Environment & Ecology 27 (1) : 78—81, 2009
 ISSN 0970-0420

Performance of Banana Varieties under Agro-Climatic Condition of Western Orissa

D. N. SINGH[1]

Regional Research & Technology Transfer Station, Orissa University of Agriculture & Technology Chiplima, Sambalpur 768035, India
[1]Department of Horticulture, College of Agriculture, Orissa University of Agriculture & Technology Bhubaneswar 751003, India

Abstract

Nine varieties introduced from the different banana growing areas were tested in the West Central Table Land Zone of Orissa during 1998-2000. Out of nine varieties evaluated, Robusta showed over all superiority and produced maximum fruits and highest fruit yield (54 t/ha) with a net profit of Rs 371,669/ ha. Robusta also recorded higher pulp weight (98.20 g), TSS (24.7%) and total sugar (24.7%). Further, Robusta also gave highest net profit with highest C : B ratio (7.16).
Key words : Banana varieties, Performance, Yield.

Banana is the most important crop next to mango, grown in India. Area and production in the last few years have increased sharply owing to its wider adaptability, increased demand for fruits and high economic return per unit area. At present total production of banana is estimated 13.2 million tones with contribution to 31% of total fruit production of the country (1). Banana is grown in every state in India either as a kitchen garden plant or as a regular commercial orchard near cities and town. In Orissa also, production and productivity of this crop is increasing considerably due to the availability of improved varieties and production technology. It can be further increased with the introduction of suitable high yielding and superior varieties. With these objectives in view, studies were initiated to select banana varieties suitable for cultivation in West Central Table Land Zone of Orissa.

Methods

An experiment to identify a suitable variety for commercial cultivation of banana in the West Central Table Land Zone on the basis of yield, fruit type and fruit quality was conducted at Regional Research and Technology Transfer Station (OUAT), Chiplima, Dist. Sambalpur, Orissa during October 1998 to June 2000.

Four month old healthy sword suckers of different varieties of banana were collected from the government fruit farm, Pallahara, Deogarh, Orissa in first week of October, 1998 for the study. Four month old healthy sword suckers were used for the experiment.

The varieties Dwarf Cavendish, Ghrut Sagar, Champa, Patkapura, Robusta, Batheesa, Gaja bantal, Pausia bantal and Mendi bantal were planted in a randomized block design with three replications having 10 plants each at a distance of 2 m × 2 m. The suckers were planted in the experimental plots on 30 October 1998. All the varieties were given uniform cultural practices for fertilization, irrigation and plant protection measures throughout the period of their evaluation. Data were recorded on various vegetative, flowering, fruiting, yield and quality parameters from five uniform plants. The fruits were harvested from 17 January 2000 to 25 June 2000 when they attained full maturity and observations were recorded following standard methods and physico-chemical analysis of fruits was done following the method suggested by Ranganna (2).

Results and Discussion

Vegetative Characters

Results revealed that varieties differed significantly among themselves in growth, flower initiation

Table 1. Vegetative growth, flowering and sucker production of different banana varieties.

Varieties	Plant height at harvest (cm)	Stem girth (cm)	No. of leaves at harvest	Leaf area (cm^2)	First flowering (days)	No. of suckers produced
Dwarf cavandish	143.7	43.0	26	8147	418	7
Ghrut sagar	210.3	55.3	30	9091	323	4
Champa	227.3	50.4	30	9136	411	5
Patakapura	204.5	55.3	29	9414	333	4
Robusta	165.4	64.7	36	10255	314	9
Batheesa	243.0	60.0	32	6218	384	6
Gaja bantal	244.0	63.0	33	10246	382	7
Pausia bantal	258.0	63.3	31	9825	440	7
Mendi bantal	255.0	62.7	31	6179	454	6
SE ±	5.32	1.33	0.62	167.1	2.01	0.39
CD (0.05)	15.96	4.01	1.62	501.1	6.04	0.83

and sucker production (Table 1). The plant height was significantly higher (258.0 cm) in Pausia bantal as compared to all other varieties except Mendi bantal, Gaja bantal and Batheesa, while Dwarf Cavendish was shortest in height. Among varieties studied Robusta produced more number of leaves (36) and stem girth

Table 2. Fruit characters, fruit yield and physico-chemical characteristics of different banana varieties.

Varieties	No. of hands/ bunch	No. of fingers/ hand	No. of fingers/ bunch	Weight of fingers (g)	Length of finger (cm)	Girth of finger (cm)	Weight of full bunch (kg)
Dwarf cavandish	11	12	128	121	19.4	14.3	14.8
Ghrut sagar	8	10	79	117	15.5	12.1	11.5
Champa	9	12	103	68	10.4	9.8	8.5
Patakapura	8	11	91	1113	17.4	15.1	12.3
Robusta	13	13	166	132	23.5	18.6	21.6
Batheesa	12	11	131	108	17.3	11.4	16.4
Gaja bantal	10	10	99	123	13.3	12.9	15.2
Pausia bantal	7	10	71	121	12.0	12.1	11.7
Mendi bantal	8	11	87	115	11.5	11.3	13.2
SE ±	0.4	0.47	1.5	1.9	0.20	0.15	0.2
CD (0.05)	1.2	1.42	4.4	5.6	0.59	0.46	0.5

Table 2. Continued.

