

Economical useful life of the banano (*Musa AAA Cavendish cv Grand nain*) in the alluvial plain of Motatan river.

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Abstract

In the banana area located in the alluvial plain of the Motatan river, in Trujillo state, Venezuela, are four enterprises that produce banana with the aim of exporting them, which presented a reduction in quality and number of bunch by hectare, with the question about the duration of the useful life of the banana crop in the area, so it was determined the economical period, measured in years, from the crop to the moment that was necessary to proceed to the removal of the banana plantations, determining the equilibrium point expressed in exportation boxes, and a practical model that allows that banana producers of the area that is being studied, to take the decision of renewing. The area was visited from may 1998 to may 1999, in order to obtain all the economical and production information. The population is of 1000 Has. The results showed a reduction in the bunches number by hectare when years have passed, being necessary to renew at 3 ± 1 years after the sow. The equilibrium point was of 2533 and 3109 boxes by hectare, without and with financing respectively. The prediction equation for the collect variable by hectare was: $Y: Emb/ha = 3131.671182 - 247.635691 \times age$. 60% of cost to produce a banana box corresponds to the manpower.

Key words: Useful economic life, removal of plantation, banana.

Introduction

The plain of the Motatan river has a couple of own ecological characteristics for the banana crop that explain why the transnational DOLE is located in this area, helping the enterprises Kambuca, Banaoro, ORO Verde and La Vega with the aim of producing bananas with exportation purposes and obtaining fruits of the highest quality with competitive costs and a sustainable production in the time, applying the adequate handle of the natural and human resources.

Inside the Cavendish sub-group there are four clones, the most commercially exploited is *Musa* AAA Cavendish cv Gran Enano (11).

The cultivation of the banana plants in the areas already mentioned initiated in 1992, continuing little by little the development of new surfaces of this crop. Since banana projects started in Venezuela, and until recently, it was thought that after a sow many years would pass in order to talk about renovation of plantations, because the biologic cycle and the propagation of the banana crop extends for a superior period of 20 years, according to the experience obtained by some producer and exporter countries of fruit, as for example Costa Rica, Ecuador, Colombia among others. However, when the useful economical life of this crop it is analyzed, some reductions in quality and number of bunches by hectare have been observed, and consequently, of the exportation boxes by hectare, which join to the increased

of the production costs is interpreted as a sustainable reduction of the net usefulness. Based on this, producers have begun the partial or total renovation of the crop area. Even though for the moment there is not any information in this matter, that is, it is unknown the number of years where will be obtained a production that would make profitable the exportation business, in the national aspects and in other producers and exporting countries of the fruit where practical investigations have not yet been done.

The producer has to be competitive, searching the best quality of the fruit, higher productivity and therefore, lower costs (3). It is necessary to improve yields and the quality of fruits, in order to capture the exterior market (4). The increased of the productivity would obey an increment in the physical yields (7). The banana has to be kept in productivity levels by hectare over the acceptable economical threshold (2).

With the renovation it is pretended to reach a profitable production (8). To renew a plantation means to eliminate any trace of it in a determined area in order to sow a new one of the same type (5). Renovation is justified when there is low production with poor quality of the bunch, and when incomes are the same as outgoings (6).

The aim of this research is to determine the economical period measured in years, from the first

harvest to the moment, when it will be necessary to proceed to the renovation of the plantations of banana. Also, to determine the point of equilibrium expressed in number of

exporting boxes by hectare, and a practical model that would serve the banana producers of the area, to infer the right moment for renewing.

Materials and methods

Area of study. The research was done in the banana area located at La Ceiba parish, Trujillo state, south oriental coast of the Maracaibo's Lake; characterized as a Tropical Dry Forest, with an "Ustico" soil humidity (1). Nowadays it has an area of approximately 1000 ha of banana for exportations, of the Kambuca, Banaoro, Oro Verde and La Vega enterprises, represented by the transnational DOLE, market in what is known as alluvial plain of the Motatán River. The average annual precipitations in the area are of 1221 mm. The annual mean temperature is of 27.5°C.

Methodological aspects. The research was based on the compilation, selection and investigation of the basic information of the productive and economic aspects.

Population. The population is represented by the enterprises Kambuca, Banaoro, Oro Verde and La Vega, occupying a surface of 1000 ha. of Banano Cavendish cv Gran Enano, these exploitations are the only ones exporting banana in the country.

