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Studies the effect of bunch management in yield and quality of banana Cv. Grand Naine (AAA)

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Abstract
To assess the effect of bunch management for yield and quality production in banana (*Musa* AAA, cv. Grand Naine) over control of plants with out spraying of sulphate of photosh and having uncovered bunches. The On Farm Trail was conducted at Sunkulagari Palle, Settivaripalle and Musalnayana Palle villages of Y.S.R kadapa district, Andhra Pradesh, India, during the year 2017-2019. The experiment was conducted on farmers' field comprising 6 plots at different location. Each plot consisted of 210 numbers of plants. The bunches of the plants spraying with sulphate of photosh @ 5g/l and cover with nonwoven polypropylene skirt bag were compared against the normal farmers' practice of without spraying of sulphate of photosh and covering of the bunches. In this study, fruits under bunch management showed significantly lower scarring beetle infestation (1.52%) as compared to fruits of uncovered bunches (44.32%). Significant increase in fruit weight and bunch weight were recorded to the tune of 10.85% and 9.5% respectively, whereas shooting-harvest interval was reduced by 9 days under cover as compared to control. Banana fruits grown under cover had minimal bruises (2-5%) and were significantly cleaner from dust, spider web, and bird drops at harvest over control (50%). It may be concluded that under bunch management get more yield and banana fruits more attractive to the consumers and this phenomenon led the farmers to avail higher market price as well as significantly higher net profit over control.

Keywords: Banana, bunch management, scarring beetle, market price

1. Introduction
Banana farming is one of the major occupation among the fruit growers in the world and Banana is the fifth largest agricultural commodity in the world trade after cereals, sugar, coffee, and cocoa (Samiyappan *et al*., 2005) [1] It is cheap and excellent source of energy and vitamins, being an essential part of human diet. Its production ranks first among all the fruit crops in India, constituting 12% of total world production.
It is the most important fruit crop in Andhra Pradesh, India. Banana comprises maximum area of 1.12 lakh hectares (ha) among all fruits grown in this state with the production of 63.84 lakh Metric Tonnes (MT) and productivity of 56.24 MT/ha (Anonymous, 2018) [2]. There is all time demand for this fruit in the market, but the fruits that grow in the rabi (cool) seasons are inferior in all aspects compared to fruit developing in other seasons growth of bunch under such season shows slow growth with improper finger filling and lower bunch weight when the shooting time coincides with the low temperature periods of the season and market price of this fruit varies due to scar and blemishes on the fruit. Keeping these aspects in mind, the present On Farm Trail demonstration was conducted to "Assess the performance of banana using bunch cover with spraying of sulphate of photosh" in this region.

2. Materials and Methods
Banana (*Musa* AAA) cv. 'Grand Naine' was used for the study, conducted on farmers' field in Sunkulagari Palle, Settivaripalle and Musalinayana Palle villages of Y.S.R kadapa district, Andhra Pradesh, India, during the year 2017-2019.
The experiment was conducted on farmers' field comprising 6 plots at different location. Adequate care was taken so that nature of each plot and agro-climatic condition remains similar among the plots. Each plot consisted of 210 numbers of plants.

It was basically a verification trial, and in this trial, the treatment of spraying of sulphate of photosh and covering the bunch with nonwoven polypropylene skirt bag was compared against the normal farmers' practice of without spraying of sulphate of Photosh and covering of the bunches. The bunches under the bunch management treatment were spraying of Sulphate of Potash @ 5 g/l of water at 5th day and 15th day after last hand opening after that bunches covered with banana covers. Observations were taken on Bunch length (cm), Bunch Circumference (cm), No. of hands/bunch, No. of fingers/hand, Finger length (cm), Finger Circumference (cm), Average Finger weight (g), Weight of third hand (kg), Bunch weight, Shooting-Harvest interval, the percentage of fruit infested with scarring beetle in a bunch and Visual appearance.

Randomly selected 25 bunches of each plot were taken and weighted by electronic balance (Model-Sup, Sumo Digital Incorporation). The fruits from the 3rd hand of randomly selected bunches were taken and weighted by electronic balance (Model-Sup, Sumo Digital Incorporation). Accordingly, the number of fruit infested by scarring beetle under bunch management and control was counted and expressed in percentage. The fruits were checked for incidence of dirt which included dust, bird droppings, spider web and mechanical injuries (blemishes). They were also checked for general visual appearance. Percentage of surface area covered was rated based on the Merz 0-6 scale, adopted for surface area covered by dirt instead of lesions where, 1 = 0-2%, 2 = 2-5%, 3 = 5-10%, 4 = 10-25%, 5 = 25-50% and 6= ≥50% of the surface area covered by blemishes, dust, and spider webs (Merz *et al*., 2000). Average weather component of the experimental area and Soil status of the experimental plots is as shown in Table 1 and 2.

To compare between bunch management and control (Farmers practice) for all parameters two independent sample t-test were performed. Entire analysis was performed in statistical Analysis System software (SAS, version: 9.2) using statement proc t test.

