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Original Research Article

Response of Banana Cultivars to Various Doses of Nitrogen

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A B S T R A C T

The experiment entitled "Response of Banana cultivars to various doses of Nitrogen (*Musa Paradisica* L. and *Musa accuminata* L.)" was carried out in 2017-19. Two factors were studied during the investigation *viz.*, different varieties - V_1 (Konkan Safed Velchi), V_2 (Red Banana), V_3 (Grand Naine), as main plot treatments and Nitrogen levels *viz.*, F_1 (200:100:100 NPK g/plant), F_2 (100:100:100 NPK g/plant), F_3 (300:100:100 NPK g/plant), F_4 (400:100:100 NPK g/plant), F_5 (500:100:100 NPK g/plant) as subplot treatments and each treatment was replicated thrice in Split plot design. The highest height due to interaction effect of varieties and nitrogen was recorded in the treatment V_2F_3 (308.7cm) whereas the lowest height was recorded in treatment V_3F_2 (192.9cm) i.e. F_2 (100:100:100) in Grand Naine. The highest yield due to interaction effect of varieties and nitrogen were recorded significantly in the treatment V_3F_3 (22.45 kg/plant) i.e. F_3 (300:100:100) in Grand Naine. The lowest yield recorded in treatment V_1F_2 (7.76 kg/plant) i.e. F_2 (100:100:100) in Konkan Safed Velchi. The highest yield due to interaction effect of varieties and nitrogen were recorded significantly in the treatment V_3F_3 (69.29 t/ha) i.e. F_3 (300:100:100) in Grand Naine. The lowest yield recorded in treatment V_1F_2 (23.93 t/ha) i.e. F_2 (100:100:100) in Konkan Safed Velchi.

Keywords

Banana, Varieties, Nitrogen levels, Growth, Yield

Introduction

Banana (*Musa paradisica* L.) is a large herbaceous perennial monocotyledonous plant, belonging to family Musaceae of order Scitamineae. It is believed to have originated in the hot tropical regions of South East Asia (Robinson, 1996). The plant is called 'Kalpatharu', meaning herb with all imaginable uses. Each and every part of the plant is used for specific purposes. Banana could be considered as "Poor Man's Apple" because it is cheaper and nutritionally rich than any other fruit. It has a calorific value ranging from 67 to 137 calories/100 g (Rao, 2005). They are cultivated in 130 countries, mainly in the tropics and subtropics. It is grown over an area of approximately 10 million ha worldwide, with an annual production of over 81.2 million tones. In

India, banana is being grown in an area of 8.58 lakh ha with a production of about 291.6 lakh tones. The average productivity in India is 34.0 t/ha. Tamil Nadu, Maharashtra, Karnataka, Gujarat, Andhra Pradesh, Assam and Madhya Pradesh are major banana producing states in country. In, Maharashtra, banana is being grown in an area of 0.74 lakh ha with a production of about 30.72 lakh tones (Anon. 2017).

Banana is being cultivated in Konkan region on more than 10,000 ha area. Many farmers are coming forward of banana cultivation. Grand Naine the commercially popular variety is being cultivated on large scale. However, the local types like 'Konkan Safed Velchi' evolved by the Dr. B. S. K. K. K. V., Dapoli (2008) is also being commercially cultivated in Konkan region. Similarly Red Banana which is quite popular in Konkan region as special demand. This necessitates the evaluation of banana cultivars namely 'KonkanSafedVelchi', 'Red Banana' and 'G-9' under Konkan conditions. Standardization of nitrogen levels to these varieties is a very important thing.

Nitrogen is one of the most important elements in crop nutrition. It is essential constituent of proteins and nucleic acid and many other organic uses e.g. Chlorophyll, which plays an important role in plant life being essential for formation of protoplasm, the deficiency of nitrogen inhibits cell division and cell enlargement and reduced chlorophyll content.

