Organic banana 2000: Towards an organic banana initiative in the Caribbean

Report of the International workshop on the production and marketing of organic bananas by smallholder farmers

31 October - 4 November 1999, Santo Domingo, Dominican Republic

M. Holderness, S. Sharrock, E. Frison and M. Kairo, editors

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The opinions in this publication are those of the authors and not necessarily those of INIBAP.

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Editorial note

Some references have been submitted without complete publishing data. They may thus lack the full names of journals and/or the place of publication and the publisher. Should readers have difficulty in identifying particular references, staff at INIBAP will be glad to assist.

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Foreword

Many small-scale banana farmers are facing increasing difficulty in competing in a free market economy. Production and diversification alternatives for such growers have become clear needs. One such possibility is the organic production of bananas, which has attracted considerable interest in both producer and consumer countries. There is a growing interest in organics throughout the Caribbean region, as these are widely seen as having a developing market. As a result of this demand, INIBAP, CAB International, and the Technical Centre for Agricultural and Rural Cooperation (CTA) jointly organized an International workshop on the production and marketing of organic bananas produced by smallholder farmers. The workshop was hosted in the Dominican Republic, by kind invitation of the Executive Director, *Centro para el Desarrollo Agropecuario y Forestal*, Inc. (CEDAF).

In order to ensure that all the key issues in the farmer-to-table chain were addressed, a wide range of interest groups were represented at the meeting. Participants included farmers and producer representatives, mainly from the Caribbean and Latin America regions, but also others with relevant experience to share from Africa. From the importing and marketing side, European and North American organic certification organizations, importers and retailers were represented. Other participants in the meeting included government representatives, donor agencies and representatives of a number of regional and international bodies.

The main aim of the meeting was to provide an impartial forum for discussion and information exchange, with the objective of establishing the framework for an initiative to develop and support all aspects of export organic banana production through to the market. The meeting was organized with the understanding that organic banana production would not provide a solution to all the problems facing the banana industry in the Caribbean. However, it is considered that organic banana production has the potential to provide a stable source of increased income for some smallholder producers, and a continuous, guaranteed supply of organic bananas is required for the market.

After initial review papers (published in the second part of this volume), the meeting divided into multidisciplinary working groups in order to consider in more detail five major issues:

(i) Technical constraints to production;
(ii) Mechanisms to support small-scale farmers converting to organic agriculture;
(iii) Organic certification;
(iv) Marketing of organic products;
(v) Total quality assurance and exporting.

The aim of the working groups was to formulate a strategic initiative to support the production and marketing of organic bananas by smallholder farmers.

Opening Ceremony

Guests of Honour at the Opening ceremony were Dr Altagracia Rivera de Castillo, Executive Director of CEDAF, who delivered the welcoming speech, and Ing Amilcar Romero, Secretary of State for Agriculture, Dominican Republic, who gave the feature address.

In addition, Mrs Isolina Boto of CTA conveyed a message from the organisers of the workshop, Dr Emile Frison of INIBAP provided a overview of the aims and objectives of the workshop, while the ceremony was concluded with a vote of thanks by Professor Jeff Waage of CAB International.

A summary of the presentations made by Dr Rivera de Castillo and Ing. Romero is provided below.

The importance of organic agriculture in the Dominican Republic

The experiences of organic agriculture in the Dominican Republic hold valuable lessons for the Caribbean region. Agriculture, particularly bananas, is of great importance in the Dominican Republic. However given the increasing pressures and demands of an open market, the agriculture sector here, as elsewhere in the region is now facing new challenges. Such challenges relate to the need for sustainable production methods and high-quality products, as well as an urgent need to improve competitiveness and extend participation in global markets. The increasing interest in tropical fruit and the growing market for organic products in the USA and Europe have resulted in an increasingly important role for organic products in exports from the Dominican Republic. Organic banana production first began in 1989 and since then, due also to the decline in importance of sugar, coffee and cocoa following falling world prices, there has been a growing shift to organic production. Organic banana production now involves some 2500 smallholder farmers and is being seen to have a major impact on poverty alleviation in rural areas.

Growth of organic production has been sustained by developing high levels of knowledge of organic production measures and awareness of market requirements among producers. The future market potential is considered promising, especially for newly developing European markets. Direct trading links established for organic products between producers and commercial organizations have been seen to bring increased benefits to the producers.

Organic products exported from the Dominican Republic now amount to around 20% of fruit and vegetable exports and a wide range of crops are produced organically. Increasing revenues for small- and medium-scale farmers, who generally tend to be located in areas of rural poverty, is of crucial importance and can be achieved through an increase in high value export opportunities. The socioeconomic benefits of organic production are seen in the high level of involvement of small- and medium-scale farmers

and the agrarian reform associated with this, such as the formation of cooperatives, which provide important opportunities for rural development and mutual advancement.

Nonetheless, the pressures to satisfy new markets create new expectations and concerns for both small- and medium-scale farmers. The comparative advantages offered by organic production favour development of the organic sector, but a strategy is needed for tackling the problems and needs arising, primarily among small-scale growers but many of which are also faced by larger growers. These particularly relate to plant health, most notably in the management of black Sigatoka disease and associated needs for farmer training and information dissemination. There is a clearly recognized need for regional integration in the future development of organic production in order to preserve and broaden production and so ensure stability of supply without overproduction. This meeting is thus well timed and its conclusions will help to define a strategy to further develop organic production in the region into the medium term.

Part 1

Report of the workshop

Workshop conclusions and recommendations

The meeting recognized that a growing market for organic bananas does exist, particularly in Europe and North America. In contrast, local markets have a low awareness of organic issues, but have the potential for growth.

Organic banana initiatives are in place, particularly in the Dominican Republic, and have been shown to work well with organized groups of small-scale producers. It is clear that organic production methods are more sustainable than traditional methods and could provide an alternative market opportunity for smallholders.

The meeting acknowledged the importance of information-sharing and dialogue between all the stakeholders, and the desirability of partnerships between the producers and the market. In addition, a coordinated approach and collective commitment are essential, particularly in the case of small-scale producers.

Black Sigatoka and lack of soil fertility were identified as the key constraints on the production side. It was noted that site selection is crucial in any organic initiative and it was recommended that organic production should be based on an entire watershed with a sufficiently large area. This would thus require a coordinated approach and a critical mass of farmers.

It was acknowledged that where a heavy presence of black Sigatoka exists, it can be extremely difficult to produce Cavendish varieties organically. However other varieties with potential for organic production, either as Cavendish replacements or as speciality bananas for niche markets, are available. It was noted that there is a market for different types of bananas, so long as they meet basic criteria with respect to appearance, taste, shelf-life and ripening characteristics.

The meeting identified the urgent need for training and provision of information for farmers who are considering converting to organic production. It was recommended that "leader farmers" should be specifically targeted for training. Farmer groups or cooperatives provide the ideal forum for discussion and provide the framework through which support services can be provided.

The need for financial support during conversion was highlighted and it was noted that some possibilities exist in the framework of linkages with 'Fair Trade' or 'Pesticide-free' labels. An enabling environment, in terms of local institutional support for organic farmers and a favourable policy framework, is also essential in encouraging farmers to convert. In the longer term, public awareness and education at all levels will be a major element in maintaining organic production.

The certification of organic production is an extremely important issue for smallholder producers. The high cost of international certification was noted, together with the need to develop the capacity for certification at the national level.

The market benefits of linking organic and Fair Trade certification are clear, even though Fair Trade does not embrace all the standards of organic products. It was noted that it would be particularly desirable to have the same certifiers for both Fair Trade and organic certification. It was also noted that products with both Fair Trade and organic labels stand the best chance of market entry.

The meeting noted that there is presently some confusion regarding the market for organic bananas. In order to assess the real situation with regard to demand and supply, members of the marketing working group agreed to form a task force to collect relevant information.

There is a need to define quality criteria for organic Cavendish and for other varieties according to stakeholders demands. It is also necessary to understand how these criteria relate to the quality aspects of the fruit, both for Cavendish and for other varieties.

Regarding the suitability of organic banana production for the Windward Islands, it was noted that there are several factors in favour of this. These include the absence of black Sigatoka, the existence of a 'banana culture' and farmer associations, the possibilities to link organic production to tourism, especially ecotourism, the existence of a market demand and the interest of younger farmers.

On the other hand, a number of factors are against organic banana production in this region. These include the topography of the islands, the large numbers of small-scale farmers, lack of organic materials for improving soil fertility, the high labour cost, an ageing farming community, problems of land tenure, especially for younger farmers, and lack of technical knowledge.

Towards an organic banana initiative in the Caribbean: Plan of action

To assist the farmers and countries of the region to better assess the prospects for organic banana production and marketing, a number of specific immediate action points were identified during the meeting. These are:

- To carry out, in the short term, feasibility studies with farmers on the socioeconomic and agronomic potential for organic banana production in the Windward Islands.
- To put in place further variety evaluation trials. These are already planned for FHIA-23 in the Dominican Republic and are ongoing elsewhere, notably in Cuba. FHIA[1] hybrids, as well as material from other breeding programmes are freely available for testing from INIBAP.
- To initiate research on organic banana management systems and particularly the management of black Sigatoka and soil fertility for smallholder organic farms.
- To set up demonstration farms to facilitate the training of farmers in the application of new technology packages.
- Follow-up on standard setting mechanisms (ISO 14000 and 9000, FAO-Codex, IFOAM (International Federation of Organic Agriculture Movements)).
- The marketing task force established through the meeting to carry out a supply-and-demand study.
- The World Organic Supermarkets Club (WOSC) to establish a forum for discussion between producers and retailers.
- INIBAP to put in place a Web site for relevant producer/market information regarding organic banana production.
- Interested parties to approach donors/regional organizations for support to move forward on this initiative.
- To produce the proceedings of the meeting including a research agenda.

[1] Fundación Hondurenã de Investigación Agrícola, Honduras

Timing of activities

Feasibility studies

Feasibility studies should be initiated in the near future, subject to formal requests to funding agencies from relevant Ministries. These are estimated as requiring six months duration. Determination of farmers' interest would follow these studies through a consultative process.

Technology development and transfer

Technology development and transfer activities can start as soon as funding sources can be identified and are independent of the feasibility surveys. These have a wide significance in the sustainability of smallholder banana production, going beyond organic production. These elements should be considered as a process to support both existing and potential new producers, as a part of the general process of developing sustainable supply from smallholder farmers of the region.

Varietal assessment

Testing of FHIA-23 in Dominican Republic is already planned. This variety and others can be provided to national programmes by INIBAP on demand. It was noted that a mechanism needs to be put in place to allow producers and retailers to exchange information regarding the market for new varieties. The World Organic Supermarkets Club has offered to provide a platform for dialogue between producers and supermarkets on issues of market requirements and sustainability of supply.

Assessment of market potential and provision of market information

The Marketing Task Force is to provide a report on relevant producer/market information by March 2000. This information will be made widely available on the Internet by mid-2000 and kept up-to-date, subject to the identification of an appropriate funding source.

Understanding and ensuring quality

Surveys and studies are required in order to determine stakeholders quality criteria and to identify fruit factors, production protocols and handling systems which have an effect on fruit quality. Such surveys could be completed in six months. Further research on factors determining fruit quality and on organic control methods for postharvest diseases are expected to take 2-3 years.

Introducing national certification schemes

A timeframe of 3-7 years is expected to be required to put in place national certification schemes. Key actions required include:

- Collection and dissemination of information;
- Creation of public awareness;
- Adoption and adaptation of international standards to local requirements;
- Creation of legal basis for national certification.

Training and installation of infrastructure.

Detailed working groups' reports

Participants at the meeting divided into five working groups. Each working group was provided with a set of guidelines to direct discussions. However, the groups were free to address the issues and report back in the way they felt most appropriate. The following working groups' reports reflect this diversity of approach.

Report of working group 1: Technical constraints to organic banana production

Current situation

The group established the need to differentiate between Cavendish and new black Sigatoka- (black leaf streak – BLS) resistant varieties. Key issues were considered to be soil fertility and organic management of specific pests as well as the postharvest requirements for Cavendish and new varieties under organic production. The significance of different pests and possible control measures had been outlined in earlier presentations, so the group concerned itself with options to overcome these various constraints and development of an action plan to address the key barriers identified.

Technical advantages/disadvantages identified for smallholder organic Cavendish banana production in the eastern Caribbean (primarily discussed for Jamaica and the Windward Islands)

For	Against
Absence of BLS gives comparative advantage against Central America for organic production	Large-scale corporate industries elsewhere have potential to capture market share
Use of organic soil amendments protects and improves soils	Bananas presently planted on steep slopes, with erosion problems
Existing 'banana culture' and skilled banana farmer community	Policy framework required
Strong Farmers Associations exist	Numerous small farmers involved
Scope for crop diversification	Potential lack of organic materials for inputs
Potential for linking to tourism and new local market	Requires local entrepreneurs and training of local certifiers
Existing and growing export market demand, price incentive	Export quotas not being met at present
Demand for organic production among younger farmers	Farming population generally ageing
Social implications of urban drift among young from outside agriculture	High labour costs and competition for labour
Offers security of supply and thus stronger industry through diversification from Dominican Republic alone	Potential risk of competition for Dominican Republic producers
Sustainability of production in continuous systems	Land tenure/access
Relatively simple, safe and low capital technologies	Technical know-how lacking

Soil fertility issues

Key concepts

- Crop rotation and system biodiversity.
- Soil coverage.
- Minimize nutrient losses.
- Return organic matter to the soil.
- Mineral fertilizers and bought-in materials supplement nutrient cycling.

Constraints

- Perceived as a major constraint to organic production (especially on steep slopes), site selection crucial.
- Timeframe for soil rehabilitation can be extensive.
- Mind shift required in moving from monoculture.
- Availability of N sources? (e.g. animal manures, bedding).
- Availability of mulches.

Some available options

- Bokashi (rapid fermented compost) (density allows transport, easy to produce, slow release effect).
- Bagasse/composted bagasse (where sugarcane industries present).
- Banana trash.
- Fruit 'teas' used as foliar fertilizer.
- Coffee processing residues.
- Market/domestic wastes.
- Cocoa wastes.
- Nutmeg shell.
- Vermiculture.
- Green manures (requires training and use of organic-produced seed).
- *Leucaena* and leguminous trees.
- Multipurpose trees around field (intercropping not considered feasible within existing mature systems).
- Commercial organic fertilizer is available but expensive.
- Availability of N sources can be an issue.
- Poultry manure (rich in P, but difficult to transport).
- Small ruminant manures can be locally available but quantities are an issue.

Considerations for use of options

- Income and market implications of rotations/intercrops/associated crops and reducing proportion of land cropped to banana.
- Transport infrastructure implications in moving bulk materials.
- Relative economics of organic vs. inorganic nutrition (purchase costs, transport costs, labour and frequency of application etc.).

- Development of integrated systems for efficiency, synergy and minimizing costs.
- Scope for locally centralized production of organic manure.
- Farmer training needs.

Pest/pathogen issues

Technology development/evaluation needs identified for management of major pests:

Black leaf streak (black Sigatoka) and yellow Sigatoka

- Criteria for site selection (<700 mm rainfall/year preferred, thus irrigated).
- Value of vegetable spray oils.
- Improved spray forecasting and optimizing application.
- Interaction of frequent deleafing for cultural control and mulch/soil fertility effects.
- Measures for disease exclusion from disease-free countries/areas.
- Interaction with shade in young plants.
- Alternative cropping systems for shade and their markets.
- Development of biological control measures – endophytes, induced systemic resistance, leaf surface antagonists.

Nematodes

- Site selection for areas believed free of main nematode pathogens.
- Use of clean planting material (paring, tissue culture).
- Prospects for break crops and their marketability.
- Use of crop residues and deep mulches (but also interaction with weevils).
- Availability and evaluation of appropriate mulch materials.
- Feasibility of solarization and soil cultivation measures.
- Use of endophytes.

Weevils

- Prospects for pheromone traps with/without entomopathogenic fungi.
- Interaction with mulch effects.
- Farmer motivation and training in manual control methods.

Fusarium (Panama disease)

- Not a major problem in the region at present, but potential threat from new strains.
- Value of solarization?
- Endophyte/antagonist work where appropriate.

Moko

- Encouragement of antagonistic/competitive soil microbiota.
- Prospects for soil solarization.
- Implications of irrigation.
- Farmer training/empowerment for cultural control (clean planting material, sterilized tools).

Prospects for use of new varieties in organic systems

General constraints to use of new varieties are that all varieties need a handler in the market prepared to develop appropriate postharvest regimes. Large producers are also looking for speciality niche markets and may present significant competition.

Cavendish alternatives

FHIA hybrids

Variety characteristics:

FHIA-01 High yield, but more acid flavour, tetraploid but has postharvest problems in ripening. (100 ha being grown in Honduras for organic exports). Very resistant to BLS.

FHIA-18 Sweeter, produces well under drought, 4000 ha being grown in Cuba, possible Cavendish substitute. Very resistant to BLS.

FHIA-02 Have tried to market from Costa Rica, problems of finger drop and early ripening not yet solved. Very resistant to BLS.

FHIA-17 Gros Michel type, BLS-tolerant.

FHIA-23 Gros Michel type, BLS-tolerant, considered the best prospect for a similar market to Cavendish types.

All types still require some deleafing for effective control of BLS. All are tolerant to Fusarium wilt. FHIA hybrids have reasonable crown rot-resistance and are more resistant than Cavendish to nematodes. FHIA-01 has better weevil-resistance than Cavendish. FHIA-01 and FHIA-02 do not readily oxidize, thus may have value-added market potential as dried or salad bananas or as puree, where acidity is less of an issue than in direct competition with Cavendish types.

Constraints to FHIA hybrids:

- Height – not semi-dwarf types, so could be susceptible to wind damage;
- Taste - are not as 'bland' as Cavendish so specific marketing required;
- Postharvest handling - absence of characteristics that enable export under existing handling and ripening regimes.

CIRAD types

Not yet released and may not be commercial.

Taiwan types

Problems of somaclonal variation in tissue culture.

Yangambi type

Already used in Africa for specialist niche export, easy cultivar for organic production.

Speciality bananas

Also considered worth including for varietal diversity in the market. General agronomy is similar to Cavendish, but need to be handled differently in the market.

Pisang Mas

Short production cycle, BLS-tolerant and wind-resistant.

RG1 (Jamaica)
Now out for evaluation, but believed to have some yield concerns.

Red bananas
Figue rose: very sweet, good appearance, problem of occasional seeds in fruit. Slow ratooning and not easy to produce organically.
Cacaboll (large red): not yet commercialized.

Lady finger
Problem of varietal definition. Can be difficult to grow.

Action plan for addressing technical aspects

Key assumptions

- Perceived healthy demand for organic banana from the Latin America/ Caribbean region.
- Dominican Republic already the leading export producer in the Caribbean, but scope for mutual benefit of increased production security and guaranteeing market supply through exploring development in other islands.
- Good relationship established with potential markets.
- Scope for marketing environmentally sound bananas from small producers with 'tropical island' image.

Background

In relation to technical constraints to organic production, clear needs were identified for:

- Technical knowledge of organic practices - training needs for farmers.
- Requires development for specific localized niches.
- Need to consider sources and costs of organic production inputs.
- The need for group dynamics/cooperation is also essential to establish a critical mass of organic production (e.g. within a watershed).
- Guidelines on site selection criteria are required.
- Strategies for BLS management are an essential.
- There is a need for projected costs and returns from organic conversion and production over time, relative to existing production methods.
- Comparisons of organic and existing production methods need to be made on a site-specific basis as production conditions and constraints differ widely around the region.
- Demonstration plots with associated nutrient budgets would be a useful mechanism to establish the credibility of organic production among farmers.
- The use of case studies from the Dominican Republic and farmer-farmer interaction would also help establish the validity of the approach among those who may wish to make the change.
- Availability of associated testing facilities will be required to confirm soil nutrition and the absence of pesticide residues.

- Use of new varieties should be explored as a means of managing BLS and creating new markets.
- Postharvest considerations require considerable research, both in managing pathogens in organic systems and in the specific ripening and handling requirements of alternative banana types.
- There is a strong need for measures to ensure sufficiency of supply and quality.

Proposed process

Initial detailed assessments

Rapid economic feasibility studies of localized production systems (to be done on a country-by-country basis). Rapid agronomic feasibility study for localized production systems.

Mechanisms: Consultancy studies, involving regional/national bodies and external technical support as appropriate.

Assessment of farmer interest and group formation

Mechanisms: National Ministries and farmer associations/farmers (with credit finance agencies as required).

Technology development and transfer

Training, information-sharing and catalysis including:

- Establish demonstration farms/plots and nutrient budgets.
- Assist farmer-to-farmer technology transfer, including Dominican Republic to W.I. and Jamaica.
- Farmer training and appropriate training and information materials.
- Establish measures (participatory technology development) to develop specific technological packages appropriate to local circumstances.

Mechanisms: National/NGO (non-governmental organization) /regional /international research and extension organizations, farmers' associations, private companies.

Specific technology development/validation needs identified

Adaptive/participatory research on appropriate production systems:

- Choice of mulches and sources of organic nutrition/mulch.
- Feasibility of different production systems (single cycle cropping, use of N-fixing trees, banana/animal systems etc.).

Organic black Sigatoka management

- Optimizing cultural management measures (sanitation).
- Biological control.
- Interaction with soil mulching and management of other pests.
- Interaction with shade.
- Organic spray application and substitutes for mineral oil.

Breeding and varietal evaluation

- BLS-resistance/-tolerance.
- nematode-resistance/-tolerance.
- dwarf characters.
- market acceptability.

Mechanisms: assessment in existing germplasm collections in the region and participatory variety selection by farmers.

Postharvest issues

- Spoilage control (particularly crown rot and latex staining).
- Postharvest storage, handling and ripening technologies for new varieties.

Mechanism: NARS (National Agricultural Research Systems) and regional scientific organizations, with advanced research institutes.

Proposed timeframe

Of the above, initial surveys to establish the feasibility and appropriateness of organic production under local conditions could be initiated in the near future, subject to formal request to funding agencies from the relevant Ministries. These are estimated as requiring 6 months duration. The determination of farmer interest would follow these studies as a process of consultation and consolidation once the specifics are known for a particular environment. It is important to note that these need to be rapid studies in order to maintain momentum and in light of the rate of decline in Caribbean banana production.

Technology development and transfer elements can start in the near future, as soon as funding sources can be identified and independent of survey activities. These have a wide significance in the sustainability of smallholder banana production, going beyond organic production. These elements should be considered as a process to support both existing and potential new producers, as a part of the general process of developing sustainable supply from smallholder farmers of the region.

Issues raised during plenary discussion

- It was noted that the cost of Bokashi is very variable between countries, and in countries where it is expensive, other forms of organic fertilizer may be more appropriate.
- Availability of irrigation was considered a key issue in the development of organic banana production, to enable establishment in areas at low risk from black Sigatoka disease. Without irrigation, it is considered that organic production will be difficult to implement.
- The importance of adopting a systems approach to research was emphasized.
- It was recommended that all available information on the use of organic sprays in disease control should be brought together in order to develop a systematic approach to research in this area.
- A system of permaculture developed in Ecuador was cited. Here waste from the packhouse is shredded immediately and tiger worms are added to help in the conversion of this waste into an organic material which is used as a mulch.

Report of working group 2: Mechanisms to support small-scale farmers converting to certified organic farming

Introduction

This group made the following assumptions about the farmers and organic banana production systems involved:

1. The smallholder farmers identified have an interest in certified organic production.
2. They have no, or limited, knowledge of the requirements of certified organic banana production.
3. Their farms are suitable for conversion (not all areas may be, c.f. working group 1).
4. There are no present market constraints – they have market access, what they produce can be sold at a favourable price in compliance with WTO/SPS (World Trade Organization/sanitary and phytosanitary regulations).
5. There is an interest amongst smallholders in organizing into groups.
6. Governments and national policies are supportive to organic conversion.

Analysis of conversion issues for organic banana production

The group decided to do a SWOT analysis, the results of which are reported below.

Strengths in farming communities which will support conversion

- Existence of leaders or champions amongst farmers who will drive organic initiatives.
- Farmers own their own land and provide their own labour.
- Existence of a source of local expertise in organic production.
- Extensive previous experience in pesticide-free production.
- Young farmers particularly interested in potential for organics.
- Farmers are already accustomed to producing specialized, "labelled" products.
- Farmers already familiar with quality criteria of export markets.
- Communities which have a history of cooperation between smallholders.
- Strong farmers associations able to represent growers concerns to certifiers and the export industry.

Weaknesses in farming communities which will work against conversion

- Limited knowledge or experience of organic production or farmer participatory approaches:
  - Amongst farmers;
  - At the institutional level: research and extension.
- Farmers' lack of confidence and certainty in banana production.

- Financial constraints to farmers including:
  - Cost of conversion;
  - Lack of credit-facilities.
- Farmers are reliant on neighbours to ensure organic production is not compromised.
- Unfavourable topography – in mountainous areas, problems of catchments, run-off.
- Previous experience of conventional production can be a weakness – fear of change.
- Very high quality standards difficult to achieve for smallholders.
- Weaknesses in book-keeping.
- Lack of a tradition of regular assessment/auditing, maintenance of consistent quality, etc.
- Lack of a tradition of regular field observation and decision-making.
- Lack of access to input (e.g. low livestock resources for manure).
- Dependence on external certifiers unfamiliar with farmers and farming systems.
- Dependence on external markets only.
- Lack of a history of cooperation between smallholders, who are independent by nature.

Opportunities associated with smallholder conversion to organic production

- Profound benefits to health and environment for farmers and society.
- Increased income to farmers, reduced costs due to decreased purchase of external inputs.
- Benefits from a more aware, educated farming community practising ecological agriculture.
- Development of small, rural industries which support organic production.
- Diversified production associated with organic production systems, increasing stability of income.
- New niche markets – organic production of other crops, ecotourism markets.
- Greater empowerment of farmers through strong local group formation with mutual interests.

Threats to smallholder conversion to organic banana production

- Growth of large farmer organic production will threaten smallholders.
- Potential loss of yields, income, farmer welfare during and after conversion.
- Abuse of system (use of proscribed products under pressure).
- Loss of organic status due to factors beyond farmers control (e.g. area-wide pesticide application).
- A fall in prices.
- Threat of new pest and disease problems (e.g. BLS in Windward Islands).

Plan of action to support small-scale farmers in and after conversion

Key:

F = farmers and farmer groups
I = institutions – national and international research and extension organizations
N = NGOs, national and international
C = industry, including exporting, importing, certifiers, retailers (supermarkets)
B = banks

Priority activities to support farmers before conversion

Farmer-participatory training in organic banana production is a critical element of farmer support and requires a well-planned programme of activities, selection of participants, follow up and continuous evaluation. Below are some activities identified by the group for this component (not necessarily exhaustive):

- Bring together and support leaders and champions of organic banana production (F, N, I).
- Identify sources of participatory training skills and inputs (F, I, N).
- Identify sources of technical information and methods for training curricula in organic banana production (I).
- Design and run training (e.g. farmer field schools), including training for research, extension, farmers (F, I, N).
- Besides training in organic production, training should address:
  - Need for regular and continuing assessment and maintenance of standards.
  - Meeting high quality requirements.
  - Book-keeping skills.
  - Regular field observation and relevant decision-making.
  - Fear of change and tendency to continue conventional production practices.
- Encourage local, traditional non-chemical and low-input farmers as resource persons and advocates.
- Methods to access necessary inputs for organic farming (e.g. manures).
- Organize farmer-to-farmer and technician-to-technician visits and exchanges, and encourage their support through regional/global development assistance programmes (I, N).
- Create a forum for discussion between farmers, support services (research and extension), certifiers, exporters/importers, retailers (F, I, N, B, C).

Financial and logistic support

Financial support to farmers to offset risks and costs of conversion can be provided by industry, banks, governments and consumers (and their governments). Some aspects covered above, including farmer training and access to market information improve the credit-worthiness of farmers and support measures below.

- ***Retailers/Supermarkets*** can provide farmers with pre-financing arrangements, contracts for advanced purchase, guaranteed transitional/minimum/long-term prices, marketing under special, intermediate grades.
- ***Governments*** can create incentive or buffer schemes to help farmers with potential losses during conversion, on the basis of demonstrated benefits (see below). Incentives can be promoted as one-off investments to assist conversion (I).
- ***Governments*** can improve land ownership and tenure arrangement, which will encourage farmers to invest in conversion (I).
- ***Banks*** can train credit officers to understand organic farming and its economics (B).
- ***Consumers*** can pay higher prices to support conversion (see Retailers/Supermarkets above), and lobby, with NGOs, their governments to support conversion through aid budgets to the benefit of producers and consumers (N).
- ***Industry*** can provide farmers with up-to-date market information (I, C).
- ***NGOs*** can encourage transparency from retailers regarding requirements, particularly quality (N, C).

