402 tons per hectare during 2013/2014 cropping season in Ethiopia [4].

Groundnut production being expanded due to its high market value and resistance to drought [9]. Its production can also be a way for women to earn income and participate in the cash economy. Groundnut is plant that has the ability to survive in areas of low rainfall because it is a legume and it increases soil fertility by fixing nitrogen in the soil [13]. It requires fewer inputs than many other crops, giving a high return per unit of land, and hence is appropriate for small-scale farmers, including women [14, 16]. Many productivity studies involve the use of production frontiers that describe the technical relationship between inputs and outputs and define the maximum output attainable from a given bundle of inputs and technology [1, 5]. Aflatoxin contamination of

agricultural crops, such as groundnut and cereals, causes annual losses of more than $750 million in Africa [3]. Aflatoxin contamination is both a pre-harvest and postharvest problem. Therefore, management of aflatoxin contamination of groundnut in Ethiopia is very important using cultural practice such as habitat management, soil amendments and pre- and post-harvest managements, using physical control methods, using biological control methods, using resistance groundnut varieties and using chemical control methods [8]. According to Smith, good warehousing practices largely prevent further increase of post-harvest aflatoxin contamination [12, 18].

Pests, diseases, lack of appropriate production technologies, inadequate markets and information, and poor post-harvest handling practices are also among the factors that influence the low production and profitability of groundnuts in East Africa [14, 16]. It contains 48-50% oil and 26-28% protein and is a rich source of dietary fiber, minerals, and vitamins. Women account for 70–80% of household food production in sub-Saharan Africa, growing crops to sell in the market, as well as preparing it for their families [2]. In many countries, groundnut cake and haulms (straw stems) are used as livestock feed [17]. Ground nuts are also a good source of dietary fibre and provide a wide range of essential nutrients, including several B group vitamins (including folate), vitamin E, minerals such as calcium, iron, zinc, potassium and magnesium, antioxidant minerals (selenium, manganese and copper), plus other phytochemicals such as antioxidant compounds (flavonoids and resveratrol) and plant sterols (Lisa Yates). It help regulate blood cholesterol, reduce cholesterol re-absorption from the gut, reducing the risk of atherosclerosis (hardening of the arteries), Antioxidant vitamins and minerals, e.g. vitamin E, copper, manganese, selenium and zinc, and other antioxidant compounds such as flavonoids and resveratrol that reduce oxidation and inflammation Naturally low sodium and high potassium levels which assist in maintaining healthy blood pressure [11]. Therefore, this activity initiated to demonstrating and evaluating the best performing improved groundnut technology to the study area.

2. Objectives

1) To demonstrate ground nut verities in the study area.
2) To popularize and create awareness on improved groundnut production technologies.
3) To collect farmers feedback on the technology.

3. Materials and Methods

3.1. Site and Farmer Selection

Farmers problem and actual performance of the technology identification, identification of farmers technology needs/demand because it not what researcher choose for farmer but it is what farmers choose for themselves, identification of applicability, compatibility, complexity of the technology with the existing weather and soil condition to enhance research extension linkage and to promote agricultural research technology in a better way.

Fadis and Babile were purposively selected based on groundnut production potential. Frome each deistrict one Kebeles were purposively selected. Ballina Arba from Fadis district and Bishan Babile from Babile were selected purposively. Farmers were selected jointly with multidisciplinary researcher, experts from office of agriculture and development agents based on their interest, innovation, farmers' potential, land provision for this pre-extension demonstration, interest in cost-sharing, willingness to share experiences, resource (land, labor, animal etc.).

Farmers Research Group (FRG) participate in the implementation of the activities land preparation, sowing, weeding, fertilizer application, harvesting, shelling and storing, FRGs with the member of 15 farmers. In the establishment of FRGs cross cutting issue like nutrition, gender and HIV considered.

Totally of two FRGs with thirty members and ten trial farmers from one kebele.

