

An analysis of the pineapple (*Ananas comosus* L.) varieties in Teppi, South Western Ethiopia

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Research Article

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Abstract

During the 2015–2016 main cropping season at Teppi, three pineapple types were imported from Jimma Agricultural Research Center plant tissue culture and assessed. The purpose of the experiment was to determine the optimal high-yielding, pest-and disease-resistant, and tolerant variety or types for the target region, as well as to assess the adaptation of enhanced pineapple cultivars. The evaluated cultivars' mean yields varied from 19.8 tons per hectare for Queen to 70.4 tons per hectare for Smooth Cayenne. Smooth cayenne took an average of 406 days to blossom, while sugar loaf and queen took an average of 455 days. The average plant height ranged from 82.33 cm for Queen to 113.93 cm for Sugar Loaf. For Queen and Sugar loaf, the average leaf length was 58.13 cm and 91.93 cm, respectively. For Queen and Smooth Cayenne, the average fruit length was 10.7 cm and 14.57 cm, respectively. For Queen and Smooth cayenne, the average fruit diameter was 10.05 cm and 11.68 cm, respectively. For Queen, the average fruit weight was 1.01 kg, while for sugar loaf, it was 1.65 kg. The greatest mean yield was found in sugar loaf (69.7 tons/ha) and smooth cayenne (70.4 tons/ha). Because of the positive qualities mentioned above, farmers in the research region favor sugar loaf and smooth cayenne.

Keywords: *Magnaporthe oryzae*, microconidia, appressoria, disease intensity

Introduction

The Bromeliaceae family, which includes the pineapple (*Ananas comosus* L. Merr.), originated in South America, Southern Brazil, Northern Argentina, and Paraguay (Paull and Lobo, 2012). Fresh and canned fruit and juice are the primary uses for it (Office of the Gene Technology Regulator, 2003). About 100 to 200 berry-like fruitlets are joined to a central core to form this non-climacteric, parthenocarpic, multiple fruit (Taufiq et al., 2015). Suckers, slips, or crowns are used to grow pineapples vegetatively (Eeckenbrugge and Leal, 2003). A pineapple may reach a height of one to one and a half meters. Its popularity is mostly due to its sweet flavor and rich vitamin B1, B2, B6, and C content. Only pineapple has the protein-digesting enzyme bromelain, which aids in digestion after a high-protein meal (Fouque, 1981). According to Hossain et al. (2015), pineapple has positive health effects on nausea and dyspepsia, including morning sickness and motion sickness. Ferulic acid is extracted using pineapple peel (Rudra et al., 2015). Tropical areas produce the majority of the world's pineapples. According to Ndungu (2014), pineapples are produced on more than 2.1 million acres across 82 nations. The smooth Cayenne cultivar is widely grown in nations including Hawaii, the Philippines, Australia, South Africa, Puerto Rico, Kenya, Mexico, Cuba, and Formosa (de Azevedo et al., 2007). Brazil and Costa Rica are the next biggest producers of pineapple, after Thailand (Baruwa, 2013). Nigeria is the top producer in Africa and ranks seventh globally (FAO, 2011). The southern and southwestern regions of Ethiopia are home to the majority of the country's pineapple producing facilities. Both the state and private farmers control the farms (Edossa, 1998). In Ethiopia, 70,584 farmers planted pineapples on more than 645.2 hectares, according to CSA statistics from 2016–17. While state farms grow pineapple in addition to their primary crop (coffee or maize), farmers grow pineapple on a modest scale on pieces of land (Edossa, 1998). For many years, smallholder farmers have been using pineapples as a cash crop in a mixed agricultural system. The southern regions of Ethiopia (Sidama and Gojeb) are the primary locations for significant pineapple growing. According to SNV BOAM 2, 2010–2011, the Ethiopian population's consumption habits generally support the production of pineapples, mostly for regional markets around Ethiopia and on the Arabic peninsula for processing and fresh fruit. According to Yonad Business Promotion and Consultancy (2011), there has been a minor increase in pineapple consumption due to both visitor preferences and overall national growth in public expenditure. Therefore, it seemed to be crucial to continuously identify and promote the best and appropriate agricultural technology in order to boost crop yield in various places. Tests for adaptability and the creation of new technology may accomplish this. Despite the abundance of prospects for pineapple cultivation in the region, no enhanced cultivars have been made available to consumers. In light of this, the current research was carried out at Teppi Agricultural Research Center to evaluate the performance of commercially released pineapple cultivars for their local adaptation and for future user distribution.

MATERIALS AND METHODS

Experimental site

During the primary agricultural seasons of 2015 and 2016, the experiment was carried out at Teppi Agricultural Research Center. Teppi is situated

at latitude 7° 10, 54.5, and longitude 35° 25, 28.2, E in South Western Ethiopia's SNNP Regional State. It is 1200 meters above sea level, has an average annual rainfall of 1559 mm, and has maximum and minimum temperatures of 29.7 and 15.5°C, respectively (Figure 1). The experimental site's soil is reddish-brown. sandy clay loam with a pH range of 5.60 to 6.0 that is categorized as nitosol.

