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Research Article

On-farm Demonstration and Participatory Evaluation of Improved Desert Type Banana Varieties in Selected Districts of Silte Zone, Ethiopia

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Abstract

The per-extension demonstration was conducted for three successive years at Silte Zone. Hulbareg, Sankura and Silte were selected purposively based on potential of banana production and availability of irrigation with respective district Agricultural Office. Banana were produced on farmers' fields in the Silte Zone using both irrigation and rain feeding techniques as a means of producing revenue and supplying food. A total of six improved banana varieties namely Giant Cavendish, Dwarf, William I, poyo and Robust were demonstrated with local variety. Farmer's feedback results revealed that fruit size of Giant Cavendish variety was larger than William I and other varieties. Farmers were preferred Giant Cavendish due to its big fruits, early maturity, market preference, medium in height and sweetness than others. Giant Cavendish and William I varieties were disease resistant as compared to Robusta, poyo and local check variety. Demonstration of dessert type banana was conducted in Silte zone of Hulbareg, Silte and Sankura districts mainly intended to evaluate improved varieties of banana and then create linkage & awareness on the banana technologies. The result of the study revealed that Williams and Poyo varieties have showed advantage over others varieties in terms of their number of hands per bunch and number of fruits per bunch as compared to local check.

Keywords

Pre Extension, Demonstration, Banana, Silte Zone, Preference, Varieties, Farmers

1. Introduction

A fruit that is extensively grown in tropical and subtropical areas is the banana (Musa spp.). A warm subtropical temperature, sufficient rainfall, and wind shelter are all necessary for bananas. The majority of banana cultivars expand when exposed to intense sunshine for 12 hours and high humidity levels of 50% or more. The optimal temperature range is roughly 26-30°C (78-86°F), with a 75-85% relative humidity. The temperature starts to rise at 18°C, achieves its peak growth at 27°C, and stops completely at 38°C. Bright sunlight is ideal for banana growth, but high temperatures will burn the fruit and leaves. According to [1] banana production is the largest among fruit crops, and Ethiopia is one of the tropical country with a significant quantity of arable land suited for banana cultivation. Most bananas are grown using conventional methods, mostly for local markets and domestic consumption [4, 3]. Additionally, by providing chances for both on- and off-farm employment, as well as revenue generation and food security [5] the banana plays a vital socioeconomic

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role in the nation's rural areas [3].

Despite its importance, the national average (estimated at 8.0 t ha^{-1}) is much lower than the global average (22.6 t ha^{-1}). [1] Diseases and insect pests, inadequate post-harvest care, a lack of improved banana varieties and their agronomic practices, and a lack of extension service involvement are the main reasons for bananas' low production. Agricultural extension directorate guidelines from the Ethiopian Institute of Agricultural Research (EIAR) state that technologies be tried on a slightly medium-sized scale before being used on a large scale, following a performance demonstration. The most important thing is to find popularisation strategies that can effectively spread the technology. To achieve popularisation, it is necessary to participate a number of potential collaborators who will cooperate for the benefit of both sides. Research institutes and extension offices are typically the first to lead the mass production and marketing of those enhanced and suggested cultivars [2].

Over time, a variety of issues have been identified that have a negative impact on the production of this crop in the Central Ethiopian Region, particularly in the Silte Zone. The primary obstacle to banana yield among these is the absence of better varieties. This is due to banana varieties available at the hands of farmers in the major growing areas are low yielded, poor quality and susceptible to diseases which have been under production for many years. However, improved varieties of banana can give higher yield than the mentioned yield potential. Pr-extension demonstrations in the Central Ethiopian Region of Silte Zone over the previous three years have brought improved and suggested banana varieties with its agronomic practices and it has benefited several farmers. four improved banana varieties (williams-1, poyo, dwarf Cavendish and, Giant Cavendish) were used for demonstration in the aforementioned locations, From those demonstrated banana varieties williams-1, and Dwarf banana varieties were recommended for large scale demonstration in selected districts of Silte zone of Central Ethiopian region by their agro ecological adaptation, good yield performance, disease and drought tolerance.

