



Full Length Research Article

PARTICIPATORY EVALUATION OF DESERT BANANA VARIETIES IN DELLO-MENNA DISTRICT OF BALE ZONE, SOUTH EASTERN ETHIOPIA

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ABSTRACT

Participatory evaluation of seven desert banana varieties were carried out in Dello Menna district of Bale zone, South Eastern Ethiopia. The purpose of the study was to test the adaptability of different banana varieties in the study area. The study was undertaken in four sites, with treatments arranged in randomized complete block design with three replications. Both agronomic data and farmers preferences toward the varieties were collected and analyzed using Genestat statistical software and matrix ranking respectively. The analysis result showed that there was significant ($p \leq 0.05$) difference among the varieties in all parameters. There was significant difference ($p \leq 0.05$) in number of fruits per bunch among the varieties. The highest fruit yield/plant (30.64kg/plant) was obtained from the variety Robusta followed by Grand nain (28.72) and Dwarf Cavandish (25.03), while the lowest yield (7.69kg/plant) was obtained from local Variety. Poyo has the shortest maturity period (463days) as compared to other varieties. Matrix ranking result of farmers preference also showed that overall mean of the ranks for all performance indicators were higher for Robusta (4.33), Grand nain (4.0), Jiantcavandish (3.50) and poyo (3.33). This means, Robusta, Grand nain, Jiant Cavandish and Poyo were high yielding as well as the most preferred banana varieties by farmers respectively. Therefore, based on this finding both Robusta, Grand nain, Jiant Cavandish and Poyo were recommended to banana growers due to absence of improved banana varieties in the study area. On the other hand, Dwarf Cavendish was the variety with high number of fruits per bunch. However, the farmers perceived that it is highly susceptible to wild animal damage due to its dwarf nature. Therefore breeders could use the variety in their banana improvement program to exploit its merit.

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INTRODUCTION

Background and Justification

Eastern and Southern Africa produces over 20 million tonnes of bananas (*Musa spp.*) annually which accounts for 25.58% of total world output (Karamura *et al.*, 1998). Banana is a staple food for over 20 million of people in eastern Africa (Wambugu *et al.*, 2008). It is an important source of income for small-scale subsistence farmers in the region. It is also good sources of vitamins and minerals and provide raw materials for the processing industries (UAAIE,2001). Reports indicate that local cultivars of banana were under cultivation in Ethiopia since mid 18 century (EARO, 2001). According to CSA (2012), it is the first major fruit grown in Ethiopia, both in area coverage (35,869.31ha) and total production

(2,705,715.16 Quintals). The bulk of banana is produced in traditional agricultural system in the homestead where gardens are small and intensively managed (Seifu, 1999). Banana is also a major fruit crop grown in Bale zone. It covers 68% of area under fruit (930.61ha) crops (CACC, 2003). The overall development of fruit sector in the country is limited. This could be attributed to constraints such as lack of improved varieties, limited inputs, skilled manpower and extension approaches and, focus of agricultural development efforts on grain production amongst others (Berhe *et al.*, 2008). Similarly, the yield obtained is very low due to the use of low yielding local varieties, lack of appropriate knowledge about banana production and management, lack of sufficient quantity of planting material and insufficient orientation to make aware of the nutritive and economic advantages of these crops. Therefore this activity was proposed with aims evaluating the varieties under farmers' circumstances and select better performed varieties to the study area.

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MATERIALS AND METHODS

Description of the study districts

Dello Mena and Berbare districts are located in Bale zone, South Eastern Ethiopia. The capital of Dello Mena district (Menna) is located at 555km and 125km from Addis Ababa and Robe respectively. The mean annual temperature of the district is 29.5°C with the lowest and the highest being 21°C and 38°C respectively. The mean annual rainfall of the district is 701.5 mm. Welmel, Yadot and Shawe rivers are the major sources of irrigation in the district. Cereals are the main crop produced during the main season followed by pulses, oil seed, vegetables, and spices. Coffee, Banana, Mango and Avocado are the major permanent crops in both districts (BZFEDO, 2009).

Experimentation, Data Collection and Analysis

Field experiments were conducted in Dello Mena district for two years from 2012/13 to 2013/14. Seven desert Banana varieties (Williams-1, Grand Nain, Robusta, Butazua, Poyo, Jiant Cavendish, Dwarf Cavendish) were introduced from Melkasa Agricultural Research Center, Ethiopia, and evaluated for their adaptability, yield potential and other quality parameters at four irrigation sites. The treatments were laid down in Randomized Completed Block Design (RCBD) with three replications. The varieties were planted along with local variety at 3m x 3m spacing with 3 replication. All management practices such as weeding, hoeing, composting and watering were carried out according to the recommendation throughout the growing season. Biological data such as plant height, number of suckers per plant, number of fruits weight, day per plant were collection. Farmer perception on the improved technologies (variety, agronomic, disease management and post-harvest handling) were recorded. Biological data collected were analyzed using Genstat software, while simple descriptive statistical analysis like mean, SD and ranking were employed to analyze farmers' perception about the improved varieties.

Farmers' selection and participatory evaluation of the varieties

In this study, a group of banana growers having 30 members were formed with the help of development agent. Training was given to the farmers to create general awareness about the experiment. Group discussion and debates were held to identify characteristics of good banana variety. Evaluation criteria were set by farmers' prior to evaluation as: number of suckers per plant, number of fruits per bunch, fruit size, days to maturity and total yield per plant. According to the participant farmers, good banana varieties should have the following characteristics: more number of suckers per plant, large number of fruits per bunch, larger fruit size, early in maturing, medium height and strong stem that tolerate falling during fruit bearing and with higher total yield. Therefore, the varieties were evaluated by the farmers using these criterion and analyzed using matrix ranking (Boef and Thijssen, 2007).

