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High density planting with sucker arrangements: Influence on growth, yield and quality in banana cultivars Rajapuri (*Musa* AAB) and Grand Naine (*Musa* AAA)

Presented by

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ALL INDIA CO-ORDINATED RESEARCH PROJECT ON TROPICAL FRUITS

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DEAN

INTRODUCTION

- Banana and plantain are grown largely by small holders and play a major role in food security and income generation for millions of the region's rural poor worldwide.
- In terms of gross value of production, banana is the developing world's fourth most important food crop after rice, wheat and maize and as a fruits , it ranks first.
- More than 100 millions tonnes of bananas are produced every year in 120 countries in over 10 million hectares.
- Only about 13 per cent of the world's banana production is exported and 87 per cent is consumed where they are produced, indicating , that banana plays a vital role as source of food and income in developing countries.
- Banana constitutes a major staple food for millions of people and provides a valued source of income through local and international trade.

- **India with the production of 16 million tonnes of banans annually, provides livelihood security to millions of people in production, trade and processing.**
- **The fruit contributes more than 2.8 % to GDP of agriculture in India and 31 % of the total food production.**
- **Among the various banana growing states, Tamil Nadu ranks first in production and Maharashtra first in productivity.**
- **With projected requirement of 25 million tonnes of banana for our country by the year 2020.**
- **Concreted efforts are to be taken up to increase the production and productivity of banana, which may call for application of high tech. methods in banana production such as micro propagation, high density planting , drip fertigation, integrated pest and disease management etc.**

- **High density planting (HDP) : a recent and novel concepts of increasing the productivity**
- **Several studies have been conducted in banana to elucidate the influence of HDP in different agroclimatic regions using different cultivars. HDP: High density was practiced by narrowing down the spacing.**
- **Another method of HDP: Planting more than one sucker/hill i.e. 2,3 or 4 suckers/hill with wider spacing-permit of easy cultural operations an for monocrop of banana and also as intercrop**
- **Solar radiation-abundant. Efficient utilization of solar radiation enhances the productivity.**

OBJECTIVE

To find out a suitable high density planting systems so as to maximize the productivity with least cost of production

METHODOLOGY

- The experiment was laid out during 2004-2005 at Kittur Rani Channamma College of Horticulture, Arabhavi (AICRP on Tropical Fruits).
- The Design adopted for the experiment was RBD with four replications

P_1 Planting system No:1- Planting of three suckers per pit spaced at 2x3m (1667 pits x 3 = 5001 plants/ha)

P_2 Planting system No.2- Planting of three suckers per pit spaced at 1.8 x 3.6m (1542 pits x 3 = 4629 plants/ha)

P_3 Normal planting- 1.8 x 1.8m(Local recommendation specific to the region).

V_1 – Variety 1 [Rajapuri (AAB)]

V_2 – Variety 2 [Grand Naine (AAA)]

P_1V_1

P_2V_1

P_3V_1

P_1V_2

P_2V_2

P_3V_2

Table 1. Effect of high density planting on growth characters of banana cv.Rajapuri under Arabhavi conditions

Treatments	Plant height at flowering (m)				Stem girth at flowering (cm)			
	PC	IR	IIR	Mean	PC	IR	IIR	Mean
P_1V_1 (5001)	1.50	1.49	1.51	1.50	14.30	14.28	14.29	14.29
P_2V_1 (4629)	1.51	1.50	1.52	1.51	14.25	14.26	14.25	14.25
P_3V_1 (3086)	1.40	1.41	1.40	1.40	15.42	15.51	15.49	15.47
P_1V_2 (5001)	1.75	1.79	1.76	1.76	17.90	18.02	18.06	17.99
P_2V_2 (4629)	1.77	1.81	1.80	1.79	18.25	18.31	18.28	18.28
P_3V_2 (3086)	1.50	1.45	1.48	5.47	21.30	21.36	20.81	21.15
S Em $\pm$	0.021	0.22	0.33	**0.11**	0.34	0.28	0.21	**0.19**
LSD at 5%	0.065	0.66	1.04	**0.36**	1.02	0.86	0.65	**0.59**
CV%	18.76	11.26	10.81	**9.46**	10.77	8.76	9.28	**9.03**

Treat ments	Leaves/ plant at flowering				Phyllocron (days)			
	PC	IR	IIR	Mean	PC	IR	IIR	Mean
P_1V_1 (5001)	15.07	15.70	15.05	15.27	11.12	11.08	11.10	11.10
P_2V_1 (462 9)	15.21	15.28	15.26	15.25	10.47	10.38	10.38	10.41
P_3V_1 (3086)	16.08	16.11	16.07	16.08	9.80	9.81	9.87	9.82
P_1V_2 (5001)	15.08	15.01	15.10	15.06	11.75	11.81	11.80	11.78
P_2V_2 (4629)	15.11	15.16	15.18	15.15	11.29	11.31	11.34	11.30
P_3V_2 (3086)	16.09	16.11	16.07	16.09	10.01	10.10	10.07	10.06
S Em $\pm$	0.28	0.11	0.13	**0.14**	0.12	0.14	0.11	**0.12**
LSD at 5%	0.72	0.37	0.41	**0.46**	0.41	0.58	0.36	**0.43**
CV%	11.81	10.76	8.76	**9.21**	12.72	10.88	11.26	**10.02**

Table 2. Effect of high density planting on growth characters of banana cv.Rajapuri under Arabhavi conditions