Medium-term support to farmers during and after conversion

- Identification and support to creation of "organic zones" and locally-appropriate definition of buffer zones.
- Implement a programme to recruit young farmers into organic production, to accelerate a change in culture (F, I, N).
- Training of farming communities in formation and management of group/cooperative initiatives (F, I, N).
- Promote the development of local markets for organic bananas and other products (I).
- Maintain community cooperation – continued training and experimentation, inclusion of secondary level training, rotation of tasks, regular meetings with support agencies (F, I, N).
- A major threat to continued smallholder organic production is competition from large organic growers. An organic label may not be sufficient to continue in the face of such competition and the following other measures may be taken (N):
  a. differentiate the product to promote its production by smallholders;
  b. integrate organic and Fair Trade concepts towards this end;
  c. be innovative in ways to associate the consumer with the smallholder through the product;
  d. involve smallholders more closely in the production-marketing continuum;
  e. support smallholders to cooperate or confederate in order to create a larger, more influential group, not necessarily restricted to organic production.
- Establishment of continuing local institutional support for organic farmers (e.g. demonstration of new methodologies) (I).

- Implement a campaign of public awareness raising on benefits of organic production, including results of initial programmes on organic banana production (I).
- Implement a strategy of training for government agencies in benefits of organic production (to encourage support to conversion). This should be based on measured and demonstrated benefits e.g. (1) increased rural income, (2) increased health, (3) an improved, more sustainable agricultural and natural environment, (4) benefits of a diversified agricultural economy (I).

Long-term support to maintain farmers' organic production systems

- Prevent abuse of organic production systems through education and monitoring programmes run by NGOs (F, I).
- Reduce the risk of unwanted "contamination" of organic production systems by outside factors (e.g. run-off from neighbouring farms, etc.) by giving farmers tools to monitor changes and report contamination events (F, I).
- Build a capacity in farmers' groups, through training, to negotiate favourable contracts with importers which protect farmers against sudden falls in prices (F, N, C).
- Engage farmers in running early warning systems for new pests and diseases, e.g. through operation of indicator/sentinel plants, bearing in mind that the government is responsible to the farmers for effective quarantine (F, I).
- Compile and analyze information (e.g. databases) to demonstrate and quantify the local and national benefits of organic farming (I).
- Enable smallholders to work more effectively with their advocacy groups in consuming countries (N).
- Build strategic linkages for the organic farming movement outside the agricultural sector into other sectors (e.g. Ministries of environment, health and tourism) (I).
- Plan and promote strategies for diversification associated with organic farming, by first working with farmers to identify opportunities, new intercrops, etc. (F, I).

Research required to support farmers in conversion and production

- Research on socioeconomic/technical aspects of conversion in tropical agroecosystems to identify locally appropriate durations, approaches.
- Research to adapt/facilitate farmer-participatory (FFS: farmers field schools) methods to local organic banana production and marketing from other model systems.
- Market research for diversification systems to help plan diversification associated with conversion and organic production.
- Research on potential impacts of organic farming on a national scale to help support investment.

Issues raised during plenary discussion

- It was noted that regulations concerning conversion periods required and practices allowed during conversion are based on European conditions, and these may not be appropriate for the tropical situation. In this respect, the need to establish a dialogue between producers and certifiers was underlined.
- The possibility that supermarkets would pre-finance organic farmers during the conversion period was not considered likely. However there are possibilities regarding small premiums for pesticide-free products – informative labelling is important here.
- Three possible sources for funding the conversion process were suggested:
  - government subsidies using donor funds (e.g. European Development Fund (EDF) for Africa, Caribbean, Pacific countries) ;
  - support through supermarkets;
  - Fair Trade certification.
- It was suggested that efforts should be made to investigate ISO 14000 and ISO 9000 labelling schemes.

Report of working group 3: Organic certification

Current situation

The members of the working group emphasized the need for a clear definition of organic farming and a general acceptance of this definition.

The current situation with respect to certification is that in some developing countries, organic production is already taking place with certification being carried out by international agencies using national inspectors. In other countries, there is an interest in organic production, but national standards and certifiers are not available.

The relationship between the standards for organic and Fair Trade certifying also require clarification. While certain standards are applicable to both Fair Trade and organic production, others are not. It is clear that significant advantages are to be gained through having compatibility between organic and Fair Trade labelling such that certifiers are able to work within both systems.

The working group went on to discuss the advantages and disadvantages of national versus international certification. It was generally agreed that national certification is highly desirable for several reasons, but it is also clear that several major obstacles remain to be overcome. These issues are listed below.

National certification

Advantages

- Lower cost.
- More readily acceptable by producers.
- No language barrier between producer and certifier.
- Better understanding by certifiers of the local crops and local culture.
- Reduced administrative and management costs.
- Results in capacity-building at national level.

Disadvantages

- Need to establish credibility on the side of the importers.
- Lack of knowledge at national level.
- Possibility for conflicts of interest.
- Finance limitations (need for joint certification schemes).
- Lack of human resources.

In light of the above, it was felt that a system of phased introduction of national certification would be the most appropriate.

Opportunities

The development of national certification schemes offer certain opportunities for farmers. Certified growers have a certain status conferred upon them and they have access to specific markets. They are recognized as producing a premium product and are likely to develop a wider horizon with regard to importers and relationships with supermarkets.

Risks

Several risks are associated with certification at the national level and these basically revolve around the possibilities for conflicts of interest and corruption. To try to avoid such risks, it would be important to encourage good local participation in any such scheme and ensure a sound legal base.

Mechanism and needs

Policy support

The working group agreed that for organic production to move forwards, an enabling environment is needed at the national level and this could be created via policy initiatives, particularly including financial policies (tax incentives, easy credit etc.).

The working group recommended the creation of a regional organic agricultural development programme, which would include:

- An advisory service (through extension workers);
- Support to the development of a legal framework for certification;
- Marketing schemes;
- Direct payment or credit facilities for farmers producing organic products;
- Support to defray the costs of certification.

Through such a programme, efforts would be made to sensitize the local population, particularly the key stakeholders involved in conversion to organic production. This would also work towards creating a local demand for organic produce.

Training and information

Training is required on a number of issues and at a number of levels. These particularly include:

- Training and information dissemination regarding international standards and laws. This is essential if efforts are to be made to adopt existing legal literature to local situations.
- Training for inspectors/certifiers.

With regard to information needs, these have been identified as follows:

- Provision of an advisory service – in some case there is considered to be a greater need for advisors than for certifiers.
- The establishment of a register or public list of certified farmers/enterprises.
- Technical information is required regarding the formal export requirements and on market demand.
- Basic information for farmers covering all aspects of organic production.

Financial issues

A number of significant costs have to be considered in relation to certification of organic produce. Inspection costs, as reflected in the inspection fee, must cover the costs of time, travel, food and accommodation of the inspector, as well as the administration costs and accreditation charges. In addition, there is a need for continuing assessment to ensure that standards are maintained and decisions are required on the frequency of inspection visits. For the grower, certification may mean significant costs are incurred before any income from sales can be achieved, while in some cases, a commission may be charged as a percentage of sales.

Certification can be carried out on an individual or cooperative basis, both of which have advantages and disadvantages. While cooperative ownership can help to spread the costs of certification, it requires that all members of the cooperative maintain the same standards.

The costs associated with certification also impinge on the establishment and sustainability of a certification service at the national level. The start-up costs of such a service need to be covered in some way and a minimum number of clients will be required to ensure sustainability.

A number of ways by which local certification could be established were identified. These include:

- Support provided by international bodies (USAID (United States Agency for International Development), GTZ (German Agency for Technical Cooperation), SwissAid, HELVETAS (Swiss Association for International Cooperation), CIDA (Canadian International Development Agency), FAO (Food and Agriculture Organization of the United Nations), EU (European Union), SIDA (Swedish International Development Cooperation Agency), etc.).

- Partnerships with existing recognized certifiers (also including supermarkets).
- Support through regional organizations such as OECS (Organization of the Eastern Caribbean States) or groups of countries.
- Support through national governments.

Key linkages and partnerships

The working group identified a number of partnerships which would be important in relation to certification issues. These are:

- Organic agriculture associations (IFOAM, MAELA (*Movimiento Agroecológico de América Latina y el Caribe*), local/regional organizations and NGOs);
- Ministries of Agriculture;
- International organizations (including international NGOs);
- International certifiers;
- Producers;
- Importers.

It was suggested that at the national level, a commission should be set up, through which linkages with international certifiers would be maintained and within which a framework would exist for an appeals process.

Plan of action

The members of the working group suggested that a time period of 3 to 7 years would be required to put in place national certification schemes.
Actions are required in the following areas:

Collect and disseminate information

Information should be collected by: growers, certifiers, public and private sector organizations, consumers, donors agencies and international organizations. This information should then be disseminated through all available media, taking advantage of existing information channels. Use should be made of local government and NGOs as well as regional institutions such as CARDI (Caribbean Agricultural Research and Development Institute, Barbados) and IICA (International Institute for Cooperation on Agriculture, St. Lucia).

Create public awareness

Efforts will be required by governments, farmer groups, certifiers, consumers, international organizations and information agencies to create public awareness of the important issues surrounding organic farming. Use should be made of all media channels, especially TV, rural radio programmes, video, magazines and leaflets.

Adopt and adapt international standards to local requirements

Action in this area is required at the government level working through existing legal structures and with the assistance of financing institutions and local certifiers. Actions taken in this regard must remain transparent and a high level of integrity will be required.

Seek financial support

Financial support is required to train inspectors, to install the infrastructure and provide administrative and logistical support to a certification service. In addition, funds are required in order to allow the formation of farmers groups and for putting in place internal controls.

Analyse the potential for local certification and identify possible partners

The potential for local certification depends on the number of interested farmers. In addition, potential partners need to be identified. Studies in this area should be commissioned by national or regional bodies considering the availability and needs of potential certifiers, farmers groups, processors, exporters etc.

Develop a business plan

A business plan, taking into account cost analysis, tariffs and accreditation costs should be developed by certifiers or groups of certifiers (including both international and local representatives). NGOs supporting small business may be able to play a role here.

Promote local/regional certification

Promotion campaigns using all available media outlets: TV, radio, leaflets, training etc. will be required. This could be done by the certifiers with the support of international organizations and donors.

Create legal basis

Local certification must be carried out using obligatory and legally-binding standards. This should be carried out using legislative procedures by national or regional bodies, with the support of international organizations such as FAO and the EU.

Issues raised during plenary discussion

- Organic standards developed in temperate countries may not be suitable for tropical conditions.
- A legislative basis for certification at the local level is important.
- A new text has been developed by FAO: "Codex Guidelines for the production, distribution and marketing of organic produce". This will have international legal status and will be binding at the World Trade Organization. In addition, FAO is presently strengthening its capacity to help build certification capacity at the national level.
- If produce is to be sold in the EU, it has to be covered by EU certification. Therefore in order to ensure that local certification will be acceptable to the EU there will be a need for cooperation between national governments and the EU.
- Good linkages between producers and certifiers are essential. The certifier can than help the producer to understand the standards required.
- It is possible for the importer to cover the costs of certification, but in this case, the producer is bound to a particular importer.

Report of working group 4: Marketing organic bananas

Goal

To succeed in worldwide marketing of organic bananas and to avoid disorder and market distortions causing price and quality declines.

The group examined issues related to the goal above, as well as other suggested topics. Proposed recommendations/activities are outlined under each item in the proposed plan.

Key aims

1. Make a precise assessment of the market potential.
2. Improve marketability of organic bananas.
3. Assess market needs for different types of bananas.
4. Identify the scope for marketing value-added products.
5. Assess the scope for linkage between organic bananas and Fair Trade.
6. Develop mechanisms for assessing the right price for each country.
7. Determine the scale of production required to meet market needs.
8. Identify the scope for expanding national and regional markets.
9. Identify the scope for alternative organic crops or crop mixes in organic banana systems.

Action plan to address each aim identified

Assessment of the market potential

Collate information on current status of the market

At present, the supply and demand basis of the market is not well known. This is an important immediate need, for which four members of the group undertook responsibility to meet by 1 March 2000, as follows:

- Supply representative - Jetta van den Berg to cover existing major producers - Dominican Republic, Brazil, Cameroon, Canary Islands, Cape Verde, Colombia, Ecuador, Honduras, Israel, Mexico, Philippines and Suriname. It is suggested that participants from other countries can contribute information as necessary.
- Market representatives - Pascal Lui (FAO), Carol Haest and Eric Sauvé (National Research Council, Canada).

Establish mechanism for market data collation and dissemination

Based on the information collated as above, establish a mechanism for sharing information and identify an appropriate lead group to further champion the activity. The

need here is to develop realistic estimates of the future scope of the market as activities develop and market forces change.

Key linkages: National Producer Organizations, Industry, International/Regional Organizations.

Monitoring system

Develop a system for monitoring offer and demand price levels as well as providing information (target date 1st May 2000). The system would ideally be Internet-based and information can be fed into it from Producer Organizations and industry. Initial reports prepared by Jetta van den Berg, Pascal Lui, Eric Sauvé and Carol Haest can be fed into the system. It is recognized that the system could also assist in reducing fraud. There is a need to identify an appropriate funding source to support development and maintenance of such a system.

Key linkages: INIBAP, Producer Organizations, Supermarkets and Retailers, WOSC.

Improving the marketability of organic bananas

Publicity

In the short term, develop mechanisms for publicity for the organic banana initiative. It was proposed that well-edited proceedings with brief synopsis of each presentation would be appropriate for the initial purpose.

Quality assurance

A key activity is the development of mechanisms and quality chains/audit trails for ensuring that only high quality bananas are produced and marketed (see output of group 5 - total quality management).

Produce identification

There is a clear need to establish mechanisms for produce identification. Produce should be identified with growers in particular areas and countries in order to develop a farmer-consumer solidarity and enable the consumers to identify with the types of farmers involved in production and their socioeconomic and geographical context.

Key linkages: Workshop Organizers, Producers and Industry.

Assessment of market needs for different types of bananas

Any type of banana can be marketed as long as it satisfies the key criteria of taste, shelf-life, appearance and ripening. There is little scope for marketing plantains so the focus should be on bananas. In view of the growing significance of black Sigatoka and potential spread to new locations, consideration should be given to development of alternative varieties. FHIA-23 is seen as a potential alternative.

Varietal assessment

Undertake research to determine whether FHIA-23 satisfies the key requirements. For this there will be a need to provide FHIA-23 to national programmes for testing. It was noted that this was already happening in the Dominican Republic.

Export market development

Create a dialogue between producers and supermarkets to discuss issues of quality and sustainability requirements. The World Organic Supermarkets Club (WOSC) was willing to give a platform for this dialogue.

Key linkages: FHIA, INIBAP, National Governmental and Producer Organizations, Producers, Industry, WOSC.

Identify the scope for marketing value-added products

Product options

Banana puree, for incorporation into baby products, is the most successful product so far. However, this market is dependent on establishment of the necessary infrastructure which requires a prohibitive capital outlay. Furthermore, it would be difficult to compete with already established enterprises. Other alternatives considered were dehydrated banana and chips. However, markets for these are presently small.

Actions required

- Determine whether proposed products do in actual fact add value to the producer.
- Collate information on the food ingredient market and in particular assess potential for alternative use of puree, e.g. in adult processed food.
- Investigate potential for development of inexpensive solar drying systems.
- Assess the potential for growth in the market for dehydrated bananas.

Key linkages: Regional-international organizations, Supermarkets and Retailers, Producers, Food Ingredient shows.

Assess the scope for linkage between organic bananas and Fair Trade

The group felt that there is a perception among smallholders that they have little or no influence on Fair Trade criteria and therefore cannot play a fully active role in the system. Mechanisms are required to further empower farmers to actively engage with those promoting Fair Trade to incorporate the requirements of organic production criteria, particularly during the conversion phase.

Specific needs

- Actively engage Fair Trade Organizations (FTO) on criteria and smallholder specific certification.
- Foster closer linkage between FTO and producers.
- Identify a representative group of smallholder globally who can participate in developing a dialogue with FTO.

  Key linkages: Fair Trade Organizations, Producers, Supermarkets and Retailers, Consumers.

Develop mechanisms for assessing realistic prices for each country

Activities required (these activities link in with those under 'Assessment of market needs for different types of bananas' above):

- Price implications of specific logistics including shipping, ripening and distribution also need to be promulgated through discussion between all stakeholders. Mutual awareness of the cost implications of organics to each stakeholder in the market chain and potential benefits through reduced wastage is required to ensure a successful relationship.
- Promote realistic price expectations. Currently, in the Dominican Republic, price premiums range from 25-50%. In the medium term, premiums in the range of 25-30% are considered realistic for giving a sound return to the individual smallholder. With current premiums, farmgate prices in the Dominican Republic range from US$5-7.
- It is essential for each country contemplating organics to undertake an assessment of realistic farmgate price expectations for its own circumstances.
  Key linkages: Producers, Exporters/Importers, Supermarkets and Retailers.

Scale of production required to meet market demands

A realistic minimum production area to ensure the homogeneous container loads necessary for ripening should be at least 25 ha in any particular area. It is necessary to consider minimum area requirements when undertaking feasibility for establishment of organic production schemes.

- Engage governments to support establishment of organic production zones.
  Key linkages: Producers, Governments, Development and Donor Agencies.

Development of national/regional markets

- To establish credibility of organic production for food security and food safety, it is necessary to explore scope for development of national and regional markets. At present this is almost non-existent.
- Promote organic markets at the local level also with the tourist industry.
  Key linkages: Producers and Supermarkets and Retailers, Tourist Industry.

Linkages with alternative organic crops and scope for mixed cropping

There is some scope for development of rotation crops, particularly legumes such as peanuts that can help add nutrients to the soil. However, for the Dominican Republic it was noted that this is not a necessity as the same land can be in production for a long time provided enough organic matter with appropriate nutrient characteristics is available. As far as crop mixes/underplanting are concerned, there is limited scope, particularly during the initial stages of establishment. Crops such as peanuts, beans, cassava and corn are grown in the Dominican Republic, but these are for local consumption. In the Windward Islands, banana is often grown with other crops but the export potential of these is rather limited. There may be greater scope for planting of alternative organic crops around field margins, both as a source of mulch or soil nutrients and as potential marketed crops in their own right.

- Determine suitable alternative crops which could be grown in specific countries.
- Research is required to determine suitable crop mixes and with potential for export and for local organic markets such as ecotourism.
  Key linkages: National and International Organizations.

Issues raised during plenary discussion

- It was noted that in the Windward Islands, the reject rate is around 30%. Efforts should be made to identify options for using these rejects in value-added products. Technologies such as small-scale solar dryers already exist and should be further evaluated. The possibilities for using organically-produced reject bananas as ingredients in other products should also be investigated.
- Regarding the question as to whether supermarkets are generally more interested in social/ethical or environmental criteria, it was stated that this varies from country to country. Some countries, particularly those that have experienced food scares, are more likely to favour organic products, whereas countries with a more politically aware population give greater support to Fair Trade products. However, it is clear that products with both Fair Trade and organic labels have the best opportunities for market entry.
- The packing house requirements for organic products are very important and must not be forgotten. For example, any water used in a packing house must be of drinking quality and the overall standards must ensure a clean product.

Report of working group 5: Quality assurance and marketing

Goal

The goal of working group 5 was defined as follows:

"To deliver a well-flavoured banana, without progressive defects, and with attractive appearance to consumers, wherever and whenever they wish to purchase it."

Identification of needs

Understanding quality

In order to understand quality, the working group agreed that it is necessary to:

- Define quality criteria in relation to:
  Consumer/market;
  Regulatory bodies (EU etc.);
  Distributor/retailer.
- Relate quality criteria to the quality characteristics for Cavendish and other varieties in relation to external and internal properties, in terms of:
  firmness;
  flavour;
  shelf-life.

Developing quality assurance systems

In this respect, it is necessary to:

- Define key fruit characteristics at harvest and ripening.
- Determine appropriate postharvest handling procedures for Cavendish and other varieties – particularly in relation to:
  - Disease control for anthracnose and crown rot;
  - Early ripeness/shelf-life.

Ensuring export quality is produced

The main need in this area is to define smallholder production systems capable of producing export quality organic bananas.

Actions required

Understanding quality

- A survey of stakeholders is required to determine quality criteria and perception, in terms of taste, visual appearance, compliance with environmental and ethical standards etc. Such a survey could be completed in **6 months**.
- Research is required to understand the factors determining quality and preference attributes in relation to:
  - Nature of texture and flavour;
  - Organoleptic properties;
  - Shelf-life.

  Such research is expected to take **2-3 years**.

Developing quality assurance systems

In this area the following activities are necessary:

- Studies are required in order to identify the fruit factors and handling systems which influence harvest, transport, storage and ripening requirements for organic products of existing and new varieties. Such studies could be completed in 3 months.
- Research on organic control methods for postharvest diseases, especially crown rot. Such research should include short-term studies, such as the effect of hot water treatments of the crown (6 months) or long-term studies on biological control methods (2-3 years).

Ensuring export quality is produced

In this area, the actions required are:

- To define production protocols and develop smallholder-based audit trail systems (6 months).
- Carry out research on production systems in relation to disease control, fertilizer applications and varietal differences (2-3 years).

Expected outputs

Understanding quality

- Industry guide with specifications for organic banana and consumer needs.
- Guide to help define and assess the development of appropriate pre- and postharvest practices.

Developing quality assurance systems

- Total quality management manual for field managers and producers.
- Manual to define minimum standards for producers and packhouse facilities
- Manual for ripeners.

Ensuring export quality is produced

- Smallholder quality assurance and audit trail manuals.
- Protocol for production systems (including model HACCP (Hazard Analysis and Critical Control Point) methods to identify key critical points in production) including needs and timeframe for conversion to organic farming.

Key linkages

The working group identified the need for effective interaction between the public and private sectors, including policy makers. This would be required for example, for implementing fruit grade changes.

In addition, collaborative research initiatives between farmers, researchers, shippers, ripeners etc. are required covering both technical and socioeconomic issues. Such initiatives are required in order to address livelihood strategies for smallholders.

For the introduction of new varieties, international linkages will be crucial for the establishment of trial shipments of such varieties and the testing of new practices.

Institutional issues

The following issues were raised by the working group:

- There is a need for efficient exchange of information – via a Web site for example.
- Efforts must be made to lobby donors to obtain funding for regional and international initiatives.
- Interaction with the EU and other regulatory bodies is important.
- Constructive interactions with other ongoing initiatives, especially Fair Trade are required.

Issues identified to be addressed by other groups

- Public awareness – consumers, policy-makers and certification bodies must be made aware and kept informed of activities.
- Potential of new varieties must be assessed.

- Information on the time and criteria required to reach organic status must be made available.
- The possibility to market produce under shared labels should be investigated, particularly during the conversion process.
- Effective training at all stages will be essential.

Issues raised during plenary discussion

- It was noted that neither hot water treatments or surface disinfectants are effective against crown rot disease. However, it was suggested that saline treatments and modified atmosphere packaging may hold potential.
- With regard to the introduction of new hybrids, FHIA-23 has been growing in Cuba for four years and a large amount of information is now available regarding the post-harvest characteristics of this hybrid. Information on FHIA hybrids is available on the FHIA Web site.
- It was noted that the FAO Codex standards have different criteria for products identified as 'pesticide-free', 'Fair Trade' and 'organic'. It is important that producers have an opportunity to contribute to the setting of standards, and that these are not just imposed from outside. It was recommended that representatives from the region should work towards developing regional standards which are acceptable to all stakeholders.

Part 2

Papers presented

Session A - Current situation and country perspectives

Status of banana production in the Windward Islands and the prospects for organic banana production

Errol D. Reid[1]

Introduction

Banana-based cropping patterns and systems in the Windward Islands of Dominica, St. Lucia, St. Vincent and Grenada have been changing from mixed cropping and plantation production to monocultural and small farm production of bananas to meet the requirements of the market. The countries (particularly Dominica and St. Vincent) have become highly dependent on banana production as a source of foreign exchange and domestic employment. The performance of the agricultural sector and the economies as a whole, in terms of export revenue earning capabilities, Gross Domestic Product and farmers involved, to name a few variables, therefore, continue to be directly linked to the fortunes of the banana industry, as reflected in Table 1 below.

Table 1. Selected indicators, 1997

Indicator	Dominica	St. Lucia	St. Vincent	Grenada*	Windwards
Population	75 700	149 570	111 476	91 150	427 896
Banana exports Mt	34 902	71 397	31 021	2020	139 340
Banana exports value (EC$M)	41.47	85.94	37.11	1.51	166
Banana exports as % of GDP	7.4	7	6	0.30	21
Banana exports as % of domestic exports	51	59	33	2.4	43
Active banana farmers	4793	4823	6653	0	16 269
Banana acreage	8500	14 000	7000	700	30 200
Average yields (Mt/acre)	4.11	5.1	4.43	2.89	4.61
Average farm size (acres)	2.3	2.7	1.5	0.6	1.75

*1996 Figures for Grenada only; very little bananas were exported in 1997
Source: Government Statistical departments, Banana Associations and WIBDECO

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The rise in small farmer production of bananas came about partly because of the relatively ease with which they could enter the industry and partly because of the market arrangements with the United Kingdom which guaranteed preferential access. The market arrangement was one which resulted in an attractive price to the producers (and marketers), and this, along with reliable transportation, and the perennial nature of the crop, provided for a weekly/fortnightly income source.

In 1993, the European Community (EC) established a Single European Market which adversely affected the preferential marketing arrangements for ACP bananas. The ACP producers, including those in Dominica, St. Lucia, St. Vincent and Grenada, were allowed to export duty-free a quantity equivalent to their highest exports up to 1990. The resulting quota for the Islands under the new arrangements are 71 000, 127 000 and 82 000 metric tonnes respectively. Following a successful challenge of the WTO compatibility of this regime in 1998, these arrangements could be phased out when a new import regime is adopted by the EU in the year 2000. While the features and components of the new arrangements are not yet clear, one outcome could be that bananas from the Windward Islands will be expected to compete in a free market with those of the rest of the world. Since Windward Islands banana producers face a much higher cost of production than their counterparts elsewhere, this scenario will result in the income earning capacity of the producers being severely threatened. Given the banana sub-sector linkage with almost all other sectors, the entire fabric of the Islands' societies will be threatened.

The importance of banana to the economies of Dominica, St. Lucia and St. Vincent should not be underestimated. Although actual data are not available, it is estimated that the industry employs about 70 000 persons directly and indirectly. Given the high propensity to consume among persons employed in the industry (with average households of approximately 5), the commercial life of the nation will be affected, for this section of the population will only consume what is necessary (food, clothing and medicine) as their incomes decrease. So any fundamental decrease in disposable income will have multiplier effects with dire consequences for the industry and the economies.

Organization and management of the banana industry

The organization and management systems which evolved within the banana industry were driven by the following needs:

- To secure remunerative prices to the banana grower;
- To achieve consistency in quality and volume of production;
- To secure the long-term viability of the industry.

The industry has progressed from the very loose structures in the 1950s to the tightly knit and much more efficient ones of the present. The leaders recognized that activities towards these objectives were intertwined, and the achievement of any one strengthened the course towards achieving the others. Thus, for example, remunerative prices to the farmer encourages adoption of the recommended practices required to produce high

level and quality of the product. This, in turn, will further improve prices, spread overheads over a larger production level, thus reducing unit costs, and strengthen the viability of the industry.

Within each producing island, the need for a body to coordinate and collect production and provide support services to the banana farmers was recognized quite early. This led to the formation of private growers' associations, the Dominica Banana Association (1934), St. Lucia Banana Association (1934), St. Vincent Cooperative Banana Association (1934) and in Grenada, the Grenada Agriculturist Union provided this coordination. These Bodies were reorganized on a number of occasions, firstly, to make them more accountable to their members and, secondly, to give the respective Governments a formal role in their direction. Thus, the St. Vincent Banana Growers' Association (SVBGA) came into being in 1953, the St. Lucia Banana Growers' Association (SLBGA) in 1954, the Grenada Banana Cooperative Society (GBCS) also in 1954, and the Dominica Banana Growers' Association (DBGA) in 1959. The SVBGA and GBCS have remained substantially the same since; however, the DBGA was replaced by the Dominica Banana Marketing Corporation (DBMC) in the mid-eighties to provide services and market bananas, while the SLBGA was replaced in 1998 by two private companies, the St. Lucia Banana Corporation (SLBC) and Tropical Quality Fruit Company (TQFC).

