Knowledge Management on Banana Establishment: Growth and Yield Performance of Banana Lacatan Variety to Different Types of Fertilizer

Mariano Rene F. Bales[1], Greta G. Gabinete[2]

[1]Faculty, College of Agriculture and Forestry
West Visayas State University, Lambunao, Iloilo, PHILIPPINES
Tel. No. +639098366070 Fax: 033-3200-879
Mariano.bales@yahoo.com

[2]Faculty, College of Agriculture and Forestry
West Visayas State University, Lambunao, Iloilo, PHILIPPINES
Tel. No. +6309217230862 Fax: 033-3200-879
Gggabinete1@yahoo.com

ABSTRACT

Six months after planting, results showed no significant differences among treatments on present numerical rate and at blossom stages all parameters showed no significant differences among treatments except girth diameter. Yield parameters were influenced by the types of fertilizers used. Banana without fertilizer (A) consistently obtained the lowest yield per bunch, per clump and per hectare, and at the same time obtained the lowest return on investment (ROI). Bananas applied with pure organic (B) and combination of organic and inorganic fertilizers (D) significantly obtained the highest yield for three years of production and were on the top rank in terms of return on investment.

Keywords
Banana Production, Suckers, Varieties

1.0 INTRODUCTION

Banana is the country's top fruit export earning 17.04 million dollars in 1997. Western Visayas is one of the top producers of bananas in the country having ranked third in hectarage (40,671 has) and 5th in volume of production (238,247 metric tons) in 1998 (DA, 2000).

Of the numerous banana varieties, Lacatan is considered to be the most popular. It reaches a height of five to nine feet. The fruits are straight, round and thick, yellowish when ripe and taste sweet without seeds. Lacatan is the most sought variety in the market today.

In the country, banana productivity is low because it is mainly grown in the backyard with less or no care at all. To improve its productivity, proper management of the crop is must. Fertilizer application is one of the important management practices of banana. Banana is a fast-growing plant requiring large amount of nutrients for optimum production. The main source of nutrients for crop production is the chemical fertilizers. With the increasing adverse effects of chemical fertilizers however, there is a need to find an alternative for its use without sacrificing the potential yield of the crop. Organic fertilizer is a possible alternative that promises an environment friendly effect. Other researchers claimed that fruits grown using organic fertilizers are comparable if not better than those grown using chemical fertilizer in the production of banana specifically Lacatan.

1.1 Objectives

General: The study was conducted to evaluate the response of Lacatan to different types of fertilizers.

Specific: Specifically, the study aimed to identify which type of fertilizers would result to better survival and growth of banana (Lacatan variety); identify which types of fertilizers would improve banana yield; and identify the cost and return of growing banana (Lacatan variety) using the different types of fertilizers.

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. The same agency (2004) however added that before establishing a banana farm, we should considered the suitability of the perspective site, conduct a feasibility study, plantation layout and labor availability. Enough knowledge in farm management post harvest management are likewise very important.

Rama Napolleon (1998) reported that the Philippines leading agricultural products explorer is expanding its banana production by an additional of 1,000 hectares over the next three years, not withstanding the economic

crises in then Asian region. Exports 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 the most stable. Aside from its local use as desert, banana is also need in the manufacture of several food products (Meranda, 1996).

MNC (1986) stated that about 75% of banana production goes to local consumption and 25% goes to processors. Lacatan fruits demand better sealing prices than other varieties of banana which sold at P60.00 per 100 pieces.

Lockhart (1998) mentioned that the most serious disease of banana that significantly affect the yield especially in Lacatan is the bunchy top disease. As a result the plant is dwarf. At the later stage, the leaves are erect and yellow, and infected plants produced unmarketable fruits. To possible overcome such phenomenon, the use of tissue culture plantlets is the only sure way because they are not only free from pathogens, but they have the higher survival rate in the fields and reduce the cost of foliar disease by 50% (Shein-Chuan and Hwang-Jime). Furthermore, planting of Lacatan in typhoon-and-drought prone areas become not profitable (PCARRD as cited by Ignacio and Pascua, 1998)

3.0 METHODOLOGY

The experimental area of 1,728 sq.m. excluding guard rows and alleyways was cleared with grasses and all other vegetation. Plowing and harrowing were done three times using a carabao-drawn plow. Staking was done 3 x 3 meters apart. Holes with dimensions of 50 x 50 x 5o cm were prepared. Drainage canals were likewise constructed between plots.

The study consisted of four treatments, namely: A-control (without fertilizer), B-organic fertilizer, C-inorganic fertilizer, and D- ½ organic and ½ inorganic fertilizer. The amount of fertilizer was based on the results of soil analysis. There were 16 plants per treatment each replicated three times in a Randomized Complete Block Design.

Vigorous sword leaf suckers of Lacatan were used as planting materials. These were planted erect in the hole at 30 cm deep and covered with top soil at the corm level.

