Knowledge Management on Banana Production: Effects of Types of Suckers on the Growth and Yield of Different Varieties of Banana

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ABSTRACT

Based on the results of the study, it shows that growth and fruiting parameters were primarily influenced by variety and type of suckers. Date revealed that significant influences among the varieties and types of suckers in all the parameters during the first and second year of production. Statistical analysis revealed no significant interactions between the varieties and types of suckers.

Keywords
Banana Production, Suckers, Varieties

1.0 INTRODUCTION

The country's economy is being boasted to a large extent by the banana industry. Export earnings from banana represent 2.3% of the total Philippine export revenue. Aside from generating dollar earnings, the banana industry provides food and employment to numerous people in the related industries.

Approximately, 73% of the total consumer fruit intake is allocated for banana. The consumption trends show an increasing demand for this fruit. Banana fruit is often used as food, as feed and for industrial purposes.

At present, there are 80 distinct cultivars in the country but only a few are utilized from cultivation. The varieties that are commonly planted for domestic production are the

"Lakatan", "Bunglan", "Saba", while "Cavendish" is cultivated especially for export market. Other cultivars such as "Morado" and "Senorita" are gaining acceptance in major importing countries of their luxury fruit appeal and because of changing consumer preferences.

Considering the roles played by the banana industry in the economy of the country, there is an urgent need to refocus attention on increasing banana productivity at lower production cost. Moreover, emphasis should also be focused on improving the quality of the fruit.

Production of good quality bananas starts at the propagation and planting stage. If the crop had s good start, there is a tendency to bear large bunch of bananas. It is therefore, necessary to identify which planting materials is best suited to a certain cultivar of banana as to promote and obtain high yield.

1.2 Objectives

The study was conducted to evaluate the effects of different types of suckers on the growth and yield of different varieties of banana.

Specifically, the study aimed to: identify which type of sucker would result to better growth, and give higher yield to the different varieties of banana; determine which type of sucker is best suited to a certain variety as far as planting materials are concerned; determine bearing age and peak of production of different varieties of bananas using different types of suckers; and determine cost and return analysis per hectare of growing different varieties of banana using different types of sucker.

2.0 REVIEW OF LITERATURE

The PCARRD (1992) mentioned that banana and plantain are the tropical zone fruits that put Asia, their home of origin in favorable geographic position to produce banana for global exports. Fortunately, the temperature west has taken the liking for the fruit. Demand has since escalated and has reached such an economic proportion.

Meranda (1996) reported that aside from its local use as dessert, banana is used in manufacture of several food products like banana flour meal, chips, banana figs, wine and vinegar. The banana leaflet is used for baling purposes. The flower bud is used as vegetables. The banana trunks are used as rafts by people of rural areas during floody days.

Rama Napoleon (1998) stated that the Philippines leading agricultural product explorer is expanding its banana production by an additional of 1,000 hectares over the next three years, not withstanding the economic crisis in the Asian Region. Export demands for banana continue to rise for the high desired by health-conscious all over the world. Of all the export crops produced in the Philippines, its market price is also considered and the most stable.

Shein-Chuan and Hung –Jime (2000) observed that banana growers use suckers from their own plants as planting materials. However, virus diseases are so widespread that many suckers are already infected. Tissue culture is the only sure way to produce healthy planting materials. Plantlets are not only free from pathogens, but also they have the higher survival rate in the fields and reduce the cost of foliar disease by 50%. They also tend to have higher yield of better quality fruit. However, at an early stage of growth they re very sensitive to herbicides. This can be prevented by mulching. New silver plastic mulch not only control weeds, but also repels aphids which are the vectors of banana bunchytop virus diseases.

Lockhart (1998) pointed out that banana bunchytop is the most serious among the various disease of banana in Asia. As a result, the plant is dwarf and there are dark-green streaks or dots around the midrib and lateral veins. At later stage, the leaves are3 erect and yellow, upcureled margins. Plant with disease have to cutdown, other4wise infected suckers will grow again. This can be done by applying herbicides or kerosene or cutting down the plants and digging out of the roots.