Varieties	Weight of pulp (g)	Weight of peel (g)	Pulp : Peel ratio	Fruit yield (t/ha)	TSS (%)	Acidity (%)	Total sugar (%)
Dwarf cavandish	90.3	32.2	2.80	37.0	20.4	0.43	17.8
Ghrut sagar	93.5	28.2	3.29	28.7	23.3	0.44	17.2
Champa	46.1	23.0	2.05	21.3	23.7	0.44	16.5
Patakapura	92.4	23.1	4.02	30.8	24.4	0.45	18.3
Robusta	98.2	35.5	2.77	54.0	24.7	0.43	19.5
Batheesa	81.0	30.0	2.71	40.9	22.6	0.46	15.4
Gaja bantal	91.0	34.6	2.63	38.0	22.0	0.47	15.6
Pausia bantal	87.0	37.1	2.34	29.2	20.9	0.48	15.7
Mendi bantal	18.0	37.5	2.17	33.0	21.9	0.48	14.9
SE ±	0.6	1.10	0.09	0.40	0.30	0.01	0.60
CD (0.05)	1.8	3.29	0.27	1.20	0.90	0.03	1.90

(64.7 cm). The number of suckers produced per plant was also observed to be the maximum in Robusta and the least in Ghrut sagar and Patakapura. Regarding flowering variety Robusta showed flowering significantly early (314 days) compared to other cultivars. Thus, banana varieties differ significantly from one another in respect to various vegetative characters, flower initiation and in production of suckers. These differences or the variations may be due to the different genetic make up of the plant or varietal differences or may be due to the differences in the photosynthetic efficacy of various varieties. Chundawat et al. (3), Vijaya Raghava Kumar et al. (4) and Rosamma (5) have also reported vast differences in the vegetative characters of different banana varieties.

Fruit Characters

The number of hands/bunch (13), number of fingers/hands (13) and total number of fingers/bunch (166) were found to be significantly maximum in variety Robusta and the minimum in Pausia bantal. Size of finger (weight of finger 132 g, length 23.5 cm and girth 18.6 cm) was significantly higher in Robusta as compared to other varieties. Average bunch weight was significantly more (21.6 kg) in Robusta than all other varieties. Among the various varieties tested (Table 2), variety Robusta gave significantly higher fruit yield (54.0 t/ha). The yield was significantly lower in the variety Champa. In other varieties it ranged from 28.7 t/ha in Ghrut sagar to 40.9 t/ha in Batheesa. Thus, different varieties exhibited a great variation in their yield potential. Though low bearing is a genetic character in some old varieties in banana but Robusta has been reported to give good yield in a specific zone because of their wider adaptability (6). More yield, as observed in Robusta, might be because of higher number of hands/bunch coupled with higher number of fingers/bunch and bigger size of fingers. The results are in conformity with the findings of Nayar et al. (7), Rosamma (5) and Chundawat et al. (3).

Quality Parameters

Variety Robusta had significantly higher pulp weight (98.2 g) and TSS (24.7%) than all the varieties, whereas minimum pulp (81 g) and TSS (20.4%) was in Mendi bantal and Pausia bantal respectively. In other varieties TSS ranged from 20.9 to 24.4%. Total sugar was also recorded more (19.5%) in Robusta and the least total sugar (14.9%) was noted in Mendi bantal. Total acidity was found to be significantly less in Robusta and Dwarf cavandish whereas other varieties, viz. Pausia bantal, Mendi bantal and Gaja bantal had significantly more acidity (Table 2). The peel and pulp ratio was found to be more (4.02) in Patakapura which is significantly higher than other varieties. These results are in agreement with the findings of Desai and Despande (8), Nayar et al. (7), Palmer (9), Rekha and Prasad (10) and Simmonds (11) who also observed that varieties differed significantly for various quality attributes.

Table 3. Economic of different banana varieties. Sale price of banana : Ripe fruits at Rs 8/kg, green fruits Rs 6/kg. Cost of cultivation Rs 60,331.00/ha.

Varieties	Bunch weight (kg)	Fruit yield (t/ha)	Gross return (Rs/ha)	Net profit (Rs/ha)	Cost : Benefit ratio
Dwarf cavandish	14.8	37.0	2,96,000	2,35,669	4.90
Ghrut sagar	11.5	28.7	2,29,200	1,68,869	3.80
Champa	8.5	21.3	1,70,600	1,10,269	2.83
Patakapura	12.3	30.8	2,46,600	1,86,269	4.08
Robusta	21.6	54.0	4,32,000	3,71,669	7.16
Batheesa	16.4	40.9	2,45,400	1,85,069	4.06
Gaja bantal	15.2	38.0	2,28,000	1,67,669	3.78
Pausia bantal	11.7	29.2	1,75,050	1,14,719	2.90
Mendi bantal	13.2	33.0	1,98,000	1,37,669	3.28

Economic Analysis

The economic analysis of banana cultivation revealed that the cost of cultivation being the same for all the varieties, the net profit showed great variation among different varieties. Variety Robusta recorded highest net profit of Rs 371,669/ha as compared to the other varieties, whereas minimum net profit (Rs 110,269/ha) was recorded in Champa. In other varieties net profit ranged from Rs 114,719/ha to 235,669/ha. Robusta also recorded highest C : B 7.16 than other varieties. However, the minimum C : B ratio (2.83) was noted in variety Champa (Table 3).

The banana variety Robusta was found to be suitable and showed over all superiority as compared to other varieties during experiments. Thus Robusta is recommended for commercial cultivation in the West Central Table Land Zone of Orissa.

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