PN-ABB-949
60127

A Diagnostic Prescriptive Assessment of the Production and Marketing System for Mangoes in the Eastern Caribbean

by

Alan Hrapsky

with

Michael Weber and Harold Riley

Staff Paper No. 85-42
Department of Agricultural Economics
Michigan State University
East Lansing, Michigan

May 1985

This is an Executive Summary of a more complete research report that has been published as Working Paper No. 23 in the MSU International Development Paper Series. The study was conducted for the U.S Agency for International Development, Regional Development Office for the Caribbean, Bridgetown, Barbados under Contract No. LAC-0000-I-2023-00 TSM, Work Order No. 8. However, the findings, conclusions and recommendations are those of the authors and do not necessarily reflect the views of USAID or Michigan State University.

ACKNOWLEDGEMENT

The authors would like to acknowledge the general support provided throughout this project by the USAID/Regional Development Office for the Caribbean, and the contributions of the following individuals from the Agriculture and Rural Development Division: William Baucom; David Jessee; Mike Maxey; Steve Szadek; and Don Harrington. We are also indebted to Dr. Basil Springer and the staff of Systems Caribbean Limited for their warm cooperation and support, and similarly to Rick Andrews of Deloitte, Haskins, and Sells Associates.

A very special thank you is extended to Joseph Dolphin at CATCO who offered his scarce and valuable time and allowed the field researcher broad investigative access to the firm's business operations. We would also like to recognize the research suggestions, substantive contributions, and most of all, the friendship of the late Ivan Shaw, former general manager of the St. Lucia Banana Growers Association. Patrick Isaacs also gave freely his time and practical expertise about mango production during this study.

We are also grateful to Dr. H. C. Bittenbender for his technical and editorial counsel during preparation of the final report. Finally, numerous other individuals and organizations provided information and assistance which helped shape this report. A list of these individuals is appended to this summary report.

EXECUTIVE SUMMARY

I. Introduction

Many constraints impede development of an efficient production and marketing system for fresh fruits and vegetables in the Eastern Caribbean Region. Key constraints to expanded production and trade include: geographical dispersion of production; relatively small production units; limited markets within individual countries; inconsistent volume and quality of products marketed; lack of suitable and timely transportation; and the absence of appropriate market information.

In order to alleviate existing constraints, USAID has recognized the need to incorporate a strategy of market-guided agricultural research, extension, and production promotion activities into its regional agricultural project portfolio, and to improve coordination among project activities.

The over-arching objective of this research was to provide USAID with a diagnostic-prescriptive assessment of the mango production/marketing system that would be useful in the design and management of USAID's project portfolio. A secondary objective was to demonstrate how a market-guided food systems approach could be applied to a particular commodity, thus facilitating coordination of vertical stages in the agricultural production and marketing system. The food systems approach begins with identification of consumer requirements in terms of product specifications and volume flows, examines the production changes necessary to achieve the requirements, then systematically diagnoses constraints at each stage in the production/marketing chain. Finally, realistic actions designed to remove the constraints are prescribed.

Mango was selected for detailed study for four main reasons: markets currently exist both regionally and extra-regionally; mango production and export levels are relatively high in St. Lucia, St. Vincent, and Dominica; (hereafter referred to as the three island group) planned increases in production in St. Lucia and Dominica have begun to come on-stream and should continue to grow significantly throughdut the 1980's; the Caribbean Agricultural Trading Company (CATCO) began importing mangoes Barbados in 1984 and plans to penetrate the Trinidad market. Also, because most fresh fruits and

vegetables flow through the same channels in moving from producers to consumers in the Eastern Caribbean, many bottlenecks identified for mango are common to other commodities.

II. Overview of the Production and Marketing System for Mangoes in the Eastern Caribbean

The Structure of Production

The mango season in the Eastern Caribbean generally begins in May and ends in September although variations due to variety and geographic location occur. There is no large-scale commercial production of mango in the region and trees are generally dispersed within individual islands. For the most part, farm size ranges from one-half to five acres and mangoes are commonly inter-cropped with annual crops and other tree crops. Backyard trees are also prevalent.

In general, producers of fruits and vegetables in the region face high chemical and labor input costs and significant natural risks such as pests, disease, and hurricane damage. This study found that mango producers do not typically apply fertilizer, fungicides, or herbicides.

