

Profitability of a Backyard Grafted Mango Nursery in Mati

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Abstract

The 35 sq m backyard mango nursery was located at Dahican in Mati, a suitable site that was 4.7 kilometers away from Poblacion, Mati, Davao Oriental. Farm materials and other supplies needed in the nursery were readily available. Two laborers were employed on a contractual basis. The project had an initial investment of P8,659.00. The operation ran from July to December 1998 for a total of 6 months (1 cropping season) with all of the propagules disposed within the period. The mortality incurred after grafting was 2.83%. The nursery obtained a net income of P5,666.00 and a return on investment (ROI) of 65.43 %. The price of P 25.00 per grafted mango was pegged based on the costs incurred. The grafted mango seedlings were easily sold on cash basis making it possible to recover the initial capital invested. These were sold to the Department of Agriculture in Mati, Mango Growers' Cooperative and other farmers engaged in mango growing. The project is deemed sustainable as it can be readily repeated. Demand is shown to be high in the next few years.

Keywords: *Mangifera indica*, Carabao mango, cleft grafting, nursery management, net income, return on investment

Introduction

Agricultural crop production is an enterprise that follows a system of growing that starts either from seeds or from vegetative plant parts up to its final stage wherein harvests of desirable plant parts or products are obtained.

Growing of fruit trees in the past has been limited to backyards. However, with the government's effort to attain self-sufficiency not only in grain crops, but also in fruit, plantation and other high value crops, a growing demand for planting materials have ensued resulting in the establishment of nurseries where plants are managed until these are ready for planting.

Like any agricultural business, the operation of a plant nursery necessitates that some factors such as work areas, growing shed, source/availability of materials, labor and possible market are considered. Ideally, the operations in a nursery should be conducted in a simple and orderly fashion.

This study was done on a nursery of cleft-grafted *Mangifera indica*, commonly known as mango. Several mango cultivars are grown in the Philippines but the most important are the 'Carabao' and the 'Pico'. 'Carabao' is recommended for both local and foreign markets. 'Carabao' mangoes are highly acceptable in the Philippines and worldwide due to its perfect blend of sweet and sour, succulence, pleasant aroma and bright yellow color when ripe (Valmayor, 1962; PCARRD, 1994).

This study aimed to make available ready-to-plant mango seedlings through asexual propagation as well as to determine its profitability. Other than seeds, asexual propagation, also known as vegetative propagation, is another way of producing plants. It makes use of the vegetative parts of the plants. The advantages of asexual propagation include the following: (a) the desirable characteristics of the parent plants are retained; (b) takes shorter period to bearing; (c) tree sizes are generally reduced, thus labor, cost, and time in maintenance and harvesting are also reduced; and (d) there is a uniformity in tree/produce appearance, blossoming time, and fruit maturity.

Methodology

Location. The project site was located at Dahican, adjacent to the National Housing Authority in Mati, Davao Oriental. This site was 4.7 kilometers away from the Poblacion, the commercial center in Mati. Accessibility was good due to existing provincial and national roads.

The project was concentrated in a 35 sq m area. In it was a shed, and a soil mixing area. There was also space (17.5 sq m) for future expansion of the nursery.

The soil added to the medium was Bolinao clay loam. This was found to be similar as that used by the Menzi Farmers' Cooperative (MEFCO) in Mati. MEFCO is a progressive cooperative which grows mango and citrus, among others.

Materials. The mango seeds used as rootstocks were of the 'Pahunan' cultivar while the scion used for grafting was of the 'Carabao' cultivar commonly known as 'Manga Cebu'. The scions used were obtained from MEFCO mango trees.

Potting medium preparation. The potting medium used was composed of garden soil, river sand and compost material (decomposed corn cobs) at a ratio of 1:1:1. These materials were thoroughly mixed. Fifteen sacks of compost were needed in the preparation of the medium.

The potting medium was one of high fertility with a pH of 6.8 per analysis of the Bureau of Soils in Davao City. Its texture was sandy clay loam.