Ignacio and Pascua (1998) studied the profitability of raising banana in typhoon and drought prone areas. The study listed three varieties of banana (Lacatan, Latundan and Cavendish). Of the three varieties, Latundan showed the best growth, yield and the tallest. It also produced the most number of suckers per year, matured the earliest at 9 to 11 weeks after shooting. It also produced the most number of hands and fingers.

Rama (1998) mentioned that despite of currency crisis and the onslaught brought about by El Nino, Southern Mindanao posted modest again in export performance for the first quarter of 1998 with banana as the number one export. Data released by the Department of trade and industry (DTI XI) revealed that Region XI exhibited an upsurge if 15.7% total merchandise exports as total export for the quarter reached $292.24 million in freight on board (FOB).

MNC (1986) stated that about 75% of banana production goes to local consumption and 27% goes to processors. Because of the preshability of bananas, prices fluctuate. Lacatan fruits demand better selling prices than Latundan and Bunglan. Farm gate prices fro Saba is ₱30 per 100 pieces while that for Lacatan is about ₱60 per 100 pieces.
Belen (1998) reported that export earnings from fresh and processed banana reached $72 million in 1992, making the Philippines fifth in the International Banana Trade. The country is the world's supplier of banana chips, savings about $60 million over the past five years. Banana chips are exported to 32 countries, mostly to the United States and Europe.

Lansang de Rusa (1985) pointed out that the environment of production and quality of banana for domestic consumption within the producing countries has been the concern of the International Network for the improvement of banana and plantains (INIBAP)> Almost 90% o total banana and plantains production are consumed domestically, yet the International Research Community has ignored this aspect of production.

According to Payot (1987), 75 percent of banana growers are small farmers. To this end, the International Development Research Center (IDRC) of Offaca, Canada approved a three-years grant of $247,000 (P3,594,500) to support banana research in the Philippines while aims the increase banana production of small-scale in the country.

3.0 METHODOLOGY

The experimental area of 7,000 square meters excluding guard rows was cleared with grasses and stones and other vegetation prior to staking and holing. Holing was done 5x5 meters apart. The hole dimension was 50x50x50 centimeters. The top soil was separated from the sub-soil. Drainage canals were constructed in every other two rows.

Four varieties of banana (Lacatan, Latundan, Arnibal, and Cavendish) were used as the main plot treatments and three types of suckers (sword leaf, maiden leaf, peeper) were used as the sub-plot treatments. There were twelve treatment combination replicated three times and laid-out following the Split Plot in Randomized Complete Block Design.

Healthy and vigorous banana suckers were planted in the hole about 90 cm deep, then covered with topsoil at collar level. Peepers used in the study were more or less 15 cm in height from the ground

up to the level to the tip of the pseudostem. Sword leaf suckers were more or less 50 cm high with small and erect leaves while maiden leaf suckers were more or less 75 cm high with fully expanded leaves.

The bananas were fertilized (80-0-0) at the rate of 270g/plant during the first year of growth add 135g/plant during the succeeding years using 45-0-0 and 0-20-0 fertilizers. Split application was employed. Spraying of pesticides, ring weeding and cultivation, removal of dried leaves and excess suckers, mulching and proofing were also employed when necessary. Banana blossom were cut-off with the use of a sharp knife just above the first false hand when the second false hand appeared. Cut-wounds were treated with fungicides immediately after cutting. Fruits were harvested based on consumer preference. Harvested fruits were sold directly to both the middlemen and the consumers.

Data on growth such as height, stem diameter and number of functional leaves were gathered using sample plants at flowering. Number of days from appearance of removal of blossom and number of days from removal of blossom to harvesting of fruit were likewise gathered. Data on interval of harvesting was also gathered. Yield data include number of hands per bunch, weight per bunch, yield per clump, number of bunch per clump and yield per hectare were also gathered. Cost and return per hectare was also done. The study was terminated after three years of production.

