ORIGINAL ARTICLE

Frontline demonstration on effect of bunch cover in banana for quality production of banana fruits

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Abstract

Aim: To assess the effect of bunch cover for quality production in banana (*Musa AAB,* cv. Malbhog) over control of plants having uncovered bunches. **Materials and Methods:** The front line demonstration was conducted at Khagribari and Dakhin Barosakdal village of Cooch Behar district, West Bengal, India, during the year 2011-2014. The experiment was conducted on farmers' field comprising 14 plots at different location. Each plot consisted of 150 numbers of plants. The bunches of the plants cover with nonwoven polypropylene skirt bag were compared against the normal farmers' practice of without covering the bunch. **Result:** In this study, fruits under bunch cover showed significantly lower scarring beetle infestation (1.8%) as compared to fruits of uncovered bunches (98.5%). Significant increase in fruit weight and bunch weight were recorded to the tune of 7.5% and 4.4%, respectively, whereas shooting-harvest interval was reduced by 8 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%). **Conclusion:** It may be concluded that covered bunch 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.

Key words: Banana, bunch cover, climatic vulnerability, scarring beetle

INTRODUCTION

Banana is the fifth largest agricultural commodity in the world trade after cereals, sugar, coffee, and cocoa.[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 Cooch Behar district of West Bengal, India, located geographically at *Teesta* flood plain of *Terai* region. Banana comprises maximum area of 1915 ha among all fruits grown in this district with the production of 35,480 MT and productivity of 18.52 MT/ha.[2] There is all time demand for this very fruit in the market, but market price of this fruit varies due to scar and blemishes on the fruit. The scar is developed by the attack of scarring chrysomelidae beetle, *Basilepta subcostatum* Jacoby.[3] The scarring beetle, *B. subcostatum* is a serious pest banana in the entire North-East India which causes about 19.3% damage of fruit yield. Attack of scarring beetle is aggravated by hot and humid weather[4] which is a typical characteristic of weather in this region prevailing from April to October. Adult of the beetle feed on epidermis, i.e., the green portion of ventral and dorsal surface of the leaves and makes irregular patches. The beetle also attack on fruit

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causing heavy damage, fruits become blemished, and market value is reduced.[5]

Keeping these aspects in mind, the present front line demonstration was conducted to assess the performance of banana bunch cover in the context of present climatic vulnerability in this region.

MATERIALS AND METHODS

Banana (*Musa AAB*) cv. Malbhog was used for the study conducted on farmers' field in Kharibari village of the district Cooch Behar, West Bengal, India in the year 2011-2014.

The experiment was conducted on farmers' field comprising 14 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 150 numbers of plants. It was basically a verification trial, and in this trial, the treatment of covering the bunch with nonwoven polypropylene skirt bag was compared against the normal farmers' practice of without covering the bunch. The bunches under the first treatment were covered at the time of opening of first hand. Both ends of the bag were tied with a thread. At the interval of 3-4 days, lower end of the cover was opened to clean opened bract, dried flower remnants, and male flower bud gradually. Observations were taken on bunch weight, shooting-harvest interval, the percentage of fruit infested with scarring beetle in a bunch and visual appearance. To compare between bunch cover and control 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 ttest.

Randomly selected 10 bunches of each plot were taken and weighted by electronic balance (Model-Sup, Sumo Digital Incorporation). The fruits from the 2nd 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 cover and control was counted and expressed in percentage. Average weather component of the experimental area is as shown in Table 1.

The fruits were checked for incidences 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,[6] 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. Soil status of the experimental plots is as shown in Table 2.

RESULTS AND DISCUSSION

Results of the study showed that bunch cover 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 7.8% and 4.5%, respectively, under bunch cover over control [Table 3].

As a consequence yield was also increased significantly. Increase in yield and yield attributing characters may be due to the fact that temperature is increased and microclimate is changed around bunch under cover, which provides congenial environment for better fruit growth and

Table 1: Average weather component of the experimental area for last 10 years (2005-2014)

Month	Temperature (°C)		Relative humidity (%)		Rainfall (mm)
	Maximum	Minimum	Maximum	Minimum	
January	23.03	9.61	92.00	63.25	20.89
February	25.60	12.44	89.00	54.50	26.48
March	29.66	16.47	85.00	46.75	42.66
April	30.04	20.29	90.00	64.75	188.69
May	31.71	22.43	90.00	68.50	307.13
June	30.88	23.56	92.00	70.50	651.32
July	31.52	24.94	93.00	72.75	797.63
August	32.23	25.16	93.25	72.50	520.79
September	31.24	23.89	92.25	76.50	444.55
October	31.09	21.26	91.00	70.25	162.52
November	27.49	15.31	91.00	58.75	9.06
December	25.60	11.78	94.00	62.00	2.87

Source: Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, 2014

Table 2: Soil status of experimental plots

Soil type	Available nutrient (kg/ha)		
	N	*P*	K
Acidic (pH - 5.2-5.5) loamy to sandy loam	162-206	42-73	81-138

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

Parameter	Cover versus control		Exact level of significance (*P* value)	Standard error of difference
	Cover	Control		
Bunch weight (kg)	16.97[a]	16.11[b]	0.064	0.289
Fruit weight (g)	105.79[a]	96.64[b]	<0.0001	1.503
Shooting-harvest interval (day)	124.79[a]	133.14[b]	<0.0001	1.162
Yield (t/ha)	43.50[a]	41.62[b]	<0.0001	0.399
Number fruit infested by scarring beetle (%)	1.50[a]	98.14[b]	<0.0001	0.716
Visual appearance (Merz scale)	1.79[a]	6.0[b]	<0.0001	0.114
Net profit (Rs/ha)	374543.21[a]	334949.86[b]	<0.0001	3578.711

Different alphabet denotes that variables are varying significantly within the parameter

development.[7] Shooting-harvest interval under bunch cover was reduced by around 8 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 Anonymous.[8,9] (2002). Scarring beetle infestation on fruit was recorded significantly very high on fruits of uncovered bunches (98.14%) as compared to minimal infestation on fruits of covered bunches (1.5%) [Table 3]. Here, bunch cover might have provided physical barrier between bunch and scarring beetle. This work was similar with findings of Anonymous[10] 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 (2-5%) and were significantly cleaner from dust, spider webs and bird droppings at harvest compared to the uncovered fruits (>50%) based on Merz 0-6 scale.[6] 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 3]. This agrees with Anonymous[10,11] 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.

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.

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