Bagging/Potting. Six hundred (600) black polyethylene bags (8" x 12" were used as containers because this permitted better growth when transplanted. The polyethylene bags were provided with holes using a puncher. Each bag was filled with sufficient potting medium to support a seedling.

Sowing of seeds. Ripe 'Pahutan' mangoes were purchased from the market. Seeds were extracted and selected in terms of seed size. Well-developed seeds were dehusked. The seeds numbering a little over six hundred were treated with Dithane M-45 at 2 tbsp per 4 L of water. Seeds were soaked for 20 minutes and then air-dried using a screen. The medium in the bags was moistened with water before the seeds were sown.

Hardening. A make shift shed was constructed to support the coconut leaves used for partial shading.

Watering. Watering of the plants was done every three days to avoid rotting of the seeds. This was a regular activity which continued up to the sale of the seedlings.

Crop protection. Weeding was done once every week by manually pulling out weeds from the bags. Grasses were also eradicated in the surrounding area to maintain cleanliness and reduce insect pest and disease attack.

Aside from maintaining cleanliness in the surroundings, pesticides were sprayed when needed to control insects and diseases. Cymbush 5 EC, an insecticide* was applied at 5 ml to 4 L of water to prevent insect attack. Spraying was done twice a month until the grafted plants were disposed. Dithane M-45, a fungicide, at 2 tbsp per 4 L of water, was applied to control anthracnose. Application was done once a week until the grafted plants were disposed.

Cleft grafting. Active, physiologically mature scions (each with 4 or more bud eyes) from selected MEFCO trees were obtained. The mature scion had crispy leaves when squeezed by the hand. The selected scions were wrapped with a plastic cellophane to prevent dehydration.

Rootstocks were selected based on seedling height and good visual appearance. The top portion of the rootstock was cut to a desirable height at the point of active growth. A longitudinal cut at the center of the initially cut surface in the rootstock was then made. This longitudinal cut was deep enough to accommodate the wedge of the scion. The selected scion was approximately 10 to 15 cm long. A wedge cut was made on the lower portion of the selected scion about 4 to 5 cm long. The wedge of the scion was inserted into the rootstock and secured firmly with a plastic tape. The top portion of the newly grafted plant was covered with a 1" x 6" cellophane bag (the size of ice candy bar). The newly- grafted plant was watered every 3 days.

Later, the bag in which the newly grafted mango was grown was lifted in its place to prevent root penetration into the ground and also for ease in transporting.

Profitability. Costs of the materials used in the nursery as well as of land rent, water transportation services, labor and sales were obtained. The net income was obtained by getting the difference between the gross income and the total production cost. The return on investment (ROI) was obtained by dividing the total net income over that of the total investment x 100.

Results and Discussion

Technical aspect. Fig. 1 shows the production flow chart.

The mixing and the hardening areas were initially identified and prepared prior to the hauling of the garden soil, river sand and compost; bagging; and sowing of seeds.

Ripe ‘Pahutan’ mangoes were purchased from the market. Seeds that were plump, big and well-developed were selected and dehusked. Dehusking consisted of removing the seed cover which physically prevents the entry of water and oxygen needed in germination. In mango seeds, the apical end (thinner portion) of the seed is cut then the husk split for the seed to be scooped from the husk. This is followed by sowing of the seeds in the medium. The seeds were sown with the concave side down at the subsurface of the medium. Each seed was sown directly in individual containers.