Nitrogen starvation causes a lowering of respiratory rate in addition to stunted growth, leaf chlorosis, leaf shading, poor flowering and fruiting. Hence the present investigation was done to find out optimum dose of Nitrogen to different banana cultivars under Konkan agro-climatic conditions.

Materials and Methods

The field experiment was laid out in split plot design and replicated thrice. Main plot treatments consist three varieties *viz.,* V_1 (Konkan Safed Velchi), V_2 (Red Banana) and V_3 (Grand Naine) and five nitrogen levels viz. F_1 (200:100:100 g NPK/plant), F_2 (100:100:100 g NPK/plant), F_3(300:100:100 g NPK/plant), F_4(400:100:100g NPK/plant) and F_5(500:100:100 g NPK/plant)as sub plot treatments. The field experiment was conducted during December 2017 to April 2019. The data were analyzed statistically as per the method suggested by Panse and Sukhatme (1995) using SPD and valid conclusions were drawn only on significant differences between treatment mean at 0.05% level of significance.

Results and Discussion

To find out optimum dose of Nitrogen for different banana cultivars under Konkan agroclimatic conditions has been studied and the results of these findings have been presented in this paper.

Plant height (cm)

Data regarding to plant height which were recorded at30, 60, 90, 120, 150, 180, 210 and 270 days after planting varied significantly among the treatments under study (Table 1). Maximum plant height at 270 DAP due to interaction effect was in the treatment V_2F_3 (308.7 cm) i.e. F_3 (300:100:100) in Red Banana which was at par with V_1F_3 (306.2 cm) V_2F_1 (302.6 cm), V_2F_2 (299.8 cm), V_2F_4 (302.8 cm) and V_2F_5 (301.9 cm) treatment. The lowest height was recorded in treatment V_3F_2 (192.9 cm) i.e. F_2 (100:100:100) in Grand Naine. Differences in height among varieties might be due to genetic character of variety and competition for available sunlight, space, optimum fertilizers

utilization and environmental factors. The above findings are similar to the results reported by Indhumati and Durga (2016) in Grand Naine.

Plant girth (cm)

The data given in (Table 2) regarding the girth at collar exhibited significant difference in various treatments. At 270 DAP, The highest girth due to interaction effect of varieties and nitrogen was recorded significantly in the treatment V_2F_3 (68.9cm) i.e. F_3 (300:100:100) in Red Banana was at par with V_1F_3 (67.1cm), V_2F_1 (68.04cm), V_2F_4 (66.7cm) and V_2F_5 (66.9cm) treatments.

The lowest girth was recorded in treatment V_3F_2 (43.25) i.e. F2 (100:100:100) in Grand Naine. Differences in girth among varieties also might be due to genetic varietal character and available sunlight, space, optimum fertilizers utilization and other environmental factors. Similar findings in relation to girth were observed by

Number of leaves/plant

The number of leaves (Table 3) due to interaction effect of varieties and nitrogen varied non-significantly and it was in the range of 11.25 to 16.33in $V_2F_2$and$V1F_3$respectively.

It is a proven fact that adequate supply of nitrogen promotes vegetative growth and helps to retain leaves for a longer time. Ahmed *et al.,* (2010) cv. Grand Naine described the similar result.

Number of suckers/plant

The data regarding effect of varieties, nitrogen levels and their interactions in relation to number of suckers per plant (Table 4) were recorded at 150, 180, 210, 240, 270 DAP At 270 DAP, interaction effect of varieties and various nitrogen levels on number of suckers (Table 4) differed non-significantly and was in the range of V_2F_5 (1.08) to V_3F_3 (5.07).

Leaf area (m^2)

Leaf area is an important attribute as it is directly related with interception of light for photosynthesis.