3.2. Agronomic Practice

Two improved groundnut varieties Shulamis released from Bako agricultural Research center and Babile-2 from Haramaya University) one standard check were used per farmers. adaptation trail conducted by Fedis Agricultural Research center pulse and oil research team and the two high yielder varieties recommended for demonstration The Size of demonistraton plot: 10mx10m, Seeding rate 100 kg/ha, Spacing 40cm*10cm (Between row and plant), Fertilizer rate: DAP 100kg/ha and Maturity Date 123-135.

3.3. Data Collection

Quantitative data were number of farmers participated in FRG, Agronomic and yield data. Inputs cost (fertilizer, labor, and chemicals), Net return/benefit and number of stakeholders participated on the training. While qualitative data were Farmers' perceptions towards the new technology and Farmer's preferences Ranked using Matrix ranking.

3.4. Data Analysis

The collected quantitative data were analysed using simple descriptive statistics, ANOVAto 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 were analysed narrative explanation and argument.

4. Results and Discussion

4.1. The Results of the Demonstrated Varieties

The grain yield of the improved Shulamiz, Babile-2 and local were 11.68, 10.44 and 7.68 qt/ha at Balina Arba, 12.02,

12.02 and 7.60 qt/ha at Bishan Babile, respectively. The mean grain yield of Shulamiz and Babile-2 were higher than local and statistically significant difference 1% probability level.

Table 1. *ANOVA.*

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	103.32	2	51.66	42.02	.00
Within Groups	33.19	27	1.22		
Total	136.51	29			

4.2. Yield Advantage

The result showed shulamiz and Babile-2 variety has better yield (11.85 and 11.23 qt/ha) when compared with local check 7.64qt/ha). Thus the yield of the Shulamiz and Babile-2 variety over the local were 55.1 and 46.98 % under farmer condition.

4.3. Income Gain from Each Varieties

The costs and benefit of the demonstrated improved ground nut varieties across two demonstration sites for 2019/20 production year the calculation used 4500 birr as farm gate price for a quintal of ground nut grain. Thus the profit per hectare gained from shulamiz variety were 29,892 and 31,422 ETB at Balina Arba and Bishaan Babile kebeles respectively. Whereas Babile-2 profit were at 24,312 and 31,422 ETB Balina Arba and Bishaan Babile kebeles.

4.4. Perception of Farmers

Trial farmers practically participate in land preparation, layout arrangement, sowing, weeding, fertilizer application, harvesting and storage marketing ground nut. The get the experience of spacing, seeding rate and fertilizer application rate during the activity intervention. The major criteria used by farmers used were grain yield, Disease tolerance, large seed size, high number of pod per plant, drought tolerant. Based on the above criteria's; farmers evaluated the varieties and ranked Shulamiz followed by Babile-2. Therefore, majority of farmers prefer both improved groundnut varieties to reuse on their farm for the pre-scaling up.

Figure 1. *The demonstration plot at Fedis (Ballina Araba).*

5. Conclusion and Recommendation

Adaptation trial was conducted on six location by Fedis Agricultural Research Center pulse and Oil Research Team and they recommend shulamiz and Babile -2 based on their yield across location. Farmers also perceive on the demonstration of these technologies that have an advantage over the varieties that were being used. Shulamiz and Babile-2 were identified by researchers and farmers as high yielding during technology demonstration. In general, high grain yield, disease tolerance, large seed size, high number of pod per plant, drought tolerant, uniformity. The overall grain mean yield of Shulamiz, Babile-2 and local were 11.85 qt/ha, 11.23 qt/ha and 7.64 qt/ha, respectively. Shulamiz and Babile-2 with yield advantage of 55.1% 46.98 respectively. Bearing farmer selection criteria in mind, scaling-up of the two ground nut verities up further increase its production and hence income from ground nut for the resource poor farmers in Fadis and Babile.

Hence, Shulamiz was found as the best ground nut variety followed by babile-2 variety as it produces a higher yield. The yield under demonstration was higher than the local check and the use of research recommended ground nut varieties can reduce the technology gap to a considerable extent.

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