With the advent of Geest in the Windwards in 1953, as a producer, shipper and marketer of bananas, the market for Windward Islands bananas was “solidified” in the UK, where the Islands had preferential access. Geest entered into agreement with all the Growers' Associations to purchase all export quality fruit produced. In 1958 the Windward Islands Banana Growers' Association (WINBAN) was formed as a coordinating organization to address common problems facing the industry in the Islands, take over the joint marketing of bananas from the Islands and provide hurricane insurance coverage and technical services to banana farmers. With the formation of WINBAN, Geest now negotiated with one instead of four separate Growers' Associations. The contracts negotiated over the years reflected the Windward Islands' growing interest in the marketing of bananas. WINBAN was replaced by the Windward Islands Banana Development and Exporting Company (WIBDECO) in 1994. This company afforded the Windward Islands the opportunity to become more involved in the shipping and marketing of its bananas. WIBDECO, in a joint venture with Fyffes, eventually took over the banana operations of Geest in 1996 (see Figure 1).

WIBDECO's mission is “to advance the socioeconomic well-being of the banana growers of the Windward Islands, by taking appropriate measures to improve the quality and efficiency of production, shipping and marketing of the bananas, by consulting with and advising the banana growers' organizations of the Windward Islands and representing their common interest on all matters relating to the banana industry, particularly in dealing with external agencies”.

The Company was incorporated in St. Lucia in March 1994, and was subsequently registered in Dominica, St. Vincent and Grenada. The ordinary shares in the Company are held by the Governments and the four local banana corporations or Banana Growers'

Associations (BGAs) in the Windward Islands, in the following ratios:

Government of the Commonwealth of Dominica	12.5%
Government of Saint Lucia	12.5%
Government of Saint Vincent and the Grenadines	12.5%
Government of Grenada	12.5%
Dominica Banana Marketing Corporation (DBMC)	13.2%
St Lucia Banana Growers' Association (SLBGA)	20.0%
St Vincent Banana Growers Association (SVBGA)	15.6%
Grenada Banana Cooperative Society (GBCS)	1.2%

The shares of the BGAs are held in proportion to their average annual production in the years 1992-94.

The production environment

Banana in the Windwards is predominantly of a small-scale nature. It is estimated that approximately 80% of the banana farms are less than 5 acres in size, 15% are between 5-10 acres and the remaining 5% are above 10 acres. Banana production is also highly skewed in that approximately 80% of the total number of farms produces less than

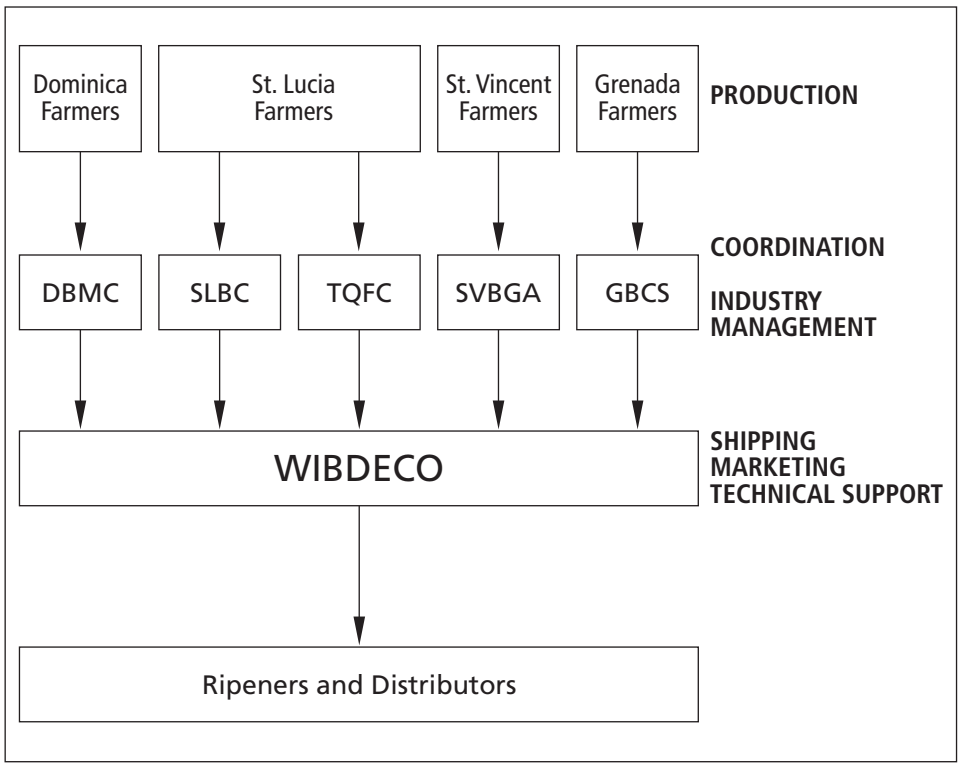

Figure 1. Structure of the Windward Islands banana industry.

20 tonnes annually, representing some 40% of the total banana production volume. Over 75% of farmers are male, and approximately 50% have had at least primary education (considered the cut-off point for functional literacy). The typical farmer has a general knowledge of the recommended practices in banana production, however less than 50% have in-depth knowledge and understanding of the practices.

Total area under cultivation in the Windwards is estimated at over 30 000 acres. Approximately 51% of this area is on slopes greater than 20 degrees. Most of the cultivated land is subjected to drought stress during the period January to June of each year. Average yield is estimated at 6-8 tonnes per acre. This relatively low average yield is one of the major factors contributing to the relatively higher unit cost of banana production in the Windwards. Generally, unit cost of production tends to decline with farm size, due mainly to relatively higher yields obtained on larger farms.

Banana production in the Windwards is relatively labour-intensive and the steep terrain of the islands tends to limit any opportunities for wide usage of mechanization. Labour accounts for over 50% of the total cost of production, with material inputs representing approximately 30% and management and capital, the remaining 20%.

The banana production environment in the Windward Islands is characterized by a number of factors which militate against farmers achieving the high level of production and productivity common in other banana producing regions. These contribute to the relatively low average yields of 6-8 tonnes per acre obtained on most farms. Low average yields in turn, are partly responsible for the relatively high unit cost of banana production. Some of the main problems include:

a. the rain-fed nature of banana production characterized by severe water deficit in the dry season causing crop loss;
b. the difficult production environment, with particular reference to steep slopes and shallow soil depth, high level of soil acidity and poor native soil fertility. Farmers have to use large amounts of fertilizers and to apply limestone in an effort to ameliorate the adverse effects of the soil acidity;
c. the relatively high level of field losses, estimated at 20-30%, resulting mainly from the ravages of nematodes and the corm borer (*Cosmopolites sordidus*);
d. the high cost of "high quality" inputs to farmers, who may not be able to use these at the recommended rates;
e. the high cost of controlling leaf spot disease (estimated at an average of $14 M per annum) in the rugged terrain and highly variable agroecological zones in the Windward Islands;
f. the shortage and high cost of labour in banana production. Labour now comprises over 60% of the total cost of production.

The lower cost of production faced by other banana producers will enable them to operate profitably in a liberalized market for bananas. The relatively higher cost of production by the Windward Islands banana producers requires that they increase productivity if they are to compete in the market for bananas. Windward Islands producers must, therefore, move to narrow the productivity gap between local production and that of other producers.

Notwithstanding the disadvantages associated with the production environment in the Windward Islands, they do enjoy a few advantages; primarily among these are:

- the lower level of use of agrochemicals, particularly nematicides and insecticides, reduce exposure of farmers, workers and consumers to these;
- low level of spraying against Sigatoka resulting in less oil and fungicides released in the environment;
- the fruit is usually smaller and more tasty than those produced under more intensive growing conditions;
- the income earned goes directly to many small producers in rural communities, thereby encouraging the development of and stabilizing the Islands' communities;
- management of production practices, quality and labour is usually easier on smaller farming units.

Postharvest production management

The Windward Islands' banana industry is market-driven. The quality of fruit demanded by the consumer has dictated practices and management systems in ensuring the Windward Islands are able to place fruit of acceptable quality on the market. Since the opening up of the UK banana market in 1993, the entry of substantial levels of non-ACP fruit onto the market has stimulated competition and prompted the Windward Islands to implement activities to substantially improve the quality of Windward Islands' bananas.

Each banana company or Association now has specialized divisions to address quality issues, including managing quality assurance processes on the farms and at reception centres and with responsibility for enforcement of quality-related regulations and assisting farmers to produce the quality of fruit required.

Banana farmers process and package bananas under strict guidelines specified by WIBDECO in collaboration with the Banana Companies or Associations. The packed boxes may be palletized on the farm or transported loose-stacked on pickups or trucks to designated Reception Centres, where the quality of each delivery is assessed, the fruit accepted or rejected and in the case of the former, palletized for shipment to the UK. The bananas must be loaded on board refrigerated vessels within 36 hours of harvest; usually this is achieved within 24 hours. The fruit is subjected to controlled atmosphere conditions (elevated carbon dioxide and depleted oxygen) for preservation of quality, during the 10-day journey to the UK. The shipment of banana is subjected to a quality assessment after discharge in the UK port and the assessment data are transmitted to the Windward Islands for use in extension follow-up activities.

Practices for harvesting, processing and transporting bananas as well as the quality specifications and quality control procedures are specified by WIBDECO in collaboration with the Banana Companies/Associations. The overall objective of these specifications is to maximize the quantity of premium fruit produced and packed by each farmer, and preserve the quality of the packed fruit from the farm to the market. In addition, specific concerns and requirements of the UK buyers are taken into account, such as the

sensitivity of consumers to the issue of pesticide use in food crops and on fruit, and the establishment of MRLs (maximum residue level) of the various chemicals on and in bananas. Indeed, the British Food Act of 1990 requires that the producer shows "due diligence" in its control of chemical usage and of residues on the fruit. Samples of Windward Islands bananas are regularly collected for residue analysis in order to assure customers that MRLs are not exceeded.

In ensuring the integrity of the quality control processes and a common approach to fruit assessment at inspection points in each island, WIBDECO has responsibility for training and certifying all fruit inspectors and assessors.

Trend in banana production

Over the past ten years, there has been significant decline in banana production in the Windward Islands (see Figure 2). Production declined from a high of 282 234 tonnes in 1992 to the low of 137 422 tonnes in 1997.

The distribution of production by island from 1994 to 1998 is presented in Table 2.

Table 2. Windward Islands banana production, 1994-1998

Year	Dominica		St. Lucia		St. Vincent		Grenada		Total
	Tonnes	% of total	Tonnes	% of total	Tonnes	% of total	Tonnes	% of total	
1994	43 046	25	90 909	53	30 925	18	4544	2	164 885
1995	33 366	17	105 658	55	50 083	26	4574	2	193 681
1996	39 956	21	105 547	55	44 038	23	1866	1	191 407
1997	34 902	25	71 397	52	31 021	23	102	-	137 422
1998	28 640	20	73 220	52	39 886	28	94	-	141 840

Figure 2. Windward Islands banana production 1988-1998.

Most of the bananas exported went to the United Kingdom market, however, towards the end of 1998, approximately 2348 tonnes went to other EU market destinations.

Following some years of decline, the total number of active farmers involved in banana production in the Windwards increased from 16 269 in 1997 to 16 760 in 1998, an increase of 491 farmers or 3%. This overall increase in the number of active farmers may be due to farmers being encouraged to re-invest in the industry because of the more attractive prices being paid under the Certified Grower Programme in all the Islands. In addition, the Production Recovery Plan instituted in 1998 has been providing financial assistance to the banana companies and farmers to upgrade production practices and put in place the infrastructure to enable farmers to obtain irrigation and drainage facilities. It is expected the Plan will assist in expanding production up to 220 000 tonnes in 2001.

Table 3. Number of active* growers in Windward Islands 1994-1998

Year	Dominica	St. Lucia	St. Vincent	Grenada	Total
1994	6763	8011	7375	897	23 046
1995	6218	7379	6139	450	20 186
1996	5471	6677	5667	150	17 965
1997	4793	4823	6653	0	16 269
1998	3533	6061	7048	118	16 760

* active growers are those who delivered bananas during the past twelve months.

Trend in quality performance

The change in market arrangements for Windward Islands bananas has been accompanied by an increasingly competitive environment in which higher quality, lower-cost fruit from elsewhere became much more readily available to consumers in the UK. This competitive pressure, together with an increasing volume of fruit have tended to increase the demand for higher quality bananas.

The increasing dominance of the supermarkets in the UK banana trade, currently estimated to account for nearly 80% of bananas sold to the consumer, has placed further pressure on the Windward Islands to supply fruit of superior quality and meet the specific requirements of this sector, if they are to earn a satisfactory income for their product. In general, the supermarkets offer the more attractive prices for bananas throughout the year while the wholesale trade, where lesser quality fruit can be sold, offers very low prices when the market is over-supplied or demand is low.

The Windward Islands responded to these challenges by implementing programmes to improve the quality of their bananas and reduce the cost of marketing. The Islands have completely overhauled their quality assurance and control systems and adopted improved fruit processing technologies in their drive towards achieving top quality throughout the year. The graph in Figure 3 presents the improvement in quality achieved by the Windward Islands between 1997 and 1998 as a direct result of the actions implemented by the banana institutions.

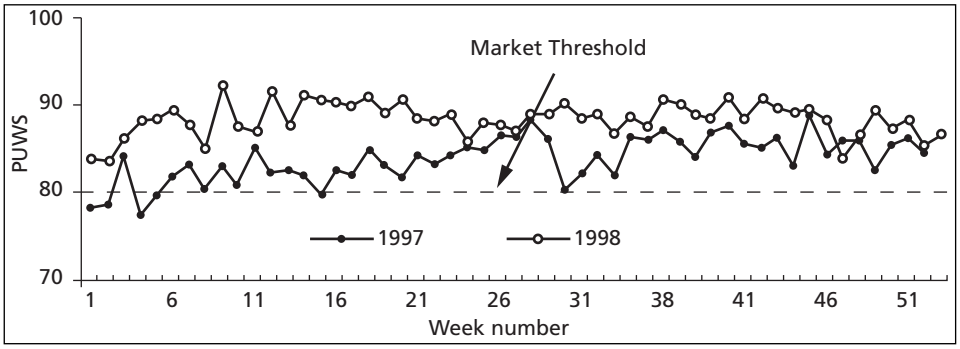

Figure 3. Windward Islands banana quality scores, 1997-1998.

The adoption of the Certified Grower Programme in 1996, to develop a pool of farmers producing fruit of the required quality consistently under conditions acceptable to the supermarket trade, has been highly successful and the industry has been able to place its fruit in the top supermarkets in the UK. An estimated 80% of total production now comes from Certified Farmers and this (and fruit from other farmers) now achieve unprecedented quality levels. As a result of this improvement in quality, the demand by the leading British supermarkets for Windward Islands fruit has increased substantially and current orders now outstrip supply.

Prospects for organic banana production

Banana production had, from the onset, been geared to the export market. Whereas much of the production during the early years no doubt depended on a "low agrochemical input" regime, it soon became clear that the low natural fertility of most soils required the use of a fertilizer material. Similarly, the control of significant pests, diseases and weeds soon became chemical-based. It is generally agreed that production of the volume and quality of bananas required to satisfy the export market and maintain a viable banana industry could be achieved only with the use of a range of fertilizers, pesticides and herbicides. Whereas these agrochemicals are not usually applied to bananas and plantains grown for domestic consumption, the driving force is often economic rather than a desire to consume chemical-free bananas.

There is no known farm producing "certified" organic bananas in the Windward Islands. Indeed, although there a few farms on which crops are produced "naturally", there appears to be little local demand for organic crops. Local consumers appear to be content to purchase fruits and vegetables produced on conventional farms. In the absence of significant local demand for produce grown under "agrochemical-free" conditions, the development of rules and regulations or a responsible authority to support the production and marketing of organic crops, has not been a priority issue.

The case of bananas for the export market is different; in this case, the forces driving interest in producing an organic product are external to the Islands and the rules,

regulations and controls would have been established by an external authority, whether regional or international.

In order to initiate sustainable organic banana production in the Windward Islands, a number of key issues will have to be addressed urgently; these include the following:

Farmer capability and production costs

There is the tendency to associate the production of organic crops with smaller or disadvantaged farmers possibly because of the perception that they can least afford the agrochemicals used on conventional crops and are more likely to use naturally occurring inputs. However, in the Windward Islands environment, it is uncertain how many small-scale farmers would be able to maintain the discipline and afford the costs implicit in producing organic bananas for the export market. The onerous record keeping requirement, strict implementation of integrated crop management (ICM) and integrated pest management (IPM) principles, non-use of synthetic agrochemicals, labour-intensive weed control and the need to use higher-cost alternative pest and disease control substances could militate against the participation of smaller producers.

The challenge will be to produce organic bananas cost-effectively, given a possible decline in productivity from the current average of 15 to 20 tonnes/ha, increased level of rejection and a price premium of 25% (estimated). A sustainable organic banana production unit would most likely be farmed by someone who had adopted the recommended practices for producing conventional bananas, is doing so cost-efficiently and profitably, and is keen to adopt new technologies and follow the strict discipline required. In introducing the production of organic bananas in the Windward Islands, it will be necessary to undertake the re-training of participating farmers in the farming disciplines and production procedures and provide continuing technical support and monitoring to assure all key practices are being followed.

Availability and location of suitable lands

The small and overlapping nature of most agroecological zones in the Windward Islands severely constrains the ability to locate farms isolated from areas where conventional agriculture is practised. The risks of contamination through runoff from farms at higher elevations and flooding could eliminate most low-lying farms. Similarly, possible contamination of surface and underground water could limit use for irrigation on farms producing organic bananas. The aerial and ground spraying of mineral oil and fungicides for the control of Sigatoka carry the risk of drift of these chemicals over considerable distances, thereby further restricting areas which may be suitable for organic farming.

These considerations could eliminate a large proportion of the arable areas in valleys and lands subjected to drift from aerial spraying, from use for organic banana production. The remaining land would be in upland areas where the climate is humid and ideal for the rapid development of Sigatoka disease, and the soil is of low natural fertility. Both conditions could make organic banana production more costly.

It will be necessary to undertake a comprehensive survey of the arable lands and the quality of available surface and ground water in the Windward Islands to determine those suitable for organic banana production.

Low natural fertility of the soils

The low natural fertility of most soils requires the use of relatively large quantities of high analysis NPK fertilizers to achieve economic yields. The low nutrient levels found in the main soils in St. Lucia (Table 4) are typical of the fertility status of Windward Islands soils. On the average farm, some 2700 kg of NPK fertilizer (16:8:24 + 4), are applied per hectare per year. On soils highly deficient in one or more of the primary nutrients, side dressings of other fertilizer material may be required.

Table 4. Chemical properties of the main agricultural soils - St. Lucia

	%	% meq/100g soil				ppm
	N	CEC	Ca	Mg	K	P
Ultisols	0.3	23	8	5	0.3	8
Inceptisols	0.3	29	15	7	0.5	10
Alfisols	0.1	15	9	5	0.1	7
Vertisols	0.3	47	26	16	0.6	9
Mollisols	0.2	36	21	12	0.3	7

Organic banana production would require that the mineral fertilizers are replaced by "organic" types such as animal manure, green manure, compost, fish meal etc. However, these are low analysis material and large quantities (possibly as much as 5 times) must be used to equate to the level of nutrients supplied by inorganic fertilizers. More importantly, apart from green manure, very little material is available in the Windward Islands and expensive, low analysis material may have to be imported. The net effect would most likely be to increase the unit cost of production.

The use of green manures as a source of nitrogen could be a cost-effective approach to supplying this nutrient to the banana crop; however, this technology is untested in the Windward Islands and it will be necessary to investigate the potential of this practice.

Endemic pests and diseases

Endemic pests and diseases such as nematodes, Sigatoka, weevil borer and thrips are controlled by appropriate agrochemical treatments in conventional banana production. These will remain issues in organic banana production and it will be necessary to identify appropriate effective treatments. It is understood that approved treatments against the main pests and diseases exist, however since these have not been used in the Windward Islands, it will be necessary to investigate their performance in this environment. Similarly, the use of vitroplants as a means for reducing the need for a nematicide of any type should be investigated.

The use of the approved substances for control of Sigatoka and insects could be at a higher cost per unit of production than those incurred in conventional banana production. Unless there is a significant net benefit, the farmer is unlikely to be favourably disposed to organic banana production.

Lack of low-cost farm labour

Farmers must use non-chemical means of weed control and this will most likely translate into the use of mechanical devices such as the cutlass and "weed-eaters". Because of the rapidity with which weeds regenerate in the humid tropics, the farmer would be forced to undertake control every two to three weeks during the wet season. The labour input required to undertake such a control regime is likely to be 100 to 200% above that in conventional banana production and given the current difficulty in accessing low-cost labour, the farmer's weed control cost in organic banana production is likely to be substantially higher than current levels (assuming he is able to find the labour required). It is likely, therefore, that the proportion of production cost associated with labour would be higher than the 60% which exists in conventional banana production.

Availability of adequate postharvest treatment of fruit

The main postharvest disease of bananas is crown rot which is controlled by application of a fungicide such as Imazalil or Thiabendazole. These will have to be replaced by a non-chemical treatment; citrus extract is thought to provide some protection to the fruit, however, since this treatment has never been used in the Windward Islands, it will be necessary to investigate this and other treatments appropriate to the Islands.

Production level required

There is no clear indication of the volume of organic bananas which the Windward Islands would be able to successfully place on the UK banana market. The Islands have been advised that the market can absorb "all they can produce", however while this may be the present position when supplies are hard to find, the next few years may see a dramatic increase in the volume of organic bananas which could result in the erosion of prices. Discussions with supermarkets' representatives have led to tentative target of 20% of total production, in the first instance. This would translate to approximately 28 000 tonnes/year and would require an estimated 4700 acres. It will be necessary to more clearly determine market requirement projected over the next three to five years.

Conclusion

The Windward Islands' banana industry has survived natural disasters and periods of difficult market and climatic circumstances, since its humble beginnings in the first half of the century. It has gone through a series of reorganizations and consolidations, but has remained a viable export business. While the protected status of its primary market had contributed to its survival through difficult periods, there is no doubt that the

organizational structures and management systems which have evolved contributed substantially to its continuing viability. These structures and systems have been developed to assist the industry in achieving its major objectives of good prices to farmers, good and consistent quality of export bananas and its long-term viability. Given the increasing competitiveness of the banana business, the banana industry must further improve the efficiency of its management systems and seek novel methods of reducing costs, if it is to remain viable.

Two important lessons learnt over the more than four-decade history of the banana industry are (i) that the farmer is central to the industry and his/her loyalty and confidence are absolutely necessary for its continuing survival, and (ii) that farmers need an acceptable level of income if they are to participate meaningfully in development activities. In order to ensure the successful introduction of organic banana production to the Windward Islands, a number of key issues must be addressed; these include:

- economic analysis of realistic scenarios for the production of organic bananas;
- a comprehensive survey to determine sites suitable for organic banana production;
- identification and re-training of interested farmers and preparation of a comprehensive production procedures manual;
- identification of appropriate and cost-effective sources of plant nutrients and the means for ensuring farmer access to these;
- determination of appropriate technology for controlling the main pests and diseases; and
- strategies for reducing labour cost and/or improving farmers' access to labour.

Resolution of these issues is a pre-requisite for any programme designed to expand organic banana production in the Windward Islands.

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Brief overview of banana production in St. Lucia

Julius Polius[1]

Ever since the earlier era of colonization by the French and English, agriculture has been an important area of economic activity in St. Lucia. Throughout that period, the country produced a range of tropical produce that included tobacco, cocoa, spices and sugar. Meanwhile, the persons brought onto the island as labourers from Africa and Asia, were engaged in the production of food crops (root and tubers, vegetables and livestock) for domestic consumption, on the periphery of the plantations.

In terms of exports, sugar was the first major commodity to be traded. The planting of sugarcane lasted from the latter part of the 1800s until around the 1960s, when the crop was replaced by bananas as the main export commodity. Sugarcane production was always of the 'conventional' type, with increasingly widespread use of fertilizers and pesticides throughout. The subsistence farming of the labourers was low input in nature, capitalizing on the fairly high natural fertility of the new lands that were cultivated.

The elevation of bananas in the 1950s, as a major export crop, facilitated the active involvement of a larger number of persons in that industry. While initially the large estates predominated, there were, however, opportunities for the emergence of a "small farmer" category of persons that grew and dominated the industry by the end of the 19th century.

In recognition of the fact that banana production requires a collective effort, there have always been moves aimed at bringing farmers together in a structured way. A private growers association, the St. Lucia Banana Association, was formed in 1934. This evolved into a quasi-government body, the St. Lucia Banana Growers Association (SLBGA), in 1954. All of this was catalyzed by Geest, a Dutch company, who came to the Windward Islands in 1953 as a producer, shipper, and marketer of bananas destined for a secured market in the UK. To assist in the coordination of all these activities, the Windward Island Banana Growers' Association (WINBAN) was formed in 1958.

Developments in the banana sector, over time, have caused changes in the organizations and institutions involved in the industry. The banana industry was privatized in 1998 and as a result the SLBGA gave way to the formation of the St. Lucia Banana Corporation (SLBC) and the Tropical Quality Fruit Company (TQFC). Previously, in 1994, WINBAN had been replaced by the Windward Island Banana

[1] Ministry of Agriculture, Castries, St. Lucia.

Development and Exporting Company (WIBDECO). The shares in this Company are held by the Governments and the Banana Growers Associations (BGA) of the Windward Islands.

Economics of banana production

Agriculture's contribution to Gross Domestic Product (GDP) has been significant, though there are signs of a declining trend over the last decade. Table 1 below shows the percentage contribution to GDP by economic activity within the sector.

Table 1. Percentage contribution of agriculture to GDP by economic activity within the sector

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Agriculture	14.63	11.96	13.93	13.67	10.82	11.16	11.1	9.06	9.14
Crops	12.93	10.18	12.27	12.06	9.20	9.76	9.44	7.23	7.16
Bananas	10.27	7.33	9.68	9.15	6.56	7.52	7.07	4.78	4.75
Others	2.66	2.86	2.59	2.92	2.86	2.25	2.37	2.45	2.41
Livestock	0.89	0.71	0.68	0.57	0.58	0.53	0.69	0.77	0.87
Forestry	0.38	0.36	0.31	0.28	0.25	0.22	0.20	0.18	0.16
Fishing	0.42	0.72	0.67	0.75	0.56	0.64	0.77	0.88	0.95

Source: R. Paul citing ECCB, National Accounts Statistics 1999.

Banana has dominated performance in the agricultural sector and the fortune of that sector is intimately tied to that commodity. The fall-off in the performance of the agricultural sector has been due, mainly, to the reduction in exports of bananas and consequent decrease in foreign exchange earnings. Since the early 1990s, Caribbean banana exporting countries have been alerted to likely changes to the banana import regime in Europe and the need to adjust to increased competition and lower prices. The impact of the World Trade Organization (WTO) decision to dismantle preferential trading arrangements has resulted in major adjustments being made in the lives of the producers in the Windward Islands.

Agricultural diversification

As part of the adjustment, the Government of St. Lucia has embarked on a strategy to diversify the agricultural sector to enhance food security, to increase import-substitution and foreign exchange earnings. In this regard, much attention has been given to the fresh produce sector, particularly vegetables, fruits, root crops and cut-flower production. Some attention is also being given to the livestock sector with the hope of expanding poultry, swine and small ruminant production. There have been moderate successes in the diversification programme which have been influenced largely by factors relating to marketing. The expected linkages with the tourism sector have not

developed, and overall the importation of food continues to rise at an alarming rate. Nevertheless, Government continues its efforts at diversification and views the option of producing organic bananas as one worthy of consideration.

Banana production system

The current production of bananas in St. Lucia is all based on a conventional system that involves a high input of synthetic pesticides and fertilizers. Banana production is dominated by small-scale farmers with an average farm size of about 0.8 ha. In 1997, the area under banana cultivation was estimated at around 5600 ha. A significant portion of the lands cultivated to bananas, around 50%, are on slopes greater than 20 degrees. Most of the land is subjected to drought stress during the January to June period of each year. Yields average about 15-20 tons/ha, and such low yields have been identified as one of the major causes of the relatively high production cost experienced by farmers. The production system is relatively labour-intensive and the steep and difficult terrain limits the possibilities for mechanization. Over the last five years there has been a marked decline in production and level of farmer involvement in the industry (see Table 2 below).

Table 2. Banana exports and farmer involvement in St. Lucia

Year	Exports (Tonnes)	Number of active growers
1994	90 925	8011
1995	105 658	7375
1996	105 547	6677
1997	71 397	4823
1998	73 220	6061

Source: Annual Statistical Review 1998, WIBDECO.

The factors contributing to the apparent movement away from bananas include uncertainty about the market, shortage and high cost of labour, high cost of inputs, yield losses due to drought, pests and diseases and declining soil productivity. These issues would need to be addressed if farmers are to confidently remain in the current production systems or to adopt new approaches such as organics.

Organic farming in the context of St. Lucia

There are no certified organic production systems, crop or livestock, in operation in St. Lucia. A group of farmers, Roots Farm Cooperative, have been engaged in low input agriculture where the use of synthetic pesticides and fertilizers are minimized particularly in the production of the food that they consume. They have offered for sale such products as rice, soybean and vegetables, which they claim to be organically-produced. However, their operation is not certified as being organic by any of the known authorities in that field.