Production Trends

Mango production in the region will increase significantly in the 1980s as trees planted under the British Development Division (BDD) supported tree crop diversification projects in Dominica and St. Lucia approach full production. Plantings to date total approximately 510 acres with another 150 acres scheduled for propagation in St. Lucia. Total on-coming production in St. Lucia and Dominica is projected at about 300 tons in 1986, almost 900 in 1988, and 1700 in 1990. However, assuming that these projections are accurate and that about 60 percent of total production will be of suitable quality for export to extra-regional markets, about 200 tons will be available for export in 1986, 600 in 1988, and 1100 in 1990. A smaller BDD supported tree crop project in St. Vincent and the St. Lucia Model Farms Project which plans to plant about 160 acres of mango over the next four years will also contribute to increased production. Additionally, relatively small tree crop projects which include mango are underway or in the planning stage in Barbados.

Production Profitability

Rigorous farm level yield and cost of production data for mango are not available in the Eastern Caribbean making financial and economic analysis difficult. However, analysis of data available from the St. Lucia Orchard Crop Diversification Project results in financial and economic internal rates of return greater than 50 percent. Despite the fact that the analysis does not account for returns that factors of production would receive had they not been employed in the project, these high rates of return suggest that mango is a potentially profitable enterprise.

Export Trade and Trends

Hurricanes David in 1979 and Allen in 1980 wrought considerable damage on mango trees in the region and total exports from the three island group declined by as much as 17-40 percent from 1979 to 1981. Since 1981 exports have steadily increased and statistics available for 1984 indicate that exports from the three island group have surpassed pre-hurricane highs at nearly 800 metric tons. It should be noted that reliable production data is not available in the region. Also external trade statistics collected by regional island governments appear to underestimate the volume and value of trade, but are nonetheless, the best available indicators of market activity.

Bananas dominate export crop production of fresh fruits and vegetables in St. Lucia, St. Vincent, and Dominica accounting for 50 to 90 percent of all fresh produce exports shipped from those Windward Islands in 1983. Excluding bananas, mangoes rank among the top two fresh produce exports in St. Lucia, top six in St. Vincent, and top eight in Dominica. In 1984, St. Lucia exported over 300 metric tons of mangoes to regional and extra-regional markets; St. Vincent shipped over 400 tons, and Dominica exported about 90 tons.

Markets in the Eastern Caribbean are small in comparison to other Caribbean and world markets. Trinidad and Tobago offers the largest potential market in the region with a population of 1,152,000 and per capita GNP of $3,390 U.S. After Trinidad, individual market size of other islands decreases significantly. Trinidad imported over 280 tons of mangoes in 1984 of which St. Vincent accounted for about 90 percent. Barbados imported over 220 tons in 1984 which were almost evenly shared by St. Vincent and St. Lucia. However, St. Lucian mango imports into Barbados were banned in late July 1984 due to discovery of the mango seed weevil (Sternochetus mangiferae). Historically, Dominica's largest regional markets have been the French West Indies and

Antigua. Dominica exported about 29 tons to the French West Indies and 20 tons to Antigua. Dominica also shipped 28 tons to Trinidad in 1984.

Mango exports to regional markets are mainly handled by a large number of small-scale entrepreneurs from the Windward Islands known as "traffickers," "hucksters," or "speculators" who accounted for roughly 80 to 85 percent of all exports to Barbados and Trinidad in 1984. Traffickers operating from St. Lucia, St.Vincent, and Dominica are thought to number between 300 to 400 in each country. The balance of mangoes exported to Barbados and Trinidad were largely shipped by three regional trading companies which implemented systematic market development and export strategies within the last two years.

Most public sector institutions and private sector businesses exporting mangoes and other fresh fruits and vegetables from St. Lucia, St. Vincent, and Dominica to extra-regional markets ship to the U.K. Reasons for shipping to the U.K. include the following: Geest provides a regular weekly shipping schedule and sufficient cargo capacity for non-banana exports; the U.K. market can absorb larger volumes than regional markets; supply relationships with buyers or agents are relatively stable; and prices have been traditionally higher than in the region.

Private sector firms exporting to the U.K. and Canada largely sell to buyers who supply immigrant populations, and it is common for a family member to act as the importer and wholesaler in the market country. Other private sector firms develop their own import contacts. On the other hand, public sector firms such as marketing boards tend to sell on consignment with Geest which largely distributes to supermarket chain groups in the U. K. Geest charges a 10 percent commission on gross sales.

Harvesting and Assembly

Except for two large estates that produce mangoes and export on consignment with Geest, all other firms must buy mangoes from a large number of producers and therefore face several common problems. Communicating the product requirements of extra-regional markets to farmers and convincing them of the benefits of following recommended cultural, harvesting, and handling practices are key stumbling blocks to improving regional fruit quality.