The data presented in (Table 5) exhibited significant difference in leaf area. At 270 DAP, The highest leaf area due to interaction effect of varieties and nitrogen were recorded in the treatment V_2F_4 (11.8 m^2) i.e. F_4 (400:100:100) in Red Banana. The lowest leaf area recorded in treatment V_3F_2 (6.29 m^2) i.e. F_2 (100:100:100) in Grand Naine.

Leaf area index (m^2)

Leaf area index is used to predict photosynthetic primary production, evapotranspiration and as a reference tool for crop growth. LAI recorded at 60, 90, 120, 150, 180, 210, 240, 270 DAP.

The critical LAI necessary for maximum utilization of photosynthetically active radiation in Banana. The leaf area index (Table 6) due to interaction effect of varieties and nitrogen varied non-significantly and it was in the range of 2.38 m^2-3.44 m^2 in V_2F_4i.e. F4 (400:100:100) in Red Banana and V_1F_2 i.e. F_2 (100:100:100) in Konkan Safed Velchi.

Boot leaf stage (days)

A boot leaf emerges from the plant before the bunch emergence and its main purpose is to protect the top curved part of the peduncle and the upper portion of the bunch from sunburn or scorching.

The data presented in (Table 7) exhibited significant difference in boot leaf stage.

The least number of days required for boot leaf stage due to interaction effect of varieties and nitrogen were recorded in the treatment V_3F_1 (203.67) i.e. F_1 (200:100:100) in Grand Naine.

The more number of days required for boot leaf stage recorded in treatment V_2F_2 (314.17) i.e. F_2 (100:100:100) in Red Banana. The similar results were also reported by Venkatesam *et al.,* (1965) in Karpura Chakkar Keli and Kohli *et al.,* (1985).

Days required for commencement of flowering (days)

The least number of days required for commencement of flowering (Table 8) due to interaction effect of varieties and nitrogen were recorded non significantly in the treatment V_3F_1 (202.17) i.e. F1 (200:100:100) in Grand Naine.

The more number of days required for commencement of flowering recorded in treatment V_2F_2 (317.17) i.e. F_2(100:100:100) in Red Banana. The similar results were reported by Badgujar (2004).

Days required for fruiting (days)

The data pertaining to the number of days to fruiting is presented in (Table 9) which revealed that varieties, nitrogen levels and their interactions significantly varied for number of days from flowering to fruiting.

The least number of days required for commencement of fruiting due to nitrogen was recorded in the treatment V_3F_3 (194.17) i.e. F_3 (300:100:100) in Grand Naine. The more number of days required for commencement of fruiting recorded in treatment V_2F_2 (326.3) i.e. F_2 (100:100:100) in Red Banana.

Bunch weight (kg/plant)

The data pertaining to the weight of bunch were presented in (Table 10) which revealed that varieties, nitrogen levels and their interaction significantly varied for bunch weight. The highest bunch weight due to nitrogen were recorded in the treatment V_3F_3 (22.5) i.e. F_3 (300:100:100) in Grand Naine.

The lowest bunch weight was recorded in treatment V_1F_2 (7.8) i.e. F_2 (100:100:100) in Konkan Safed Velchi. Increased availability and uptake of nutrients at higher levels of N might have led to the better expression of growth and yield attributes which ultimately resulted in higher yield. Manica *et al.,* (1978) and Geetha (1998) reported similar findings related with this investigation.

Stalk weight (kg/plant)

The data pertaining to the stalk weight are presented in (Table 11) which revealed that varieties, nitrogen levels and their interaction significantly varied for stalk weight.

The lowest stalk weight recorded in treatment V_1F_4 (0.7) i.e. F_4 (400:100:100). The highest stalk weight due to nitrogen were recorded in the treatment V_3F_3 (1.2) i.e. F_3 (300:100:100) in Grand Naine in Konkan Safed Velchi. Similar findings were quoted by Geetha, (1998) in Banana.