Meanwhile, the Ministry of Agriculture has identified organic production systems as a possible option in the agricultural diversification strategy being pursued currently. This has been underscored by the numerous requests that the country receives from buyers overseas for organic products. Many of the major supermarkets in the UK, including Tesco, Waitrose, Sainsbury, Marks & Spencers, and Mack Multiples have mounted missions to the island in search of organic products such as bananas, passion fruit, fresh herbs, mangoes, papaya, coconuts etc.

As well, it is recognized that there is a growing consumer preference for foods grown in the organic mode with reduced risk of exposure to pesticides. Therefore there is a desire among farmers and policy-makers, to tap into this market opportunity wherever it may exist.

Potential/opportunities for organic banana production

There is a consensus of opinion that suggests that there are opportunities for the island to get involved meaningfully in organic production of a wide range of crops including bananas, fruits and some food crops. This view is driven primarily by the overwhelming need to diversify agriculture. There is also the fact that lands exist that could be easily converted to organic production because of the absence, for a long time, of conventional farming practices involving pesticides and synthetic products. As well, there is a pool of farmers either within the current banana production systems or in the non-traditional modes who are willing to try something new in order to secure their income in the coming era of globalization. Most significant is the fact that there exists, worldwide, a huge market for organic products. The most crucial issue in all of this is whether we can effectively compete and secure a market share in the organic production arena.

Issues and concerns relating to opportunities for organic banana production

There are a number of general issues and concerns to be addressed before the island could consider taking-off in this field of organic agriculture, as follows:

1. Foremost among the problems facing the island in the development of an organic production capability is a total absence of know-how on the subject. There would be the need to train technicians and farmers in the basic principles and techniques of organic agriculture. In that regard, the services of an expert in organic farming, to be resident on the island for a period of time, is most important.
2. The matter of production cost needs to be detailed given the specific requirements of organic farming. The fact that very little manure is produced on the island suggests that a substantial amount of the nutrient requirement will have to be met through the importation of organic fertilizers. In the case

of bananas there would be limited opportunity for using intercropping techniques to enhance soil fertility because of shading effects of the banana plant itself and difficulty in incorporation of green manures. The issue of weed control and the need to manually carry out such an activity, would result in significantly higher labour costs under our conditions. There are other production-related matters to be considered, such as type of planting material and source of manure.

3. The matter of productivity needs to be well understood as it is being reported in many places that yields and productivity under organic farming may be much lower than under conventional systems.
4. Related to (2) and (3) above would be the matter of price at which the product would be sold. It is understood that organic products are more expensive than conventionally-produced ones. However, it is unclear whether the likely increased cost of production would be covered by the price differential.
5. The matter of farm size and the requirements for buffer strips and windbreaks may pose some problem where numerous smallholders are farming small plots next to each other on sloping lands. Here, the matter of spray drift, contamination of irrigation water, and movement of synthetic materials from one farm to the next may prove difficult to control.
6. The matter of conversion and the supporting financial mechanism will need to be addressed if farmers are to be encouraged to participate. The existing conventional banana plantations will need to undergo a minimum 3-year conversion from date of first inspection; establishing a new plantation on conventional land will take a minimum of two years before crop could be considered organic; establishing a new plantation on 'new' or reverted bush land could be given organic status in anything between 6-12 months depending on the history of the land, level of record keeping and production plan. Throughout that conversion period farmers will require assistance, through subsidies or otherwise, in bearing the likely high initial cost of the operation.
7. The certification process and associated costs will need to be clearly defined and responsibilities allocated. Given that there is not a certification organization in the Caribbean, it means that such an important service must come from Europe, USA and other such places where organic farming is well established. The cost of certification and monitoring services may be such that farmers may become uncompetitive in the production of organics. Consideration should be given to the establishment of a recognized certification body within the region.
8. The appropriate technical support mechanisms would need to be developed to provide support in areas such as soil testing and water quality monitoring.
9. There is also the critical issue of farmers' capability and discipline in adhering to the strict requirements for being a certified organic producer. The small-scale farmer has always had problems in keeping records of his/her operation. This attitude may pose serious problems to effective participating in organic farming where meticulous record keeping would be key to remaining in the business.

10. Food Safety issues as that relates to microbial load on food products need to be addressed as well, so as not to breach specifications set under the Sanitary and Phyto-Sanitary (SPS) regulations of the WTO.

Finally, it must be noted that commercial organic farming is a new concept to the farming community in St. Lucia and will have to be approached with an open mind given the opportunities that it offers. However, acceptance or non-acceptance will depend largely on the financial rewards to be gained.

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Banana production in St. Vincent and the Grenadines (SVG)

Philmore Isaacs[1]

Introduction

Location

St. Vincent and the Grenadines is a small island developing state located at latitude 13°N and longitude 63°W. It belongs to the group of islands commonly called the Windward Islands, part of the Eastern Caribbean States.

Size

The country is composed of many islands which together have a total area of 388 km^2. The largest of these islands is St. Vincent. The other islands form the Grenadines, the inhabited ones being Bequia, Mustique, Canouan, Mayreau, and Union Island.

Physical features

St. Vincent has a volcanic origin. It is rather mountainous with a central mountain range running from north to south. Mt. Soufrière (1220 m) dominates the northern half of the island. A number of short river valleys radiate from this central range and end in narrow plains along the coast. The soils are of volcanic origin and are generally deep and fertile.

Climate

St. Vincent and the Grenadines (SVG) is a well-watered land with average annual precipitation ranging from 120 mm along the coast to over 3000 mm in the mountainous wooded interior. Temperature averages about 29°C throughout the year.

Winds

We are in the path of the prevailing northeast trade winds and the annual tropical storms and hurricanes.

[1] Ministry of Agriculture and Labour, Kingstown, St. Vincent & the Grenadines.

Economy

The economic activities center around agriculture, tourism, light manufacturing and services.

The agricultural sector contributes between 13-14% of Gross Domestic Product which in 1998 amounted to US$ 72 million. Banana production and export dominates agriculture and accounts for 75% of all agricultural exports (1997), and 34% of the workforce. It was estimated that there were about 2600 ha under banana cultivation in 1998 with 3855 registered active growers.

Table 1 gives an idea of banana production for the past $5^{1/2}$ years.

The main cultivar is the Cavendish with varieties such as Williams, Robusta, Valery and Grand Nain.

Table 1. Banana export and earning for SVG, 1994-1999

Year	Export in tonnes	Earnings/revenue (EC$)[1]
1994	30 933	40 838 668
1995	50 013	59 093 092
1996	44 802	53 124 783
1997	31 273	39 742 051
1998	38 947	55 552 075
1999	37 944	52 000 000

[1] EC$ = Eastern Caribbean $ (EC$ 2.71 = US $1.00).

In 1998 the direct payment to the farmers was EC$31 million or 56% of the earnings. The average quality scores in 1998 was 86.88. In 1999 there were about 1488 certified farmers producing 80% of the fruit. The majority of the farms are small (< 1 ha). Most of these farms are located in the sheltered valleys, mountains, slopes and narrow coastal plains on the eastern half of the island.

Organization

The industry is controlled by the Banana Act # 10 of 1978 which was amended by Act #30 of 1996. The provisions of this Act calls for a Growers Association with a Board of Directors, the majority of whom (5) are elected by the growers at an annual general meeting. Government nominates four members to the Board. The growers belong to the district branches which elect their own representatives. The business of the Association is administered by a team of technical and managerial staff appointed by the Board.

The Association provides extension services and input supplies to the farmers and purchases fruits from the farmers which meet the quality standards. This fruit is shipped weekly to WIBDECO, UK, for sale and distribution in the UK (Figure 1).

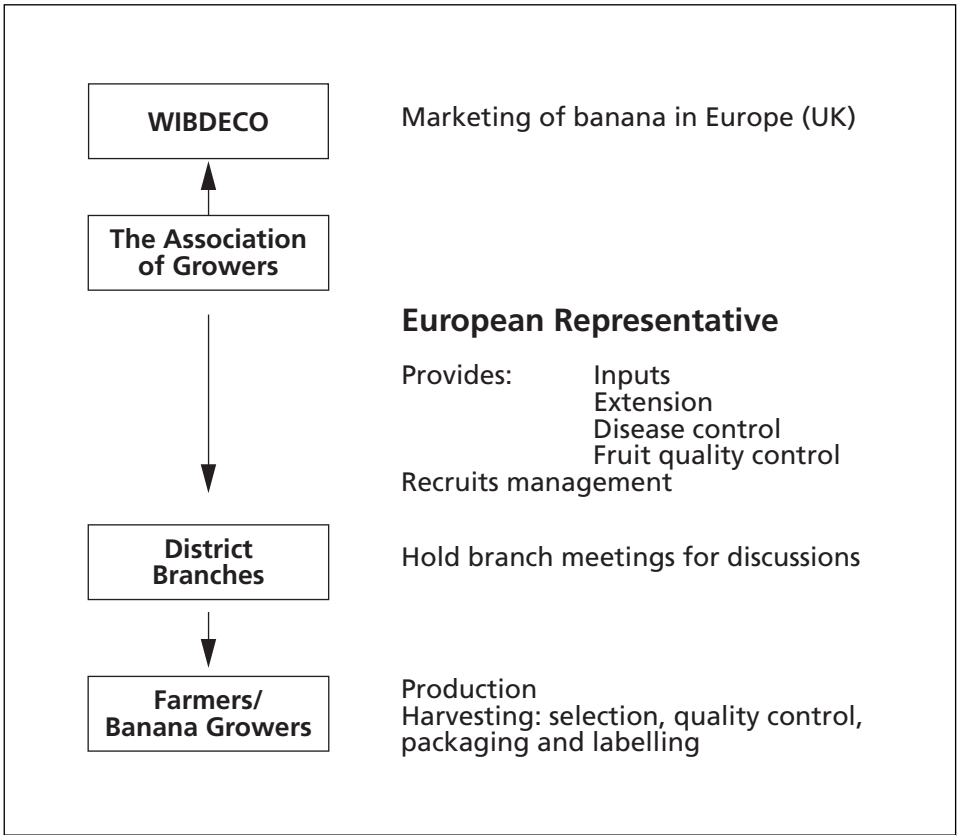


Fig. 1. Organizational structure of the St. Vincent Banana Growers Association (SVBGA).

Pests and diseases

The major pest is the borer *Cosmopolites sordidus* – a coleopteran that lives in the corm of the pseudostem. The nematode *Radopholus similis* is the other pest affecting the corm. Yellow Sigatoka is the most important disease problem. A spray programme is implemented by aerial spraying and a ground crew. The annual cost of disease control is approximately EC$ 1.6 million (1998).

Constraints facing the industry

One of the major constraints facing the industry is the uncertainty in the market place. The WTO ruling on the European banana regime, coupled with the current oversupply are not good news for the industry in SVG. Some farmers are also finding the changing quality demands too burdensome. The occasional windstorm and prolonged dry weather also take their toll. In spite of all these, the production of bananas remains at the center of the Government's Agricultural Diversification Policy.

Recent developments

With assistance from European Development Funds a number of initiatives have been undertaken in the industry under the broad heading of the Banana Recovery Plan. Of note are the following:

1. Infrastructural development: investment in a national irrigation system. The target is to bring about 1620 ha of the coastal and flatter lands under irrigation to improve productivity and quality.
2. Construction of palletization centres.
3. Construction of pack-houses on farmers holdings.
4. Feeder roads development.

Reform in the industry

1. Farmers certified programme: to be certified, farmers must meet certain written criteria including good agricultural practice. Certified fruits receive a higher price.
2. Farm Loan Scheme: farmers are now able to access credit from a trust fund for on-farm investment including roads, labour and farm facilities.

Government's Agricultural Policy

As stated in the 1990-1995 National Development Plan and re-stated in the 1997-2006 Strategic Plan for Agricultural Diversification and Development, it is the country's intention to diversify around bananas. In spite of the difficulties which surround the industry, Government still sees a role for a modernized, streamlined, competitive banana industry.

Other crops of interest are listed in Table 2.

Table 2. Other crops of interest in SVG

Crop	Year	Export in tonnes	Earnings/value (EC$)1
Arrowroot starch	1997	156	880 411
	1998	148	858 980
Fruits	1977	379.74	1097.421
	1998	348.85	94.784
Root crops	1997	1980.7	6276.602
	1998	1664.5	7460.883

[1] EC$ = Eastern Caribbean $ (EC$ 2.71 = US $1.00).

Therefore any future development in the banana industry must take into account the overall Agricultural Diversification thrust for food security and foreign exchange earnings.

Belize banana industry

Wilmot Garnett[1]

Historical background

- The banana industry in Belize developed during the global sugar crisis of the 1980s.
- Unlimited quantities of banana could have been sold to the United Kingdom market.
- Privatization came as growers quickly recognized the potential of bananas and bought out government holdings.
- Belize's quota was set at 40 000 tons per annum.
- The industry seemed viable and encouraged crop diversification.
- Government policies were complementary and approximately 200 million Belize dollars was invested by the private sector and government.

Current status of banana production, market and projected trends

- The Belize Banana Industry now strives to increase in competitiveness and in product quality.
- Production peaked at 57 000 tons in 1996, gradually declined, but is forecasted to top 62 000 tons in 1999.
- Belize sells only to the European Export Market.
- Domestic market accounts for only 1% of total production.
- If the WTO rules in favour of the US, Belize's quota will fall from 55 000 tons to 26 000 tons.
- Diversify into production of organic banana and banana flour.

Constraints faced by banana growers

- Lack of funds to develop a breeding programme.
- More cost-effective methods of pest and disease control necessary.
- Need for development and use of organic fertilizers.
- Unpaved roads.

[1] Horticulturist/Consultant IICA, Belmopan, Belize, C.A.

- Management of marginal lands.
- High cost of labour.
- Poor work ethics.
- Inadequate communication between growers and labourers.
- Difficulty in accessing funds from local and international agencies.
- Need to use forecasting system.
- Heated struggle in the WTO, Belize's 55 000 tons can be cut to 26 000 tons, making the industry less viable.

Institutional organization of banana production

- In 1991, the Belize Banana Growers Association took over the responsibility of the Banana Industry.
- A management committee, headed by a General Manager/Controller directs the Banana Growers Association.
- The Banana Growers Association (BGA) is charged to promote and foster the development of the Banana Industry.
- The BGA provides management and technical assistance with respect to pest and disease control, production, quality, shipping and marketing all fruits, and collects and distributes the proceeds of the sales.
- Acreage remains constant since 1990 at approximately 2000 hectares.

Quality assurance and shipping system

- Agronomic practices are carefully monitored.
- Field and packinghouse sanitation are stringent.
- Fruit are processed and transported immediately to holding site at port for weekly shipping.
- Belize ships from only one seaport.
- Trained personnel manage the entire operation.

Status of alternative crops

- Produce organic apple bananas for the fresh fruit and dehydrated fruit markets.
- Organic cashew production:
  - false fruit for wine, juice, preservatives and dehydration;
  - nut for export to the US and Canada.
- Organic cacao for export.
- Organic coffee for local and export markets.
- Some funds available, but additional funds are being identified.
- Government policies complementary, financial support, policy and market structure.

The Dominican Republic experience

Cesar E. Lopez[1]

Current status of banana production and markets and projected trends

History of the activity

Organic banana production in the Dominican Republic started in Azua, during the mid-1980s, where there was already experience of conventional banana production. This had its most significant impact on the agriculture economy more than 30 years back when the Grenada Fruit Company was in operation. Azua was an ideal place for organic bananas, since the problems associated with the whitefly pest on vegetables, especially canning tomatoes, were making it increasingly difficult to obtain profits from vegetables.

Plantaciones Tropicales was the first to start; Savid Dominicana and Horizontes Orgánicos followed as pioneer companies expanding the production of organic bananas in this country. Plantaciones del Norte, Ekoban, S.A. and others came more recently. Several small farmers' cooperatives and associations, totalling about 1000 farmers are now producing in the provinces of Azua, Valverde and Monte Cristi.

Current production and geographical areas

Organic bananas are produced on more than 1300 hectares in the country, with an average productivity of 34 boxes/ha/week. The current volume of organic banana exported is shown in Table 1.

Table 1. Current volume of organic banana exported

Exported boxes per week	Containers/year	Metric tonnes per year
42 000	2184	40 000

The main production areas have a dry climate, with around 600 mm rainfall per year. The soils are deep calcareous and irrigated, with high natural fertility. On the southwest coast, Azua is the main centre of production, with about 30% of the area. In the

[1] *Grupo de Desarrollo Rural Nacional* (GRAN), Gazcue, Santo Domingo, Dominican Republic.

northwest, the fruit is cultivated in the provinces of Valverde and Monte Cristi, with about 70% of the total area.

Certifying organizations

There are several certification organizations for organic bananas operating in the Dominican Republic:

- **FVO** (Farm Verified Organic) (USA);
- **BCS ÖKO-GARANTIE** (Germany);
- **Skall** (The Netherlands);
- **Instituto Biodinamico de Brasil**.

Most of the certification of organic bananas in Dominican Republic is done by BCS ÖKO-GARANTIE (>60%).

Markets

There are three major markets for the Dominican organic bananas: the European Union, with about 80% of the exports; the USA, with about 13%; and Japan, with 7% (Table 2).

Table 2. Export markets for the Dominican organic bananas

Countries	Exported boxes/week	Percentage of total
European Union	32 000	80
USA	5000	13
Japan	3000	7

Projection of production

The projection of production and exports of organic bananas depends very much on the behaviour of the demand by consumers. During the last two years the demand has increased by about 5% per year. Assuming that this behaviour is representative of what will happen during the next five years, we could expect to export the following quantities (Table 3):

Table 3. Projection of production for years 2000-2005

Year	No. of boxes
2000	2 300 000
2001	2 415 000
2002	2 535 750
2003	2 662 538
2004	2 795 664
2005	2 935 447

Status of organic banana production and supporting national policy

There is no clear national policy on the support of organic bananas in Dominican Republic. What has developed has been due to the creativity and motivation of the farmers and private companies. However, due to the increasing production and growing interest in organic bananas over the last few years, the Dominican Government, through the Secretariat of State for Agriculture, with the participation of the *Junta Agroempresarial Dominicana*, the producers' organizations and other institutions, have been working on a legal regulatory document for organic agriculture production, including organic bananas.

Institutional organizations of banana production, including farmers' groups, number of farmers and farm sizes

The organic banana producers in the country can be divided geographically. Small-scale farmers, with farms with less than 2 hectares, are mostly in the south, in the Azua province. Representatives of these are the following:

- In Azua: about 700 producers, 95% of whom have less than 2 hectares:
  - Cooperative Francisco del Rosario Sanchez (about 112 members)
  - Cooperative San Vicente de Paul (about 65 members)
  - Asociación Productores de bananos orgánicos, Finca 6 (about 140 members)
  - Others (about 380 members).
- In the northwest: about 300 producers, most of whom have farms sizes with more than 10 hectares:
  - Asociación de Laguna Salada (about 15 producers)
  - Asociación Julia Jaramillo (220 members)
  - Asociación de Amina (68 members)
  - Asociación Productores Palo Verde (24 members).

Producing companies	**Exporting Companies**
Ekoban	Savid Dominicana
Plantaciones del Norte	Plantaciones del Norte
Horizontes Orgánicos	Horizontes Orgánicos
Bohio Viejo	Caribbean Fruit
Agroindustrial El Arca	

Constraints facing farmers, including finance, pest and diseases, competing priorities, etc.

The main constraints identified by the producers and exporters are the following:

- **Access to the market for the small-scale producers** (about 200 producers are Fair Trade).
- **Financing for infrastructure**, such as cables, packing plants, irrigation system, deep water wells of good quality.
- **Technical assistance** for quality production.
- Access to **quality shipping services**; frequency of ships is inadequate (should be every 7 days); port storage facilities are required.
- **Weak producers' organizations**.

Pests and diseases problems are being managed with good results.

Review of critical technological requirements for organic banana production at the farm level

Producers identified the need for improving harvesting and postharvest management to ensure quality of the produce and soil fertility management to increase productivity. There is a need for technology transfer, including access to written, systematized technical materials. Some producers think there should be an attempt to locally produce inputs that are presently imported.

Quality assurance and shipping systems

What was said in the previous paragraph also applies here. There is also a need to adapt to the organic production the postharvest technology that is being used in conventional banana production, including types of packing materials and shipping methodology.

Perspectives on the banana industry and how organic bananas fit in the country's overall strategy

Most producers and exporters see the future of organic banana production with optimism. Every year more consumers are getting conscious of the impact on their health of the pesticides and other chemical residues in their food. This makes them want to buy more organic products. Many are also worried about the quality of the environment. For countries where tourism is important, organic bananas may be an added attraction. Policies and strategies are needed to make sure that the opportunities for the organic banana market can be used to help the development of the country. There should be an integrated effort to reduce or eliminate the constraints that have been mentioned.

The banana industry in Jamaica

Thomas Burton[1]

Environment

Jamaica has an area of 10 940 square kilometres or close to 1.10 million hectares. About 51% of the land surface consists of slopes greater than 20 degrees rising to a maximum of 2256 m in the Blue Mountains. The remainder consists of coastal plains together with some inland valley floors and basins. Temperatures average 27°C in the lowlands and fall with rising altitude. The country on the whole is well-supplied with water, with most of the hill lands receiving over 1500 mm annual rainfall, rising to above 5000 mm in some areas. Irrigation is, however, necessary in parts of the coastal plains, especially during the summer months. Based on the topography, there are limited opportunities for mechanization or conventional irrigation methods.

The agricultural sector

The agricultural sector is highly diversified. The traditional export crops are sugar and bananas; other important crops are cocoa, coffee and citrus. Agriculture contributed 7.3% of the GDP and 21.4% of total exports in 1998. Some 200 000 persons work directly in agriculture with others engaged in industries and trading dependent on agricultural products. Farm size and acreage are shown in Table 1.

Table 1. Farm size and acreage

Size of farms (ha)	No. of farms	% of total no.	Acreage (ha)	% of total acreage
0-5	162 034	95.7	144 883	35.2
5-20	5863	3.5	52 065	12.6
25-50	775	0.5	23 261	5.7
50-200	422	0.2	40 999	10.0
200 and over	201	0.1	149 927	36.5

There are approximately 162 000 small-scale farmers operating throughout Jamaica. The sizes of most of their holdings are quite uneconomic and due to their hilly location

[1] Rural Agricultural Development Authority (RADA), Kingston, Jamaica.

and lack of irrigation, productivity is low. The previous table shows that 95.7% of holdings are less than 5 ha and represent 35.2% of the total acreage in agriculture, while 0.1% of the total number of farms operate on 200 ha and over, representing 36.5% of the total acreage. However, one important aspect of small-scale farming is that it encourages people to remain in the rural areas, who might otherwise migrate to urban localities, which could compound social and economic problems.

Current status of banana production

Bananas referred to hereafter will mean commercial exportable bananas.

Overall, there are some 3400 ha of lands under cultivation with bananas of which approximately 3000 ha are in production. The production exported between January to October 1999 was 42 000 tonnes, which represents a 15% reduction when compared to the corresponding period in 1998. A total of 62 000 tonnes was produced in 1998. The high cost of inputs compared to the returns is preventing expansion in this industry, although a vibrant domestic market exists and is being serviced. On the average, small-scale farmers' production is averaging about 20 tonnes per hectare while the larger farms and farmers are averaging about 30 tonnes per hectare with irrigation.

Marketing

An active market exists for non-exportable fruits, either to be processed into chips, for ripening, or as table food.

Currently, Jamaica has a preferential quota of 105 000 tonnes per annum but has not met this quota in recent times. Fruits are marketed through the Banana Export Company (BECo) Limited, which has the responsibility for purchasing, shipping and marketing to the United Kingdom and Europe. Any grower who ships a minimum of one tonne fruit per year automatically becomes a member of BECo. With the coming into being of the WTO, the preferential treatment formally afforded us will be no more, so we will have to compete for the limited markets. Our quota will now come from that allocated to the ACP states and will qualify based on quality.

It is now costing between J$17.60–24.40 to produce a kilogram of fruit, so any price received should be above this for us to remain viable. BECo has, however, agreed to a Green Boat price of £525 per tonne with one marketing company.

Projected trends

Although the projected trend is pointing to a decline in production for 1999, some new mats are expected to come into production during the last quarter, and we may end up with some 67 000 tonnes overall.

Our exports may also be affected by the zero tolerance levels in respect of the maximum residue levels (MRLs) for pesticides being advocated. Postharvest treatments

with fungicides may have to be curtailed. We may, therefore, have to start looking at producing for specific markets that do not have the same stringent requirements.

Organic production is an alternative, but can that niche market accommodate all the players? Prices also tend to be higher for this kind of product, so one would have to find out what the consumers are willing to pay.

Constraints facing farmers

a. Lack of adequate collateral to access loans – under capitalization.
b. Reservation of lending institutions to make loans to the industry based on its present state.
c. Poor road conditions.
d. Climatic conditions, particularly drought in non-irrigated areas.
e. Low productivity levels resulting in inadequate income to take care of domestic requirements.
f. Small acreage with no alternatives for expansion.
g. Poor image of small-scale farmers.
h. Shortage of affordable farm labour.
i. Theft from production areas.
j. Insufficient research data for forward planning.
k. Unavailability of some inputs at critical periods.

Pests and disease

Much production is lost annually to pests and diseases. Black Sigatoka is one of the major diseases now affecting banana production in Jamaica. It causes quality problems such as early ripening and underdeveloped fruits. Currently black Sigatoka control costs two-and-a-half times more than it takes to control other diseases such as yellow Sigatoka. A centralized management control programme for Sigatoka disease is thus being implemented in the major producing areas.

The major pests affecting bananas currently are borers and nematodes. Much of the inputs for controlling the above problems are imported and not always available when required, thus affecting the potential output of the farmers.

Competing priorities

In a country of limited resources, there will always be the need to prioritize expenditure in an attempt to satisfy all sectors of the economy. Sometimes resources may have to be diverted e.g. to repair a road to get the product to the market place, and so timely allocations to the sector may be affected.

As other crops come into greater demand and prices rise, some small farmers will get out of banana production and produce the higher-priced crop.

Institutional organization of banana production

There are three primary institutions associated with banana production in the country:

a. **Banana Board:** carries out research on various aspects to benefit the industry, and also deals with insurance for the growers' crop. There is a mandatory deduction from payments for each banana exporter to cover the operations of the Board.
b. **BECo:** this is an operational department with responsibility for shipping and marketing. This company is also responsible for quality assurance and technology transfer. Recently the European Union-funded Banana Support Programme – a J$411 million programme – has been placed under BECo to improve our competitiveness to meet the challenges of WTO. The Programme will also source material inputs which are sold to farmers at reasonable prices.
c. **AIBGA (All Island Banana Growers Association):** this organization is charged with the responsibility for extension delivery to the small farmers and also to provide some of the inputs for the industry.

Farmer groups

The grouping of farmers facilitates the easy dissemination of extension information and also the disbursement of benefits under any enabling scheme being operated. However, from time to time farmers will form their own groups in order to make representation on their behalf. Currently there are 35 formal farmers' groups, each with 10-15 members. Each group has its own leader. There are between 350-400 registered active growers who produce for export. The number of growers who produce for the domestic market exceeds those for export.

Farm sizes

The farms currently producing for export are divided into three categories:

a. Small-scale farmers: 0.40–31.6 ha,
b. medium-size growers: 32-120 ha, and
c. estates: there are three with the following sizes: 364 ha, 552 ha and 770 ha respectively.

Small-scale farmers constitute the largest numbers of producers but the smallest acreages.

Quality assurance strategy

i) The quality rating (PUWs, Percentage Units Within Specification) is linked to the pricing system. Therefore the higher percentage units within specification, the higher will be the final price. This is an incentive for farmers to produce quality bananas.

ii) There is a rigid inspection system at the wharf, with a minimum threshold rating of 75%. Inspection is based on:
- intelligence reports;
- field teams, along with quality control officers looking at boxing operations and reaping practices;
- certification programme; growers are issued with warning letters if they supply fruits of poor quality. Failure to comply with the instructions carries various penalties. Deadlines are also given for the necessary corrections to be made.

All cultural practices e.g. pruning, drainage, spraying, have to be carried out according to recommended guidelines, as failure to comply will result in poor quality fruits. Failure to implement cultural practices will lead to de-certification and the growers will not be able to export until they comply.

Offenders are easily identified as each grower that exports has an individual export number. Boxes for shipping have to be of a given p.s.i. (pressure per square inch) rating and the fruits are cluster-packed with inner polythene lining.

Shipping system

There are three ships in the fleet to transport bananas to the United Kingdom and Europe. These operate on a rotational basis. A ship, therefore, calls every week at two of our ports, namely Port Antonio and Kingston. It first calls at Kingston where on the average it collects about 400 pallets weekly. It departs Port Antonio usually on Saturdays. Bananas are received at the wharf and are refrigerated until the ship is ready to be loaded. Between 700-800 pallets are shipped from Port Antonio weekly. Each pallet contains 40-50 boxes with weight ranging from 18.14–18.60 kg per box.