Shipping

Mangoes exported to the U.K. are largely shipped on the Geest Industries banana ships in refrigerated lockers or reefer containers. However, the 10-14 day voyage from

the Eastern Caribbean to the U.K., delays that may be encountered at the U.K. port at Barry, and climatic conditions can significantly reduce product quality and shelf life. St. Lucia is the only Windward Island with an international airport but even so, capacity is limited (15 tons per week on British Airways) and freight is costly ($1.56 EC/kg).

Exports in the region are shipped on small inter-island schooners that lack refrigeration and adequate ventilation. Regional air service is unreliable and nearly three times the cost of sea freight. In addition, storage facilities are generally not available at wharfs or airports in the Windward Islands.

III. Characteristics of the Markets for Mangoes in Barbados and Trinidad

Supermarkets and domestic hucksters (small vendors) are the major market channels for distribution of mangoes in Barbados and Trinidad. Hucksters sell small quantities of mangoes from stalls in public markets and along city streets. Another significant yet non-market channel of distribution for mangoes are owners of backyard trees and farmers who provide relatives and friends with surplus fruit.

Supermarkets in Barbados and Trinidad rely on a large number of mango suppliers, experience a high number of individual transactions, and encounter inconsistency from week to week vis-a-vis prices, quantities supplied, and product quality. These procurement arrangements influence managerial behavior necessitating trading by inspection rather than description and make planning of supply difficult. Few produce managers make purchasing agreements in advance regarding prices and quantities albeit most buy from regular weekly suppliers.

Regional traffickers from St. Vincent and St. Lucia are the major suppliers of mangoes flowing through supermarkets in Barbados. Traffickers account for about 48 percent of major supermarkets' mango supplies. The number of regional traffickers directly supplying the Trinidad supermarket sector is limited, due in part to the reduced shelf life of their fresh produce which forces them to sell in the Central Market in Port of Spain. However, as traffickers appear to be handling nearly all mango imports into Trinidad, they are an important indirect source of supply.

It is difficult to predict how much supermarket mango purchases in Barbados and Trinidad would increase if the current supply situation improved. In the future it is important to try to test the market over the course of a season with an appropriate volume of high quality fruit at competitive prices, and then measure consumer

response. It does appear that the Julie mango has the greatest potential for increased sales in the Barbados and Trinidad supermarket sectors.

IV. Characteristics of the Market for Mangoes in Western Europe

Trends and Volumes

The market for mango continues to expand in western Europe where imports increased from 5,530 metric tons in 1978 to over 12,000 in 1983. Large non-European ethnic populations, a more widely travelled European population which has acquired new culinary tastes in tropical countries, and improved and more aggressive marketing techniques practiced by European importers have fueled market expansion for exotic fresh produce. The U.K. absorbed approximately 38 percent of all mango imports into western Europe from 1977-1983 (4,724 tons in 1983), France accounted for 28 percent, the Netherlands 19 percent (albeit the Netherlands re-exports significant volumes to other European markets), and West Germany about 9 percent.

Among western European markets, Eastern Caribbean exporters currently ship only to Great Britain. In 1983 St. Vincent, St. Lucia, and Dominica together exported about 373 tons of mangoes to the U.K. representing an eight percent share of the market.

No legally binding quality standards for mango exist in the U.K. However, given the competitiveness of the import market for mangoes, fruit color (a reddish blush is preferred), grading, and overall quality play key roles in price determination. Florida cultivars such as Tommy Atkins and Haden have strong demand in the U.K. and other western European countries mainly due to their red blush, favorable shipping characteristics, and size.

Constraints to Market Expansion for Eastern Caribbean Exporters

Major constraints which lie in the path of West Indian exporters of mangoes who ship to the U.K. are as follows.

1. West Indian exporters lost their foothold in the U.K. market after hurricanes David (1979) and Allen (1980) which caused dramatic declines in production. During this time, other mango producing countries improved the packaging and presentation of their products and strengthened their commercial market positions.

2. Keen competition in terms of price and quality from several major world producers prevail during the West Indian peak production season from May to September.
3. Although the Julie cultivar is popular among the West Indian ethnic population in the U.K., cultivars ripening to a brighter red blush, such as the Florida cultivars, are preferred by the large supermarket chains.
4. Lack of consistent quality and the absence of grading have contributed to lower prices for West Indian exporters.
5. Variability in the West Indian growing season and relatively low supply volumes have made continuity of supply difficult to achieve.
6. Exporters are handicapped by high air freight costs and lack of frequent flights to the U.K. from the Eastern Caribbean.
7. The 10-14 day voyage on the Geest ships causes deterioration of product quality and may result in lost market opportunities. For example, a major world producing country may land a large, high quality air-freighted shipment before the Geest ship arrives, depressing prices for mangoes from other sources.
8. Dramatic declines in exchange rates have reduced profits to Eastern Caribbean exporters. The value of the EC dollar declined by about 15 percent in relation to the U.S. dollar between the 1983 and 1984 mango seasons.

