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Effect of Different Doses of Nitrogen to Banana Cultivars (*Musa Paradisica* L. and *Musa accuminata* L.)

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A B S T R A C T

The experiment entitled "Effect of different doses of nitrogen to banana cultivars (*Musa Paradisica* L. and *Musa accuminata* L.)" was carried out at college of Horticulture, Dr. Balasaheb Sawant Konkan Krishi Vidyapith, Dapoli, Dist. Ratnagiri (Maharashtra) during 2017-19. The experiment was executed in split plot design with fifteen treatment combinations with three replications. 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 result of investigation revealed that, all the three varieties, nitrogen levels and their interaction recorded significant variation on quality parameters. The highest shelf life due to nitrogen was recorded in the treatment V_1F_1 (12.6) i.e. F_1 (200:100:100) in Konkan Safed Velchi, The highest TSS due to nitrogen was recorded in the treatment V_1F_3 (26.6) i.e. F_3 (300:100:100) in Konkan Safed Velchi, The lowest acidity recorded in treatment V_3F_2 (1.04) i.e. F_2 (100:100:100) in Grand Naine, the V_1 (Konkan Safed Velchi) recorded the highest net returns of 364325/- ha with cost benefit ratio of 1.6, Among the all three varieties sensory score (8.5) i.e. liked very much was obtained in Konkan Safed Velchi, whereas lowest sensory score obtained in Red Banana (7.9).

Introduction

The banana is one of the oldest fruits known to mankind and have been named botanically as *Musa paradisica* as it was said to be the Apple of Paradise (Rao, 2005). Banana is cultivated over a wide range from 20°C N to 20°S of the equator in tropical and subtropical region, though it prefers tropical climate. It can be grown in a wide range of soils having a good drainage and humus content. They are cultivated in 130 countries, mainly in the tropical and subtropical regions of the southern hemisphere, Banana is grown over a harvested area of approximately 10 million hectares worldwide, with an annual production of over 81.2 million tones.

Nitrogen is a vitally important plant nutrient. Plants

normally contain 1-5 per cent by weight of this nutrient. Being a constituent of protein and chlorophyll, it is necessary for all important process of plant life. In banana, it is the chief promoter of growth.

It induces the vegetative growth of pseudostem and leaves giving them desired healthy green colour. A healthy robust vegetative frame work is an essential pre-requisite for high yields and nitrogen is mainly responsible for such a vegetative structure. Nitrogen also increases the bunch grade and sucker production. Nitrogen deficiency causes slow growth and paler leaves with reduced leaf area and rate of leaf production.

In view of the above background information, an attempt was made to evaluate the effectiveness of nitrogen as supplementary source to fertilizer-N with the following objectives *i.e.,* to study the response of banana cultivars i) Konkan Safed Velchi, ii) Red Banana and iii) Grand Naine to various doses of Nitrogen and to find out best fertilizer dose combination for improving yield and quality of Banana produce.

Materials and Methods

The present experiment was conducted in split plot design consisting of 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 (400:100:100 g NPK/plant) and F_5 (500:100:100 g NPK/plant) were replicated thrice. The data obtained during present investigation was statistically analysed as per the methods prescribed by Panse and Sukhatme (1995).

Results and Discussion

The data presented in table 1 shows that varieties and nitrogen levels, showed significant effect on shelf life while interaction showed non-significant effect. The highest shelf life due to nitrogen was recorded in the treatment V_1F_1 (12.6) i.e. F_1 (200:100:100) in Konkan Safed Velchi. The lowest shelf life recorded in treatment V_3F_2 (7.2) i.e. F_2 (100:100:100) in Grand Naine. Shelf life varied non-significantly. Similar result was also reported by Geetha (1998) in Banana.

The data pertaining to the TSS are presented in table 2 which revealed that varieties, nitrogen levels and their interaction significantly varied for TSS. The highest TSS due to nitrogen was recorded in the treatment V_1F_3 (26.6) i.e. F_3 (300:100:100) in Konkan Safed Velchi.

The lowest TSS was recorded in treatment V_2F_2 (20.7) i.e. F_2 (100:100:100) in Red Banana. Result varied non-significantly. The similar result was also reported by (Geetha, 1998) in Banana.

The highest acidity (presented in table 3) due to nitrogen was recorded in the treatment V_1F_1 (0.17) i.e. F_1 (200:100:100) in Konkan Safed Velchi was at par withV_1F_3 (0.20), V_2F_1 (0.22) and V_2F_3 (0.23). The lowest acidity recorded in treatment V_3F_2 (1.04) i.e. F_2 (100:100:100) in Grand Naine. Similar result reported by Beena *et al.,* (1993) and Firoz Hussain *et al.,* (2015) in Banana.

Table.1 Effect of varieties, nitrogen levels and their interactions on shelf life.

Treatment	Shelf life (Days)			
		V_2	V_3	**Mean**
F_1	12.57	10.50	9.00	10.69
F_2	10.82	9.88	7.20	9.30
F_3	11.33	10.71	8.41	10.15
F_4	11.66	10.42	7.73	9.94
F_5	10.33	10.00	7.47	9.27
Mean	11.3	10.3	8.0	
	Result	S.M. ±	C.D.	
V	SIG	0.07	0.27	
F	SIG	0.24	0.69	
V×F	NS	0.41	-	

Table.2 Effect of varieties, nitrogen levels and their interactions on TSS (^{0} Brix).