Compilation of information. In some groups, a reduction in the number of bunches and boxes by hectare were presented, proceeding to initiate the renovation but without

knowing the exact moment to do this procedure.

Here appears the question of knowing the exact moment, and the first meeting to the committee and the general and operational manager is done, with the purpose of suggesting the objectives and aim of the research. The banana area was visited from may 1998 to may 1999; in order to obtain all the necessary economical and production information, as well as to meet managers, administrators, administrative personnel, workmen and others members related in the activities of each enterprise, using as methodological instrument to obtain the information a semi-structured interview.

The information was taken from the ribboned group and approximate bunches by year in the area, from 1993 to 1997 (in the proceeding year the renovation began), represented by smallholdings and the surface hectares to specify the reductions of bunches by year.

Processing and analysis of information. The obtained data was located in a data base, analyzed and processed using the statistical analysis system SAS (10). The point of equilibrium was represented in an algebraic and graphical way (9).

Results and discussion

At the time of determining costs of production it could be appreciated that the most elevated are those assigned for the irrigation labor, fruit protection, package and commercialization. This is because the European market is very strict; therefore the fruit needs to be protected in order to avoid damages that might affect it looks, besides it is necessary to use supplementary irrigation to normalize the production in low precipitation periods, hence increasing expenses by all the machinery and by electricity expenses. The package and commercialization is done through boxes and containers and ships that take them to the final destination. The administrative expenses and others expenses have elevated costs, and the financing cost represent the highest quantity of Bolivar's in the year (table 1). It must be said that this financial cost is a loan that was done in a bank.

At the moment of analyzing the cost of a banana box (figure 1), can be seen that when adding the working compensations (43%) and the sub-contract (17%), is observed that 60% of costs is represented by manpower, reflecting in the structure of costs the importance of the personnel in these banana enterprises. On the other hand, the rotation of the personnel who go to the banana enterprises should be reduced in order to have an experienced team and to reduce at the same time, expenses by training the new personnel.

In relation to the equilibrium (figure 2) point that intersects the line of the total expenses to the one of the incomes, it was obtained that it corresponds to a sell of 3109 boxes/ha equal to 9.059.980 Bs/ha. The fixed price plus the changeable price were added with the aim of obtaining the total price; the value of sells of the exportation boxes was divided with the resultant price of each unit. The total price was divided with the price of each box, and that value was divided with the number of hectares in production, obtaining a result with financing of 3109 boxes by hectare, being the profitability of 1,46%. When the exercise was done without considering the quantity of money of the financing, the equilibrium point was of 2533 boxes by hectare, with a profitability of 22.72%.

The equilibrium point might increase or reduce in case of some variation or alteration of values, as for example devaluation, likewise, it is presented the equilibrium point for each of the enterprises (table 2).

Enterprises, at the moment of knowing the point where incomes equilibrate expenses, must estimate the economical effects or how to consider this parameter in the time, also the administrative measures that might take in mid term, as rationalization of costs or increase the productivity by hectare.

At the time of doing an income analysis-outgoings (with financing), including the incentives of incomes and other incomes, the results turn

Table 1. Production costs of bananas in the banana area. 1998.

Bs./ha	Price \$ha/year	Price in	Price/box\$
Costs of the pre-cut			
Fertilization	361.827,82	655.83	0.2241
Irrigation	448.874,43	813.61	0.2780
Health control	271.512,85	492.13	0.1682
Moko control	11.384,72	20.64	0.0071
Sigatoka	246.730,11	447.21	0.1528
Defoliation	13.398,02	24.28	0.0083
Handle of the population	93.928,05	170.25	0.0582
Desuckering («desherman»)»	0	0.00	0.000
Desuckering	93.928,05	10.25	0.0582
Weeds control	136.369,78	247.18	0.0845
Drainages	271.157,51	491,49	0.1679
Protection of the fruit		1.279,52	0.4372
Total of the pre-cut	234.038,16	4.150,01	1.4181
Variables expenses			
Cut	519.424,21		0
Package	902.176,53		1
Commercialization	983.014,61		1
Total of variables	2.404.615,36		1.4893
Indirect expenses			
Price of package			
Maintenance of the cable	71.236,82	129,12	0.0441
Other indirect prices of cut and package	162.129,12	293,87	0.1004
Total of indirect expenses	233.365,95	422,99	0.1445
General expenses			
Personnel	285.724,09	517.89	0.1770
Others expenses	897.997,15	1.627,66	0.5562
Administrative expenses	953.975,52	1.729,12	0.5909
Total of general expenses	2.137.696,77	3.874,67	1.3241
Total price of the production	7.065.271,80	8.447,67	43760
Other expenses and incomes			
More: financial cost	1.676.399,75		1.0383
Other expenses	318.310,64		0.1972
Less sells in the national market	-437.145,18		-0.2708
Exportation incentive	-172.756,17		-0.1070
European fare	-217.515,75		-0.1347
Other incomes	-54.553,67		-0.0338
Total of other expenses and incomes	1.112.739,61		0.6892
Final cost	8.178.011,41		5.0652