All data gathered were organized, tabulated and analyzed using the analysis of Variance for the Split-Plot in Randomized Complete Block Design. Significant differences were further analyzed using Duncan's Multiple Range Test.

4.0 RESULTS AND DISCUSSION

Average Growth and Fruiting Parameters

Table 1 shows the summary table on the average growth and fruiting parameter. Results showed that regardless of types of suckers, the varieties used differ significantly in all the growth and fruiting parameters. This could be attributed to varietal differences.

Lacatan (VI) and Latundan (V4) had significantly produced the tallest plants and Arnibal (V3) the shortest. On the other hand, Latundan significantly had the biggest stem diameter at blossom while Cavendish (V2) significantly produced the most number of functional leaves. In terms of stem diameter at blossom appearance, Latundan (V4) had significantly the biggest stem diameter, followed by Cavendish (V2), Lacatan (V1) and Arnibal (V3) had significantly the smallest stem diameter.

Cavendish (V2) had the most number of functional leaves at flowering and least number of functional leaves was produced by Lacatan (v1) and Latundan (V4). Among the varieties used, Lacatan was the tallest to produce blossom from planting (417.68 days). The three varieties produced blossom 331.93 – 355.50 days from planting.

Lacatan had the least number of days (9.86 days) of cutting the male bud from the appearance of blossom. For Latundan, Cavendish and Arnibal ranged from 12.09 – 12.30 days. Lacatan was harvested 81.18 days from removal of male bud while Arnibal was harvested 33.72 days. The average number of days from planting to appearance of blossom revealed that peeper sucker significantly bloom late (388.25 days than sword leaf sucker (354.47 days) and maiden sucker (350.21 days) which were comparable to each other. Interaction between varieties and types of suckers were not significant in all parameters.

Table 1. Summary table on the different growth and fruiting

Parameter	Variety				Type of Suckers			A X B
	V1 Lacatan	V2 Cavendish	V3 Arnibal	V4 Latundan	S1 Peeper	S2 Sword leaf	S3 Maiden leaf	
Average height (cm) at blossom	526.88a	453.71b	393.80c	576.75a	486.13	489.55	487.68	Ns
Average Girth Diameter (cm) at blossom	18.74b	19.20b	14.89c	20.32	17.54	18.40	18.09	Ns
Average number of functional leaves at blossom	4.92 c	7.16 a	7.10 b	4.90 c	6.32	6.26	6.15	Ns
Average number of days from planting to blossom	417.68a	355.50b	331.93b	352.12b	388.25a	354.47b	350.21b	Ns
Average number of days from blossom to	9.86 b	12.14a	12.30a	12.09a	11.29	11.57	11.93	Ns

male bud cutting								
Average number of days from male bud cutting to harvest	81.18a	80.90a	33.72b	77.30a	62.10	63.08	63.75	Ns
Interval of harvesting in months	8.13 a	6.96 b	4.59 c	6.19 b	6.34	6.20	6.32	Ns

In the row within factor, mean value having a common superscript are not significantly different at 5% level by DMRT.

Yield Parameters (1st year of Production)

Data on the average yield parameters gathered during first year of production is shown in Table 2. The table showed significant differences among the varieties and types of suckers in all the parameters. Regardless of types of suckers, Cavendish (V2) significantly produced the most number of hands per bunch, heaviest fruits per bunch and highest yield per clump and yield per hectare as compared to other varieties. Lacatan (v1) significantly produced the least number of bunch per clump, while Arnibal (V3) significantly got the highest number of bunch per clump.

Regardless of varieties, the maiden leaf sucker (S3) significantly produced the least number of hands per bunch and the lightest weight of fruits per bunch while peeper sucker (S1) significantly produced the least number of bunch per clump and weight of fruit per clump. Yield of sword leaf sucker and maiden leaf sucker pr hectare is comparable but are significantly higher than the yield per hectare of peeper sucker. Interactions between the varieties and types of suckers are not statistically different in all yield parameters.

Table 2. Summary table on the average yield parameters during the 1st year of production.