Treatment	TSS (^{0} Brix)			
		V_2	V_3	**Mean**
F_1	27.11	22.49	23.70	24.43
F_2	24.33	20.67	20.99	22.00
F_3	26.56	22.83	22.92	24.10
F_4	24.33	21.19	22.52	22.68
F_5	25.29	21.67	22.15	23.04
Mean	25.5	21.8	22.5	
	Result	S.M. ±	C.D.	
V	SIG	0.16	0.64	
F	SIG	0.24	1.69	
V×F	NS	0.41	-	

Table.3 Effect of varieties, nitrogen levels and their interactions on acidity (%).

Treatment	Acidity (%)			
	V_1	V_2	V_3	**Mean**
F_1	**0.17**	0.22	0.70	**0.36**
F_2	0.26	0.24	0.92	0.51
F_3	0.20	0.23	0.80	0.41
F_4	0.24	0.24	0.94	0.47
F_5	0.23	0.25	0.81	0.43
Mean	**0.22**	0.23	0.8	
	Result	S.M. ±	C.D.	
V	SIG	0.01	0.05	
F	SIG	0.01	0.04	
V×F	SIG	0.02	0.06	

Table.4 Sensory evaluation

Variety	Sensory score			Total score	Average score
	Colour	Flavour	Texture		
Konkan Safed Velchi	8.5	8.5	8.5	25.5	8.5
Red Banana	7.8	8	8	23.8	7.9
Grand Naine	8	8.1	8	24.1	8

Table.5 Economics of Banana cultivation under the influence of different varieties and nitrogen treatments.

Sr. No.	Treatments	Yield t/ha	Gross Returns `/ha	Cost of Cultivation `/ha	Net Returns `/ha	C:B Ratio
1	2	3	4	5	6	7
A.	**VARIETIES**					
	V_1 (Konkan Safed Velchi)	27	968069/-	603744/-	**364325**/-	**1.6**
	V_2 (Red Banana)	31.33	717957/-	583537/-	134420/-	1.2
	V_3 (Grand Naine)	57	590228/-	540770/-	49457/-	1.09
B.	**FERTILIZER**					
	F_1 (200:100:100NPK/plant)	39.33	829774/-	589520/-	240253/-	1.4
	F_2 (100:100:100NPK/plant)	34.33	717957/-	570984/-	146973/-	1.2
	F_3 (300:100:100NPK/plant)	45	983713/-	615334/-	**368379**/-	**1.5**
	F_4 (400:100:100NPK/plant)	36.99	723512/-	576396/-	147116/-	1.2
	F_5 (500:100:100NPK/plant)	36.3	750206/-	585254/-	164952/-	1.2
C	**INTERACTION**					
	V_1F_1	27.8	968065/-	612584/-	355480/-	1.5
	V_1F_2	24	837585/-	586472/-	251112/-	1.4
	V_1F_3	32.8	1147650/-	647057/-	**500592**/-	**1.7**
	V_1F_4	24.1	844095/-	600880/-	243214/-	1.4
	V_1F_5	25	875210/-	610672/-	264537/-	1.4
	V_2F_1	39	971160/-	618150/-	353009/-	1.5
	V_2F_2	34	911280/-	603755/-	307524/-	1.5
	V_2F_3	45	1012350/-	629457/-	382892/-	1.6
	V_2F_4	36	912210/-	617182/-	295027/-	1.4
	V_2F_5	35	893790/-	618719/-	275070/-	1.4
	V_3F_1	58.1	875445/-	602198/-	273246/-	1.4
	V_3F_2	49	737550/-	574800/-	162749/-	1.2
	V_3F_3	69	1038000/-	633732/-	404267/-	1.6
	V_3F_4	54.4	824220/-	602517/-	221702/-	1.3
	V_3F_5	55	825465/-	607332/-	218132/-	1.5

The results presented in table 4 revealed that fruits of all three varieties of Banana were acceptable and the sensory score was in the range of 7.9 to 8.5. Among the all three varieties sensory score (8.5) i.e. liked very much was obtained in Konkan Safed Velchi, whereas lowest sensory score obtained in Red Banana (7.9).

The V_1 (Konkan Safed Velchi) recorded the highest gross returns of 968069/- ha with cost benefit ratio of 1.6 F_3 (300:100:100NPK/plant) recorded the highest gross returns of 983713/- ha with cost benefit ratio of 1.5 (presented in table 5) whereas among the interaction between varieties and nitrogen levels V_1F_3 recorded the highest gross returns of 1147650/- ha with cost benefit ratio 1.7. The V_1 (Konkan Safed Velchi) recorded the highest net returns of ` 364325/- ha with cost benefit ratio of 1.6 F_3 (300:100:100NPK/plant) recorded the highest net returns of 368379/- ha with cost benefit ratio of 1.5 whereas among the interaction between varieties and nitrogen levels V_1F_3 recorded the highest net returns of 500592/- ha with cost benefit ratio 1.7.

For maintaining the quality of Banana shelf life was highest in Konkan Safed Velchi with RDF i.e. F1(200:100:100NPK g /plant). Among all the three varieties sensory score (8.5) i.e. liked very much was obtained in Konkan Safed Velchi. From these studies, it could be concluded that Konkan Safed Velchi can be successfully grown with 10 kg FYM + fertilizer dose 300:100:100 g NPK/plant which proved to be the superior combination for good quality Banana fruits.

Author Contributions

Vedika V. More: Investigation, formal analysis, writing—original draft. R. S. Patil: Validation, methodology, writing—reviewing. B. R. Salvi:—Formal analysis, writing—review and editing. C. D. Pawar: Investigation, writing—reviewing. V. G. Salvi: Resources, investigation writing—reviewing.

Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethical Approval Not applicable.

Consent to Participate Not applicable.

Consent to Publish Not applicable.

Conflict of Interest The authors declare no competing interests.

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