Objectives:

1. To evaluate yield performance of improved dessert type banana variety under farmers condition.
2. To identify farmers preference on the Improved Banana varieties.

2. Materials and Methods

2.1. Farmers and Site Selection

pr-extension demonstration was held at Silte Zone for three years in a line. Purposefully, the districts were chosen based on their capacity to produce bananas and their access to irrigation through the local agricultural office. Twenty farmers in all were chosen for the variety demonstration based on their interest in new technologies, their ability to access irrigation, and their readiness to oversee and assign field trials for the activity in cooperation with researchers and extension workers. Williams-1, Poyo, Dwarf, and Giant Cavendish are the four improved banana kinds that were compared to the local variety.

Table 1. *Summaries of participants on pr-extension demonstration.*

Districts	Number of farmers	Number of suckers distributed	variety
Hulbareg	9	320	Poyo, Dwarf, Giant Cavendish and Williams-I
Siltie	7	250	Poyo, Dwarf, Giant Cavendish and Williams-I
Sankura	8	270	Poyo, Dwarf, Giant Cavendish and Williams-I
Total	20	840	4

2.2. Agronomic Management of Banana Cultivation

The optimal time to grow bananas was at the start of the main rainy season. Prepare holes that are at least 60 cm deep and 60 cm in diameter. Before filling the planting hole, half fill the top soil with rotting manure. It was planted at the start of the major rainy season or during it for proper establishment and subsequent production. With holes spaced 2.5 m by 2.5 m apart, desert type bananas have 1600 plants per hectare. A decrease in banana yield may result from weed invasion. Thus, mechanical weeding was used to control weeds. To control weeds, covering an established field with coffee husks, elephant grass or other dry seedless grasses is advised. Allow three to five primary stems of different ages per stool. With this setup, the crop is produced continuously all year round. When the banana tree reached maturity, the fruit was plucked. Depending on the kind, the ripe fruits have different colors. The color turns yellow for some types, particularly

the desert types. The fruits in the bunches should not be bruised when they are gathered for sale [6, 10].

2.3. Method of Data Collection and Analysis

Through supervision and the preparation of a mini-field day, yield and farmers' preferences for the variety were collected. During the field day, the perceptions of farmers and development agents were collected. Group discussions were held to gather their true feelings and opinions. The field day participants were interviewed using a formal checklist to measure farmers' genuine interest in technology for future promotion and scaling up. Lastly, descriptive statistics, including mean, standard deviation, frequency distribution, and pairwise ranking were used to analyse the quantitative data that had been collected. The qualitative data was analysed through qualitative narration.

3. Result and Discussion

3.1. Feedback on the Participants

At the field day, farmers said, "The banana varieties' performance was interesting, so we will continue to grow this variety if we have market demand or linkage created." We tried using cooperatives to address our primary problem, which was a lack of market demand, but it was attempted. They stated that suckers and a lack of improved banana types were the primary reasons for their low productivity and low production, and that they had not obtained as high of yields as they had expected before this year. When they witness the high yield of the improved variety, they are happy. The farmers thanked the Wondogenet Agricultural Research Centre for the banana's successful performance on farms. Farmers said that more crops, soil and water conservation, and livestock parts will be helpful in the future and thanked numerous stakeholders for their support during their work. Observably, cluster demos were a very effective way to spread awareness of the new technology. Given that people have different capacity for thought and action, farmers' opinions and interest are mostly centred on working in clusters, which promotes team spirit in both work and mental processes. Consequently, the cluster functioning helped farmers in the field learn from and support one another. According to experts, the improved banana varieties have a high yield and are adaptive, and their entire package application helps farmers increase the productivity and output of bananas in their community. However, establishing a market connection is essential because their town doesn't have a large market for better bananas. It was also revealed who will be in charge of bringing the technology to further districts and Kebele. Researchers also recommended that farmers form cooperatives to connect the consumer marketplaces in the study area.

