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Bunch improvement in banana Cv. grand naine

NB Shaikh, VM Rajenimbalkar and AR Mendhe**Abstract**

With a view to improve the weight and size of fingers of banana for domestic as well as export market, the present investigation entitled, "Bunch Improvement in Banana Cv. Grand Naine" was conducted at AICRP on Banana Jalgaon under the Mahatma Phule Krishi Vidyapeeth, Rahuri during the year 2014 - 2017. The treatments under 'dehanding' were no-dehanding, dehanding at 10th hand and 8th hand while treatments under bunch sprays were water spraying (control), 0.5% Potassium dihydrogen phosphate (KH₂PO₄) + 1% Urea, 2% Sulphate of Potash (SOP) and 1% 19:19:19 grade fertilizer. The dehanding of bunch after 8th hand has recorded significantly maximum finger length, finger girth, finger weight, bunch weight and yield. Under spraying treatments significantly maximum finger length, finger girth, finger weight bunch weight and yield were found under 0.5% KH₂PO₄ + 1% urea spray. The pooled results of interaction under dehanding after 8th hands + spraying 0.5% KH₂PO₄ + 1% urea showed significantly maximum finger girth, finger weight and bunch weight. The treatment combination dehanding after 8th hands with spraying 0.5% KH₂PO₄ + 1% urea gave the best results in respect of yield traits, B: C ratio, sustainable yield index and sustainable value index after three series of trial.

Keywords: Dehanding, finger, bunch, KH₂PO₄, SOP, 19:19:19 grade**Introduction**

In India banana is one of the major economically important crop, the second largest growing fruit crop, occupy 20% area among the total area under crop. Total area under banana crop is 8, 83,000 ha and total production is 30.80 million MT. with productivity 52.05 Mt/ha. And production share of major fruit crops in India is 33.6per cent (Anonymous, 2018) ^[1].

Banana is one of heavy feeder of nutrients. However, it draws the nutrients from a very limited depth of soil because it has a shallow root system. The choice and dosage of nutrients applied mainly depends on the cultivar, initial soil fertility, stage of the plant growth and climate (Lahav and Turner, 1983) ^[7]. Under traditional farming system, banana crop receives its last dose of fertilizer (nitrogen and potassium) at 7th month after planting to support the requirement of nutrients till harvest, since large quantity of photosynthetic move from the source to the sink i.e. developing bunches at this phase. Any limitation in the supply of nutrients at this stage leads to poor finger filling & development, reduce the bunch size and quality (Jeyakumar *et al.*, 2010) ^[5]. However, it is not advisable to go for soil application of fertilizers at finger development stage, since the uptake is slow and low at this stage. The uptake of nutrients is very slow and low at bunch development stage. As uptake of nutrients through the finger peel is considerably faster than through roots, bunch spray of water-soluble fertilizers and nutrients at this stage is being successfully used to increase the yield of banana (Sandhya *et al.*, 2018) ^[9]. In banana, fruit quality is mainly judged by the sugar content and acidity in the pulp. The foliar and bunch spray of sulphate of potash appeared to be effective in enhancing various quality parameters such as TSS, reducing sugar, non-reducing sugar, total sugars and acidity (Gamit *et al.*, 2017) ^[3]. In general, the last hands are discarded or sold at lower prices because they fail to meet the standard of specialized markets. Fingers of the distal hand (at the bottom of bunch) are 30-40% smaller than proximal fingers at the top of the bunch. Due to competition for assimilate; pulp cell number is reduced in younger fruits of distal hands, which ultimately become determining factor in decreasing pulp dry weight in distal hands (Jullien *et al.*, 2001) ^[6].

Keeping all these factors in consideration a study on "Bunch improvement in banana cv. Grand Naine (AAA)" was taken during 2014-17 with objectives to improve the weight and size of individual banana fingers for domestic as well as export market and to study the economics of treatments.

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Material and Methods

There were major two sets of treatments 'Dehanding' and 'Bunch spray'. Under dehanding group of treatments, there were three treatments viz., D₁ No dehanding, D₂ dehanding at 10th hands and D₃ dehanding at 8th hands. Under bunch spray group of treatments there were four treatments viz., S₁ water spraying, S₂ 0.5% KH₂PO₄+1% Urea, S₃ 2% SOP and S₄ 1% 19:19:19 grade fertilizer. The experiment was laid out in a factorial randomized block design having 12 treatment combination with 3 replications. The de-handing treatments were applied immediately after opening of all hands in a bunch while under the spraying treatments, first spray was taken immediately after all hands were opened and de-handed while second spray was taken 15 days after 1st spray. The observations were taken during harvesting of bunches. The data so obtained was subjected to statistical analysis by using method of Fisher's analysis of variance (ANOVA) for factorial randomized block design (FRBD). The level of significance used in 'F' and 't' tests was P=0.05 (Fisher and Yates, 1963) [2].