The ships are leased by Jamaica Freight and the Banana Company pays for their use. They take nine days to reach England. The boxes are packed in four sections or hatches on the ship, which are refrigerated at 13.3∞C.

Status of alternative crops

Jamaica produces a diverse range of both plantation crops (coconut, pimento, cocoa, citrus etc.) and domestic crops (vegetables and a range of soft fruits). With these crops suffering from various diseases such as Tristeza, lethal yellowing, black pod, other non-traditional crops are being targeted to substitute on the export market.

The policies guiding development of the non-traditional sub-sector will be commodity and market-oriented in keeping with the dictates of the global economy. It is expected that greater market liberalization will be achieved so the support services to the domestic sub-sector will be strengthened to assist farmers to become more competitive in the global marketplace.

In this regard the Ministry of Agriculture is focussing on strengthening its research and development arm, and at the same time seeking to make the extension arm (RADA) more effective in an effort to achieve greater productivity in all areas.

Incentives are being given to producers in this sector through regulatory work to enhance exports. This will be achieved through the implementation of an Integrated Pest Management Programme to maintain international standards for export of fruits and vegetables.

There will also be institutional strengthening of the Forestry Department and planting of trees to enhance environmental conservation.

To further encourage production in the domestic sector, a domestic food crop production programme has been initiated with various levels of assistance to the producers. The hospitality trade is being asked what they require, how much, and then selected farmers are targeted to produce these requirements.

A national Fruit Trees Crop Project is being initiated with backward linkages to the processors so that adequate raw material will be available when required.

Adequate budgetary requirements are in place for these programmes as staff are needed to properly execute them.

Organic production of bananas

There is no recorded organic production of bananas. However, the very small-scale producers for home use and domestic markets as a rule, do not spray and fertilize.

The Banana Breeding Station has developed some tetraploids that are tolerant to yellow Sigatoka and two varieties appear resistant to black Sigatoka. These are for the domestic market and also need no spraying.

There are also some local cultivars e.g. apple, banana, and “chiney” banana which have withstood the passage of time with no apparent ill-effects from pests and diseases and continue to produce to satisfy local tastes. Maybe niche markets could be found for these under an organic label.

Organic bananas in Honduras

Dale T. Krigsvold[1]

Production data

At the time of this presentation, the total area in production of certified organic bananas in Honduras is 92.1 ha, all of it on the north coast (Table 1).

Table 1. Total certified organic banana in Honduras, 1999

	Area (ha)	Cultivars
Standard Fruit Co.	75.0	Cavendish
Cooperativa La Cruz	1.7	FHIA-01,-02,-18
Luis López	8.4	FHIA-01
Antonio Rápalo	7.0	FHIA-03 (etc.)
Total	**92.1**	

Status of organic banana production in Honduras

Roberto Rivera

The pioneer in organic bananas in Honduras was Roberto Rivera. Mr Rivera has pioneered much of the export organic production in Honduras and presently produces black pepper, limes, pineapple and organic fertilizers. His effort with bananas started in production for export in 1994 on his farm located in the banana-producing north coast area of El Progreso. He had 5 ha of Grande Naine, certified by Quality Assurance International, and he was able to ship 50/60 boxes per week (box stem ratio of 1.25 box/stem) to the US market for 2 years but had to abandon the effort when black Sigatoka (*Mycosphaerella fijiensis*) (BS) became too difficult to control and he could not maintain yield or quality.

Mr Rivera used a combination of compost and bocashi fertilizers, ground covers for weed control, clean culture for BS control, and sodium chloride for crown rot control.

[1] *Fundación Hondureña de Investigación Agrícola*, La Lima, Honduras

Adequate control of BS continues to be one of the major limitations to organic banana production on the north coast of Honduras, due to the heavy disease pressure found in the commercial production area.

Standard Fruit Company

The major effort in organic bananas in Honduras is being made by Standard Fruit Co. with 75 ha of Valery planted in Coyoles near La Ceiba. These bananas are marketed under the Dole label and are the result of several years of trials in organic production methods.

Standard Fruit has been in organic banana production since 1997 and is currently exporting 3000 boxes per week certified by Quality Assurance International of San Diego, California. The production is managed by Ligia de Ramos in Honduras and the overall organic effort is managed by Franz Wielemaker, based in Costa Rica.

Standard has many trials ongoing in organic bananas but their production methods are similar to other growers. All of the fields were planted with tissue-culture plants for uniformity. The plants are held in protected nurseries in large bags for 16 weeks before planting, versus the normal 8 weeks. This allows for better, early BS control through clean culture. Irrigation is through micro-sprinklers and weed control is with motorized weed cutters (weedeaters). The fertilizer base is composted materials enriched with the cyanobacterium *Anabaena azollae* from *Azolla* plants. Nitrogen fertilization is through composted chicken manure supplemented with Chilean nitrogen and blood meal. Supplemental phosphorous comes from Rock Phosphate, blood meal, plant extracts and animal manures. Potassium is provided by Sulpomag, mined potassium sulphate from Germany, plant extracts and animal manures. Additionally, magnesium is provided by Kieserite, zinc from zinc sulphate dissolved in plant extracts, and boron is from Solubor and compost teas.

For insect control, early bagging is the main control for fruit-damaging insects. Other methods used are *Bacillus thuringiensis* for lepidopterous insects, micronized sulfur, and vegetable oils for other insects. For insect control in the packing stations, light traps and pyrethrums are used.

Moko control is through standard commercial practices of prevention, disinfesting tools with 50% alcohol solution.

Nematode control is through prevention by planting only tissue-culture plants and only in fields tested free of *Radopholus similis*.

For BS control, clean culture is the main control measure used along with applications of spray oils. Number of leaves at harvest averages 2.2.

Another method of BS control attempted was to plant BS-resistant hybrid bananas from the *Fundación Hondureña de Investigación Agrícola* (FHIA) in blocks between the commercial Cavendish to try to reduce inoculum potential of *Mycosphaerella fijiensis*. It is not reported whether this method had any positive effect.

Postharvest fruit cleaning is done with water under pressure coupled with soaps and brushes.

Using these production methods, Standard produced fruit stems weighing between 17.1 and 22.3 kg each with a range of 6.3 to 7 hands per stem, with finger caliper from 38.4 to 42.6 and finger length of 8 to 8.7 inches. Yields averaged 1900 boxes/ha (0.9 box/stem). However, in 1999, yields dropped considerably because of very heavy BS pressure during a prolonged rainy season.

Cooperativa La Cruz

Another effort in organic bananas started with FHIA in 1997 working with Cooperativa La Cruz, at the request of the *Cooperación Suiza para el Desarrollo* (COSUDE). Using only the BS-resistant FHIA hybrid bananas FHIA-01, FHIA-02 and FHIA-18, 1.7 ha were planted in Morazán, Department of Yoro. This project was carried out in response to a demand for dehydrated organic bananas for the European market through local organic processors.

Production methods followed known practices of composted fertilizers, ground covers and manual weed control. BS control came from the inherent resistance of these hybrid bananas. Because these bananas were for processing, no field fruit bagging was done. Certification of the production was through OCIA (Organic Crop Improvement Association).

Although poor management by this cooperative reduced expected yields, production averaged 2.5 tons/week at a box/stem ratio of 0.84. Most of the product was sold at a contracted price to two processing companies and some was sold successfully through San Pedro Sula supermarkets when supply was higher than demand. The processors bought 37.8 tons at an average price of $0.16/kg at farmgate. Supermarket sales on consignment were less at $0.12/kg. The processors required that the fruit be almost ripe at harvest for better sugars and size. This made it difficult to take some fruit to the retail market because of advanced maturity. The processing market folded in late 1999 when the two major processors went out of business because of reduced demand for their overall range of product not including bananas. The organic banana fields are still in limited production for sale at farmgate.

Production problems encountered in this venture were twofold:

1) FHIA worked with a cooperative diversifying from corn, beans and cattle and with limited experience in plantain production; and
2) organic bananas were planted adjacent to plantain fields containing plants that, although resistant to BS under appropriate production practices, were moderately infected with BS under the poor management of this cooperative.

Other initiatives

Two other organic farms were planted in 1997-1998 in response to the demand from the dehydration industry: Luis López' farm in Yoro and Antonio Rápalo's farm in Chotepe, Department of Cortés.

- *Productos del Trópico*, S.A. (PROTROSA) is Luis López' partner in 8.4 ha of FHIA-01 planted specifically to feed their processing plant. FHIA-01 lends itself well to the processing industry because of its non-browning characteristic, in comparison to the Cavendish bananas which start to oxidize immediately when cut.

- Organic Fruits International, S.A. (OFISA) convinced Antonio Rápalo to plant 7 ha of FHIA-18, another BS-resistant hybrid banana which can be processed into an excellent dehydrated product. Unfortunately, through a nursery mix-up, a cooking banana, FHIA-03 (along with a mix of FHIA-01, FHIA-02 and FHIA-18) was planted instead of FHIA-18. This was not a fatal error because FHIA-03 produces a sweet, ripe banana also excellent for dehydrating, and outyields FHIA-18.

Conclusions

In general, all of the FHIA hybrid bananas in Honduras have been planted for the processing industry and the major effort for fresh export is from Standard Fruit with 75 ha of Cavendish. The perception is that the US and European markets would be hesitant to accept a banana different from the commercial standard Cavendish, organic or not.

Future efforts will be to move production away from the traditional, commercial production areas on the Honduran north coast, to the drier areas of Choluteca and Valle on the south coast. Also planned in the future are trials with the BS-tolerant hybrid bananas FHIA-17 and FHIA-23. These two hybrids are derived from Gros Michel and the fruit is very similar to Cavendish in shape and taste. It is expected that the tolerance to BS of these hybrids in drier production areas with less disease pressure will provide a solution to the serious limiting factor in organic banana production, that of the difficulty in controlling black Sigatoka.

The Suriname banana industry: production organization, management and diversification trend towards organic production

Robert H. Power

Historical background of the Suriname banana industry

The production of banana in Suriname for export purposes started in 1905 with the Gros Michel cultivar. However, due to a high incidence of Panama disease (*Fusarium oxysporum* f.sp. *cubense*) the acreage had to be abandoned in 1910.

In 1931 a second attempt to produce banana for the European market followed, this time with the Panama disease-resistant Cavendish variety Poyo (syn. Robusta). Lack of finance due to the economic recession and the outbreak of World War II caused this attempt to fail.

A third attempt was made in 1957 and after encouraging results the Government decided to start with the production of bananas under the management of a special Banana Division of the Ministry of Agriculture as a means to solve the high rate of unemployment in the rural area.

To enhance development in the rural area, two polders (Santo and Boma) were geared for the concept of nucleus farms surrounded by small-scale private banana growers. However, mainly because of consistently poor quality supplied by the small-scale farmers and significant losses, farmers lost interest in banana and gradually, the banana industry became solely a Government activity.

In 1971 the special Banana Division of the Ministry of Agriculture was transferred into "De Surinaamse Landbouwbedrijven N.V." (Surland Ltd.), a fully state-owned company.

[1] Consultant Specialist, Surland Ltd., Paramaribo, Suriname.

Present situation

Currently, Surland Ltd. owns 2300 hectares of land under banana in two locations in the country's vast coastal plain *viz*. the "Jarikaba Banana Operations" of about 1300 hectares (approximately 20 km west of Paramaribo) and the "Nickerie Banana Operations" of 1000 hectares (approximately 250 km west of Paramaribo) respectively.

For the sake of completion it should be noted that, in addition, Surland owns a 1000-hectare rice farm in the Jarikaba location i.e. the "Jarikaba Rice Operations", also to serve the international market.

Recently a new company, Eco-Agro Suriname, has been established with the initial aim of organizing middle-scale producers for organic fruit production. However, forced by numerous constraints the option of low input of agrochemicals is followed. Current planted area is 15 ha.

Production conditions

The production of Surland banana in both sites is on heavily-textured marine clay (60-70% clay fraction) with poor physical quality. Chemically the clay is fairly rich for agricultural production. This main growing medium in the coastal plain restricts growth of the banana plant and hence characteristic to Suriname banana is the slightly smaller fruit size than supplies from Middle and Latin America.

The Suriname climate is of the humid tropics with two dry and two wet seasons that alternate. Annual precipitation ranges from 1800 to 2300 mm. On average the temperature ranges from 23°C to 32°C and relative humidity varies from 70 to 90%. There is a steady Northeast Trade wind ranging from 0.9 to 1.3 degrees Beaufort. The country is free of natural disasters like cyclones, hurricane, tornado, earthquakes etc.

Because of the generally low capacity of vertical drainage in these soils, the entire banana area is transferred into a polder in which the culture is practiced on planting beds (6 x 100 m).

Pest and disease constraints

The main constraint in banana production is (yellow) Sigatoka (*Mycosphaerella musicola*) for which an effective quantified system is used to forecast and monitor the disease. Black Sigatoka (*Mycosphaerella fijiensis*), so far, does not occur in Suriname.

The second most important pests are the root-invading nematodes *Radopholus similis* and *Helicotylenchus multicinctus*. The main control strategy is based on monitoring of the population dynamics and submerging the planted areas for six months after every seven consecutive years of production. Roughly speaking, 15 percent of the production acreage is permanently submerged.

The banana corm borer (*Cosmopolites sordidus*) is another constraint factor. The monitoring of population density is by field traps.

Other problems demanding attention are e.g. *Colaspis* sp., thrips and bat. (Early) fruit bagging prevents their devastating effect on fruit quality.

Irrespective of pest, IPM (integrated pest management) is implemented in the company through limited exposure of the agroecosystem to chemical pesticides; related to economic threshold, it comprises genetic, cultural, ecological, biological, and chemical control measures.

Labour requirement and financial output

Banana production for the international market is a labour-intensive operation. The digging and maintenance of drainage structures, Sigatoka control by spray planes and the cableway system to transport the fruit from the field to the packing stations are the main options of mechanization in this industry.

Production activities in both locations make this government-owned company an important employer in the regions; about 1800 people are employed permanently and 600 casually. With the multiplier effect this means that some 10 000 people are dependent on the Suriname banana industry.

Fyffes Group London Ltd. has for more than 30 years been the sole buyer of banana produced by Surland Ltd. The boxed fruit is palletized in packing stations. The Suriname banana industry provides the government an annual income of US$18 000 000. After mining and rice, banana is the third largest foreign currency-earning sector of Suriname.

Market developments

International regulations

As a former Dutch colony and the related ACP status, Suriname has been in the position to take advantage of the special Agreements on Trade (preferential market as by Regulation 404/93) in the European market. However, with the expiry of Lomé-lV for bananas in the year 2002, and the uncertainty whether there will be a continuation of or alternatives to the Lomé agreement, the banana industries of ACP countries in general and Suriname in particular, will face serious problems as the current preferential access to the European market will come to an end. ACP banana producers will be exposed to the new situation of open competition with Latin and Middle American sources.

As a transitional solution towards 2002, the ACP export of bananas to the EC market is limited by a country-specific quota system; the Suriname specific quota is 38 000 m tonnes per year.

Much is currently going on between EU and WTO to reach full agreement in the understanding of compatible trade between EU and ACP banana suppliers.

Changing trends in consumer's preference

The worldwide intensification of crop production as a result of market and trade opportunities has been accompanied by increasing pest and disease problems associated with greater use of broad-spectrum chemical pesticides, for example, the development of pesticide resistance.

While chemical pesticide usage continues to increase on an annual basis, enterprises and farmers relying heavily or solely on chemical pesticide input for crop protection are increasingly confronted with many undesirable problems, which threaten sustainability.

The spread of pesticide resistance, particularly amongst insect pests and fungus diseases, has reduced the efficacy and raised the cost of pesticide-based control measures in many crop systems. Recurring outbreaks caused by pesticide-induced resurgence of pests have resulted in serious crop losses in production regions.

Food safety, the incidences of farmer poisoning, long-term side effects of chemical pesticide use on aquatic and terrestrial ecosystems are causing concern at large. In addition, the man-made pathway for entry and spread of exotic pests and pathogens or vectors as a result of reduction in trade barriers requires special attention.

Meanwhile, quality of agri-based commodities comprises many specifications in the production and marketing stages and has developed into the most important competitive weapon.

Consumers have provided agri-producers with their clear-cut conception of food standard, quality aspects of the environment and workers health and safety. Movements have emerged to campaign on the issues of harmful agrochemicals (i.e. chemical pesticides, artificial fertilizers), occupational health and dangers associated with genetic engineering.

Joint campaigns reflect a growing realization amongst many activists that real changes to the system cannot be achieved by groups on their own.

There is a growing recognition of the campaign for broad changes in policy direction and supermarket chains in Europe and the USA have been shown to play an instrumental role in the implementation of consumer's wishes. An "Ethical Code of Practice" emphasizing the consumer's wish, is for most large supermarket chains (e.g. Sainsbury, Tesco) and buyer (Fyffes) the basic approach for agribusiness. Full transparency of the operational processes and external audits are implicit to that.

Another trend visible in the agribusiness is that consumer's preference for agricultural products is shifting from food produced in the conventional way (i.e. with agrochemical input) to food produced with low input of agrochemical and agrochemical-free produced food successively, the latter referred to as organic food. Supermarket chains have special space for organic food products; demand in e.g. organically-produced banana exceeds the supply.

Of paramount importance in international trade is also full compliance with the Sanitary and Phyto-Sanitary (SPS) regulations set by the WTO.

Modernization of the Suriname banana industry

Because of inconsistency in quantitative and qualitative outputs to serve the buyer (Fyffes) on the one hand, and anticipation of the changing consumer's and market standards on the other, development, dissemination and implementation of new technologies embedded in appropriate management practices were necessary. Consequently, a modernization programme, worth Euro 8 million has been executed as Phase I in the Jarikaba production location in which the European Union contributed for Euro 3.5 million.

Technical infrastructure (the installation of a 1300-ha under-tree irrigation system, 1300 ha cableway system, new packing stations including new equipment), new technologies in crop husbandry and the introduction of tissue culture material of the variety "Williams", restructuring of the production organization, technical assistance and thorough training to employees at all levels are the key aspects in Phase I of the modernization programme. Fyffes contributed to the programme as an important facilitator.

Phase II in the modernization comprises the Nickerie location and will basically contain the same elements. Here again the contribution of the European Union will be significant.

Expected results from the modernization programme

Completion of Phase I of the modernization programme in November 1999 will increase both Surland's annual production level and the company's financial position because of:

- full compliance with international requirements;
- improved production condition;
- lowered input and cost per production unit;
- increased production per hectare of higher quality without negative impacts on the environment;
- increased export with shorter harvesting and shipment cycles;
- increased competitiveness on the international market;
- an appropriate economic environment that will facilitate the movement of resources in or out of banana production and trade, from or into other sectors, when appropriate; and
- capacity-building and institution-strengthening, including training.

An integrated and quantified approach to management of agroecosystems

In the intensification of agricultural production, crop protection and (artificial) fertilization can become major constraints to food, occupational health and the environment. Hence the global movements towards reduction of both chemical pesticides and artificial fertilizers in

agricultural production. Globally, huge efforts have been made to lower the negative impacts from agriculture on food safety, worker's health and safety, etc.

Using the scientific data on crop physiology, soil physics and chemistry, pest and disease development, weather and climate, technologies in crop husbandry, computer technology etc., Surland designed a quantitative approach to the management of the agroecosystems, which is briefly discussed here.

In the quantitative approach the qualitative and quantitative yield (output) of a crop plant attainable in a particular area is considered the production function of a series of production factors (input) under the given conditions, technology and human resources. The production factor includes a wide range of activities (processes) e.g.:

- project preparation, land clearing, field laying-out, soil preparation, training, planting, crop maintenance:
  - water management,
  - fertilization,
  - crop protection: weed management, pest management and disease management;
- harvesting;
- product processing;
- shipping and distribution.

Crop maintenance e.g. consists of three distinct components (i.e. sub-production factors or sub-processes) in which crop protection is also subdivided.

Characteristic for production function (Q) in the ***Input – Transformation - Output*** relation is that

$$Q = | x1, x2, x3, \ldots\ldots\ldots xn |$$

which means that the quantified individual inputs and their interaction determine the qualitative and quantitative output of the production system.

From quality standards set by consumers and international institutions, processes and sub-processes are integrated and critically planned in terms of their respective components:

a. human resources: qualitative (skills, experience, training record) as well as quantitative;
b. technology: appropriateness and adaptation to local conditions;
c. materials: appropriateness, quality and quantity, impact on workers and environment;
d. equipment (appropriateness, maintenance record etc.) for the support of technology, human resources and protection of the environment;
e. conditions, organizational structure, procedures (occupational health and safety of working sites), logistics, instructions, assessments etc.; and
f. services/suppliers (quality aspects, capability, reliability, track record etc.).

With respect to agricultural products, quality is formulated in terms of minimal fulfilment of specifications, and standards are therefore highly subjected to changes by time. Appropriate management of the agroecosystem demands a high level of accuracy and flexibility in planning, execution, monitoring and adjusting of processes in crop husbandry.

Box 1. A pragmatic approach in quality of banana production in Suriname

1. Characteristic to this decade is the substantial contribution to quality and quality determining factors in trade; some of the normative references most cited are: ISO-9000 series and ISO-14000 series, HACCP, CE.
2. Each product or service is seen as having a set of objectives of its own against which its quality is measured, evaluated, validated or assessed.
3. Quality is no longer a single aspect in production, but a total concept that demands a total approach.
4. In the systematic planning of quality and quantity a clear breakdown of production steps (i.e. internal processes and sub-processes) is essential for achieving consistency in outcome.

That being the case, in internal (sub-) processes it is far more realistic to focus on quality of the:

A. Production input
B. Transformation
C. Production output

Box 2. Surland "4-step practical methodology" to manage quality in banana production

Step one

Defining mission, vision, goal and strategy

- quantifying norms of (sub-) processes
- short process description
- identifying strengths and weaknesses by flowcharting of internal (sub-) processes

Step two

SIPOC-analysis: analyzing the company's suppliers, input, processes, output and customers for identification of the:

- quality of suppliers for good and services
- quality of input
- quality of processes
- quality of output
- quality needs of the customers

Step three

Statistical Process Control (SPC)

- assessing process capability
- appropriate feedback

Step four

Organizational strengthening and training

- harmonizing the system to the new concept

Box 3. Content of the company's "production manual"

1. Company policies on product quality, environment and health quality and safety, mission, vision, strategic goal and operational instrument i.e. "SIPOC-analysis"
2. Brief description of internal (sub-) processes
3. Process flowcharting
4. Inspection plan: critical control points (CCP)
5. Waste management
6. Documentation
7. Material safety data sheets (MSDS) and technical specification of equipment

As a consequence, the way of managing Surland's banana farms to ensure consumer's satisfaction at every stage, internally and externally, is achieved now by a quantified and integrated approach along the generic lines of either HACCP (Hazard Analysis and Critical Control Point) or ISO-9000, ISO-14000 series of quality standards for the product (organization) and environment, respectively. By this approach, Surland is able to appropriately plan the qualitative and quantitative output of the farms and at the same time provides the buyer with full transparency of the operation.

In this quantitative approach WTO-SPS and waste management are an inherent part of the ecosystem management.

Results achieved after three years

The implementation of Phase I of the modernization programme resulted in:

a. complete documentation of the Suriname banana industry;
b. an increased volume of fruit from areas under the modernization scheme;
c. less pronounced seasonal effects;
d. in the PCMS scale a marked increase in fruit quality (PCMS > 85);
e. decrease in rejected fruit (45 to 25 percent);
f. shorter frequency of harvesting;
g. full transparency and traceability of the production system;
h. full compliance with international requirements;
i. a decrease in costs of production per Mt product;
j. trained and motivated workers;
k. an organizational structure that is geared towards sustainability.

Future perspective

The future projections of Surland Ltd. include consolidation of the current acreage with further optimizing of the field productivity. Based on market trends and local capabilities a diversification programme is designed.

As a start, the production for niche markets is focused on economically interesting local varieties of apple bananas *viz.* "sugar banana", red banana and "maripa banana", a Sigatoka-tolerant type of apple banana.

With the interest showed by Fyffes to collaborate with local entrepreneurs in developing these new products for either the organic or the conventional market, interest to diversify in banana became stronger. However, the current company locations are not geared to introduce organic production of banana and new sites are required.

In order to keep cost of production and risks at acceptable levels and to overcome the constraints of nutrient availability to the crop plant, and pest and disease management, Surland Ltd. relates the perspectives of organic production to the beneficial effects from soil microbiological composition.

Conceptually, the soil environment contains many physicochemical properties that are constantly being modified by dynamic biological processes. In particular, soil in the immediate vicinity of plant roots is influenced profoundly by root-derived nutrients and microbiological activity. Among the predominant organisms in this region are the vesicular-arbuscular-mycorrhizal (VAM) fungi. These fungi are found in nearly all soils where plants grow, including the banana environments.

Box 4. Contribution of vesicular-arbuscular-mycorrhizal fungi to organic farming

1. Improved nutritional status of VAM plants results in altered membrane permeability, which changes the quality and quantity of root exudates
2. The altered composition of root exudates creates a new microbial equilibrium of mycorrhizosphere
3. The symbiotic effects collapse when artificial fertilizers and chemical pesticides are used
4. Significant relationship between VAM fungi and specific rhizobacteria such as phosphate solubilizers, the symbiotic nitrogen-fixer Rhizobium, biocontrol agents, plant growth-promoting rhizobacteria, siderophore producers, hormone producers etc.
5. VAM plants exhibit beneficial environmental effects against:
   - drought
   - salinity
   - toxicity
   - seasonality
   - soil conservation
   - soilborne pathogens (fungi, nematodes)
   - cultural stresses

The VAM symbiosis begins with germination of large spores that germinate in the soil and penetrate the root cortical cells. The VAM-fungal hyphae extend from the root into the soil where they interface with the soil particles (see Box 4 for particulars).

In the course of sustainable agriculture, tomato and bell-pepper grown under controlled conditions and artificially inoculated with VAM fungi isolated from tobacco plants showed marked beneficial effects in leaf nutrient composition (R.H. Power, unpublished).

Conclusion and recommendations

- In anticipation of the shift in consumer's preference and successive policy of supermarket chains, organic produce in general and banana in particular will increase further to satisfy market demand.
- Diseases and pests (Sigatoka, nematodes, corm weevil), nutrients availability, shelf-life etc. are major constraints in organic banana production.
- Mycorrhizae are ubiquitous symbiotic associations important to growth of crops, e.g. banana. VAM fungi confined to the banana root are e.g. *Glomus* spp.
- The beneficial effects of VAM fungi to growth, development and tolerance to root-parasiting organisms have been demonstrated.
- Future research efforts must emphasize their beneficial role in organic banana production and how they might be managed to optimize crop production.

Export Agro SARL, Cameroon[1]

Jean-Martin Tetang[2]

Export Agro SARL, Douala, Cameroon

Export Agro produces and exports organic banana, pineapple and mangoes. We are the pioneers in the production of controlled and certified organic banana in Cameroon.

We have been producing organic banana for 8 years. Our first plantation was made on a section of virgin forest. This consisted of:

- Guineo gigante (Gros Michel)
- Pisang mas (Figue sucrée)
- Figue Pomme
- Yangambi
- Figue Rose (Dwarf and Giant)

For fertilization, mainly poultry manure is used at a rate of ± 40 t/ha.

Three cycles from that section were harvested without any serious disease problems. Symptoms of black Sigatoka started to be seen only in the fourth cycle.

This original section was then used as a mother block for establishing the other farms. Two methods of multiplication are used:

1. by removing suckers from clean mother plants
2. for plants that are difficult to multiply, e.g. Figue Rose, the mother plant that had flowered is uprooted and placed in a container with sterile soil. The new suckers that come out from the side are then split and placed into bags containing sterile soil. After 6-8 weeks these are transferred to the farm.

We have around 20 small-scale growers whom we supply with planting material to be grown for us. Each grower has around 1/2 ha, for easy management. In September 1998, we added to our current production an extra 2 ha, comprising about 3800 plants, including:

Pisang Mas	2444
Figue Pomme	53
Yangambi	54
Figue Rose	1163

[1] Based on overheads presented at the Workshop.
[2] Export Agro SARL, Douala, Cameroon.

Choice of site

The plantation is located on an area that has not been cultivated for 4 years.

Management practices

- Weed control: regular manual removal.
- Regular de-leafing and removal of leaves from the plantation.
- Mulching is done with coffee husk and dead weeds.

Control measures against diseases and pests

- Regular de-leafing.
- Elimination of infested plants from the plantation.

The farmers cultivating for us are given certain incentives:

1. We supply the planting material.
2. We supply all production inputs.
3. They have a guaranteed market with good prices.
4. Technical assistance.