Parameter	Variety				Type of Suckers			AXB
	V1 Lacatan	V2 Cavendish	V3 Arnibal	V4 Latundan	S1 Peeper	S2 Sword leaf	S3 Maiden leaf	
Average number of hands of per bunch	7.93 b	7.93 a	6.71 c	7.61 a	7.39 a	7.49 a	7.07 b	Ns
Average number of bunch per clump	0.79 b	1.01 c	1.44 a	1.22 b	0.87 b	1.20 a	1/26 a	Ns
Average weight per bunch (kg)	8.21 b	13.88a	5.26 c	9.13 ab	8.93 b	10.32a	8.72 b	Ns
Average yield per clump (kg)	6.26 b	13.25a	7.52 b	11.17a	7.63 b	11.90a	10.50ab	Ns
Computed yield per hectare (kg	2,624c	5,300a	2,984c	4,466b	2,766b	4,181a	3,908a	Ns
Computed yield in tons per hectare	2.62 c	5.54 a	2.98 c	4.47 b	2.76 b	4.18 a	3.91 a	Ns

In the row within factor, mean value having a common superscript are not significantly different at 5% level by DMRT.

Yield Parameters (2nd year of Production)

As shown in Table 3, the varieties, regardless of types of suckers, significantly differ in all the parameters gathered during 2nd year of production except on the average number of hands per bunch. Arnibal (V3) significantly produced the most number of bunch per clump and significantly had the lightest weight of fruit per bunch. In terms of average yield per clump and yield per hectare, Lacatan and Arnibal got comparable but significantly lower than Latundan and Cavendish. On the other hand, Cavendish got the heaviest bunch and the highest yield per clump as well as per hectare.

Regardless of varieties, types of suckers are statistically different only on the average yield per clump and per hectare wherein the maiden leaf sucker got significantly lowest yield. Yield of peeper and sword leaf suckers was comparable. Statistical analysis revealed no significant interactions between the varieties and types of suckers.

Table 3. Summary table on the average yield parameters during the 2nd year of production.

Parameters	Variety				Type of Suckers			AXB
	V1 Lacatan	V2 Cavendish	V3 Arnibal	V4 Latundan	S1 Peeper	S2 Sword leaf	S3 Maiden leaf	
Average number of hands of per bunch	6.55	7.18	6.73	6.97	6.93	6.88	6.80	Ns

Average number of bunch per clump	2.00 c	2.71 b	3.40 a	2.79 b	2.93	2.71	2.58	Ns
Average weight per bunch (kg)	8.00 b	11.28a	4.57 c	8.51 b	8.05	8.08	8.14	Ns
Average yield per clump (kg)	16.39c	26.00a	15.30c	23.73b	22.72a	21.23a	18.27b	Ns
Computed yield per hectare (kg	6,555c	10,480a	6,122c	9,493b	9,087a	8,493a	6,907b	Ns
Computed yield in tons per hectare	6.55 c	10.48a	6.12 c	9.49 b	9.09 a	8.49 a	6.91 b	Ns

In the row within factor, mean value having a common superscript are not significantly different at 5% level by DMRT.

Yield Parameters (3rd year of Production)

As reflected in table 4, the varieties regardless of different types of suckers were significantly different of the parameters gathered during the 3rd year of production except on the average number of hands per bunch. Variety 2 (Cavendish) significantly excelled in all yield parameters as compared to other varieties except on the number of bunch per clump which was comparable to variety 3 (Arnibal).

Regardless of varieties, the types of suckers were not significantly different in all yield parameters except yield per hectare, where the sword leaf sucker got the highest yield while the maiden leaf sucker got the lowest yield. No significant interactions were observed in all yield parameters.

Table 4. Summary table on the average yield parameters during the 3rd year of production.