Bunch Length (cm)

The lowest length of bunch (Table 12) recorded in treatment V_1F_2 (34.9) i.e. F_2 (100:100:100) in Konkan Safed Velchi. The highest length of bunch due to nitrogen were recorded in the treatment V_3F_3 (98.7) i.e. F_3 (300:100:100) in Grand Naine.

Table.1 Effect of varieties, nitrogen levels and their interactions on plant height (cm).

Treatment	Plant Height (cm)											
	210 DAP				240 DAP				270 DAP			
	V1	V2	V3	Mean	V1	V2	V3	Mean	V1	V2	V3	Mean
F_1	288.93	211.91	205.65	235.50	288.93	260.74	205.65	251.77	288.93	302.59	205.65	265.72
F_2	239.31	209.40	192.98	213.89	239.31	258.80	192.98	230.36	239.31	299.82	192.98	244.03
F_3	306.24	213.18	213.86	244.43	306.24	262.88	213.86	260.99	306.24	308.70	213.86	276.27
F_4	260.74	211.62	196.61	222.99	260.74	261.02	196.61	239.46	260.74	302.87	196.61	253.41
F_5	287.88	211.09	202.34	233.77	287.88	260.08	202.34	250.10	287.88	301.93	202.34	264.05
Mean	276.6	211.4	202.3		276.6	260.7	202.3		276.6	303.2	202.3	
	Result	S.E. ±	C.D. at 5%		Result	S.E. ±	C.D. at 5%		Result	S.E. ±	C.D. at 5%	
V	SIG	4.28	16.80		SIG	4.33	16.99		SIG	4.38	17.18	
F	SIG	5.53	15.50		SIG	5.54	15.50		SIG	4.02	11.73	
V×F	SIG	6.57	18.40		SIG	6.94	20.24		SIG	6.96	20.32	

Table.2 Effect of varieties, nitrogen levels and their interactions on plant girth (cm).

Treatment	Plant Girth (cm)											
	210 DAP				240 DAP				270 DAP			
	V1	V2	V3	Mean	V1	V2	V3	Mean	V1	V2	V3	Mean
F1	60.09	60.56	52.04	57.56	60.09	64.31	52.04	58.81	60.09	68.04	52.04	60.06
F2	49.67	58.45	43.25	50.46	49.67	62.13	43.25	51.68	49.67	66.03	43.25	52.98
F3	67.07	61.66	53.35	60.69	67.07	65.46	53.35	61.96	67.07	**68.96**	53.35	**63.13**
F4	55.67	59.18	46.66	53.83	55.67	62.85	46.66	55.06	55.67	66.75	46.66	56.36
F5	56.49	59.33	48.01	54.61	56.49	63.13	48.01	55.88	56.49	66.96	48.01	57.15
Mean	57.8	59.8	48.7		57.8	63.6	48.7		57.8	**67.3**	48.7	
	Result	S.E. ±	C.D. at 5%		Result	S.E. ±	C.D. at 5%		Result	S.E. ±	C.D. at 5%	
V	SIG	0.50	1.97		SIG	0.47	1.83		SIG	0.52	2.05	
F	SIG	0.37	1.08		SIG	0.37	1.09		SIG	0.36	1.06	
V×F	SIG	0.64	1.88		SIG	0.65	1.89		SIG	0.63	1.83	

Table.3 Effect of varieties, nitrogen levels and their interactions on number of leaves/ plant.