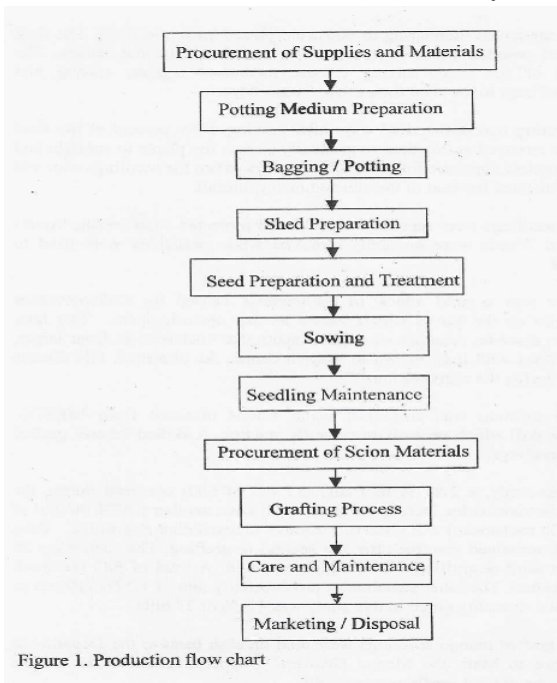


Figure 1. Production flow chart

The containers numbering to 600 were placed under the shed. The shed was made of wooden posts with an overlay of dried coconut leaves. The construction of the shed, mixing of the medium, bagging, Sowing and transferring of bags to the shed took about 5 man-days.

Sprouting was initiated 23 days after sowing. Fifty percent of the shed material was removed at this time to gradually expose the plants to sunlight and rainfall. Complete exposure followed after 33 days, when the seedlings were old enough to withstand the heat of the sun and heavy rainfall.

The seedlings were regularly watered and protected from weeds, insects and diseases. Weeds were manually removed while pesticides were used to control pests.

There was a mild attack of anthracnose caused by *Colletotrichum gloeosporoides* on the leaves which started as tiny necrotic spots. This later enlarged into discrete, roundish or angular spots that coalesced to form larger, irregular patches with light brown to grayish center. As observed, this disease was serious during the rainy season.

Cleft grafting was employed using scions obtained from MEFCO. Grafting is a skill which necessitate constant practice. A skilled laborer grafted the mango seedlings.

In this study, a 2.83 % mortality (17 out of 600) occurred during the growing of the rootstocks. During the grafting process, another 6.67% (40 out of the initial 600 rootstocks) was observed inactive necessitating re-grafting. Then 20 of the 40 remained inactive after the second re-grafting. The remaining 20 underwent a third re-grafting, 10 of which survived. A total of 583 rootstock were then grafted. The latter sustained a low mortality rate of 1.72% (10 out of 583). The total mortality noted in this study was 4.5 % or 27 hills.

The grafted mango seedlings were sold on cash basis to the Department of Agriculture in Mati, the Mango Growers' Cooperative and small mango growers. All the grafted seedlings were sold.

Financial Analysis. The total investment capital was P8,659.00 (Table 1). A certain percentage of this was spent for honorarium (P2,200.00) and miscellaneous expenses (PI, 182.50). The form of business organization was that of partnership. It was composed of five members. Each partner provided a capital share of the project. Each partner served in various capacities such as manager, production in-charge, bookkeeper, marketing in-charge, and marketing assistant. In addition, the services of a technical consultant were availed. These are the personnel who were given honoraria. This expense may be omitted. On the other, the expense may also partly pay for labor as the partners themselves did many of the activities in the nursery.

The miscellaneous expense such as meals and snacks, film processing and soil testing may also be reduced. In such case the income increases (Table 2).

The net income is the difference between the gross income and total production cost. It is the reward to the entrepreneur for labor and management together with the return on all capital invested in the business, whether borrowed or not (Brown and Librero, 1991). This mango nursery obtained a net income of P5,666.00 or a net profit margin of 39% (P5,666.00/P 14,325.00 x 100).

The return on investment (ROI) is 65.43%(P5,666.00/P8,659.00x100). This ROI is deemed high thus the grafted mango nursery is a profitable project given the conditions of the study. The ROI will increase if other costs such as trips to Davao City, honoraria and miscellaneous expenses were reduced or omitted.

Socio-economic implications. The project is easy to start and implement. -Even members of the family can assist in some operations such as: purchase of supplies, preparation of the potting medium, seed preparation, sowing, watering, weeding and marketing. Children of school age, young adults and others may learn of some basic agricultural technologies from this enterprise. Learning experiences in seed germination, grafting and plant growth can be easily demonstrated in such a backyard nursery.