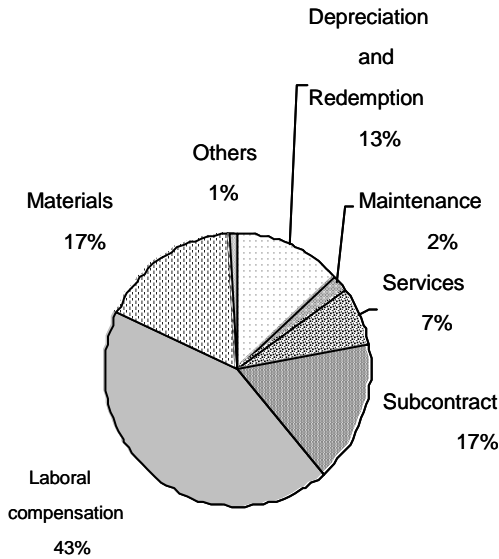


Figure 1. Costs distribution of a banana box in the banana area.

negative. When adding incomes by sell of fruits for the national market, is presented a positive use as was previously mentioned, reflecting the great importance that this market represents, and even though the objective of the enterprises is to produ-

ce fruit for the international markets, it should not be neglected what cares the operative and administrative handle of the national fruit.

The model that better adjusted to the analyzed data was the simple lineal regression model (equation of a straight

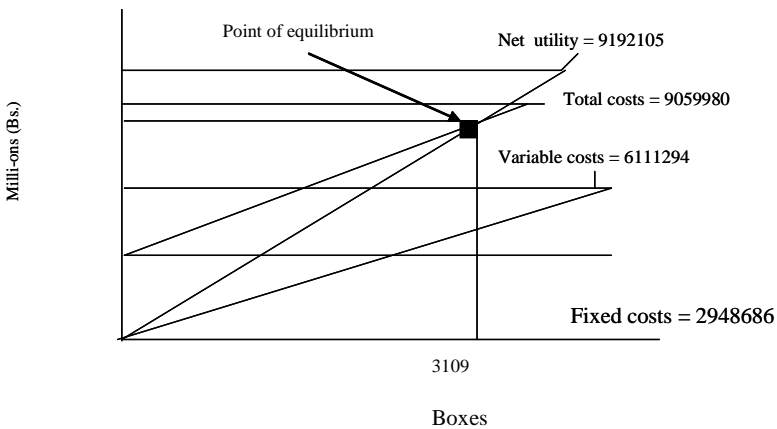


Figure 2. Determination of the point of equilibrium in the banana area under study. 1998

Table 2. Determination of the equilibrium point

Fixed cost	2.948.686	Equilibrium point (boxes/ha) ⁽³⁾	3.109,12
Variable cost ⁽¹⁾	6.111.295	Equilibrium point (without financing)	2.533,83
Total costs	9.059.980	Profitability (%) ⁽⁴⁾	1.46
Exportation sell	8.527.650	Profitability (without financing)	22.72
Price per box ⁽²⁾	2.914		
Total income	9.192.105	Equilibrium point by farm	
Income - Outgoings	132.124	Kambuca:	3.015
Boxes /ha	2.926	Banaoro:	3.156
Financial expenses	1.676.399	Oro Verde:	3.078
		La vega:	3187

⁽¹⁾Total cost= Fixed cost + Variable cost

⁽²⁾ Price per box : Exportation sells
Boxes for exportations

⁽³⁾ Equilibrium point = Total costs / Price of the box / ha

⁽⁴⁾ Profitability = Utility x 100
Total cost

line), which was used to generate the prediction equation estimated from the group of hectare in relation to the age of the plantation. With the revision and the analysis of the information, the practical model was determined which would help in the decision-making concerning the renovation.