The cultivation of organic banana in Cameroon faces three major problems:

1. The cost of production is high, not taking into consideration the cost of control and certification.
2. High infestation of pest and diseases.
3. Commercialization: there is always uncertainty; the producer is never sure of making profit.

The project receives no funding support from the Ministry of Agriculture. I personally see it as an opportunity for the Government to encourage small growers to expand.

We have not succeeded in convincing our Government of the importance of organic farming in general.

There are many constraints involved in organic production in general. The price given to the produce does not take into account:

- The real cost of production
- Protection of the environment
- The social aspects involved.

Session B - Market prospects and experiences with organic production and marketing

European market potential for organic produce

Carol Haest[1]

Foreword

Before focusing on the market for organic bananas, it is necessary to have an overview of the market for organic produce in general. In developed countries, agriculture and its long-term sustainability are not problems that concern the majority of consumers. Therefore the market for organic products today remains a niche market, exposed equally to the whims of the consumers and of the retailers, particularly the supermarket multiples.

Yet the number of consumers who buy organic products, either very consciously, for health and nutritional reasons, or unconsciously, as a reply to societal worries, is increasing rapidly.

The presence of organic agriculture in the world

Organic agriculture is present in 139 of the world's 194 countries (Table 1).

Table 1. Worldwide presence of organic agriculture

	Presence of organic agriculture (no. of countries)		
	Advanced	**Beginning**	**Total**
Africa (54 countries)	6	26	32
Asia (41 countries)	10	16	26
Australia, New Zealand and Oceania (14 countries)	2	3	5
Europe (45 countries)	23	17	40
Central America & The Caribbean (25 countries)	7	14	21
South America (12 countries)	5	7	12
North America (3 countries)	3	0	3
Total (194 countries)	**56**	**83**	**139**

Sources: ITC/UNCTAD-WTO. 1999. Organic Food and Beverages, World Supply and Major European Markets. Geneva. / own research.

[1] Haest Consultancy for the Organic Industry, Chaumont-Gistoux, Belgium

It is believed that approximately 675 000 organic farmers worldwide cultivate roughly 1% of the global productive agricultural area, i.e. 8 250 000 hectares. Countries which have the largest areas, according to the official statistics for 1999, are Austria (8.4%), Switzerland (7.2%), Denmark (6%), Italy (5.3%), and Sweden (5.3%). In Western Europe, the organic area increased from 120 000 hectares in 1985 to 3 000 000 by the end of 1999.

Expected organic world market in 2000

It is expected that the world market for organic products will exceed US$ 20 billion in retail sales value during 2000 (Table 2).

Table 2. Forecast for the organic world market in 2000

Market	Retail sales value (billion US$)	% of total food market	Expected growth
USA (*)	9.00	1.60	15-20%
Germany	2.50	2.50	10-15%
France	1.25	1.00	20-25%
Italy	1.10	1.50	20%
Switzerland	0.70	3.00	20-25%
UK (**)	0.85	1.00	25-30%
Denmark	0.60	4.25	25-30%
Holland	0.60	1.50	15-20%
Austria	0.40	3.00	10-15%
Sweden	0.40	2.00	25-30%
Belgium	0.20	0.75	25-35%
Rest of Europe	0.50		
Total Europe	**9.45**	**<1.00>**	**<15-20%>**
Japan	2.20		25-30%
Total	**20.70**		

Sources: ITC/UNCTAD-WTO. 1999. Organic Food and Beverages, World Supply and Major European Markets. Geneva. / own research.

(*) USDA, confirmed by ITC/UNCTAD mission in 2000.

(**) Sainsbury.

Breakdown of organic sales in different countries

There are considerable differences in the breakdown of the organic market according to countries. In the UK, fresh and preserved fruits and vegetables constitute no less than 45% of the total organic market, excluding the organic baby food sector in which fruits and vegetables (including banana puree) are an important ingredient and which represent another 4% of the organic market. In Germany, fresh fruits and vegetables are also the largest sector of the total

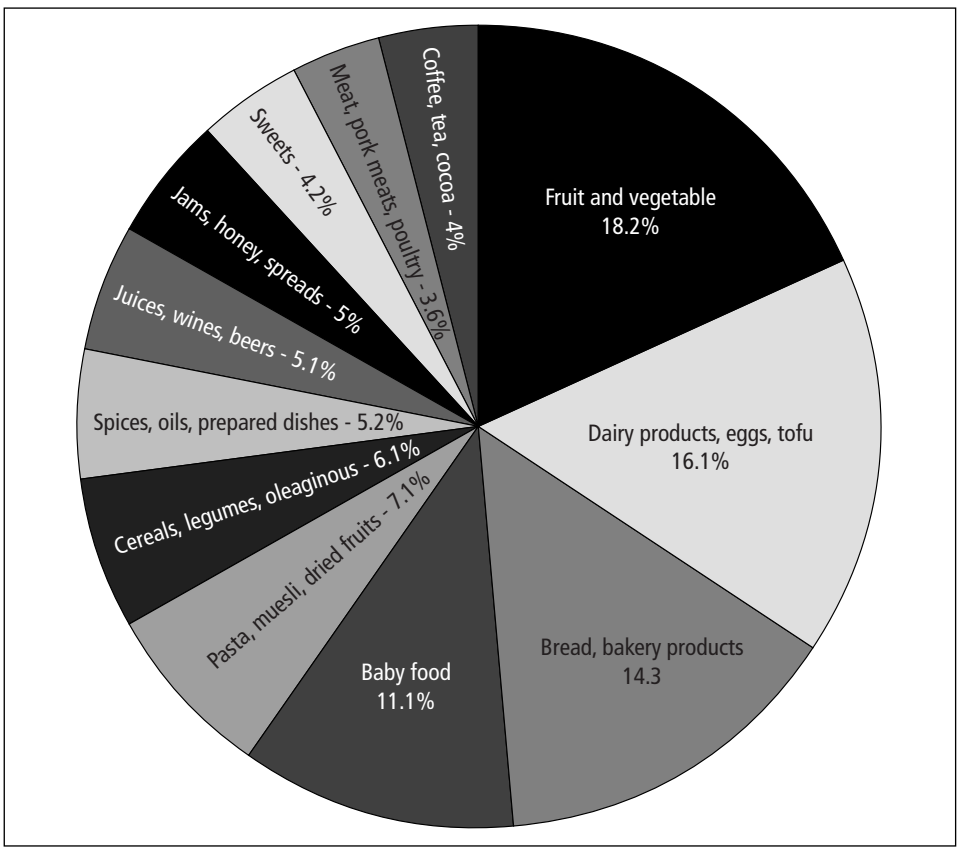
organic market but here the percentage is much lower (18.5%). The baby food sector is also very important with 11%, of which fruits and vegetables and especially banana puree, mainly coming from Costa Rica, are important ingredients. In Sweden, fruits and vegetables cover 22% of the total organic market, against 58% for dairy products. In fact in Scandinavia as well as in Austria, organic dairy is the leading organic sector, because of massive conversion programmes for dairy farmers. Yet fruits and vegetables are of paramount importance in all countries. Breakdowns of the German (Figure 1) and UK (Box 1) organic markets are given below.

Roughly speaking, the development potential in Europe is as follows:

- cereals — low to middle, strong for animal fodder
- vegetables — strong
- fruits — strong, but depending on price/quality ratio
- meat and poultry — middle to strong
- dairy and eggs — low to middle (already strong)
- processed products — middle to strong, very strong for convenience products

The export potential for products from developing countries can be found in Table 3.

Figure 1. Breakdown of the organic market in Germany.



Box 1. United Kingdom - Market share of organic products

2000 (forecast) - $ 850 millions (± 1% of all retail sales)	
Weekly sales of market leader Sainsbury's in 1999 – 2.5 million per week (± 2% of all food sales)	
Breakdown of total organic food shares	
Fruits and vegetables, also processed	45%
Cereals and pulses	14%
Meat	12%
Dairy products	8%
Processed dry groceries	7%
Baby food	4%
Coffee and tea	3%
Wines and alcoholic drinks	3%
Eggs	<2%
Herbs	<2%
Confectionery	<1%
Juices	<1%
Organic baby foods: 8% of baby food market! Includes lots of banana puree	

Sources: ITC/UNCTAD-WTO. 1999. Organic Food and Beverages, World Supply and Major European Markets. Geneva. / own sources

The organic banana market

Although FAO has reasonably accurate figures for the past, the future can only be "guesstimated". It is a reasonable "guesstimate" that the organic fruits and vegetable sector represents between 15 and 25% of the total organic world market. In Europe, more especially northern Europe, and in the USA, organic bananas are becoming increasingly important and should represent between 5 and 10% of that sector. Based on the figures given in Table 2, this means that worldwide organic sales of bananas in 2000 could or should represent between US$ 155 million and US$ 517 million. During the workshop, based on the number of European supermarkets having already introduced organic bananas and those which are likely to introduce them in the short-term, an estimate of import levels of between 25 000 and 30 000 tons for the near future was made for Europe, to be multiplied by a factor 2 or 3 in the middle and long term. In fact, today still only a small minority of European supermarkets carry organic bananas and the future growth lies with the mainstream multiples. The reason why many supermarkets, even with rather developed organic programmes, do not yet carry organic bananas, is that (organic) bananas are a very difficult product and they do not yet have a suitable combination of supplier/wholesaler/packer and ripener available. Many wholesalers/packers of organic fruits and vegetables do not know how to deal with bananas. However, it is only a matter of time before these problems will be overcome.

Table 3. Export potential

Product	Importance	Growth potential	Competition
Herbs (culinary, dried) - basil, mint, marjoram, oregano, parsley, dill, rosemary, sage, tarragon, thyme etc.	XXX	XX	XXX
Herbs (medicinal, dried)	XXX	XX	XXX
Essential oils	XXX	XX	XXX
Teas & herbal teas (also in bags)	XXX	XX	XXX
Spices (cardamom, black and other pepper, cinnamon, coriander, nutmeg, cayenne pepper, chilli, cloves, ginger)	XXX	XXX	XX
Natural repellents (neem, pyrethrum etc.)	XXX	XXX	XX
Coffee	XXX	XX	XXX
Cocoa	XXX	XX	XXX
Cane sugar	XXX	XX	XXX
Honey	XXX	XXX	XX
Cotton	XXX	XXX	XXX
Fresh exotic fruits			
banana	XXX	XXXXX	XX **increasing**
pineapple	XX	XXX	XX
mango	XX	XXX	XXX
guava	X	XX	XX
passion fruit	X	XX	XX
coconut	X	XX	X
Processed exotic fruits			
dried	XXX	XXX	XX
juice and concentrate	XXX	XXX	XX
banana puree	XXX	XXX	XXX
Nuts			
sunflower, pumpkin, almond, hazelnut, pistachio, walnut etc.	XXX	XXX	XXX
cashew	XX	XXX	XX
macadamia	XXX	XXX	XX
peanut	XXX	XXX	XXX
other?			
Oil seeds	XXX	XXX	XXX
Flowers		market still to be developed	
Fresh vegetables			
French beans	XX	XX	XX
garlic	XXX	XX	XX
Grains			
sesame	XXX	XXX	XXX
sorghum		no market demand yet	
millet	XXX	XXX	XXX
other?			
Pulses			
lentil	XX	XXX	XXX
chickpea	XX	XXX	XXX
kidney (pinto)	X	XX	XX
soy	XXX	enormous GMO-free opportunity	XXX
other?			
Food additives	XXX	XXX	XX

XXX = very strong / XX = strong /X = limited

Supermarkets carry organic growth

Table 4. Shares of total national organic market, 2000

	France	Germany	Belgium
super- and hypermarkets	41%	25%	50%
natural food and dietetic stores	26%	35%	40%
reform houses (reformhäuser)*	-	10%	-
direct sales, box schemes	15%	20%	10%
butcheries, bakeries	18%	10%	-

Sources: ITC/UNCTAD-WTO. 1999. Organic Food and Beverages, World Supply and Major European Markets. Geneva. / own research

* traditional health food stores.

Aware of the principle of push and pull, the multiples will have to listen ever more clearly to what moves the hearts and minds of the consumers. This is not a simple matter since they are themselves restless in heart and mind.

Supermarkets with well worked-out organic master plans tend to have an overall organic market share of 5% as a short- to middle-term objective. Most are still falling short but a number have already attained that objective or are getting close, and for them the sky is the limit: F.D.B. (Superbrugsen, Irma, Kvickly), Denmark's largest food retailer is an example. COOP Switzerland, the Swiss number two, is taking market shares from the number one, MIGROS, because of its aggressive organic policy. The German retailer Tegut, with 7% organic market share is percentage-wise the champion. This chain offers 1000 organic lines in its 300 supermarkets. In the Delhaize "The Lion" chain in Belgium, an organic bread is the best-selling bread and more organic frozen carrots than regular ones are sold. The company provides a full day of organic training, including visits to producers and processors and fully organic meals, for over 1500 staff members and cooperators and provides an attractive organic manual.

Although the majority of supermarkets are still struggling with the organic concept, a growing number are beginning to understand that the organic market is far more important than the few percents of turnover it currently represents would suggest. That is because it binds many more consumers than conventional products and customer loyalty has become a scarce commodity. Good organic programmes can often slow down the nomadic behaviour of the customers. Organics add value to everyday food purchases, which have long since lost their attractiveness, as people spend less and less of their family budget on food (Table 5).

The main asset however is that seriously entering the organic field allows supermarkets to think differently and to break the paradigm.

Specialized stores, farmgate sales and catering

The success of mainstream distribution by no means implies that the other sales channels are no longer important. In Germany reformhäuser (traditional health food stores) and natural food shops, with respectively 10% and 35% of the total organic sales,

still outperform the supermarkets with 25%. Although the reformhäuser have been stagnating in recent years, the natural food stores are growing by roughly 10% per year. Individual chains of organic superettes and supermarkets are mushrooming in Germany, particularly in the Bavarian capital Munich. In France the specialized stores represent 26% of the organic market against the 41% of the supermarkets, in Denmark 20% against the 70% of the supermarkets, as is roughly the case in the UK. Farmgate sales represent as much as 20% in Germany, 15% in France and 5% in Denmark. So-called "box schemes" (food boxes by subscription at fixed prices) are gaining popularity and may include exotic fruits such as kiwis or bananas.

Very slowly organics are taking off in the catering business. Organic meals are being served in the European parliament in Brussels with the involvement of one of the world's biggest caterers, Sodexho. Airlines such as Lufthansa and Swissair have been introducing organic on-flight meals but with much less audacity than expected and announced. Nonetheless the potential is huge. Equally huge but hardly developed is the potential in restaurants. Some characteristics of the different types of markets are given in Box 2.

Food and food distribution have become a battle field

As mentioned earlier, the largest gain from "going organic" is the fact that it is the best possible antidote against the conventional and in fact obsolete ways of thinking about food, food production and food consumption. The conventional way of thinking about

Box 2. Types of organic markets

1. Specialized stores

Health food and natural food stores, "reform houses"

- **magnitude and development**
  relatively small but 9000 in European Union
  relatively stagnating but 10% growth in Germany in 1999
  (growth is mainly achieved in perishables' sectors)
- **assortment:** very large
- **price and quality tolerance:** relatively big but diminishing
- **trend:** towards chains and organic supermarkets/superettes

2. Mainstream multiples

- **magnitude and development**
  major growth factor with virtually unlimited potential
  but little understanding for organics, problems of assortment and supply
- **price and quality tolerance**
  small, often unreasonable price pressure

3. Catering, institutions, airlines

emergent market with enormous potential

4. On-farm sales

important but relatively stagnating market

tending to "box schemes"

food has totally undermined the consumer's confidence. Yet breaking the paradigm is not at all self-evident and the power of inertia is immense. The food retail industry has become a battlefield in itself. The chains are totally absorbed with the value of their shares, preparing for - or defending against - the next acquisition or merger and fighting off the ever stronger and genuinely throat-cutting competition. Absurd competition with lower-than-cost-price[2] actions during prolonged periods (called *continuously low prices, Dauerniedrigpreise* in German) is a down-spiralling trend which can permanently damage the suppliers, particularly affecting the producers. This, together with continuous overhauls of their organization, makes that some supermarkets make less time, money and staff available for organics.

The advantages of mainstream distribution's involvement in organics

Yet the entry of supermarkets into the organic field has had, and continues to have obvious advantages for the organic sector. Production and processing have lost their marginality and have found much surer market outlets. They can improve and modernize their infrastructure and logistics, resulting in a generally better product at a more reasonable price for the consumer. With companies such as Mack, ICA/Viking and Tradin (Trabana), pioneering the introduction of organic bananas to the mainstream markets, *"Gone are the days that organic bananas were sold in natural food stores for DEM 12 per kilo"* (currently US$ 6.40, but at the time US$ 8.50). More rational organization and the economies of scale have provided much lower premium prices for the consumer. Prices of organic bananas have gone down by 50%, often more, and, as described below, a dangerous development has started.

The dangers of going mainstream: opposite pyramids of values

In the organic pyramid of values, *ethics*, i.e. the integrity of developing and maintaining a system that sustains our planet's fertility in order to provide all mankind with a sufficient, healthy, varied and payable food basket, within socially just structures and varying cultural backgrounds, can be found at the very base of the pyramid. Anything else comes next. In the food pyramid observed by many food manufacturing as well as by food retailing companies, *availability* (and thus turnover), stands at the very base of the pyramid whilst social responsibility and ethics are to be found at the top. Organics and the mainstream food industry and retail business are indeed very disparate partners. To have them functioning together with opposite pyramids of values is somehow like reconciling water and fire. Yet that

[2] Forbidden by law in most European countries but very difficult to prove as recent lawsuits have shown.
[3] (as expressed by Friedrich Lehmann, founder of Lehmann Natur in Germany).

is, within today's reality, a *conditio sine qua non* for the growth of the organic industry. Organics have to come down from their ivory tower and care more about availability. Because the market is demanding ever more organic merchandise, this is already happening and it is precisely there that the danger of diluting basic organic values lies. Opportunists, particularly in the trading and brokerage business, and people offering organics just *as a service*, but also supermarkets, push prices often below realistic levels. As a consequence corners are being cut on the level of crop rotations, food-processing technology and food ingredients. Fraud is creeping in fast, particularly in the cereals sector but has already manifested itself in the banana sector as well. Here are the main dangers for the organic industry.

The market for organic bananas today

At the time of the workshop, the organic banana market was still essentially demand-driven, although one could already sense this was on the verge of changing. In the months since then, the market has become offer-driven. Existing organic players have intensified their efforts and many newcomers have announced themselves. Offer exceeds demand. This is a temporary situation which occurs regularly in the organic sector since *push* and *pull* are not always in balance. The market potential far exceeds current offer.

Even during the workshop itself it became clear that some newcomers were cutting corners and that certification in various cases was confused, amongst others, in relation to transition periods. Some of the newcomers are big banana multinational companies. Although there is obviously nothing against anyone "going organic" the big question is "how" one goes organic. As shown in the previous paragraphs, agriculture and much more so organic agriculture, is more than a merely technical approach. It has very distinct socioeconomic and cultural aspects. The pioneers in the organic banana sector have been investing enormously for many years in all these aspects. Now competition is arising from the major companies who can offer bananas at very low prices. Low prices are tempting from the purchasing and distribution side. However what is needed are prices which take into account the above-mentioned socioeconomic and cultural factors.

The confused consumer and his/her run for the ultimate kick

The *strategy crisis* of companies and politicians is clearly mirroring the strategy crisis of a confused consumer. The consumer has become totally devoid of references – the past has been declared unfit and ideologically dead. Consequently, he/she seems destitute of future perspectives. To soothe the pain of having to sustain the continuous accelerated frenetic run for life that the dogmatic principles of our current economic system of free market and globalization impose upon society, consumers are looking for the *ultimate kick, the ultimate event*. They want everything *bigger, smaller, whiter, greener, more convenient, more functional, tastier*. And they want all of that *immediately, in great quantity* and above all *cheap*. In short: a *junk civilisation*.

Food has lost its attraction and families spend less on food, the stagnating market

Everyday food no longer supplies the consumer with that *kick* and is no longer an event. There is no time to buy, to prepare and to enjoy it. If only virtual food existed… The table is losing its social aspect. The food scandals, *la malbouffe* as the French call it, give the knockout blow. Families spend less and less of their food budgets on nutrition (Table 5), with a stagnating food market as a consequence. Confronted with that gloomy situation, the food and retail industries are trying to turn *crisis management* into *nutritional marketing*. They find in organics a tool that *debanalizes* food and brings back colour to everyday nutrition and that, as we have seen earlier, *binds consumers*. Organics have a growth potential that currently seems to be only matched by *functional foods*[4], particularly in the *probiotic* and *prebiotic* sectors.

Table 5. Share of family budget spent for food

Germany	1962: 32%	1998: 17%
Holland	1985: 20%	1998: 15%
Belgium	1979: 18%	1996: 14%

Increasing: rent, housing, transportation, leisure

Sources: Aktuell 2000. 1999. Harenberg Lexicon Verlag / Le Soir, Brussels, May 1997.

What makes the consumer move?

Whereas functional food refers to the health aspect only, organics refer to the *short-term* aspect of *food security and health* within a *sound environment*, as well as to the *long-term* quest of the consumer for *inner truth*, *values* and *survival*. These long-term aspirations are the reason why organics transcend fad and fashion. They are the nursery for the future organic growth. We are living longer and are entering, according to the Kondrashin[5] cycle, the era of health concern. The definition of health by the WHO is no longer the *absence of sickness and disease* but *the state of perfect physic, psychic and social well-being*.

Profile of the organic consumer

Interesting attempts are being made to re-categorize organic consumers to socioeconomic criteria within changing patterns of value orientation. The *Sinus Institut für Lebensweltforschung* in Germany concluded in 1997 that 44% of German organic

[4] Today, notwithstanding the incredible sums spent by food companies on the development of functional foods, it is not what the Germans call a Senkrechtstarter,
it has not taken off like a rocket. Mid-2000 it represents in Europe roughly 1% of the food market, in the USA 2%.

[5] Kondrashin divided the span between 1800 and 2000 in cycles representing steam energy and textile industry (1800-1850), steel industry and railways (1850-1900), electronics, chemical industry and mass consumption (1900-1950), petrochemical industry, automobile industry and individual mobility (1950-1980), information and communication (1980-2000) and health (2000-….).

Box 3. What is moving the consumers?

Short-term, consciously

State of mind of the moment
- job, economic conjuncture, health
- nutritional safety
- contaminants in food
- BSE
- porcine pest
- dioxin in animal and human food
- listeriosis
- GMOs
- lack of transparency in food

Long-term, in depth

But often unconsciously
- urge for survival
- search for (old and new) values

These movements constantly interact and organic agriculture refers to both movements.

consumers come from a technocratic-liberal environment which accounts for only 11% of the German population; 27% come from an alternative environment representing a mere 2% of the German population, 14% from a hedonistic environment representing 12% of the population and only 15% come from conservative and other backgrounds, representing 75% of the population. This means that 85% of organic consumers come from modern or progressive environments representing only 25% of the population. Likewise the Dutch organization *Motivaction* re-segmented the organic consumers, giving very high scores for the "Post-materialists", "Cosmopolites" and "Developers" and low scores for the "Traditionalists". The characteristics of the "Post-materialists" and of the "Cosmopolites" are given hereunder (Box 4).

Box 4

Post-materialists
- Goals: social and natural environment
- Lifestyle: environmentally conscious, critical, politically involved
- Work: preference for being "useful"
- Leisure: home and culture, voluntary work
- Family: chore-sharing
- Social-demographic: age spread, high education, income spread
- Media: little TV (public stations), classical radio stations, opinion magazines

Cosmopolites
- Goals: career, self-development, involvement in society
- Lifestyle: active, multifaceted, arts and culture
- Work: extrinsically and intrinsically motivated
- Leisure: "enrichment", outside
- Family: individualists, networking
- Social-demographic: age spread, high education, higher income
- Media: little TV (public stations), women's magazines (glossy), Internet

Source: Motivaction. Symposium EKO in de Supermarkt, 7 March 2000, Noorwijkerhout, The Netherlands.

In Belgium the largest consumer organization, *Test-Achats*, singled out in April 2000 the organic concept of the supermarket chain Delhaize "Le Lion" as an example of consumer satisfaction. The determining criteria for consumer satisfaction being quality (service, friendliness of the personnel), before price and proximity of the point of sales.

The crisis of credibility in forecasting trends and tendencies

The immediacy of the influence of *agriculture*, and mainly of its scandals or controversial issues (BSE, listeriosis, GMOs, see above) as well as, to a lesser effect, that of *ecology* (e.g. greenhouse effect) on the consumer is remarkable. Equally remarkable is the slow way the authorities react (cf. organic bill in the USA and organic animal regulations in the EU, matters that have been dragging for a decade and in some cases are still dragging). We (the organic "scene") do not ease the task of the authorities either: some want regulation, some want deregulation, some want their own rules.

A sustainable economy is not driven by technology alone but by a balance between technology, ecology and sociology (see Table 6).

Table 6. The economy on the road to sustainability

Technology-driven	Ecology-driven
Absolute growth	Organic and selective growth
Nature has an anthropocentric value	Nature has an intrinsic value
Technology and the market will resolve the problems	A holistic quality concept will resolve the problems
Economy-driven	**Driven by a social-economic balance**
Competition at all cost	Sharing one Earth

Two visions on organic and conceptual marketing

Some modern marketers[6] distinguish two visions on organics, which they consider mutually exclusive:

- We improve the world. Join our club.
- Long live the collective interest.

versus

- People are entitled to delicious, healthy, safe and good food.
- Long live our own individual interest.

[6] P. Hupperts. FAN/Visie and Strategy. Symposium EKO in de Supermarkt, 7 March 2000, Noordwijkerhout, The Netherlands.

I do not think they are mutually exclusive but complementary. The organic banana business is a field where we can prove this complementarity. We should express this in our marketing. Organic bananas are more than a pleasant and healthy fruit, they contain – or should contain - all the different values mentioned in this paper.

Marketing should be conceptual and communicate these values (Box 5).

Box 5. Conceptual marketing versus conventional marketing

Product		**Product + associated image**
Conventional marketing		
marketing of the appearance		sex money power status
Conceptual marketing		
marketing of the essential		health authenticity hope confidence loyalty
	Conceptual marketing	**Conventional marketing**
Priority	form superficial packaging appearance	core in depth content reality
Processing	final product	final product + roots + processing

Source: R. & J. Tarraubella. First International Seminar "Organic in the Supermarket", November 1998, Mar del Plata, Argentina.

Conclusions

This International Workshop was the right event at the right moment at the right place. The conclusions and aims of the five working groups all stand. Most of us are confronted with a lack of time, a situation which, euphemistically speaking, is not improving. *Ecology of time* is not the strength of myself and many colleagues involved in the organic sector. Let us nevertheless work together and see how we can organize to continue work on the different aims expressed. Organic bananas are a powerful tool on the road to sustainability, let's not wreck the tool.

The following annex provides some guidelines for smallholder producers considering organic production.

Annex 1.
Guidelines for smallholder producers

• The importance of cooperatives or groups for smallholders

Groups of producers
=
CRITICAL MASS for:
- Post-harvest-treatment
- Selection, classification, grading
- Packaging and labelling
- Reaching exportable mass

IF NECESSARY
An exporter can
- Pack and label
- Take care of logistics and shipping

• My (our) importer

- Does he understand my (our) potential
  but also my (our) limits?
- Does he really want to establish a genuine partnership for mutual interest?
- Is he really competent and does he have sufficient market access?
- Is he solvent?

DOES HE COMMUNICATE REALLY WELL?

• Is export "doable"?

MARKET STUDY

- Is there a market? Where? When? (seasonality)
- Is my (our) product exportable, i.e. does it fulfil foreign market requirements? - variety (species), taste, external aspect (colour, calibre or grading)
- Can my product be imported?
  Legal obstacles (cf. potatoes in EU)
  Licences, import restrictions or quota
  Taxes and levies
- Packaging and logistics, administration
- Price?

CULTURAL AND PRE-HARVEST MEASURES

- Correct species and varieties
- Choice of (organic) seeds
- Choice of appropriated fields or parcels
- Appropriated rotation programme

HARVEST AND POST HARVEST TREATMENT

- Speed, protection against sun or humidity
- Selection, grading

PACKAGING AND LABELING

Adequate (cold) storage, protection against humidity (moulds)

LOGISTICS

- National (road, water), (air)port facilities
- International (sea, air)

ENSURE FEED BACK FROM THE MARKET AND TAKE IT SERIOUSLY!

• Who can help me?

- Fellow farmers (cooperatives) who already have an experience
- Chambers of Commerce, export agencies
- NGOs
- Development organizations
- Financing and donor organizations (IFC)
- Consultants

GREENTRADE NET

and above all

Your own creativeness (R&D, exotic marketing)

The North American market for organic bananas: present and future

Eric Sauvé[1]

The goal of this paper is to provide a context for smallholder producers who would engage in the marketing of fresh organic bananas in North America. As such, it outlines the economics of the US market as it relates to volume and price, supply and demand. It represents the most current information available on this market.