RESULT AND DISCUSSION

Biological Data

Field data were collected by multi-disciplinary team of researchers and analyzed using Genstat statistical software. The analysis result showed that there was significant ($p \leq 0.05$) difference among the varieties in all parameters. There was significant difference ($p \leq 0.05$) in number of fruits per bunch among the varieties. Dwarf Cavendish was the variety with the highest number of fruits per bunch (156) followed by Robusta (155) and Grand nain (147). Similar to number of fruits per plant, there was significant weight difference among fruits harvested from each variety. Robusta gave the highest fruit weight (179.67gm) as compared to the others. There was significant yield difference among the varieties. The maximum yield/plant (30.64kg/plant) was obtained from the variety Robusta followed by Grand nain (28.72) and Dwarf Cavendish (25.03) while the lowest yield (7.69kg/plant) was obtained from local Variety. Poyo is early maturing variety (463days) as compared to other varieties (Table 1).

Table 1. Agronomic performance of improved banana varieties

Treatment	Plant Height (cm)	Sucker/plant	Number of Fruits/ bunch	Fruit Weight (gm)	Fruit Yield (kg/plant)	Days to maturity	Gross income
Williams-1	151.5	3 ^{bc}	128.7 ^c	150.23 ^c	19.33 ^{cd}	502 ^b	270.62
Grand nain	216.5	7 ^{ab}	146.7 ^b	195.83 ^a	28.72 ^{ab}	500 ^b	402.08
Robusta	220	7 ^{ab}	155 ^a	197.67 ^a	30.64 ^a	498 ^b	428.96
Butazua	217.5	6 ^{ab}	121 ^d	140.93 ^{cd}	17.05 ^d	475 ^a	238.70
Poyo	222.5	6 ^{ab}	130 ^c	151.40 ^c	19.68 ^{cd}	463 ^a	275.52
J/Cavandish	218.5	8 ^a	120 ^d	185.57 ^{ab}	22.27 ^{bcd}	496 ^b	311.78
D/Cavandish	90	5 ^{abc}	156 ^a	160.47 ^b	25.03 ^{abc}	520 ^c	350.42
Local	298	2 ^c	74.7 ^e	103.00 ^e	7.69 ^e	518 ^c	107.71
Mean	204.3	5.3	129	160.64	21.30	131.5	298.22
LSD	11.96	3.35	7.63	21.6	6.37	13.44	

Table 2. Matrix ranking based on farmers selection criteria (N=30)

Varieties	Plant Height	Stem Strength	Sucker/plant	Fruit/ bunch	Earliness	Taste	Average	Rank
Williams-1	2	3	2	2	2	3	2.33	7
Grand nain	5	4	4	4	3	4	4.00	2
Robusta	4	5	5	4	4	4	4.33	1
Butazua	3	3	2	2	3	5	3.00	5
Poyo	3	3	3	3	5	3	3.33	4
J/Cavandish	4	4	4	3	4	2	3.50	3
Dwarf cava	3	3	2	5	1	2	2.66	6
Local	1	2	1	1	2	2	1.50	8

The gross income that could be obtained by farmers from the varieties in one season were assessed using the price of a kilogram of banana at Dello-Mena town during harvesting period, i.e. 14 ETB farm gate price. Accordingly Robusta have an income advantage of 321ETB per plant over local variety. There was direct relationship between number of fruit per plant, fruit weight, yield per plant and income.

Farmers' preference

Farmers set their own selection criteria prior to selection. They prefer indicated that there is towards those varieties with more number of suckers per plant, large number of fruits per bunch, larger fruit size, early maturing, medium height and strong stem and finally with higher total yield. With this regard, farmers' perception on the performance of banana varieties was tested at Dello-Mena district and analyzed using matrix ranking. After discussion and debates, farmers ranked the varieties based on their preference and degree of satisfaction by giving the values 1-5 (Boef and Thijssen, 2007). i.e. 1=Low/Bad, 5=High/Good. Almost all farmers perceived that all the varieties introduced to the area were better than local. Matrix ranking result showed that overall mean of the ranks for all performance indicators were higher for Robusta (4.33), Grand nain (4.0), Jiantcavandish (3.50) and poyo (3.33). In line with the biological result, farmers' have also selected Robusta, Grand nain, Jiant Cavandish and Poyo respectively (Table 2).

Conclusion and Recommendation

Conclusion

Banana is the most important fruit crops grown in Dello Mena district of Bale Zone, Ethiopia. However the yield obtained by farmers is very low due to lack of high yielding varieties. To solve this problem, improved banana varieties were introduced from Melkasa Research Center, Ethiopia, and tested for their adaptability at Dello Mena District. The analysis result showed that Robusta, Grand nain, Jiant Cavandish and Poyo are higher yielding and the most preferred banana varieties by farmers respectively. Therefore, based on the finding both Robusta, Grand nain, Jiant Cavandish and Poyo were recommended to banana growers due to absence of improved banana varieties in the study area. On the other hand, Dwarf Cavendish was the variety with high number of fruits per bunch. However, the farmers perceived that it is highly susceptible to wild animal damage due to its dwarf nature. Therefore breeders could use the variety in their banana improvement program.

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