Results and Discussions

The pooled results of interaction showed significantly maximum finger length (24.26 cm) under de-handing after 8 hands + spraying 0.5% KH₂PO₄ + 1% urea which was at par with interaction combination de-handing after 8 hands + spraying 2% SoP (24.01 cm). Similarly significantly maximum finger girth (13.77 cm) and maximum finger

weight (194.0 gm) were found under de-handing after 8 hands KH₂PO₄ 5% + urea 1% spray combination. The bunch weight was found to be non-significant under different treatment combinations. The yield tons per ha was significantly maximum (116.30 t) under de-handing after 8 hands + KH₂PO₄ 5% + urea 1% spray combination. It was followed by no dehanding + KH₂PO₄ 5% + urea 1% spray combinations (114.30 mt). The higher yield may be due to de handing because of higher fruit filling as result of lesser sink because of reduction in the number of hands in a bunch. These results are in conformity with Hasan *et al.* (2007) [4], Vargas-Calvo (2014) Sarkar *et al.* (2015) [10], while spraying of KH₂PO₄ and Urea resulted in the increase in the cell wall plasticity, cell division, cell differentiation and stimulation of photosynthetic activity due to increased CO₂ fixation and further increase in protein biosynthesis. These results are in conformity with the results reported by Hanumanthaiah *et al.* (2015) and Sarkar *et al.* (2015) [10]. Venkatarayappa *et al.* (1979) [12] Sateesh and Bangarusamy (2006) [11]. Similar types of results as reported by Jullien *et al.* (2001) [6], Rajni *et al.* (2017) [8] and Priya and Pandian (2019) in banana bunch improvement studies. The treatment de-handing after 8 hands recorded the net income of Rs.6, 03590/- with B: C ratio of 2.70 while the treatments spraying bunches with 0.5% KH₂PO₄ + 1% urea recorded maximum net income of Rs.5, 04166 with B: C ratio 2.42. The interaction treatment combination de-handing after 8 hands + spraying 0.5% KH₂PO₄ + 1% urea recorded the maximum net returns of Rs. 6, 34,383 with B: C ratio 2.79.

Table 1: Yield attributes as influenced by spraying of different chemicals and de-handing (Pooled mean of 3 years)

Treatment	Finger Length (cm)	Finger Girth (cm)	Finger Weight (g)	Bunch Weight (kg)	Yield (MT/ha)	Gross Monetary returns (Rs./ha)	Net Income Rs./ha	B:C ratio
A) De-handing								
D ₁ - No de-handing	21.34	12.37	152.05	25.95	115.32	7,05920	3,53920	2.17
D ₂ - 10 hands	22.55	13.22	171.00	25.84	114.83	8,25075	4,72075	2.33
D ₃ - 8 hands	23.70	13.58	188.72	26.36	117.14	956590	6,03590	2.70
S.E. _±	0.07	0.03	1.92	0.26	1.16	-	-	-
CD at 5%	0.24	0.13	6.64	0.90	4.04	-	-	-
B) Chemical spraying								
S ₁ -Water spray	22.03	12.81	164.06	24.85	110.42	6,75904	3,22756	1.91
S ₂ -0.5% KH ₂ PO ₄ + 1% Urea	22.98	13.26	175.22	26.76	118.92	8,58000	5,04166	2.42
S ₃ -2% SOP	22.72	13.16	172.93	26.60	118.22	8,48400	4,94700	2.39
S ₄ -1% 19:19:19	22.39	12.99	170.16	25.98	115.49	8,30100	4,76569	2.34
S.E. _±	0.04	0.08	1.08	0.23	1.03	-	-	-
CD at 5%	0.13	0.26	3.74	0.80	3.57	-	-	-
Interactions								
D ₁ S ₁	20.52	12.05	144.0	24.34	108.18	6,61504	3,09504	1.87
D ₁ S ₂	21.86	12.55	156.8	26.96	119.79	8,57250	5,04083	2.42
D ₁ S ₃	21.57	12.52	155.5	26.79	119.08	8,5590	5,00867	2.41
D ₁ S ₄	21.39	12.38	151.8	25.70	114.22	8,20575	4,68575	2.33
D ₂ S ₁	22.17	12.90	165.2	24.53	109.04	7,81650	4,28169	2.21
D ₂ S ₂	22.81	13.46	174.8	26.42	117.40	8,44500	4,90333	2.38
D ₂ S ₃	22.57	13.41	173.2	26.51	117.81	8,47350	4,93317	2.39
D ₂ S ₄	22.66	13.14	170.6	25.89	115.06	8,26875	4,73011	2.33
D ₃ S ₁	23.41	13.50	182.8	25.66	114.06	9,28625	5,75377	2.62
D ₃ S ₂	24.26	13.77	194.0	26.91	119.58	9,88550	6,34383	2.79
D ₃ S ₃	24.01	13.57	190.0	26.49	117.75	9,54125	6,00092	2.69
D ₃ S ₄	23.12	13.46	188.0	26.37	117.19	9,55145	6,01281	2.69
S.E. _±	0.15	0.03	1.07	0.15	0.68	6,61504	-	-
CD at 5%	0.46	0.09	3.16	0.45	1.99	8,57250	-	-

Conclusion

The treatment combination de-handing after 8th hands with spraying 0.5% KH₂PO₄ + 1% urea gave the best results in

respect of yield traits, net income and higher B: C ratio after three series of trial.

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