In table 3 is shown the variance analysis for the lineal regression between the group and the age of the crop. The determination coefficient of the model was of 0.8031, showing that the regression equation is able to explain the 80% of the total variability of the model, being efficient to be selected as a prediction model.

Estimation of bunches by hectare. In the case of bunches by hectare in function of age, smallholdings were analyzed (period 1993-1997). In 1993, 2884 bunches by hectare were shown, reducing in 1994 at 2636 bunches by hectare (248

less bunches). It is observed that in 1995, the quantity of bunches that showed was of 2389, with 17.16% less, being the third year after the sow where could be done the renovation in some areas. There was an inferior value to the one of the equilibrium point without financing, which was of 2.533. In 1996, 2141 bunches were presented, that is, 743 bunches less than those analyzed in the first year; when arriving to the fifth year there was a reduction of 34.38% with 991 less bunches by hectare. Therefore, the renovation must be done in 3 ± 1 years (table 4 and figure 3).

This is due to the quantitative lost of bunches by hectare that is reflected in the baler at the end of the process, without obeying to the number of boxes by hectare that has been suggested, where production and productivity reduces, turning it unprofitable for the enterprises.

Table 3. Variance analysis for the linear regression between the packaged group and the age of the crop.

Coefficient	Stimated value	Standard mistake	T	P
Intercept	3131.671182	84.384356	37.112	0.0001
Slope	-247.635691	26.145536	-9.471	0.0001

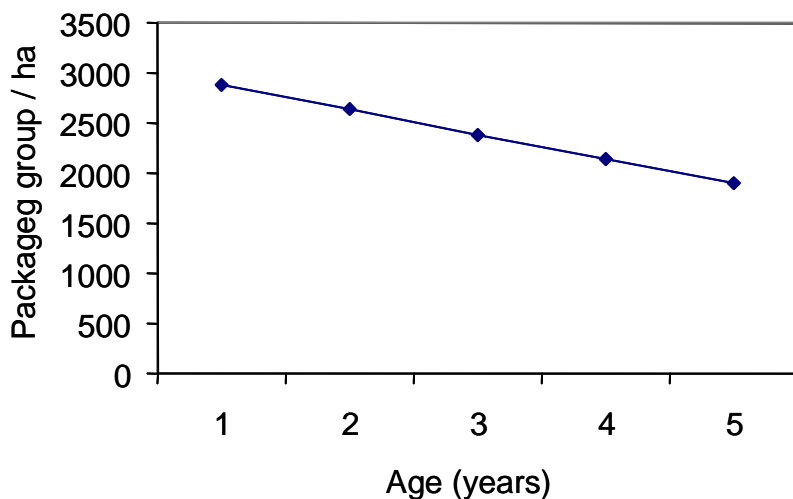
Regression equation:

$$\text{EMB/ha} = 3131,671182 - 247,635651 \times \text{Age}$$

$$R^2 = 0,8031$$

Table 4. Bunches by hectare in function of age. Years 1993 – 1997.

Year	Age	Bunches/ha	Differences %
1993	1	2884	
1994	2	2636	8.5
1995	3	2389	17.16
1996	4	2141	25.76
1997	5	1893	34.38

**Figure 3. Packaged group by hectare of banana bunches in function of age.**

Conclusions and recommendations

A reduction in the number of bunches by hectare was presented when years passed, being necessary 3 ± 1 years for the banana renovation, once sowed the plantations.

The point of equilibrium expressed in number of boxes by hectare is of 2533, if the loan of bank entities is not considered. When it is estimated with financing, the result elevates until 3109 boxes by hectare.

The equation of prediction with the obtained values, for the group variable by hectare was of $3131.671182 - 247.635691 \times \text{age}$.

Incomes as a result of sells in the national market helped that the economy exercise of a year were not negative, on the contrary, a positive

net utility will generate.

60% of costs to produce a banana box corresponds to manpower.

It is recommended to extrapolate the results of this research to the producers of banana (national market) in other areas of the country, as well as to the plantain producers with the aim of obtaining the economical and financial information to determine the adequate moment for the renewal of plantations.

Even though the objective is to produce banana of excellent quality, it should not be less important what cares about the operative, administrative and commercial handle of the fruit for the national market.

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