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# A Cost Analysis for Establishing a Barbados Cherry (*Malpighia Punicifolia*) Orchard in Barbados

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An analysis was performed to provide orchard establishment costs (land preparation, trees, planting, irrigation, herbicide and fertilizer) for a 3.5 acre planting. Figures are provided for trees only; trees with a simple drip irrigation system; and trees with an automated micro-sprinkler system. Local labour and local equipment costs are used. First year, per acre establishment costs were US$1,805.52 for non-irrigated; $2,247.23 for drip irrigated; and $2,430.20 for automated micro-spray plantings.

Barbados has been a sugar producing island for over 300 years. In 1980, abour 40,000 acres of the island's croplands were planted in sugarcane, providing 5% of the country's gross domestic product and 60% of the agricultural exports. Gross tevenue to the country was US$3,380 per hectate ($1,408 per acre) (Anon., 1982). The entire production is cutrently heavily subsidized, as world matket prices have tumbled to about 20% of the above figutes.

In recognition of the need for diversification of production, the Ministry of Agriculture has called fot increased vegetable and ftuit plantings. Vegetable crops are being cultivated on about 10% of the available land (Anon., 1984), and fruit crops on about 3%, most in scattered plantings. Perennial crops offer the advantage of lowet energy inputs, conservation of water resources, less erosion and slower depletion of organic matrer than annual crops. Long-term perennial crops multiply rhe above mentioned benefits over a four year raroon system.

However, there is no published data for orchard installation and fruit production under Barbadian condirions. There are no commercially successful orchards which porential growers may observe. In view of the large number of bankruptcies and uncertain future, most farmers are even reluctant to plant trees known to perform well. The lack of information and demonstration conttibutes to borh growers' and bankers' anxiety in atrempting to divetsify producrion.

All small island producers face production and marketing constraints. New plantings to fit expanding matkers (mainly new ftuits) offer the greatest return due ro lack of comperition on both local and export markets. It is importanr for the producers to establish a selling arrangement with the overseas company to fill a specific need of rhat company. With the matketing in-place, production can be geared to supply that market. The first to anticipate or tespond to changing market condirions will gain the most luctative returns (Kohls and Uhl, 1980).

Among the most promising of the uncommon production crops ate the soursop, *Annona muricata*, with predominately processing uses; the atemoya, *A. squamosa* X *A. cherimola*, a manbred hybtid for fresh consumption; the sapodilla, *Manilkara achras*, utilizing the besr cultivars for heavy bearing and smooth textute; the maney sapote, *Calocarpum sapota*, an attractive and flavorful fruit enjoying increasing demand but having a shott harvest season in Flotida; the carambola, *Averrhoa carambola*, a relatively recent introduction from Southeast Asia with exceptional bearing and utilization properties; and the Batbados cherry, or acerola (*Malpighia punicifolia*) a fruit with Vitamin C values ranging from 1 to 3% (Asenjo and de Guzman, 1946; Leden, 1958; Moscoso, 1956). This by no means exhausts the possibilities, as many other fruits may find markets in the conrinuously adventuresome majot markets (Michelini, 1982).

The U.S. matker demands produce that is of high quality, competitively pticed, and consisrenr supply. Manipulation of flowering times and the subsequent control of fruiting is important in filling out of season orders and assuring a consistenr supply. For tropical citrus, moisture relationships rule production dynamics (Rauther, 1980). The author has observed many similar tesponses with other fruits. Therefore, irrigation is strongly recommended for the setious grower.

In rhis paper, the local establishmenr costs for trees with and without irrigation were derermined. These are the major expenses until harvesting begins and will give the grower expected costs. Larger farmers may be able to reduce the machinery component and improve efficiency through the scale of operations. Smaller farmers may substirute higher labor inputs for less capital expenditure, especially in planting, weeding, machinery and fixed costs.

## MATERIALS AND METHODS

A gently sloping 1.4ha (3.5acre) sire with water available was bulldozed and harrowed. Stakes were placed on the row boundaries and midway in rhe rows ar 6.25 m (20 ft.) intervals. One-inch wide red plasric flagging tape was tied ro each pole to assist drivet recognition.

A tractor wirh a furrowing body was hired to cut twenty 125 m (400 ft.) rows along the contours. Irrigation mainlines were cut perpendicular to the rows. The P.V.C. mainlines and 16 mm polyethylene tubing laterals were laid and the appropriate connecrions made.

The container grown trees were delivered and spaced in a regular square patrern, 11 ft. between each tree in the row, with one row in every five planred with polinators. As the trees were planred, lateral lines were flushed and emitters individually installed to each planted tree. One emitrer was placed within six inches of the crown and the orher abour 20 inches on rhe opposire side of the tree. Since the land had a slope sufficient to cause major head vatiations, a pressure compensating emitter was installed. This emitter has a flow of 4.2 ± .2 l/hr (1.1 g.p.h.), over a range of 13 to 60 p.s.i.

Soil was pulled over the tree root ball, leaving the emirters exposed. Soil was then pulled over the remaining polyethylene lateral burying it to the depth of the trench. Eighteen gage P.V.C. coated wire was laid in along rhe mainlines, with one lead wire and a common ground to each section for the operation of the electric solenoid system. Soil was then pulled over the mainlines to complete the installation. Men with hoes were responsible for the covering of the pipes. Access to a tractor to shove the soil would have reduced the cost of this operation.

Roundup herbicide was applied along the tree rows, about 1.5 m (5 ft.) wide. The area between the rows was mowed. Water was applied as necessary, with a daily average of 1 gal/tree/day when it did not rain. Fertigation, giving a dilure nutrient solution of approximately 300 ppm N was provided with every operarion of the system.

Up to four months aftet planting, no pest control was necessary.

## BUDGET RESULTS & DISCUSSION

Costs are presented using typical farmers' prices for all supplies. The bulldozing and harrowing charges will nor be necessary in all cases, and may be omitted when appropriate. The irrigation system is amortized over a five year period, although the sysrem should provide at least ten years service.

It is assumed that a tractor is available for occasional use. If the grower prefers, grass in between rows may be hand cut or control grazed. It is possible to install a perennial legume ground cover for nitrogen fixation and animal fodder.

While these costs are compiled for one crop on a particular tree spacing, similar costs may be anticipated using a variety of tree crops. Adjustments to account for closer or wider spacing should be made.

Plant material will comprise up to 65% of the supply budget, which comprises between 37% and 45% of the total expenditure. The islands that subsidize planting material may remove up to 29% of the costs from the grower.

The machinery component (28% to 36%) facilitares speed, if not the success of the project. Hand labour may effectively subsriture for much of the machine work, especially in non-irrigated plantings.

The site must be conducive to rhe maintenance of the orchard. Too often excessively hilly locations and marginal lands are relegated to fruit crop production. Countries wishing to develop their fruit industry must give priority ro allocating it good land. The actual cosr is not high (4% to 6% of the total) and location and terrain are major factors in the success of the enterprise.

The interest/overhead/management component is a moderate cost (13% to 15% of the toral), but finding qualified managers or training the farmer may be difficult. An excellent manager will have a positive impact on most other components, and may well be the critical factor in the production system.

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