From the outset, it must be stated that the quantification of this market is difficult. Trade figures are not documented in any one location, and must be approximated from industry sources. Thus, the information in this paper has made use of a structured industry survey as its method. A telephone interview was conducted with market participants at the importer and distributor levels. Telephone interviews were also conducted with retailers representing the full geographic diversity in both Canada and the US. Further, quantitative information was substantiated with qualitative assessments by those same market participants.

This paper expressly does not focus on tendencies in the countries of production, and instead seeks to understand those in the market itself. Supply side analysis will be critical to gain a fuller understanding of the market, and as such, will certainly be the topic of future research.

Fresh bananas: volume

Building from baseline data of trade in organic bananas (Sauvé 2000), figures uncovered in this survey show that the total volume of fresh organic bananas used in the US and Canada is up by 24% in 1999. This represents an absolute volume increase from 12 760 Mt per year in 1998 to 15 882 Mt per year in 1999 (see Figure 1). The 1999 figure equates to between 19 and 20 containers per week.

Cross-checked with qualitative information, the above figures mirror the increase in demand "perceived" by those same distributors, who assessed usage increases, between 1998 and 1999, for the market as a whole, at between 20% and 30%. This figure is at pace with total annual US market growth for organic foods, which, since 1990, has been estimated at between 20% and 25% (FAO 1999a).

[1] National Research Council of Canada, Ottawa, Ontario, Canada

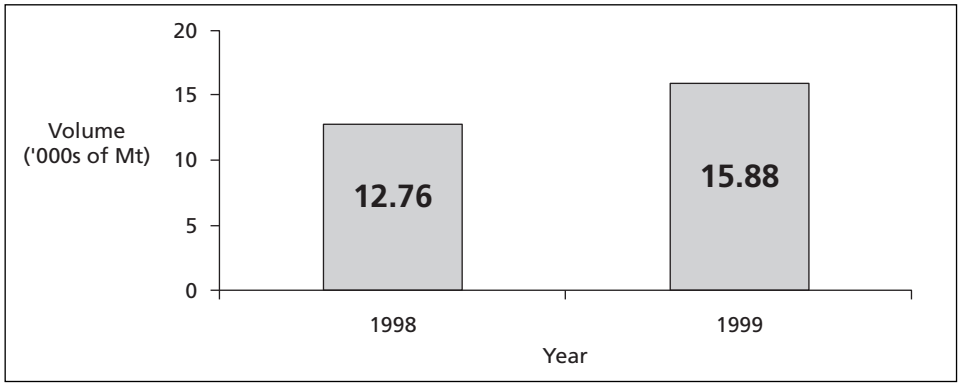


Figure 1. Estimated usage of fresh organic bananas in the US and Canada (1998-1999). (Source: Structured industry interviews 1999).

Calculating the market share of organic bananas as a percentage of the total conventional banana market, in both the US and Canada, organic bananas have increased from 0.32% in 1998 to 0.39% in 1999. The 1999 figure has been calculated from a forecasted amount for conventional bananas, based on the average annual compounded rate of growth between 1988 and 1998, derived from available statistics (FAO 1999b). While this market share growth is positive, organic bananas still represent a much smaller percentage of conventional sales than other organic produce, which have generally enjoyed a penetration level of 1.7% of total US retail produce sales (FIMP 1998).

The ability of organic bananas to increase their market share as a percentage of conventional, rests in the ability of marketers to demonstrate that organic bananas are consistent with the reasons why consumers buy other organic produce (see Figure 2). While organic bananas may provide a comparative nutritional advantage, their protective peel means that consumers may perceive less risk from chemicals applied in the production and marketing process. While organic production methods do present clear ecological advantages, this product attribute does not seem to figure prominently among US consumers.

We have seen that market usage levels have increased by 24% over the last year. However, this being the case, distributors also note a large increase of available supply for the market. Distributors perceive that supply is up 70% to 100% over the last year. This has been largely due to the entrance of new labels, most notably EcoBanana from Ecuador. On the horizon, we also see the entrance of other new producers in the Caribbean and Latin American region, the source of bananas for the North American market.

Fresh bananas: price

The pricing structure, in the US market, suggests cost inefficiencies from importer to retailer. The conventional banana market channel has an average multiplier of 2.05 between the port of entry and the retailer, compared to the organic banana market channel which sees a much higher multiplier of 3.70 (see Table 1). As a methodological

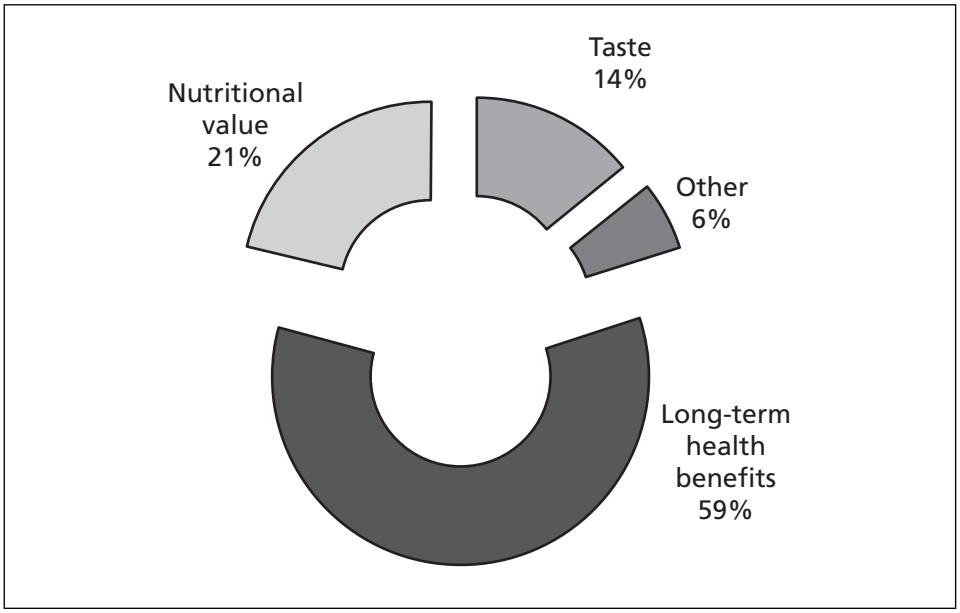


Figure 2. The most important reasons for buying organically-grown fruits and vegetables, among US food shoppers who have eaten organic produce in the past. (Source: derived from Package Facts 1996).

note, the port of entry price for the organic product has been pegged conservatively high so as not to exaggerate the differential. To draw from this table, the differential in the multiplier between conventional and organic is significant and presents a major barrier in the expansion of the organic market. Reasons for the differential can include higher margins, higher wastage, higher freight costs, etc. Further quantitative investigation into the exact reasons for this discrepancy is needed for a full understanding.

Table 1. Distribution chain analysis

	Port of entry price (US$/lb.)	Multiplier	Retail price (US$/lb.)
Conventional (1998 average figure)	0.22	2.05	0.45
Organic (1999 current figure)	0.27	3.70	0.99 (national average)

Source: derived from FAO 1999c and structured industry interviews

We have noted above that there has recently been a marked increase in the volume of supply of organic bananas. This has created a price war in the US, driving down wholesale and retail level prices, forcing middlemen to become more efficient and to reduce their high multiplier. The unfortunate corollary of this trend is that distributors then place downward pressure on prices from their producers. It is judged that the current price war, combined with a sharp increase in supply, will push prices down at all levels from production to market.

In comparison to the conventional market, where we have seen wholesale prices fluctuating in parallel with the producer and the retailer price (see Figure 3), the organic market has, since 1998, shown a relatively flat level of fluctuation on the producer and retail level, while fluctuating widely at the wholesale level. It should be expected that once market volumes grow and there is more consistency in supplied quality, we will find similar price action to the conventional industry, where the margins of intermediaries will be stabilized.

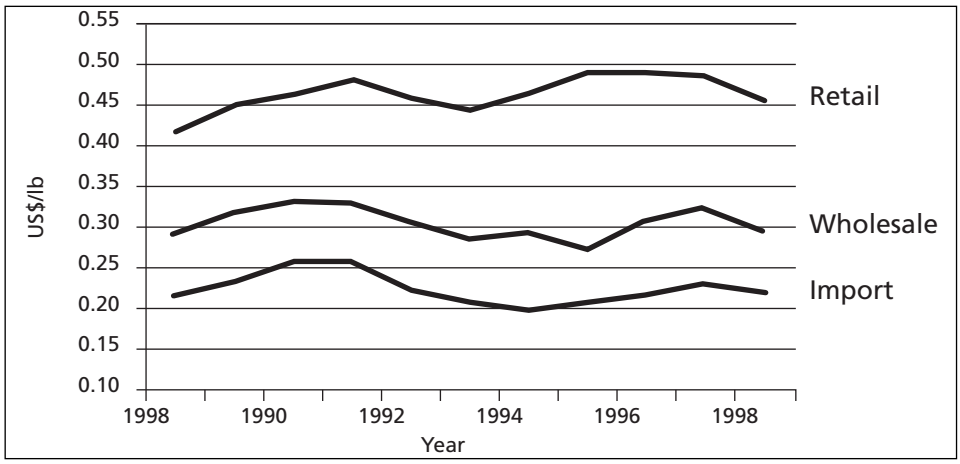


Figure 3. Price levels (US$/lb.) - Conventional bananas (year-to-year averages. (Source: derived from FAO 1999c).

With regards to price, seasonal fluctuations must also be addressed. Both distributors and retailers suggested a seasonal fluctuation very similar to that of the conventional industry (see Figure 4). The seasonality of organic banana prices in North America includes lower prices in the summer and higher prices in the winter. At the retail level, this can mean that prices will fluctuate between the range of US$0.69 per pound and US$1.29 per pound. It is also noted that price fluctuates widely based on non-seasonal factors such as hurricanes, quality issues, etc.

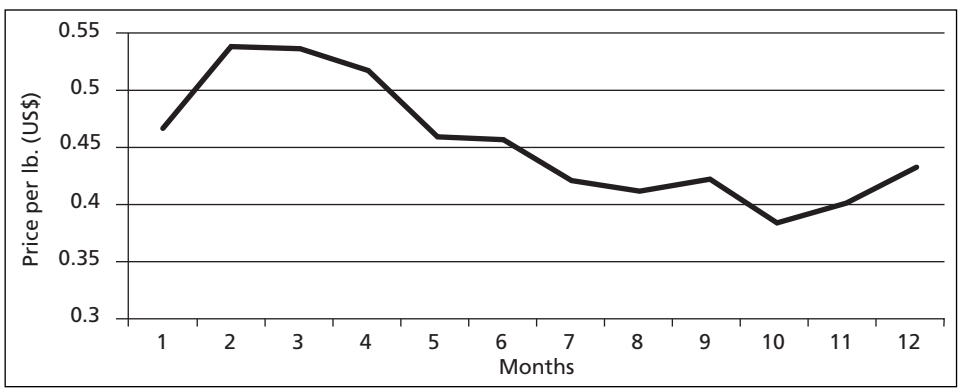


Figure 4. Seasonal fluctuations - Conventional bananas (10-year average). (Source: derived from FAO 1999c).

Other changes and processed products

The above discussion of market restructuring, originating in increased supply, has had implications on the producer, other than downward price pressure. The increased competition has also raised the quality standard demanded from the producer. As the distributor selects between a growing number of producers, differentiation based on quality becomes more important. The result has been that, in the last year, most if not all distributors have seen positive changes in quality and reliability of the product landed in the US. It is expected that, without some sort of consumer education, the aesthetic demands placed on the conventional banana will increasingly be imposed on the organic product. It will therefore be increasingly difficult for producers to meet the quality standards in the North American market, where standards have already increased significantly.

Before concluding, a note should be made on the market for processed organic banana products. Clearly the market for organic banana ingredients will grow along with the rest of the organic industry. Banana ingredients have their place in an increasing number of products placed on the market. However, the ingredients market has also shown itself to be very competitive, and in many cases, comparatively capital intensive. Opportunities in this market should be the topic of further study. A more accessible option for a processed product is the dehydrated banana, which has a small but growing niche in the North American market. Industry insiders have indicated that this market is growing slower than the larger organic market. However, analysis of the finished price as compared to the cost of inputs reveals that interesting margins can be found. It must also be noted, though, that this market will be supplied with increasing volume as the number of fresh banana producers increases, and they look for opportunities to make use of their non-exportable product.

Final notes

Increased market participants in both supply and distribution of fresh organic bananas is creating a more competitive market in North America. Prices will continue to decline, most notably at the retail and wholesale levels. All members in the market channel will be pressured to lower their prices in efforts to compete. Domestic distributors will be forced to move greater volume to compensate for lost margins. Higher quality products will be demanded from all producers, and better, more efficient handling, from all intermediaries. Lower prices at the retail level mean that the market will grow, creating more opportunities for producers. Organic bananas are in a position to go through a tremendous growth period, where they have the possibility of achieving the same level of penetration of other organic produce in the US, 1.7% of the conventional retail market. Should demand reach this level, significant increases in supply will be needed.

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Macroeconomic situation facing small-scale banana producers active in the world market

Alistair Smith[1]

In the second half of the 1980s there was an expansion in the number of smallholders involved in the world banana trade, principally in the four Windward Islands (St. Lucia, St. Vincent, Dominica and Grenada). Prices were good and therefore there was a strong incentive to plant new land to bananas for export to the British market. By 1991-92 there were some 25 000 active farmers involved in banana exports.

At the same time, there was a very significant expansion of banana plantations in the three countries that now dominate the world market – Ecuador, Costa Rica and Colombia. However, virtually all this was in large-scale plantations. Expansion was undertaken in the belief that the future EU single market would give easier access to these markets and – post-1989 – in the belief that the Eastern European market was a huge new opportunity. In Ecuador, some of these new producers had holdings of less than 10 hectares, but they were very much the minority.

In the early 1990s, just before the single market, there was also significant expansion of plantations in West Africa – Côte d'Ivoire and Cameroon. However, this expansion was directly at the expense of smallholders. Observers believe that this marginalization of small producers was more directly connected to the privatization of the state Marketing Boards in those two countries. What is clear, though, is that only medium- and large-scale plantations remained when the single EU market import regime came into force on 1 July 1993.

When the EU import policy did come into force the situation in the three regions was as follows:

1. in Central America, the expansion came to an abrupt halt, especially after protest from environmentalists in Costa Rica; in South America, the expansion slowed, but only to increase steadily again in Ecuador, once the implications of the EU regime became clear;
2. in the Eastern Caribbean, the expansion also stopped as prices slumped and farmer confidence started to fall, especially when – by 1994 – it became evident that Chiquita and the US government were looking to challenge the continuing protection offered ACP suppliers by the EU regime;
3. in West Africa, the big companies present (Dole and Del Monte) consolidated their expansion, displacing some of the medium-scale national producers.

[1] Banana Link, Norwich, United Kingdom.

Multinational operators, such as Fyffes (Ireland) and Dole (USA) were the big beneficiaries of this regime; Chiquita, mainly because it had not chosen to diversify its geographical sources like the other two, was less able to take advantage. Small producers were being squeezed out of the market across the board. A situation of structural overproduction prevailed from day one of the single EU market, partly because of the quota restrictions into the EU, partly because the Eastern markets were not as big as predicted by the big companies and the Ecuadorians, and partly because the US market was more or less stagnant. Ecuador, with the competitive edge offered by its low wages and the limited social benefits afforded by the producers – and under growing pressure to repay its heavy external debt through export growth – kept on expanding, despite the situation of overproduction to which they were contributing month by month.

In the Windward Islands, quota protection and continuing tariff-free access to the EU market were not enough to keep the 25 000 small farmers in the market. By 1997, after disastrous prices and a series of devastating hurricanes, around 10 000 had dropped out. Added to this, a study funded by Britain and the EU to advise on restructuring the Windward industry viewed small farmers as 'inefficient' and favoured restructuring of production through the strongest farms. From 1995, the restructuring programme if anything accelerated the loss of farmers, leaving well under 10 000 by 1999.

In the EU's own production zones of the French West Indies and the Canary Islands (despite the very questionable sustainability of the latter – importing water from one island to another), the number of producers declined (especially in the Canaries, where a replanting/restructuring programme was implemented between 1993 and 1996), but not nearly as dramatically, for the simple reason that the EU provided deficient payments to farmers when the price fell below a given level. These farmers had become part of the Common Agricultural Policy.

Table 1. Estimated numbers of small farmers active in the world export banana market 1999

Country	Number of small farmers
Canary Islands	9000
St. Vincent	6000
St. Lucia	5000
Dominica	4000
Ecuador	3500
Guadeloupe	3000
Colombia	2000
Dominican Republic	1500
Martinique	600
Jamaica	350
Granada	150

In Ecuador and Colombia, small- and medium-scale producers had always been treated as a kind of 'buffer stock', i.e. when the market was tight they got prices similar to

the big players, but when there are too many bananas on the market – the case for almost all the time since 1992 – they are the last to get a sale, or they receive lower prices than others. This means that even in the biggest Latin American exporting countries whose export volumes have now increased to the point where they control 63% of the world market between them, small farmers have been going out of the market week after week.

At present (November 1999), in the face of the worst price crisis for decades, with overproduction as chronic as ever, small farmers have gone on strike since 26 October, blocking main transport arteries, with support from the truck drivers. This is to protest at the prices they are getting: despite the official minimum price fixed by the State of $2.60 per box (about equal to their average costs of production), small farmers have been getting less than two dollars, in most cases around one dollar. In June, reports of prices as low as 50-60 cents were coming out of both Colombia and Ecuador. Not surprisingly therefore, the evacuation of small farmers in these countries is now faster than ever.

So, the much-heralded 'race to the bottom' has reached its logical conclusion in the banana market – the bottom! No producers outside the EU are making money at present, including even the giant transnationals, whilst the fate of the remaining small farmers looks sealed. The only ones surviving with any hope for the future are the 200 or so in Colombia and Ecuador benefiting from Fair Trade labelled fruit in Europe and around 250 with organic certification in the Dominican Republic.

In summary, smallholders have been marginalized by a combination of the intertwined processes of global economic liberalization, industry 'restructuring' and structural overproduction. Conventional wisdom says that small farmers are per se 'inefficient'. Organic production therefore is one of the few responses available in the face of the dominant politico-economic project that has taken hold in the 1990s; a project, it seems, to rid the world of a nuisance factor antithetical to the religion of economic efficiency – small farmers. But then their fate has been no better in Britain, Sweden, Italy or the USA – bananas or no bananas.

Motivations and constraints for small-scale banana farmers

From personal experiences during field visits and farmer meetings between 1994 and 1999 in St. Vincent and St. Lucia, I would summarize the principal motivations of banana farmers for wanting to convert to organic production as follows:

- better prices;
- lower costs of production;
- health of self, family, workers and wider community;
- improvement in soil and water quality;
- improved habitats for wildlife (birds, small mammals, insects, other plants, fish in streams);
- diversified farming system, including food crops and other cash crops.

These may seem like considerable and highly desirable benefits, but the constraints on adoption of certified organic systems are also considerable, although with the right enabling environment not insurmountable:

- psychological: fear of lower yields; fear of change/unknown;
- lack of knowledge, especially knowledge appropriate to specific locality, soil, type etc; including lack of resources to access existing knowledge;
- linguistic and/or literacy barriers to accessing knowledge;
- technical constraints, e.g. Sigatoka and nematodes control, crown rot prevention; these and other technical issues may prevent achievement of required export quality;
- lack of cooperation of neighbours, other farmers in same agroecological catchment;
- opposition or lack of support of advisory services (or lack of affordable service);
- lack of access to inputs, e.g. adequate animal waste, bagged organic fertilizer, disease prevention products, other biological control products;
- competition from bigger producers moving into organic production.

Ways forward

In summary, the following recommendations seek to address some of the short-, medium-, and long-term constraints to successful adoption of organic production systems by small farmers:

- Development of a major international South-South farmer-centred programme of human and technical exchanges.
- Use of 'Fair Trade' labelling – and the social and environmental premium available – as a means to fund the conversion process.
- Develop standardized cost of production calculation methodologies (not specific to organic bananas, but urgently required to transcend confusing and propagandistic information on the economics at the heart of the issues).
- Re-definition of 'quality' in terms of sustainability.

Session C - Quality aspects with reference to certification and marketing

Organic bananas - from harvest to consumer

Alan Legge[1]

Keys to quality success

Packhouse

- Field factors mentioned by other speakers, especially deflowering and avoidance of drift from other nearby crops.
- Very careful harvesting, handling and transport to packhouse.
- Fruit of uniform age and maturity.
- Stem-suspended, in source group, under shade with good air circulation not dumped on the ground.
- Clean, hygienic, well-managed packing station, dedicated to organic products. If "food-premises" insecticides from the Approved list are used then 3-5 days must be allowed to elapse before recommencing production. Only approved cleaning agents may be used.
- Confirm no flower-ends remain on fruit tips, crucial if the risk of crown-rot/anthracnose is to be reduced.
- Bore-hole or mains supply water used in washing tanks.
- Frequently-sharpened knives in use.
- Approved organic postharvest drench or spray; molten wax is occasionally used to seal the crown, but has an appearance unappealing to the consumer.
- Careful handling at every stage of the process.
- Careful checks at every stage of handling clusters for insects, amphibians, spiders and any other forms of wildlife which abound in organic plantations as a consequence of the organic approach.

Quality

- Satisfy all requirements of EU Council Regulations No.2092/91 on organic products (Rules of production, inspection, principles of production, materials used, etc.).

[1] Mack Multiples Division, Paddock Wood, United Kingdom

- Meet the written specifications of the customers for:
  - Shape/length;
  - Maturity;
  - Skin appearance;
  - Skin blemish.
- After ripening:
  - Uniformity of coloration;
  - Flesh colour;
  - Absence of progressive defects.

Packing

- Weigh to specified weight to avoid under- or overweight (both may contribute to quality defects).
- Correct choice of bag:
  - Perforated;
  - Banavac;
  - M.A.P. (modified atmosphere packing).
- Well-trained staff.
- Quality Assurance scheme in continuous operation to aid those who are supplying the fruit and identify the farmers who need further training.
- High quality, recyclable packaging, glued instead of stapled.
- Full audit-trail information on every carton, plus all legally required information for:
  - EU Regulations;
  - Organic Certification.
- Cooled fruit available within a few hours of harvest/packing (a container with generator -set is the best option.)
- Palletization at the point of packing is highly desirable to ensure maintenance quality and avoid excessive handling/mishandling.

Transport

- Good quality containers for best results and to avoid the risk of ethylene from ship-ripe organic bananas affecting conventional fruit – both parties require as much physical separation as possible.
- Fast sailing times.
- Weekly service – customers must have continuity of supply.
- All documentation received at the destination to facilitate rapid clearance from the port.

Ripening requirements

- Well-trained Quality Assurance staff to provide rapid feedback of arrival quality to senders.

- Entry inspection of every pallet, to arrange separation of ship-ripe affected cartons.
- High-quality forced air-ripening rooms, with efficient air circulation and temperature controls – with the aim of attaining uniform coloration/or holding arrival quality for a few days.
- Use of 50–100 ppm ethylene to unblock ripening receptors and permit the evolution of ethylene from the warmed fruit and the subsequent ripening of the bananas.
- Twice daily monitoring of the ripening fruit to assess progress and adjust temperature/air change frequency, as necessary.
- A "low and slow" ripening process is preferable and under this regime, organic bananas may take 1-2 days longer to achieve a suitable colour stage than conventionally-grown bananas.

Certification / entry requirements

EU Bananas from the Dominican Republic:

- Currently "Certified" farm sources – checked by an organization listed under Article 15 of EU Regulation No. 2092/91. In our case issued by BCS ÖKO-Garantie of Nürnberg.
- Bill of Lading.
- Commercial Invoice.
- EUR 1 Certificate (Proof of Origin).
- Phytosanitary Certificate.
- Isolation of fruit at all stages of packing and transport, sufficient to ensure no risk of "contamination" with conventionally-produced fruit.
- Received by a "certified" ripener – complying with (UK) Soil Association Standard St. 10.101 "plant and equipment must be dedicated and in separate areas for fresh produce packing".
- Banana Licence for fruit from those sources covered by the current European Banana Regime – hence the need for accurate weighing in the packhouse; overweight consignments against the licence tonnage declared can lead to customs penalties.

Expected changes for the year 2000

- Importer will need to declare each consignments of organic produce to the Authority in charge of verification (probably APHA in the UK). They will look for evidence of:
  - export certificate;
  - valid authorization issued by UKROFS (UK Register of Organic Food Standards).
- A physical check may be made.
- A charge will be levied for this service, on a cost basis (which is thought to be likely to be 10-20 per consignment.) If approved, it will enter into force 6 months after publication.

The market for organic food – some comments gleaned from the press

- More than 80% of all organic fruit and vegetables sold in the UK are imported.
- The current market for organic produce in the UK is worth £400 million at retail.
- Tesco estimates its organic produce sales at £35 million. Waitrose says that organic food accounts for 13% of its sales. J. Sainsbury estimates the UK organic foods market at £450 million.
- The European market for organic food was estimated at US$ 4500 million.
- Retail Intelligence Ltd. estimates that the market for organic food in Austria, Denmark, France, Germany, Italy, Sweden and UK is now about US$ 5000 million. (The population of this group represents 79% of the EU population).
- Germany is currently the largest market, accounting for 35% of EU organic foods, a market valued at between DM 3000 million to DM 6000 million.

Influences on the market for organic produce

- The market is stimulated by food health scares and safety concerns: BSE (bovine spongiform encephalopathy), GMOs (genetically modified organisms), pesticides, antibiotics, pollution.
- The trend towards increased consumption has been assisted by the entry of large food producers and retailers.
- In the UK, about 70% of all fresh produce is sold via multiples, whereas in Germany and Italy specialist and independents dominate organic sales.
- An easily recognized logo will assist sales.
- Prices of organic foods are generally 20-40% above prices for equivalent conventional food.

UK consumer survey published October 1999

Consumer attitudes towards organic food:

- 21% “very interested”;
- 27% “not at all interested”;
- 38% “would change shopping habits and stores to buy more organic food”;
- 31% “believe it is worth paying more for organic produce”;
- “If organic was less expensive, 75% would buy more”;
- “If organic produce was always available, 61% would buy more”.

Of those who had purchased organic food in the previous 6 weeks:

- 72% had bought fresh vegetables;
- 44% had bought fresh fruit;
- 10% had bought meat/poultry;
- 10% had bought bread.

Pathways towards international organic certification

Peter Grosch[1]

Terminology

Inspection

On-site verification process of agricultural production and processing units, including check of the past (paperwork) and a physical analysis of the present, using also spot-check sample taking, resulting in a report to be countersigned by the person in charge of the unit.

Control

Permanent process of the submitted unit with other than on-site visit methods, such as obligation to present documents, countercheck of achieved goods, buying samples on retailer's level etc.

Certification

Decision process, based on binding standards and the results of inspection and control fact-finding procedures. Two levels to be distinguished:

- Use of private logos, based on association's standards;
- Fulfilment of general obligatory legal criteria.

Accreditation (of certification agencies)

Verification and decision-making process within a defined framework of criteria and procedures of norms, such as EN-45011 and ISO-65, carried out by an authorized and acknowledged independent accreditation entity.

[1] BCS ÖKO-GARANTIE, S.A., Nürnberg, Germany

Formal needs

Agricultural and wild plant production

Individual farms

- Registration and contract with a recognized agency.
- Presentation of all information required, such as for example, field history, last application of chemical inputs, field map and list, book-keeping, etc.
- Initial inspection and fact finding, resulting in decision about length of conversion period and other conditions.
- Certification as 'in conversion' ('in transition') product.
- Certification as organic product when having passed conversion period.

Groups of small farmers

- List of participants.
- Information about conditions of participation.
- Group or individual contract with certification agency.
- First inspection of all farmers, after installation of an internal control system, assuring safety of fulfilment of conditions, to be documented by the group responsible, and when functioning, potential reduction of external inspections to a level of spot-check sample inspections of participating farmers.
- Inspection reports on internal and external levels, including description of and proof for efficiency of the combined 'quality assurance system'.

Wild plant collection

- Definition of the area (map/narrative description).
- Inspection.
- List of responsible buyers involved, who have to carry out their continuous documentation of goods bought in, including type of product, amount, origin, date etc., to be countersigned by the sellers/authorized collectors.
- Determination of yearly potential of volumes to be collected.
- Transport documentation e.g. to freezing/drying plants.
- Confirmation of non-use of chemical inputs in the respective region, issued by a competent authority.
- Confirmation that the natural habitat will not be damaged by the collection activities, from a competent authority.