The recommended amount of inorganic fertilizers (343 g/plant of 21-0-0 and 135 g/plant of 0-20-0) were applied in 3 splits during the 1st year of growth at one month, 4 months and 7 months after planting. Split applications were done during the 2nd, 3rd, and 4th year of growth at the on-start and before the rainy season ends. The ring method of fertilizer application was used wherein the fertilizers were applied 30 cm away from the pseudo stem during the 1st year and 1 meter away during the succeeding years of growth by ring method. Organic fertilizers such as chicken dung, hog manure and rice straws were used. These were collected within the Lambunao area, air-dried and pulverized, and sieved using a fine mesh wire. The organic fertilizers were mixed thoroughly with a 1:1:1 ratio based on weight. One kilogram of the mixture was brought to the Bureau of Soils for nutrient analysis. Application of organic fertilizers in the designated treatments was done by incorporating it in each hole 15 days before planting of banana at the amount of 1,828 g/plant for Treatment C (1/2 organic and ½ inorganic) and 3,656 g/plant for Treatment B (pure organic). The same amount of fertilizers was applied in each clump during the succeeding years of growth.

The experiment was cared and maintained by spraying of pesticides, ring weeding and cultivation, mulching, pruning of diseased and shed leaves, desuckering of excess suckers from six months after planting, propping, reapplication of fertilizers, replanting of missing hills, and fencing and repair of fence.

Banana blossoms were cut-off with the use of sharp knife above the first false hand when the second false hand appeared. Cut wounds were treated with fungicide immediately after cutting. Fruits were harvested based on consumers' preferences. Harvested fruits were sold directly both to the middlemen and consumers.

Data on percent survival rate and number of suckers were gathered six months after planting. On the other hand, data on growth such as height, girth diameter and number of functional leaves were gathered at fruiting. Height was measured from the base up to the tip of the longest leaf. Only healthy functional leaves were considered at counting time. Girth diameter was measured 15 centimeters above ground level. Also data on the number of days from planting to blossom, from blossom to male bud cutting, number of months from planting to harvest, interval of harvesting in months, number of finger per hand, number of hands per bunch, weight per bunch, and yield in kilograms and in tons per hectare were likewise gathered for three years of production.

All data gathered on pre-and-in production parameters were analyzed using the Analysis of Variance for the Randomized Complete Block Design.

4.0 RESULTS AND DISCUSSION

Average growth and fruiting parameters. Table 1 reflects the data on growth and fruiting parameters. Results revealed that percent survival rate six months later planting, height at blossom, number of functional leaves at blossom, months from planting to blossom to male bud cutting, months from planting to harvest and

interval of harvesting in months were not significantly affected by the different types of fertilizers used.

Significant differences among treatments were noted in the number of suckers six months after planting and girth diameter at blossom. Banana plants which did not receive fertilizers (A) significantly obtained the least suckers six months after planting. Moreover, the same plants significantly obtained the smallest stem diameter at blossom. While plant applied with pure organic fertilizers (B), pure inorganic (C) and with combination of organic and inorganic fertilizers (D) were comparable with each other

Table 1. Summary table on the average values on different growth and fruiting parameters.

Parameter	Treatment				Level of significance
	A- Control	B- Organic fertilizer	C- Inorganic fertilizer	D- ½ organic + ½ inorganic fertilizer	
Percent survival rate 6 months after planting	95.83	97.92	100.00	97.92	ns
No. of suckers 6 months after planting	0.708[b]	1.420[a]	1.293[a]	1.333[a]	**
Height at blossom (cm)	4.88	5.08	5.23	5.30	ns
Girth diameter at blossom (cm)	16.88[b]	17.74[a]	18.06[a]	17.86[a]	**
No. of functional leaves at blossom	4.80	5.21	5.00	4.97	ns
Months from planting to blossom	14.10	13.33	13.50	13.80	ns
Days from planting to male bud cutting	10.56	9.93	10.00	10.01	ns
Months from planting to harvest	8.12	8.33	7.90	8.04	ns
Interval of harvesting in months	8.12	7.63	7.90	8.04	ns

In a row, mean values having a common superscript are not significantly different at 5% level by DMRT.

Yield parameters at first year of production. Data on the average yield parameters gathered during the first year of production is shown in Table 2. Results revealed no significant differences among the different types of fertilizers used on the number of fingers per hand and number of hands per bunch, but showed significant differences on weight of fruits per bunch, yield per clump and computed yield in kilograms and in tons per hectare.

Lacatan banana applied with organic (B), inorganic (C), and combination of organic and inorganic (D)fertilizer produced comparable yield but were significantly higher than the control treatment (A).

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

Parameter	Treatment				Level of significance
	A- Control	B- Organic fertilizer	C- Inorganic fertilizer	D- ½ organic + ½ inorganic fertilizer	
No. of finger/hand	14.62	14.90	14.84	15.40	ns
No. of hands/ bunch	5.90	6.30	6.18	6.02	ns
Weight/ bunch	6.13[b]	8.04[a]	7.65[a]	7.86[a]	**
Yield/clump	4.62[b]	6.61[a]	6.09[a]	6.21[a]	**
Computed yield/ha (kg)	5,133[b]	7,348[a]	6,768[a]	6,899[a]	**
Computed yield (t/ha)	5.13[b]	7.35[a]	6.77[a]	6.90[a]	**

In a row, mean values having a common superscript are not significantly different at 5% level by DMRT.