Treatment	Number of leaves/plant											
	210 DAP				240 DAP				270 DAP			
	V1	V2	V3	Mean	V1	V2	V3	Mean	V1	V2	V3	Mean
F1	15.42	9.00	12.42	12.28	15.42	10.83	12.42	12.89	15.42	11.92	12.42	13.25
F2	13.67	8.42	11.17	11.08	13.67	9.75	11.17	11.53	13.67	11.25	11.17	12.03
F3	16.33	9.25	12.83	12.81	16.33	11.33	12.83	13.50	**16.33**	12.67	12.83	**13.94**
F4	14.58	8.42	11.58	11.53	14.58	9.61	11.58	11.93	14.58	11.25	11.58	12.47
F5	14.67	8.67	11.83	11.72	14.67	9.55	11.83	12.02	14.67	11.58	11.83	12.69
Mean	14.9	8.8	12.0		14.9	10.2	12.0		**14.9**	11.7	12.0	
	Result	S.E. ±	C.D. at 5%		Result	S.E. ±	C.D. at 5%		Result	S.E. ±	C.D. at 5%	
V	SIG	0.09	0.34		SIG	0.27	1.06		SIG	0.21	0.84	
F	SIG	0.12	0.35		SIG	0.18	0.51		SIG	0.14	0.40	
V×F	SIG	0.21	0.60		NS	0.30	-		NS	0.24	-	

Table.4 Effect of varieties, nitrogen levels and their interactions on number of suckers/plant

Treatment	Number of suckers/plant																			
	150 DAP				180 DAP				210 DAP				240 DAP				270 DAP			
	V1	V2	V3	Mean	V1	V2	V3	Mean	V1	V2	V3	Mean	V1	V2	V3	Mean	V1	V2	V3	Mean
F1	0.17	0.08	1.60	0.62	0.50	0.53	2.13	1.06	1.33	0.75	2.53	1.54	2.42	1.25	3.33	2.33	2.58	2.00	3.33	2.64
F2	0.00	0.00	0.53	0.18	0.25	0.00	1.33	0.53	1.25	0.25	1.33	0.94	1.75	0.92	1.87	1.51	2.00	1.33	1.87	1.73
F3	0.33	0.17	1.73	0.74	0.58	0.80	2.93	1.44	2.42	1.08	3.87	2.46	3.67	1.75	5.07	3.49	4.00	3.58	**5.07**	**4.22**
F4	0.17	0.08	1.47	0.57	0.33	0.27	2.27	0.96	1.50	0.67	2.53	1.57	2.08	1.08	3.07	2.08	2.25	1.42	3.07	2.24
F5	0.17	0.08	1.33	0.53	0.42	0.27	2.27	0.98	1.75	0.42	2.40	1.52	2.42	0.50	3.33	2.08	2.50	1.08	3.33	2.31
Mean	0.2	0.1	1.3		0.4	0.4	2.2		1.7	0.6	2.5		2.5	1.1	3.3		2.7	1.9	**3.3**	
	Result	S.E. ±	C.D. at 5%		Result	S.E. ±	C.D. at 5%		Result	S.E. ±	C.D. at 5%		Result	S.E. ±	C.D. at 5%		Result	S.E. ±	C.D. at 5%	
V	SIG	0.07	0.28		SIG	0.07	0.27		SIG	0.11	0.42		SIG	0.07	0.27		SIG	0.14	0.53	
F	SIG	0.09	0.28		SIG	0.09	0.28		SIG	0.12	0.35		SIG	0.18	0.53		SIG	0.10	0.56	
V×F	NS	0.16	-		NS	0.16	-		SIG	0.24	0.46		NS	0.16	-		NS	0.30	-	

Table.5 Effect of varieties, nitrogen levels and their interactions on leaf area (m^2).

Treatment	Leaf area (m^2)							
	240 DAP				270 DAP			
	V1	V2	V3	Mean	V1	V2	V3	Mean
F1	8.92	9.36	6.26	8.18	8.92	10.17	6.40	8.50
F2	7.72	9.52	6.15	7.80	7.72	11.02	6.29	8.34
F3	9.75	9.39	6.27	8.47	9.75	9.82	6.41	8.66
F4	7.88	9.61	6.18	7.89	7.88	**11.85**	6.32	**8.68**
F5	8.07	9.33	6.17	7.86	8.07	9.98	6.31	8.12
Mean	8.5	9.4	6.2		8.5	**10.6**	6.3	
	Result	S.E. ±	C.D. at 5%		Result	S.E. ±	C.D. at 5%	
V	SIG	0.14	0.55		SIG	0.13	0.51	
F	SIG	0.11	0.33		SIG	0.11	0.33	
V×F	SIG	0.20	0.57		SIG	0.20	0.57	