V. The North American Market for Mangoes

The U.S. Market

U.S. mango imports rose from 10,521 tons in 1977 to 29,395 in 1982 and represent three times the volume of imports into all of western Europe. Mexico accounted for 81 percent of U.S. imports during that period and Haiti provided about 17 percent. As in Europe and Canada, color, grading, and general product quality contribute to higher prices in the U.S. market. Tommy Atkins, Kent, Haden, and Keitt are the preferred cultivars.

For all practical purposes the U.S. market for mangoes is currently closed to Eastern Caribbean exporters due to restrictions on the use of Ethylene Dibromide (EDB). EDB is used to fumigate fresh fruit and vegetable imports shipped from fruit fly infested countries. It is expected that the chemical will be banned completely before the end of 1985 and although alternative treatments are being investigated, this could be a lengthy process.

However, USAID is considering funding a survey to ascertain whether the fruit fly is actually present in St. Vincent. If evidence of the fruit fly is not found St. Vincent would be eligible for an exemption to export mangoes to the U. S. without fumigation. In this event, the survey would be replicated in other Eastern Caribbean Islands.

Due to discovery of the mango seed weevil in St. Lucia and Martinique in 1984, the U.S. has banned imports of mangoes from those islands. There is no known treatment for this pest and the possibility of it spreading to other islands threatens all Eastern Caribbean mango exports.

The Canadian Market

Demand for mangoes is also increasing in the Canadian market where most imports enter through Toronto, Ontario. Although varietal preferences, quality standards, and conventional packaging parallel that of the U.S. market, fumigation treatment for pests is not required.

VI. Conclusions and Recommendations

The potential for expanding domestic markets of the principal mango producing countries in the Eastern Caribbean or increasing consumption in regional market countries such as Barbados and Trinidad appears limited. However, there does seem to be potential for increasing sales of mangoes in the supermarket sectors of Barbados and Trinidad if a consistent supply of high quality fruit can be provided at a reasonable price. Most of the potential increases in regional mango production, largely to be brought on by the BDD supported tree crop diversification projects in the Windward Islands, will have to be exported to extra-regional markets. The U.K. and other western European countries will be key markets as the U.S. market is, at present, effectively closed to Eastern Caribbean exporters.

The following changes in research, extension, production, and marketing activities are needed in order to successfully export potential on-coming production volumes.

Research

The following research activities regarding mangoes are necessary:

- rigorous cost of production analysis for mango to assess an equitable return to the grower, and the costs and benefits of fertilizing, pruning, and disease control programs;

- financial analysis for exporting mangoes to extra-regional markets emphasizing possible changes in variables such as currency exchange rates, spoilage, fluctuations in market prices, assembly and shipping costs, and farmgate prices;
- definition of a pre-harvest disease control program to mitigate the spread of anthracnose, the major disease of mango, and/or a feasibility study for post-harvest hot water dip treatment;
- definition of workable indices for judging market maturity which will facilitate planning of harvesting, packing, shipping, and distribution;
- secondary research on flower induction treatments which have been successful in extending the season in other countries (particularly the Philippines) and which could potentialy open windows of export opportunity for Eastern Caribbean exporters;
- development of more suitable cartons for shipping mangoes to regional and extra-regional markets;
- post-harvest research aimed at improving shipping conditions on the Geest ships;
- investigation of ways to eliminate the mango seed weevil problem which has stopped all St. Lucian mango exports to Barbados, St. Lucia's major regional market, and which has prompted the U.S. to ban mango imports from St. Lucia and Martinique. This problem could also spread to other islands.

Varietal Research

Varietal research on cultivars that have been recommended for field trials in the West Indies deserves serious consideration by regional research organizations. Varietal research should address the following characteristics of mango cultivars: harvest season; resistance to fruit fly, the mango seed weevil, and anthracnose; post-harvest responses to handling, chilling temperatures for shipping, and hot water dips for anthracnose and fruit fly. In addition to identifying cultivars with the greatest sales potential in target markets, emphasis should be givesn to identifying cultivars that can be most easily grown and culturally managed by Eastern Caribbean farmers.