Parameter	Variety				Type of Suckers			AXB
	V1 Lacatan	V2 Cavendish	V3 Arnibal	V4 Latundan	S1 Peeper	S2 Sword leaf	S3 Maiden leaf	
Average number of hands of per bunch	5.42	6.45	5.47	5.68	6.10	5.29	5.75	Ns
Average number of bunch per clump	1.42 b	2.96 a	2.92 a	0.28c	1.74	1.75	1.69	Ns
Average weight per bunch (kg)	6.78 b	9.79 a	3.70 c	6.55b	6.67	6.84	6.59	Ns
Average yield per clump (kg)	9.79 c	22.24a	1.68 b	1.91c	11.07	11.83	10.57	Ns
Computed yield per hectare (kg	3,918bc	8,896a	4,398b	762 c	4,426ab	4,710a	4,345b	Ns
Computed yield in tons per hectare	3.92 bc	8.90 a	4.40 b	7.62d	4.43 ab	4.71 a	4.35 b	Ns

In the row within factor, mean value having a common superscript are not significantly different at 5% level by DMRT.

Cost and return analysis per hectare (for 3 years of production)

Cost and return analysis per hectare for three years of production (Table 5) showed that regardless of types of suckers, Cavendish (V2) ranked first in terms of production in kilograms and in tons per hectare but ranked only third in terms of return on investment (ROI).

Regardless of variety, the sword leaf sucker (S2) obtained the highest yield in kilograms and in tons per hectare which at the same time ranked first in terms of ROI. Peeper sucker (S1) and maiden leaf sucker (S3) ranked 2nd and 3rd in terms of ROI per hectare, respectively.

Table 5. Cost and return analysis per hectare (for 3 years production).

Parameter	Variety				Type of Suckers		
	V1 Lacatan	V2 Cavendish	V3 Arnibal	V4 Latundan	S1 Peeper	S2 Sword leaf	S3 Maiden leaf
Computed yield per hectare (kg)	13,097	24,676	13,504	14,721	16,279	17,384	15,160
Gross income per hectare (₱)	127,627	74,029	73,922	117,769	87,051	91,441	75,341
Total cost per hectare (₱)	60,420	60,420	60,420	60,420	60,420	60,420	60,420
Net/loss return per hectare (₱)	67,207	13,609	13,502	57,349	26,631	31,021	14,921
ROI (%)	111.23	22.52	22.35	94.49	44.08	51.34	24.70

*Price per kilogram of fruits
Lacatan …… ₱10.00

Cavendish ….. ₱ 3.00
Arnibal …… ₱ 6.00
Latundan ……. ₱ 8.00

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The study entitled "Effects of Types of Suckers on the Growth and Yield of Different varieties of Banana" was conducted at West Visayas State University-College of Agriculture and Forestry at Lambunao, Iloilo, Philippines from June 2000 to January 2004 in order to evaluate the effects of different types of suckers on the growth and yield of different varieties of banana. Four varieties of banana (Lacatan, Cavendish, Arnibal, Latundan) were used as the main plot treatments and three types of suckers (sword leaf, maiden leaf, peeper) were used as the sub-plot treatments. These were twelve treatment combination replicated three times and laid-out following the split plot in Randomized Complete Block Design.

5.2 Conclusion

1. Time to mature from planting was influenced by both variety and types of suckers.
2. Flowering and harvesting of different varieties of bananas were late when peeper suckers were used.
3. Yield of both varieties and types of suckers increased from first to second year of production but decreases during third year of production.
4. Latundan was only profitable from first to second year of production due to their susceptibility to diseases.
5. Cavendish obtained the highest yield but got the second lowest income and ROI due to its very low price per kilo of fruit.
6. Lacatan gave lower yield but higher net return and ROI per hectare because of its highest price per kilo of fruit.
7. Regardless of types of suckers, different varieties of banana were still profitable up to third year of production.
8. Regardless of variety, sword leaf sucker gained higher income and ROI.

5.3 Recommendations

1. For long term production with profitable returns, Lacatan variety using sword leaf sucker is recommended. The sword leaf sucker is recommended regardless of variety used.
2. In planting banana, only disease-free planting materials and disease resistant varieties will be used.

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