Table.6 Effect of varieties, nitrogen levels and their interactions on leaf area index (m^2)

Treatment	Leaf area Index(m^2).											
	60 DAP				90 DAP				120 DAP			
	V1	V2	V3	Mean	V1	V2	V3	Mean	V1	V2	V3	Mean
F1	0.06	0.13	0.33	0.175	0.22	0.26	0.64	0.373	0.30	0.34	0.98	0.540
F2	0.04	0.10	0.30	0.147	0.11	0.24	0.60	0.317	0.19	0.32	0.94	0.484
F3	0.09	0.16	0.34	0.195	0.30	0.29	0.64	0.410	0.38	0.37	0.98	0.576
F4	0.05	0.12	0.31	0.160	0.19	0.25	0.61	0.349	0.26	0.33	0.95	0.516
F5	0.06	0.12	0.30	0.159	0.20	0.25	0.61	0.355	0.28	0.33	0.95	0.521
Mean	0.06	0.13	0.3		0.2	0.3	0.6		0.28	0.34	1.0	
	Result	S.E. ±	C.D. at 5%		Result	S.E. ±	C.D. at 5%		Result	S.E. ±	C.D. at 5%	
V	SIG	0.0013	0.0032		SIG	0.005	0.018		SIG	0.0044	0.017	
F	SIG	0.003	0.010		SIG	0.01	0.03		SIG	0.01	0.03	
V×F	NS	0.06	-		SIG	0.02	0.06		SIG	0.02	0.06	

Table.7 Effect of varieties, nitrogen levels and their interactions on boot leaf stage

Treatment	Boot leaf stage (days)			
	V1	**V2**	**V3**	**Mean**
F1	220.89	284.17	204.00	236.35
F2	243.17	314.17	230.67	262.67
F3	212.00	278.83	186.83	225.89
F4	233.50	295.50	223.17	250.72
F5	240.17	305.06	222.33	255.85
Mean	229.9	295.5	213.4	
	Result	S.E. ±	C.D. at 5%	
V	SIG	1.59	6.24	
F	SIG	1.36	3.98	
V×F	SIG	2.36	6.89	

Table.8 Effect of varieties, nitrogen levels and their interactions on days required for commencement of flowering

Treatment	Days to flowering (days)			
	V1	**V2**	**V3**	**Mean**
F1	223.56	287.67	202.17	237.80
F2	245.83	317.17	233.67	265.56
F3	214.56	281.50	198.67	231.57
F4	236.17	298.33	224.50	253.00
F5	242.83	307.83	223.50	258.06
Mean	232.6	298.5	216.5	
	Result	S.E. ±	C.D. at 5%	
V	SIG	1.61	6.33	
F	SIG	2.03	5.92	
V×F	NS	3.51	-	

Table.9 Effect of varieties, nitrogen levels and their interactions on days required for commencement of fruiting

Treatment	Days to fruiting (days)			
	V1	**V2**	**V3**	**Mean**
F1	228.94	294.67	207.67	243.76
F2	252.00	326.33	240.33	272.89
F3	219.72	287.83	**194.17**	**233.91**
F4	242.50	305.50	229.17	259.06
F5	248.33	315.17	229.00	264.17
Mean	238.3	305.9	**220.1**	
	Result	S.E. ±	C.D. at 5%	
V	SIG	0.98	3.83	
F	SIG	1.26	3.68	
V×F	SIG	2.18	6.37	

Table.10 Effect of varieties, nitrogen levels and their interactions on bunch weight (kg)