3.2. Number of Fruits Per Bunch

According to the results, poyo produced more fruits per bunch than local check, William I, Dwarf, and Giant Cavendish (Table 2). On the trial farmer's field, the average mean number of fruits from Poyo was 229, whereas the average number of fruits from William I, Dwarf, Giant Cavendish, and local check were 215, 210, 215, and 136, respectively. This suggested that the poyo variety contributed to farmers' income and shown a yield advantage over others. Similarly, [7] found that, in comparison to the Dwarf Cavendish variety, the Giant Cavendish and William I cultivars produced the most fruits per bunch.

Table 2. *Number of fruits per bunch among varieties.*

No.	Variety	Number of fruits per bunch (n=20)			
		Mean	Std. deviation	max	min
1	Williams-I	215	18.8	146	138
2	Poyo	229	17.8	158	142
3	Giant Cavendish	215	18.8	145	140
4	Dwarf	210	25.2	142	136
5	Local	136	28.4	96	80

Source: own computation, 2022

3.3. Farmers Preference Among the Varieties

Table 3. Farmers feedback on the variety evaluation.

Variety	Banana traits	Rank
Poyo	Higher yield, not easily perishable	2nd
Giant Cavendish	Big fruit size, easily perishable, disease resistant	4th
Williams-I	Medium fruit size, disease resistant, not early perishable	3rd
Dwarf	Big Fruit size, early maturity and marketable fruit, disease resistant and sweetness	1st
Local	Small fruit size, low disease resistant, poor yield	5th

Source: own computation, 2022

The purpose of the participatory variety evaluation program was to gather preferences and raise awareness among development agents and farmers. Thus, on the field day, 68 participants—52 men and 16 women—who included farmers, extension agents, experts, and researchers took part. Fruit size, early maturity, perishability, disease resistance, marketability, and sweetness were requirements established by those involved in the selection process for the different varieties. The selection process was facilitated by the presence of a group of integrated participants from several disciplines, including farmers, extension agents, and researchers. group findings for the above-mentioned enhanced banana variety (Table 3).

According to farmer input, the dwarf variety's fruit was bigger than that of William I and other varieties. Due to its large fruits, early maturation, market preference, low stature, and sweetness, dwarfs were favoured by farmers above other varieties. In contrast to dwarf, poyo, and local check variations, the William I and Giant cavndish varieties were resistant to disease. In contrast to the dwarf and giant cavendish varieties, the Poyo and William I varieties were acceptable in the market because to their good fruit size and resistance to perishability. The study is consistent with [8, 9] in Ethiopia's west Harerge zone. Thus, Dwarf and Poyo were ranked first and second, respectively, according to farmer preference.

4. Conclusion and Recommendation

Dessert-type banana demonstration was held in the Silte zone of the Hulbareg, Silte, and Sankura districts. The main objective was to evaluate best banana varieties, which would then be linked to and raise awareness of banana production. Farmers choose their own selection criteria before making a choice. They like to emphasis that they prefer varieties that have more suckers per plant, more fruits per bunch, larger fruits, early maturation, medium height, robust stems, and eventually a higher overall yield. The results of the study showed that when compared to a local control, the Williams-I and Poyo cultivars produced more yield per bunch than other varieties. Additionally, based on the feedback from farmers on field day, Williams-I and Poyo were selected for their fruit size, early maturity, plant height, disease resistance, market preference, and fruit flavour. The use of the Giant Cavendish, Williams-I, and Poyo cultivars for larger-scale demonstration in the Silte Zone and other similar agroecologies was therefore recommended. Agriculture development sectors, research institutes, non-governmental organisations, the commercial sector, and other organisations must thus promote and supply bananas to farmers to boost production and productivity and enhance the food security of farming households.

Abbreviations

EIAR Ethiopian Institute of Agricultural Research

Author Contributions

Wasihun Alemnew: Ideas; formulation or evolution of overarching research goals and aims.

Temesgen Gizaw: Preparation, creation and/or presentation of the published work, specifically visualization/data presentation.

Conflicts of Interest

The authors declare no conflicts of interest.

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