Table 1: Average weather component of the experimental area for last 10 years (2009-19)

Month	Temperature(ºC)		Relative humidity (%)		Rainfall (mm)
	Max	Min	Max	Min	
Jan	23.02	19.51	77.06	56.84	3.36
Feb	25.59	21.52	73.57	56.61	0
Mar	29.63	27.65	72.13	59.10	8.84
Apr	31.94	28.25	55.36	38.45	4.5
May	32.25	29.16	54.07	38.94	4.52
June	30.61	28.10	71.11	55.16	11.61
July	30.08	27.53	73.43	57.8	14.04
Aug	28.77	26.14	77.79	65.57	13.02
Sept	28.16	25.35	84.93	76.68	14.08
Oct	27.87	24.22	78.81	68.03	11.37
Nov	26.02	22.17	82.90	66.64	10.65
Dec	24.12	21.66	80.40	60.48	7.48

Table 2: Soil status of experimental plots

Soil type	Available nutrient (kg/ha)		
	N	P	K
Slightly Alkaline soils (pH - 7.5 - 7.9)	252-300	10-25	480-620

3. Results and Discussion: Results of the study showed that bunch management had a significant effect on yield, yield attributing parameters, shooting–harvest interval, scarring beetle infestation, visual appearance and net profit. Fruit weight and bunch weight increased by 10.85% and 9.5%, respectively, under bunch management over control (Farmers practice) [Table 3]. As a consequence yield was also increased significantly. Increase in yield and yield attributing characters may be due to the fact that sulphate of photosh increasing fruit size and weight. Shooting-harvest interval under bunch management was reduced by around 9 days over control as, increased temperature and change in microclimate inside bunch cover triggered faster fruit growth and development which was in conformity with work of Weerasinghe and Ruwanpathirana, 2002 [7].

Table 3: Effect of bunch management on different parameters of banana

Bunch characteristics	Mean		Standard Deviation		Coefficient of Variation%	
	T_1	T_2	T_1	T_2	T_1	T_2
Bunch length (cm)	104.86	103.51	3.34	3.83	3.18	3.70
Bunch Circumference (cm)	85.41	80.69	3.78	3.50	4.42	4.33
No. of hands/bunch	9.59	9.42	0.54	0.54	5.63	5.73
No. of fingers/hand	18.09	17.81	0.61	0.77	3.37	4.32
Finger length (cm)	21.16	21.02	0.85	0.88	4.01	4.18
Finger Circumference (cm)	12.11	11.60	1.21	1.13	9.99	9.74
Average Finger (fruit) weight (g)	161.90	146.05	3.15	5.44	1.94	3.72
Weight of third hand (kg)	3.39	2.45	0.28	0.36	8.25	14.63
Bunch weight (kg)	29.02	26.50	2.11	1.73	7.27	6.52
Days to harvesting (days)	321.52	330.49	1.48	1.04	0.46	0.31
Number fruit infested by scarring beetle (%)	1.57	43.11	0.29	2.63	18.47	6.10
Visual appearance (Merz scale)	1.64	4.10	0.17	0.08	10.36	1.95

T_1: Bunch management T_2: Farmers practice (Not following bunch management)

Scarring beetle infestation on fruit was recorded significantly very high on fruits of uncovered bunches (Farmers practice) (43.11%) as compared to minimal infestation on fruits of covered bunches (Bunch management) (1.52%) [Table 3]. Here, bunch cover might have provided physical barrier between bunch and scarring beetle. This work was similar with findings of Costa *et al*., 2002 who found more visually appealing, free from scar fruit under bunch cover as compared to unbagged fruit. Covered banana fruits in this study had minimal bruises (0-2%) and were significantly cleaner from dust, spider webs and bird droppings at harvest compared to the uncovered fruits (10-25%) based on Merz 0-6 scale. The covered fruits were, therefore, more visually appealing cleaner compared to the uncovered fruits which led higher market price of covered fruits and significantly higher net profit under bunch cover [Table 4]. This agrees with Rodrigues *et al*., 2001 who found out that banana fruits grown under cover had no blemishes at all and were attractive to consumers at a glance while unbagged fruits had black spots and blemishes.

Table 4: Effect of bunch management on economics of banana

Treatments	Yield (t/ha)	Cost of cultivation (Rs/ ha)	Gross income (Rs/ ha)	Net income (Rs/ ha)	B:C Ratio
T_1: Bunch management	62.3	1,15,500	4,57,000	3,41,500	3.95:1
T_2: Farmers practice (Not following bunch management)	61.5	1,00,500	2,40,000	1,39,500	2.38:1

4. Conclusion

It was revealed from the above experiment that banana bunch cover with non-polypropylene skirt bag was very much effective to protect banana fruit from dust and scarring beetle infestation. The major problem of banana cultivation was due to climatic condition of this region. Hence, it can be concluded that the practice of covering banana bunches may improve appearance of banana fruit as well as its productivity with shorter crop duration.

5. References

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