Yield parameters during the second year of production. As shown in Table 3, plants which did not receive any kind of fertilizer (A) significantly produced the lowest yield as compared to other treatments with different types of fertilizers. Computed yield ranged from 6.72 to 11.28 tons/hectare.

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

Parameter	Treatment				Level Of significance
	A- Control	B- Organic fertilizer	C- Inorganic fertilizer	D- ½ organic + ½ inorganic fertilizer	
No. of finger/ hand	13.56	14.64	14.19	14.51	ns
No. of hands/ bunch	5.13	6.35	6.05	6.10	ns
Weight/ bunch	6.80[b]	8.54[a]	8.25[a]	8.41[a]	**
Yield/clump	6.05[b]	10.15[a]	9.33[a]	9.59[a]	**
Computed yield/ha (kg)	6,724[b]	11,280[a]	10,370[a]	10,658[a]	**
Computed yield (t/ha)	6.72[b]	11.28[a]	10.37[a]	10.66[a]	**

In a row, mean values having a common superscript are not significantly different at 5% level by DMRT.

Yield parameters during the third year of production. As reflected in Table 4, the different types of fertilizers significantly affected the yield parameters except the number of fingers/hand and number of hands/bunch which did not significantly vary among treatment means.

Banana applied with pure organic fertilizer (B) produced the highest yield but was comparable to bananas that received the combination of organic and inorganic fertilizers (D). This was followed by those plants applied with pure commercial fertilizer (C), while the control treatment (A) produced the lowest yield.

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

Parameter	Treatment				Level of significance
	A- Control	B- Organic fertilizer	C- Inorganic fertilizer	D- ½ organic + ½ inorganic fertilizer	
No. of finger/ hand	12.92	14.16	13.06	13.45	ns
No. of hands/ bunch	4.75	5.41	5.10	5.35	ns
Weight/ bunch	4.50^{c}	7.15^{a}	6.10^{b}	6.94^{ab}	**
Yield/clump	3.16^{c}	7.21^{a}	6.05^{b}	6.89^{a}	**
Computed yield/ha (kg)	3,516^{c}	8,013^{a}	6,727^{b}	7,662^{ab}	**
Computed yield (t/ha)	3.52^{b}	8.01^{a}	6.73^{b}	7.66^{ab}	**

In a row, mean values having a common superscript are not significantly different at 5% level by DMRT.

Cost and return analysis per hectare for 3 years of production. The cost and return analysis for 3 years of production (Table 5) shows that Lacatan applied with pure organic fertilizer (B) ranked first in terms of production in kilograms per hectare and at the same time in terms of return of investment (ROI). This was followed by Lacatan applied with a combination of organic and inorganic fertilizers (D). The unfertilized banana plants (A) obtained the least return of investment per hectare.

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The study entitled "Growth and Yield Performance of Banana Lacatan Variety to Different Types of Fertilizer" was conducted at West Visayas State University-College of Agriculture and Forestry at Lambunao, Iloilo, Philippines from March 2002 to Febryary 2006 to evaluate the response of Lacatan to different types of fertilizers.

Table 5. Cost and return per hectare for 3 years of production.

Parameter	Treatment			
	A- Control	B- Organic fertilizer	C- Inorganic fertilizer	D- ½ organic + ½ inorganic fertilizer
Computed yield/ha (kg)	15,373	26,641	23,865	24,219
Gross income/ha (P)	169,103	293,051	262,515	277,409
Total cost/ha (P)	70,000	82,292	88,131	83,056
Net/Loss return/ha (P)	99,103	210,759	174,384	194,353
ROI (%)	141.58	256.61	197.87	234.00

The study consisted of four treatments namely: Treatment A- (without fertilizer), Treatment B- organic fertilizer, Treatment C-inorganic fertilizer and Treatment D-1/2 organic + ½ inorganic fertilizer.

The amount of fertilizer was based on the results of soil analysis. There were 16 plants for treatment each replicated three times in a Randomized Complete Block Design (RCBD). Vigorous sword leaf suckers of Lacatan were used as planting materials. These were planted erect in the hole at 30 cm deep and covered with top soil at the corm level.

5.2 Conclusion

1. The time to mature from planting is influenced by the types of fertilizers.

2. The flowering and harvesting of banana (Lacatan) were late when no fertilizer application was done.

3. Yield of both fertilized and unfertilized banana increases from the first to second year of production but decreases during the third year of production.

4. Either fertilized or unfertilized banana is still profitable from first up to the third year of production.

5. Among the different types of fertilizers used, pure organic fertilizer and in combination of organic and inorganic fertilizer gained the highest income and return of investment (ROI).

5.3 Recommendation

For long term production and profitable returns, pure organic fertilizer is recommended. In cases where supply of organic fertilizer is low, the combined use of organic and inorganic fertilizer is recommended.

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