Treat-ments	Days to flower				Days to bunch harvest			
	PC	IR	IIR	Mean	PC	IR	IIR	Mean
P_1V_1 (5001)	255.00	255.01	257.78	255.93	175.25	172.26	176.2	174.57
P_2V_1 (4629)	250.50	251.62	252.21	251.29	170.50	170.31	176.26	172.36
P_3V_1 (3086)	245.00	241.08	240.62	241.90	162.25	166.28	164.51	164.34
P_1V_2 (5001)	240.61	241.11	239.62	240.44	121.17	120.08	121.72	120.99
P_2V_2 (4629)	230.75	225.64	226.31	227.56	113.0	115.51	114.24	114.25
P_3V_2 (3086)	225.00	220.17	222.42	222.52	102.25	101.17	106.62	103.20
S Em $\pm$	1.76	1.08	0.92	0.89	1.45	1.24	1.16	1.81
LSD at 5%	5.43	3.22	2.81	2.69	4.31	3.81	3.49	3.58
CV%	10.66	10.69	11.44	10.58	12.66	8.76	11.66	9.24

Table 3. Effect of high density planting on growth characters of banana cv. Rajapuri under Arabhavi conditions

Treatments	Crop Duration (days)			
	PC	IR	IIR	Mean
P_1V_1 (5001)	430.25	427.27	434.4	430.64
P_2V_1 (4629)	421.00	421.93	428.47	423.80
P_3V_1 (3086)	407.25	407.36	405.13	406.58
P_1V_2 (5001)	361.92	361.19	361.34	361.41
P_2V_2 (4629)	343.75	341.15	340.55	341.81
P_3V_2 (3086)	327.25	321.34	329.04	325.87
S Em $\pm$	1.22	1.51	1.66	1.09
LSD at 5%	3.45	4.56	5.01	3.30
CV%	10.34	9.75	10.52	9.93

Table 3. Effect of high density planting on growth characters of banana cv. Rajapuri under Arabhavi conditions

Treatments	Bunch weight (kg)				Yield (t/ha)			
	PC	IR	IIR	Mean	PC	IR	IIR	Mean
P_1V_1 (5001)	12.75	11.28	11.17	11.72	63.76	61.19	57.88	60.94
P_2V_1 (4629)	13.19	13.28	12.56	12.98	61.05	56.40	55.85	57.64
P_3V_1 (3086)	14.34	14.76	14.88	14.66	44.25	44.40	44.76	44.47
P_1V_2 (5001)	16.75	14.62	13.11	14.82	83.76	77.13	70.42	77.17
P_2V_2 (4629)	17.51	16.66	15.21	16.46	81.05	73.21	65.65	73.30
P_3V_2 (3086)	20.18	18.82	18.63	19.21	62.27	58.05	57.41	59.24
S Em $\pm$	1.02	1.28	1.34	1.09	2.63	3.94	1.21	1.31
LSD at 5%	3.11	3.86	4.10	3.28	7.78	11.90	3.74	3.95
CV%	10.82	8.33	9.54	9.26	12.83	8.56	12.43	9.96

Table 4. Effect of high density planting on growth characters of banana cv. Rajapuri under Arabhavi conditions

Treatments	Fingers/ bunch				Finger weight (g)			
	PC	IR	IIR	Mean	PC	IR	IIR	Mean
P_1V_1 (5001)	83.25	84.62	83.36	83.99	119.42	102.31	101.27	107.66
P_2V_1 (4629)	84.22	85.73	84.24	84.98	115.02	103.03	107.10	108.38
P_3V_1 (3086)	93.97	96.65	95.28	95.96	131.00	111.04	113.34	118.46
P_1V_2 (5001)	94.10	91.94	89.46	90.70	172.41	156.60	151.31	160.10
P_2V_2 (4629)	95.18	92.63	88.34	90.48	173.66	151.23	150.68	158.52
P_3V_2 (3086)	109.79	108.67	107 .33	108.00	181.25	172.62	165.27	173.04
S Em $\pm$	1.76	1.42	1.28	1.31	1.47	1.13	1.27	1.17
LSD at 5%	5.68	4.27	3.91	3.97	4.46	3.41	3.85	3.55
CV%	11.0	9.03	8.26	9.41	9.32	8.44	10.53	10.35

Table 4. Effect of high density planting on growth characters of banana cv. Rajapuri under Arabhavi conditions

Treatments	TSS (°B)			
	PC	IR	IIR	Mean
P_1V_1 (5001)	22.50	21.25	21.78	21.51
P_2V_1 (4629)	23.50	23.26	23.62	23.44
P_3V_1 (3086)	24.00	23.95	23.81	23.56
P_1V_2 (5001)	21.50	20.28	21.62	20.95
P_2V_2 (4629)	23.00	23.62	23.42	23.52
P_3V_2 (3086)	23.00	23.08	23.21	23.09
S Em $\pm$	0.02	0.09	0.08	0.03
LSD at 5%	0.08	0.29	0.25	0.11
CV%	10.76	8.76	7.26	7.82

Table 5. Effect of high density planting on growth characters of banana cv.Rajapuri under Arabhavi conditions

Treatments	Benefit cost ratio			
	PC	IR	IIR	Mean
P_1V_1 (5001)	4.84	4.97	4.95	4.92
P_2V_1 (4629)	4.96	5.12	5.01	5.03
P_3V_1 (3086)	3.76	3.88	3.90	3.84
P_1V_2 (5001)	4.71	4.65	4.55	4.63
P_2V_2 (4629)	4.94	4.71	4.62	4.75
P_3V_2 (3086)	4.00	3.85	3.62	3.82

CONCLUSION

- The plant spacing of 2x2m with three plants per pit