Table 1. List of expenses incurred in the operation of the 35 sq m mango nursery

EXPENSE	QUANTITY	UNIT COST (P)	TOTAL COST(P)
Farm Supplies /Materials			
Mango Seeds	600 pcs	P0.25/pc	P 150.00
Polyethylene Bag	600 pcs	P0.72/pc	432.00
Cymbush 5 EC	100 ml	P100.00	100.00
Dithane M-45	1 box	P175.00	175.00
Scion	660 pcs	P3.00	1,782.00 ^a
Cellophane	1,500 pcs	P6.50/100	97.50
Compost Material(Corn Cobs)	'Pakyaw' system	P150.00	150.00
River Sand	'Pakyaw' system	P300.00	300.00
Nails			40.00
Shed Materials			150.00
Sub-total			P3,376.50
Labor (soil mixing, bagging, sowing, grafting, nursery maintenance)	'Pakyaw' labor	P1,000.00	P1,000.00
Sub-total			P1,000.00
Transportation	Bus fare-Dvo City (2 trips)		P 380.00
	Taxi fare – Dvo City		60.00
	Local fare		160.00
Sub-total			P 600.00
Land rent	P30.00/mo (6 mos)		P 180.00
Water expenses	P20.00/mo (6 mos)		P 120.00
Honorarium		P2,200.00	
Sub-total			P2,500.00
Miscellaneous expenses (soil testing, film processing)		P1,182.50	
Sub-total			P1,182.50
Grand Total			P8,659.00

^a with 10% discount

Table 2. Income statement for one cropping (July to December 1988).

	COST (P)	
Sales^a		P14,325.00
Less: Supplies and Labor		
Farm Supplies and Materials	P 3,376.50	
Labor Cost	P 1,000.00	P 4,376.50
Gross Income from Sales		P 9,948.50
Less: Operating Expenses		
Honorarium	P 2,200.00	
Transportation	600.00	
Land Rental	180.00	
Miscellaneous	1,182.50	P 4,282.50
Net Income (P)		P 5,666.00

^a 573 grafted mangoes at P25.00 each

Aside from low production cost, the enterprise does not require much labor and time for maintenance. A minimum of 13 man-days (data not shown; 1 man-day is equivalent to 8 hours) were devoted to the preparation of seeds and potting medium, sowing, grafting, crop protection and watering. Employed persons who need to work during the week may attend to this mango nursery during weekends except for watering which was done every 3 days. Thus, there is the possibility of engaging in other forms of business or means of livelihood while tending a mango nursery.

This nursery made available to consumers high quality (MEFCO was the source of the scion) and ready-to-plant grafted mango seedlings at an affordable price (P25.00 per planting material). The unit cost of P25.00 was considered significantly lower than that pegged by MEFCO for their grafted mango planting materials.

The project is deemed sustainable as the materials for the nursery are locally available. Add to this the high demand for mango seedlings as Davao Oriental gears up for a greater area planted to mangoes (Currameng, 1998, Personal Communication).

Summary and Conclusions

The 35 sqm backyard mango nursery located in Dahican, Mati, Davao Oriental operated from July to December 1998. The mortality of the grafted plants was 2.83%, considered to be low because a skilled laborer was hired to do the grafting. Grafting is a skill which can be gained with practice. The backyard mango nursery obtained a net income of P5,666.00 from a total sale of P 14,325.00. The return on investment was

65.43%. Each mango seedling was sold at P25.00 each. Other nurseries commonly pegged a higher price of up to twice as much.

The grafted mango seedlings-were readily sold even as Davao Oriental is gearing up to increase its land area planted to mangoes. Buyers were the Department of Agriculture and mango growers. The project is deemed sustainable as the materials are locally available and that its operation does not need a highly technical background. The production cost is low. Labor and time for maintenance is not also high. A minimum of 13 man-days were necessary for the preparation of seeds and potting medium, sowing, grafting, crop protection and watering. Employed persons may also engage in this kind of activity.

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