Treatment	Bunch weight (kg)			
	V1	**V2**	**V3**	**Mean**
F1	8.96	10.49	18.91	12.79
F2	7.76	9.84	15.93	11.18
F3	10.63	10.94	22.45	14.67
F4	7.82	9.85	17.81	11.82
F5	8.10	9.65	17.83	11.86
Mean	8.7	10.2	18.6	
	Result	S.E. ±	C.D. at 5%	
V	SIG	0.40	1.59	
F	SIG	0.34	0.98	
V×F	SIG	0.58	1.70	

Table.11 Effect of varieties, nitrogen levels and their interactions on stalk weight (kg)

Treatment	Stalk weight (kg)			
	V1	**V2**	**V3**	**Mean**
F1	0.84	1.08	1.07	0.99
F2	0.93	0.99	1.08	1.00
F3	0.89	1.12	1.24	1.08
F4	0.69	0.96	1.04	0.89
F5	0.93	1.06	1.01	1.00
Mean	0.9	1.0	1.1	
	Result	S.E. ±	C.D. at 5%	
V	SIG	0.03	0.10	
F	SIG	0.02	0.06	
V×F	SIG	0.04	0.11	

Table.12 Effect of varieties, nitrogen levels and their interactions on bunch length (cm)

Treatment	Bunch Length (cm)			
	V1	**V2**	**V3**	**Mean**
F1	43.10	47.17	91.09	60.45
F2	34.85	44.28	83.72	54.28
F3	49.97	49.47	98.65	66.03
F4	40.43	44.38	87.06	57.29
F5	40.28	46.08	86.58	57.65
Mean	41.7	46.3	89.4	
	Result	S.E. ±	C.D. at 5%	
V	SIG	1.01	3.95	
F	SIG	0.27	2.26	
V×F	SIG	1.34	3.91	

Table.13 Effect of varieties, nitrogen levels and their interactions on number of fingers per hands

Treatment	Number of fingers per hand			
	V1	**V2**	**V3**	**Mean**
F1	14.77	16.55	16.83	16.05
F2	13.72	14.70	13.83	14.08
F3	16.62	17.90	18.44	17.66
F4	14.75	15.37	14.61	14.91
F5	15.17	14.91	14.92	15.00
Mean	15.0	15.9	15.7	
	Result	S.E. ±	C.D. at 5%	
V	NS	0.34	-	
F	SIG	0.21	0.61	
V×F	SIG	0.36	1.07	

Table.14 Effect of varieties, nitrogen levels and their interactions on fruit length (cm)

Treatment	Fruit Length (cm)			
	V1	**V2**	**V3**	**Mean**
F1	9.14	14.40	18.26	13.93
F2	8.01	13.34	17.31	12.88
F3	10.45	14.89	19.92	15.09
F4	9.23	13.78	17.93	13.65
F5	8.90	13.80	18.06	13.59
Mean	9.1	14.0	18.3	
	Result	S.E. ±	C.D. at 5%	
V	SIG	0.13	0.50	
F	SIG	0.20	0.59	
V×F	NS	0.35	-	

Table.15 Effect of varieties, nitrogen levels and their interactions on days required from flowering to harvest

Treatment	Days from flowering to harvest (days)			
	V1	**V2**	**V3**	**Mean**
F1	108.33	108.50	98.83	105.22
F2	125.33	131.00	125.83	127.39
F3	105.17	107.67	94.00	102.28
F4	113.33	117.50	124.33	118.39
F5	120.17	118.50	126.00	121.56
Mean	114.5	116.6	113.8	
	Result	S.E. ±	C.D. at 5%	
V	NS	1.68	-	
F	SIG	2.00	5.84	
V×F	SIG	3.46	10.11	

Table.16 Effect of varieties, nitrogen levels and their interactions on yield (kg/plant)