Experimental Materials and Design

Three commercially available pineapple varieties—Smooth Cayenne, Queen, and Sugar Loaf—were used in the experiment. The Jimma Agricultural Research Center provided the planting slips, which Plant Tissue Culture multiplied. Each variety's slips were planted in three replications using a randomized full block design, with rows, double rows, and plants spaced 90 cm by 60 cm by 30 cm, accordingly. As advised, all agronomic management techniques were used equally to each variety.

Data Collected

Data was collected for 11 traits namely stand count at harvest, 50% flowering date, plant height, leaf length, fruit length, fruit diameter, fruit weight, marketable fruit number, marketable fruit weight, total fruit number, total yield Kg/plot. Some important metrological data including mean monthly rainfall (mm), mean maximum and minimum monthly temperature, mean % relative humidity and soil type were recorded.

Statistical Analysis

All necessary data were recorded and subjected to analysis. Analysis of variance was performed using the ANOVA procedure of SAS Statistical Software. Effects were considered to be significant in all if the P-values were < 0.05. Means were separated, using least significant difference test.

RESULTS AND DISCUSSION

With the exception of plant height, fruit diameter, and fruit length, every evaluated attribute revealed significant variations amongst the studied cultivars (Table 1). The existence of variability for every trait across the tested kinds is shown by the significant difference. 50% flowering, leaf length, average fruit weight, total yield kg/plot, marketable yield kg/plot, and total yield tonne/ha were all significantly different across all types. Significant variations in yield between the types were shown by statistical analysis. For Queen and Smooth cayenne, the average production was 19.8 and 70.4 tons per hectare, respectively. Smooth cayenne (70.4 tonnes/ha) and sugar loaf (69.7 tonnes/ha) had the greatest mean yields, whereas fruit flies had a significant negative impact on Queen (personal communication). This outcome is consistent with Chadha's (2001) assertion that pineapple production in monocropping systems was expected to be more than 65 tonnes/ha in hot, humid regions. Smooth cayenne took an average of 406 days to blossom, while sugarloaf and queen took an average of 455 days. For Queen and Sugarloaf, the average plant height was 82.33 cm and 113.93 cm, respectively. For Queen and Sugar loaf, the average leaf length was 58.13 cm and 91.93 cm, respectively. For Queen and Smooth Cayenne, the average fruit length was 10.7 cm and 14.57 cm, respectively. The fruit length of the "Mauritius" variety varied from 14.73 to 15.95 cm, according to research conducted in India (Priya et al., 2013). For Queen, the average fruit diameter was 10.05 cm, whereas for Smooth cayenne, it was 11.68 cm. For Queen, the average fruit weight was 1.01 kg, while for sugar loaf, it was 1.65 kg. The fruit weighed between 0.99 kg to 2.16 kg (without the crown) (Priya et al., 2013). The largest plant height, leaf length, and fruit weight are found in sugar loaf, which is followed by smooth cayenne. The largest fruit diameter and length are seen in smooth cayenne. The largest yield was produced by Sugar Loaf and Smooth Cayenne, followed by Queen. Smooth Cayenne and Queen are the most popular cultivars, although MD2 has dominated the world's pineapple trade in recent decades, according to Ndungu (2014). Smooth cayenne had the maximum output, whereas Queen Variety produced the lowest.

Table 1. Result summary of recorded traits.

Trt	Sch	Fld	Ph	LI	Fl	Fd	Fwt	Mno	Mwt	Totn	Tot kg	Ty qt/ha
Smooth cayenne	29 ^a	406 ^b	93.53 ^a	63.4 ^b	14.57 ^a	11.68 ^a	1.63 ^a	29 ^a	47.5 ^a	29 ^a	47.53 ^a	704.2 ^a
Sugar loaf	28.33 ^a	455 ^a	113.93 ^a	91.93 ^a	10.83 ^a	10.68 ^a	1.65 ^a	28.3 ^a	49 ^a	28.3 ^a	47.03 ^a	696.79 ^a
Queen	13 ^b	455 ^a	82.33 ^a	58.13 ^b	10.7 ^a	10.05 ^a	1.01 ^b	13 ^b	13.4 ^b	13 ^b	13.4 ^b	198.52 ^b
CV	10.54	0	14.43	13.04	15.5	12.06	8.37	10.54	12.14	10.54	12.14	12.14
LSD	5.6	0	31.61	21.05	4.23	2.95	0.27	5.6	9.9	5.6	9.9	146.81

NB: Trt= Treatment; Sch= stand count at harvest; Fld= flowering date; Ph= plant height; LI= leaf length; Fl= fruit length; Fd= fruit diameter; Fwt= Fruit weight; Mno= marketable number; Mwt= marketable weight; Totn= total number; Tot Kg= Total kg; Ty T/Ha = Total quintal/ha.

CONCLUSION

The majority of Ethiopian farmers use pineapple on a modest scale, despite the fact that certain state farms operate on a huge scale. Additionally, for many years, farmers in SNNPR used a mixed agricultural strategy to grow pineapple as a cash crop. Overall, this experiment showed that Sugar Loaf and Smooth Cayenne outperformed Queen in yield and yield-related attributes. Fruit flies had a major impact on Queen Variety, which is why its output was poor. For farmers in the research region, these two types—Sugar Loaf and Smooth Cayenne—are thus preferred. The yield and productivity of pineapples in the region may increase if these types are multiplied and distributed. To increase pineapple output in the region, further research including different types should be done.

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