Extension Activities

Extension activities designed to improve fruit quality at the farm level and satisfy the rigorous requirements of extra-regional markets should concern:

- the importance of maturity and fruit size, and the need to eliminate latex stains, disease, and mechanical damage;
- the role that proper grounds maintenance (burning mango seeds, removing fallen fruit, etc.) can play in reducing the spread of disease and pests;
- recommended harvest practices such as hand-picking and use of the harvesting pole which may potentially increase farmers' income and reduce time and cost of labor allocated by export firms to sorting out damaged mangoes;
- the advantages of harvesting during periods of the day when latex flows are minimal, and coordinating harvest with transport to the pack-house;
- the benefits of packing mangoes in sturdy field boxes for transport to the pack-house.

Market Information

Major informational priorities (in appropriate order of importance) that relate to mango but which could be expanded to embrace other crops include:

- more immediate and continuous feedback to Eastern Caribbean exporters and growers about export product quality and prices in destination markets;
- collection, analysis, and dissemination of information regarding the quality and prices of mangoes marketed by major world producers, and the improvements they are making in packaging, harvesting, and handling practices;
- accurate and timely export trade statistics for Eastern Caribbean countries because the current system of collecting external trade statistics is unreliable and a constraint on export planning;
- weekly farmgate price information on various Windward Island mango cultivars and crop outlook reports detailing factors that influence supply availability. Price information should be standardized in terms of data collection methods and by weight (i.e. the pound or kilogram). Additionally, linkages between intelligence units in the different island-states will be needed to increase regional market transparency.

Shipping to the U.K.

Fresh produce traders in the Eastern Caribbean exporting countries should explore the feasibility of forming export trade associations for the purposes of joining together to overcome industry-wide problems; for example, improving shipping and sales arrangements with Geest Industries, improving the quality of mango and other perishable exports by establishing common grading and packaging standards, providing input into

government agricultural planning activities, and promoting orderly industry expansion.

Regional Shipping

The regional transportation problem will require additional investment on the part of international developmental agencies and regional governments. Improving port facilities by organizing wharf areas for more efficient on and off-loading of produce, provision of packing and storage facilities, and elimination of cumbersome customs procedures are critical priorities.

CATCO

CATCO needs to achieve progress in providing innovative leadership regarding packaging, grading, cultural and post-harvest practices, and in facilitating increased private sector trade. CATCO should undertake or arrange for the following activities:

- o financial and economic analysis concerning the profitability of exporting mangoes regionally and extra-regionally;
- o training sessions on fruit quality in St. Vincent and St. Lucia (providing markets for St. Lucian mangoes are accessible) at the beginning of the 1985 season for its producers and suppliers;
- o investigation of suitable alternative cartons for shipping mangoes and other horticultural products as cartons currently used are inappropriate;
- o a small credit facility for its agent-suppliers and producers. Due to the relatively small scale of their operations, Eastern Caribbean exporters often require short-term financing which is unavailable from conventional lending institutions. This facility would provide financing for inputs such as harvesting equipment, fertilizer, fungicides and packaging materials. Provision of such a service would also promote CATCO's developmental role among exporters in the region and could open up new supply sources.

Concluding Comment

Successful integration and implementation of priority activities in the production/marketing system for mangoes outlined in this summary report will require liaison among system participants involved in development organizations, governments, and agricultural research, extension, and trade. It is hoped that this will facilitate improved communication among these participants by identifyiing constraints in the mango production/marketing system and by suggesting actions aimed at their removal.

List of Individuals and Organizations Providing Information and Assistance

Thomas Ambrose

Kennedy D'Auvergne

Michael Bharett
TRIN STORES, Ltd.

Mike Boulais
Kendall Foods

Vasantha Narendran-Chase
CARDI

Andrew Collins

Percival Combe
Dennery Farmco Ltd.

Joe Davis
Systems Caribbean Limited

David Dayes

Marcus and Douglas DeFreitas
Eastern Caribbean Agencies

Michael Griffin

C.P.L. Gunsam

John Hailwood
Geest Industries Ltd.

Ken Heinds

David Jackson
BDD

Claude John

Edward Kent
St. Lucia Model Farms

Rafael Marte
IICA

Atherton Martin
Dominica Farmers Union

John McIntyre

Richard Plumbley

Mr.Rodriquez
Geest Industries Ltd.

Cynthia Scott

Gilbert Telemarque
St. Vincent Marketing Corporation

Eustace Valton

And the Ministries of Agriculture in:
St. Lucia, St. Vincent, Dominica, and Barbados