Treatment	Yield (kg/plant)			
	V1	**V2**	**V3**	**Mean**
F1	8.96	10.49	18.91	12.79
F2	7.76	9.84	15.93	11.18
F3	10.63	10.94	22.45	14.67
F4	7.82	9.85	17.81	11.82
F5	8.10	9.65	17.83	11.86
Mean	8.7	10.2	18.6	
	Result	S.E. ±	C.D. at 5%	
V	SIG	0.40	1.59	
F	SIG	0.34	0.98	
V×F	SIG	0.58	1.70	

Table.17 Effect of varieties, nitrogen levels and their interactions on yield (t/ha)

Treatment	Yield (t/ha)			
	V1	**V2**	**V3**	**Mean**
F1	27.66	32.37	58.36	39.47
F2	23.93	30.38	49.17	34.49
F3	32.79	33.75	69.29	45.27
F4	24.12	30.41	54.95	36.49
F5	25.01	29.79	55.03	36.61
Mean	26.7	31.3	57.4	
	Result	S.E. ±	C.D. at 5%	
V	SIG	1.25	3.16	
F	SIG	1.61	5.49	
V×F	SIG	2.79	5.36	

Number of fingers per hand

The maximum number of fingers (Table 13) due to nitrogen were recorded in the treatment V_3F_3 (18.4) i.e. F_3 (300:100:100) in Grand Naine which was at par with V_2F_3 (17.9). The minimum number of fingers recorded in treatment V_1F_2 (13.7) i.e. F_2 (100:100:100) in Konkan Safed Velchi.

It has might be due to optimum use of nutrients and genetic characters of variety Manica *et al.,* (1978), (Geetha, 1998) and Mustaffa (1988) shown similar result.

Fruit length average (cm)

The highest length of fruit (Table 14) due to nitrogen were recorded in the treatment V_3F_3 (19.9) i.e. F_3 (300:100:100) in Grand Naine. The lowest length of fruit recorded in treatment V_1F_2 (8.01) i.e. F_2 (100:100:100) in Konkan Safed Velchi. Similar results were also reported by Chattopadhyay *et al.,* (1980) in Banana.

Days from flowering to harvest (days)

The critical perusal of data presented in (Table 15) revealed significant effect of

interaction on the days from flowering to harvesting. The least number of days required for maturity due to nitrogen were recorded in the treatment V_3F_3 (94) i.e. F_3 (300:100:100) in Grand Naine which was at par with V_3F_1 (98.8). The more number of days required for maturity were recorded in treatment V_2F_2 (131) i.e. F_2 (100:100:100) in Red Banana. Nitrogen reduced phyllochron and increased the leaf area in a short span of time there by helping the plant to attain early physiological maturity.

Yield (kg/plant)

The highest yield (kg/plant) (Table 16) due to nitrogen was recorded in the treatment V_3F_3 (69.29) i.e. F_3 (300:100:100) in Grand Naine. The lowest yield recorded in treatment V_1F_2 (23.93) i.e. F_2 (100:100:100) in Konkan Safed Velchi. Increased availability and uptake of nutrients led to the better expression of growth and yield attributes which ultimately resulted in higher yield. Similar results were reported by Balasubrahmanyam *et al.,* (2003) in banana cv. Grand Naine.

Yield (t/ha)

The highest yield (t/ha) (Table 17) due to nitrogen was recorded in the treatment V_3F_3 (69.29) i.e. F_3 (300:100:100) in Grand Naine. The lowest yield recorded in treatment V_1F_2 (23.93) i.e. F_2 (100:100:100) in Konkan Safed Velchi.

The considering overall performance of different banana varieties and NPK fertilizer levels, it can be concluded that to get better vegetative growth, Red Banana performed well and for yield, Grand Naine performed the best. For obtaining maximum yield of banana, Nitrogen dose F_3 i.e. (300:100:100 g NPK/ plant) in Grand Naine was performed best for yield under Konkan agro-climatic condition of Maharashtra. Among all the three varieties sensory score (8.5) i.e. liked very much was obtained in Konkan Safed Velchi.

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