Processing plants

Fulfilment of the conditions for registration and inspection.

Exporters and importers:

- Registration and contract (see above).
- Importers have to apply for import permission according to the following procedure:
  - Fill the application form.
  - Add last inspection report.
  - Add confirmation of equivalence, issued by responsible certifier.

Some banana certification specialities

- Producer's names: in Latin America it makes more sense to list the nicknames (too), since identification may be easier.
  Even better/safer: a producer's code number, to avoid any error.
- There are big differences in yields, so besides surface of production, the number of plants per area, average yields of past years and a current estimation of the present year has to be documented – as one precaution against the temptation to sell neighbour's fruit, too, as organic.
- When collecting the fruit, the list of certified farmers should always be provided to the drivers and they must collect and present countersigned receipts of collected fruit.
- At arrival of the fruit at a packing or processing plant, within the check of quality specifications, the internal quality assurance system must also refer to a probability check of delivered quantities per individual producer.
- Since small farmers normally don't have a book-keeping system – and they never will have… – the responsible coordinating unit (buyer/exporter) has to install a complete and representative file per farmer, including all relevant information, beginning with inputs, including field activities and reaching up to yields and payments.

Session D
Production constraints and adoption issues

Pest management in organic systems

Mark Holderness[1], John Bridge[1] and Clifford S. Gold[2]

General principles of pest management in organic systems

Pest management in organic farming systems is implemented on the basis of minimizing losses to pests through production of a healthy crop in a balanced and sustainable ecosystem. Organic systems create an environment that is favourable for the host, yet adverse for pests. In general terms, synthetic products are prohibited while other products are allowed only where absolutely necessary and are restricted by certification. Such systems thus utilize a holistic, ecological approach to crop management, based on pest *prevention* rather than *control*. Organic pest management is not a reversion to pre-pesticide practices, rather it addresses whole plant health through an understanding of pest biology and ecology and understanding pest damage as the product of the interaction of plant, environment and pest, with interventions directed towards shifting this balance in favour of plant health.

Technologies available for use in organic systems include quarantine and pest exclusion, preventative cultural techniques and crop sanitation, use of resistant varieties, promotion of crop vigour and fertile soils of high biological activity and, where appropriate, use of introduced or augmented biological control agents, although the latter are regarded as steps towards a self-sustaining system rather than a continuous input.

Black leaf streak (black Sigatoka, BLS) and yellow Sigatoka diseases

These foliar diseases cause significant loss of production potential through a reduction in photosynthetic area, reducing fruit filling and inducing premature ripening, with subsequent postharvest spoilage effects. Yellow Sigatoka (*Mycosphaerella musicola*) has been present in the region for many years, having spread to nearly all banana-

[1] CAB International, Egham, United Kingdom

[2] IITA-ESARC, Namulonge, Uganda

growing regions earlier in the 20th century and is the subject of routine control measures in many countries including the Caribbean islands. However, the more damaging BLS (caused by *Mycosphaerella fijiensis*) has appeared more recently, being first reported in the Latin America/Caribbean region in Honduras in 1972. The disease then spread rapidly throughout Central and South America and has now reached Venezuela and Brazil. In the Caribbean, BLS has continued to spread from island to island and has now reached Cuba (1992), Jamaica (1996), Dominican Republic (1996) and Florida (1999).

BLS is of considerable economic significance, causing extensive loss of production and premature ripening if not managed. BLS is the major target of chemical pest control inputs in banana in affected areas, accounting for 90% of such inputs. The disease displaces yellow Sigatoka in importance in affected areas.

BLS management options

Options available for the management of BLS disease within organic systems include: prevention through quarantine exclusion, the use of resistant varieties, use of cultural control and sanitation measures to reduce inoculum and reducing predisposition by abiotic and biotic stresses within the complex affecting banana through attention to maintenance of good soil fertility and moisture content and management of other pests. Direct intervention approaches at present include the use of mineral and plant oil sprays and there are also prospects for deployment of a number of novel approaches to control of the disease. These options are described below.

Quarantine and exclusion

The prevailing winds in the region may reduce the risk of spread to the eastern Caribbean, but it is doubtful that this will provide long-term protection given the rate of recent spread. To delay or prevent arrival of the pathogen in unaffected countries or regions, measures required thus include the need for analysis of the risks from different potential introduction routes, in order to inform plant quarantine decisions, the need to ensure effective diagnostic capacity in inspection services and above all, the need to maintain a high public awareness of the risks from the disease in order to avoid its inadvertent introduction.

Resistant varieties

The Cavendish-type banana is susceptible to BLS but still remains the export industry standard, despite often requiring high doses and frequencies of fungicide application in affected regions. However, some new hybrids offer improved prospects for establishing organic production even in the presence of BLS. Among these, various FHIA hybrids show particular promise and in some cases have been extensively planted (e.g. in Cuba). However, questions remain as to the acceptability of resistant varieties in commercial export trade as a specifically organic banana, both in terms of their different flavours or textures and also in regard to their specific postharvest qualities and requirements. Marketing issues are also crucial, in terms of introducing different banana types to consumer nations.

Cultural control measures

Disease avoidance through growing organic bananas in low rainfall areas and under surface irrigation (thus minimizing periods in which leaf wetness favours infection) is a well-established principle that has allowed production to flourish in affected countries such as the Dominican Republic. A range of other cultural measures can be used to establish a healthy and vigorous crop, leading to a greater tolerance of the disease and reduced losses. In terms of crop management, measures include: efficient drainage to remove groundwater, appropriate spacing to prevent leaf overlap and use of intercropping and shade management to establish conditions unfavourable to disease spread.

Sanitation measures are used as routine, to reduce the initial inoculum potential of the pathogen i.e. reduce the amount and activity ('energy') of pathogen propagules available to infect the host. These are based on the removal (and sometimes also the burial to prevent sporulation) of extensively diseased leaves/patches from the plants on a regular basis.

Integrated crop management

The significance and management of leaf diseases should not be considered in isolation from other aspects of crop management. Cultural and pest factors have been clearly shown to interact directly with the plant's susceptibility to BLS. For example in Uganda, the regression of leaf spot intensity variables on principal components of factors affecting productivity of East African highland bananas indicated a highly significant relationship with various factors, with $r^2 = 0.74^{***}$. In terms of specific effects, this study established that:

- Bananas were less susceptible to BLS with increased:
  - Ratio of Potassium : Calcium + Magnesium;
  - Organic matter in top soil.
- However, bananas were more susceptible with increased:
  - Mean minimum annual temperature;
  - Ratio of dead : functional roots (nematode damage);
  - Percentage of corm cross-sectional area damaged by weevils.

Chemical measures

Subject to certification requirements and legitimacy of use in organic systems, IFOAM (International Federation of Organic Agriculture Movements) standards permit restricted use of naturally occurring materials (IFOAM 1998). Principal among these for BLS disease management are copper salts and mineral oil (which may also act through induced systemic resistance, see below). However, mineral oil is to be withdrawn from approval, probably in 2002 and alternative sprays are sought as an appropriate control measure, at least in the short term. These include the use of citrus oils, as is already practised in a number of organic systems. Nonetheless, there are implications for smallholders which require consideration, including access to appropriate spray application technologies and their relative efficacy. Furthermore, there is considerable potential for minimizing chemical use through disease forecasting and appropriate timing of spray application periods, as well as through improved spray targeting.

Novel approaches

One prospect, which has attracted much scientific attention in recent years, is that of the systemic induction of resistance mechanisms by treatment with appropriate chemicals or biotic agents. These include micronutrients and organic acids, as well as non-pathogenic microorganisms. Induced systemic resistance (also known as systemic acquired resistance) involves the triggering of the plant's innate resistance reactions, to reduce susceptibility to infection by the relevant pathogen. Such mechanisms have been little investigated in the banana-BLS pathosystem and could offer considerable potential for use in organic systems. Endophytes may also be utilized in future. Endophytic microorganisms exist inside the plant without being associated with disease. These organisms may confer resistance to the foliar pathogens by direct antagonism or through the production of neutralizing toxins.

Genetically-modified (GM) bananas are being investigated by various researchers as a means of introducing a capacity in the plant for production of general anti-fungal resistance chemicals. However, under existing IFOAM protocols, genetically-modified organisms are explicitly prohibited from organic systems. Furthermore, there is presently so much consumer resistance to GM plants in importing nations that this situation is unlikely to change for the foreseeable future.

Banana nematodes

Cavendish types are highly susceptible to the burrowing nematode (*Radopholus similis*) and the banana lesion nematodes, *Pratylenchus coffeae* and *P. goodeyi*. Others such as *Helicotylenchus multicinctus* and *Meloidogyne* species can also be important and nematodes often occur as a complex on bananas (Gowen and Quénéhervé 1990). Nematodes are endoparasites in banana root and corm tissues and cause crop loss by destroying cortical root tissues, thus reducing mineral and water uptake and crop anchorage. Infection results in weakened roots, stunted growth, plant toppling and reduced yield. Crop losses are influenced by nematode pathogenicity and host resistance, the occurrence of associated pathogens (*F. oxysporum*) and secondary invaders of nematode-damaged tissue, climatic conditions and soil factors, particularly soil fertility (losses are highest in eroded soils).

Nematode management through sanitation

Infestation of a field is usually via infested material and disease management is thus largely dependent upon the farmer's awareness of the problem and efforts towards clean crop establishment. Eradication from an infested field is virtually impossible (except by long-term flooding).

Nematode infestation can be largely eliminated from normal planting material by peeling or 'paring' corms to remove infested tissues. Other more expensive or difficult methods of cleaning planting material include the use of hot water treatment. The use of nematode-free tissue culture plantlets is also very effective. Key issues in the use of clean planting material include the cost and feasibility of such material for smallholders (as with

tissue culture plantlets and hot water treatment). However, even the simplest methods are often not adopted by farmers and the reasons for this are unclear, but there could well be scope for use of alternative knowledge delivery systems such as participatory research, to enhance confidence in the value of this approach. An alternative philosophy among some organic farmers favours the introduction of soil from the source field with the plants, in order to establish a potentially competitive or antagonistic root microbiota to challenge the pathogenic nematodes, but this approach has its dangers and has yet to be validated.

Field management measures

The propping or guying of plants is widely used, to save the toppling of plants infested by nematodes and allow some root activity and fruit development to continue despite root damage. Other cultural practices affect the root microenvironment and reduce predisposition to nematode attack. These include improved drainage to prevent waterlogging and improvements to soil fertility. Cultivation can be used to stimulate and promote root development. Root vigour has a pronounced effect on resistance or tolerance and use of organic mulches has a strong effect on nematode problems. Organic mulching increases productivity, improves soil structure (moisture, aeration, increased nutrients, reduced erosion) and suppresses weed growth. The mechanisms underlying mulch effects on nematode significance are not resolved, but may include establishment of conditions favouring improved root growth in compensation for nematode damage and/or increasing populations and activity of antagonistic or competitive microbiota.

Further management options

Some resistance is available, particularly in cultivars with good root vigour (e.g. FHIA types). Issues here include whether this is a reflection of tolerance rather than resistance and acceptability of these types to the export market. Use of intercropping, fallows and break crops also have some promise in reducing nematode attack and may favour long-term ecological sustainability of banana systems, but this is a complex interaction and their use involves consideration of their effects on banana productivity, crop management and the balance of crop values and income security. Non-host fallows or break crops can effectively reduce nematode populations. Although the choice of crops is very constrained in long-term banana systems, crops such as cassava and sweet potato can be effective against both *R. similis* and *P. goodeyi* and sorghum is a poor host of *R. similis*. An accurate knowledge of the identity of the nematodes present is a prerequisite for recommending break crops (Bridge 2000). Other non-chemical methods to reduce nematode damage include delayed pruning of suckers (Bridge 2000, Gowen and Quénéhervé 1990, Quénéhervé 1993).

Nematicides are definitely not permitted. There may be scope for the deployment of biological control agents, but biological control is difficult to achieve for migratory endoparasites such as *R. similis* and *Pratylenchus* species although there has been some success using the bacterium *Pasteuria* against other nematodes. Nematode-trapping fungi and other fungi such as *Verticillium* and *Paecilomyces* have so far been of variable efficacy in the field.

Banana weevil

Cosmopolites sordidus causes extensive damage to the corm through boring into the tissues and such damage progressively increases in successive ratoons. Low-input systems are particularly affected and severe infestation is often associated with declining management rigour (decreased labour availability, reduced sanitation, less stringent trapping etc.). Weevil management in organic systems relies largely on the use of clean planting material, habitat management and utilisation of knowledge of weevil behaviour, appropriate cropping systems, destruction of crop residues, trapping and the appropriate application of biological control.

Clean planting material

Infested planting material is the main source of infestation in new plantings. Paring removes most weevil eggs and exposes damage so that heavily attacked suckers might be rejected. Hot water treatment at 43°C for 3 h kills larvae and eggs, while hot water treatment at 54°C kills nematodes and gives limited weevil control (Gold *et al.* 1998). Paring, combined with hot water treatment, has been shown to give optimal combined control of both weevils and nematodes. Planting of clean material provides greatest benefit in new stands placed away from sources of weevil infestation. Clean material placed in or near already infested fields may provide only limited benefit as these fields serve as a source of invading weevils.

Utilizing weevil behaviour in the manipulation of cropping systems and crop residues

Intercropping is often a means of reducing herbivore pressure with greatest effects realized on specialist insects such as the banana weevil in perennial systems. Non-host plants commonly interfere with host location or encourage emigration from the field. However, intercropping with insect-repellent green manures (i.e. *Canavalia, Mucuna, Tephrosia*) had no effect on weevil populations or damage. This probably reflects the biology of the weevil. Most adults are closely associated with banana mats (e.g. in the leaf sheaths or surrounding soil) or with cut residues. The weevils are relatively sedentary and may remain at the same mat for many weeks (Gold *et al.* 1999). Many move less than 25 m in one year. The banana weevil's limited mobility is likely to reduce the amount of contact between the weevil and the intercrop.

Adult populations are often high where mulched with crop residues (possibly due to moisture retention); thus mulches can favour weevils while reducing nematodes and leaf spots. Nevertheless, mulching probably provides an overall benefit to the system. Many farmers prefer to mulch away (e.g. 50-100 cm) from the base of the mat to take advantage of mulching without encouraging weevils. The splitting of the pseudostem and corm removal eliminates breeding sites and reduces damage on standing plants. Pseudostem sections can also serve as useful traps for gravid females and these have been widely used as a practical control measure. Intensive trapping can reduce weevil populations in established plantations but material and labour demands may exceed the resources of

many farmers. Therefore, researchers in Latin America (Alpizar *et al.* 1998) and Uganda (Tinzaara et al. 1999) are exploring enhanced trapping with semiochemicals.

Weevil biological control

Efforts in the biological control of banana weevil include the use of arthropod natural enemies and the use of microbial agents. Weevil predators identified in Asia and Africa are opportunistic generalists (i.e. they feed on many types of prey) and are not very good candidates for providing control. In Cuba, however, the myrmicine ants *Pheidole megacephala* and *Tetramorium guineense* have been reported to be effective predators of banana weevil (Castineiras and Ponce 1991). These ants will attack both weevil eggs and larvae. Roche and Abreu (1982) began the propagation and dissemination of *P. megacephala*, by encouraging them to nest in pseudostem pieces which could then be transferred to other banana stands. Best results were obtained when myrmicine ants were used concurrently with applications of entomopathogens (S. Rodriguez, personal communication). In Uganda and Tanzania, myrmicine ants, (especially *P. megacephala*) are widespread in banana stands, although their control potential has not yet been determined.

Research on microbial control of banana weevil has included the use of entomopathogenic fungi (e.g. *Beauveria bassiana* and *Metarhizium anisopliae*), entomopathogenic nematodes (e.g. *Steinernema* spp. and *Heterorhabditis* spp.) and endophytes (e.g. non-pathogenic *Fusarium* spp.). Entomopathogenic fungi and nematodes most often target adult weevils, while endophytes are used against the immature stages. Although a number of strains have shown promise in the laboratory and in preliminary field studies, efficient and economically viable delivery systems still need to be developed and tested under a range of ecological conditions. Effective management with biocontrol agents may involve chronic as well as lethal effects (e.g. reduced fecundity or feeding, or altered behaviour). The weevil habitat and sedentary habit is well suited to the use of persistent pathogens and entomophilic nematodes, formulated and applied as biopesticides in the first instance. Research in Africa (Lux, Gold and co-workers, unpublished) is currently assessing the potential for use of weevil semiochemicals as an attractant, in combination with traps and use of entomopathogenic microorganisms.

Moko disease

Moko disease is now rare in commercial plantations in the region, but still remains a significant threat for smallholders. The bacterial pathogen, Ralstonia solanacearum, infects via the roots or rhizome. Different strains, with varying symptoms, occur in different regions around the world. The pathogen is spread by human or insect vectors and in irrigation water.

Management of Moko disease

Management is based primarily on exclusion from disease-free areas. This includes the elimination of alternative weed hosts, use of a pre-planting fallow (which can require 18 months), the disinfection of tools etc (subject to organic approval for the chemicals used) and ensuring a clean irrigation supply. Control in affected fields relies on the eradication of diseased plants to reduce disease spread and usually relies on herbicides in chemical-based systems (e.g. stakes impregnated with the herbicide glyphosate are driven into affected corms; the 'Dracula' method). Organic alternatives to chemical eradication are more labour-intensive and thus costly.

Fusarium wilt - Panama disease

The fungus *Fusarium oxysporum* f.sp. *cubense* is a soilborne vascular pathogen and was the main cause of abandonment of cv. Gros Michel in earlier years. The disease is generally of less concern for export banana now that Cavendish types are widely grown. However, the emergence of race 4 types in Asia, which are pathogenic to Cavendish, poses risks to the long-term sustainability of Cavendish production.

Fusarium management

Disease management is again principally based on exclusion wherever feasible. This includes the use of pathogen-free planting material (e.g. tissue culture plantlets), avoidance of spread via cultivation activities and flood fallowing where feasible. The use of resistant genotypes may have some value if race 4 spreads to the region. Some soils (high pH, fertile, well drained) are suppressive or less prone to disease occurrence, but this is difficult to reproduce through amendments. However, heavy organic matter inputs at replanting or during fallows favour an antagonistic microbiota and so improve plant growth and vigour.

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The potential for use of disease-resistant varieties as organic bananas

Emile A. Frison and Suzanne Sharrock[1]

Pest and diseases as constraints to banana production

Banana production worldwide is increasingly threatened by a number of economically important pests and diseases. Black Sigatoka leaf spot disease caused by the fungus *Mycosphaerella fijiensis* is considered to be the most serious of these. This pathogen causes severe leaf necrosis, reducing yields by up to 50% and many important and widely grown cultivars are susceptible. The first appearance of black Sigatoka outside Asia was in Honduras in 1972, and this was followed by the development of a serious epidemic throughout central America. The disease subsequently spread to Colombia, Ecuador and Venezuela and its presence is now confirmed in Brazil, Bolivia and Peru (Cordeiro 1998). In the Caribbean, black Sigatoka has been present in Cuba since 1992, and has also been confirmed in Jamaica and the Dominican Republic (INIBAP 1997). It is thought likely that the disease will reach the Windward Islands in the Caribbean in the not too distant future.

The chemical control of black Sigatoka is expensive and beyond the means of many smallholder banana farmers. Chemical control measures also have the potential to be damaging to the environment and to the health of plantation workers. In Costa Rica, intensive use of chemicals for the production of export bananas has resulted in the development of fungicide-resistant populations of the pathogen.

Considerable losses are also caused by Panama disease (Fusarium wilt), a soilborne fungus which affects many cultivars. Caused by *Fusarium oxysporum* f.sp. *cubense*, this disease has a long and destructive history. Panama disease almost destroyed the export banana trade which was exclusively based on the susceptible cultivar Gros Michel, during the first half of the 20th century. Gros Michel plantations were then replaced by Cavendish, a resistant dessert-type cultivar. Panama disease cannot be controlled by chemical pesticides (INIBAP 1995).

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In addition, a complex of plant parasitic nematodes (*Radopholus similis*, *Pratylenchus* spp. and *Helicotylenchus multicinctus*), together with the banana weevil (*Cosmopolites sordidus*), cause serious crop losses in all regions. Nematode infestations interfere with nutrient uptake and transport, resulting in slow growth, reduced fruit filling and susceptibility to wind lodging.

Lack of diversity as a threat to production

The export banana trade has always been dependant on only one variety. Until the 1960s this variety was Gros Michel, but due to its susceptibility to Panama disease, this variety has more or less been wiped out and has been replaced by the Fusarium wilt-resistant Cavendish group of cultivars. The conversion from Gros Michel to Cavendish began in the Caribbean in the 1950s, and was completed throughout the extensive export banana production areas of Central and South America by the mid-1970s. Thus the entire dessert banana export industry is based on Cavendish cultivars which are all genetically similar with respect to disease response. Cavendish varieties, although resistant to Fusarium wilt race 1, are susceptible to black Sigatoka, and to weevils and nematodes. They are also susceptible to race 4 of Fusarium wilt. This race of the pathogen causes losses of Cavendish, and other varieties, in subtropical areas such as Taiwan, Australia and South Africa. A tropical race 4 has recently been reported in Southeast Asia. So far, race 4 has not been reported anywhere in the Americas.

Non-chemical options for pest and disease control

Integrated pest management (IPM)

Integrated pest management strategies offer some alternative options for smallholder farmers in the control of pests and diseases of bananas. The use of clean planting material, in combination with cultural control practices which promote improved soil fertility, can result in increased yields even in the presence of pests and diseases. Furthermore, recent research on the use of biological control agents for nematodes and weevils are giving encouraging results. However, IPM strategies which do not include the use of chemicals, and which result in an acceptable level of control of black Sigatoka disease on Cavendish varieties under conditions of high pathogen pressure, have yet to be identified.

Resistant varieties

The most sustainable method of maintaining production in the presence of pests and diseases is the use of genetically resistant varieties. Such varieties naturally defend themselves against pathogen attack and rule out the need for chemical pesticides. The

use of resistant varieties has the effect of reducing production costs, while at the same time eliminating the polluting and health-damaging effects of such pesticides.

In the case of bananas, no naturally occurring, black Sigatoka-resistant varieties have so far been identified with the export potential of Cavendish. Indeed, it will not be easy to replace Cavendish as an export banana. Cavendish is popular with farmers and retailers alike, for its high yield potential and its long shelf-life. Northern consumers, having never been exposed to varieties other than Cavendish, are completely accustomed to its particular taste and appearance and will not readily accept alternatives. Moreover shipping, storage and ripening processes are adapted to the needs of this variety and would need to be modified for new varieties. However any industry which is completely dependant on a single variety is extremely vulnerable. Alternatives must be developed and efforts are underway to develop such varieties through breeding.

Banana breeding

Banana breeding is a slow and complicated task. Many of the important banana cultivars, including Cavendish, are highly sterile, and can only be used with difficulty in conventional breeding programmes. Cultivars that are used are often only partially fertile, requiring huge numbers of crosses to be made for the generation of very little seed. Progress in banana breeding is also hampered by the fact that most sources of resistance so far identified are in wild species. Using such wild species in breeding means that many agronomically undesirable traits are transferred into the resulting hybrids, together with the resistance genes.

The complicated nature of banana breeding and the associated large inputs required in terms of time, labour and land, mean that it is an expensive activity. In addition, the lack of appreciation of the importance of bananas as a staple food crop has meant that relatively few banana breeding programmes have been initiated, either by the private or public sector. Indeed until the 1980s there were effectively only two banana breeding programmes in existence (Honduras and Jamaica).

The lack of a concerted effort in banana breeding in the past has meant that progress in breeding has been slow. As a result, it is only very recently that the first bred improved varieties have been released for widespread testing and cultivation.

History of banana breeding

Banana breeding first started in the 1920s at the Imperial College of Tropical Agriculture in Trinidad and soon after this, a parallel programme was developed in Jamaica. Initial efforts were directed towards breeding for resistance to Panama disease (Fusarium wilt), race 1 of which was already present in the Caribbean and to which the principal export clone, Gros Michel, was susceptible. The continuing spread of Panama disease and the ensuing destruction of Gros Michel plantations led to the initiation of a breeding programme by the United Fruit Company in Honduras in 1959. Lack of progress in breeding, together with the

success of the Cavendish varieties led the United Fruit Company to withdraw from genetic improvement research in 1984. Its programme was donated to the Honduran Government and thanks largely to external funding, banana breeding continued. The programme, now maintained by the *Fundación Hondureña de Investigación Agrícola* (FHIA), continues to play a lead role in the production of hybrids for worldwide evaluation. In recent years several new breeding programmes have emerged, including those of IITA (International Institute of Tropical Agriculture) in Uganda and Nigeria, CIRAD (*Centre de coopération internationale en recherche agronomique pour le développement*) in Guadeloupe, EMBRAPA (*Empresa Brasileira de Pesquisa Agropecuaria*) in Brazil and CRBP (*Centre de recherches régionales sur bananiers et plantains*) in Cameroon. With the development of these new programmes, breeding efforts, which were initially focused on improving the principal export clone, have now changed to include the varieties which are important for subsistence and smallholder producers. Most of the main sub-groups of bananas are now being addressed by one or more of the breeding programmes.

Recent developments in breeding

Banana improvement programmes are making increasing use of a wide range of biotechnological tools in order to improve breeding efficiency in bananas. Techniques such as embryo rescue are now used routinely to overcome some of the barriers to hybridization while micropropagation has played a key role in the rapid propagation of large numbers of male and female parents for crossing blocks (Ortiz et al. 1995). Colchicine treatment has also been used extensively to double the chromosome number of selected diploid clones, and this forms part of the breeding strategy adopted by the CIRAD breeding programme (Horry *et al.* 1997).

A number of research groups are also working on *Musa* molecular genetics with the aim of developing marker-assisted breeding strategies. CIRAD researchers are working towards establishing a molecular linkage map of *Musa* using RFLPs (restriction fragment length polymorphisms), RAPDs (random amplified polymorphic DNA) and microsatellites (Lagoda *et al.* 1995), as well as evaluating the genetic diversity of diploids using RFLPs and studying the relation between diploid and triploid bananas (Escalant *et al.* 1994). Similarly IITA, in a collaborative project with the United States Department of Agriculture (USDA), have cloned more than 300 A and B genome microsatellites which are being used in marker-assisted breeding (Crouch *et al.* 1998).

Most banana breeding is focused on the introduction of pest and disease resistance. Although some sources of resistance to the major pests and diseases (Sigatoka diseases, Fusarium wilt, and nematodes) have been identified, greater efforts are required to broaden the genetic basis of resistance used in breeding. Furthermore, it is possible that the introduction of such useful genes into sterile cultivars may only be possible through the use of genetic transformation techniques. Research in this area has progressed rapidly in recent years and, using particle bombardment of embryogenic cells, stable, genetically-transformed banana plants have been produced (Sagi *et al.* 1995). The embryogenic suspension cultures have proved to be transformable also by

Agrobacterium tumefaciens (Sagi *et al. in press*). In addition, *Agrobacterium*-mediated transformation using meristems has been reported by May *et al.* (1995).

The need for faster progress through collaboration

The number of *Musa* improvement programmes in existence today is still very small considering the scale of the problems to be addressed. In an effort to maximize the output and accelerate the impact of these limited *Musa* improvement efforts, PRO*MUSA*, the Global Programme for *Musa* Improvement, was established in 1997 as a joint initiative of INIBAP and the World Bank. This programme was developed as an innovative mechanism to bring together research carried out both within and outside the CGIAR, creating new partnerships between National Agricultural Research Systems (NARS) and research institutes in both developing and developed countries. The programme specifically aims to bring together, at the global level, all the major players in *Musa* improvement research.

Within the framework of PRO*MUSA*, a *Musa* genetic improvement working group has been established, bringing together all the major *Musa* breeding programmes, including those focusing on breeding using conventional hybridization techniques and those using mutation breeding and genetic engineering approaches.

In addition to genetic improvement, supportive working groups focusing on the major globally-important pests and diseases have also been established. These include Sigatoka, Fusarium, nematodes, and viruses. The various working groups operate as networks, within which the exchange of information, germplasm (such as parental material from breeding programmes) etc. is facilitated. The networking approach encourages the development of collaborative projects and the creation of synergies, which in turn will create added value. All network members participate in the identification of priorities for the group as a whole and are fully involved in the decision-making process.

Results to date

Although the number of banana breeding programmes in existence today remains small considering the scale of the problems to be addressed, progress is being made. New hybrids are being made available for testing by several breeding programmes and following the release of improved hybrids from FHIA in Honduras and IITA in Nigeria, the common assertion that "all cultivated bananas and plantains come from natural germplasm" is no longer valid. Improved hybrids have been distributed by INIBAP to more than 50 countries worldwide for evaluation, and although none of these new hybrids have sufficiently good postharvest characteristics to be able to replace Cavendish in the export market, there are some which may be suitable for particular niche markets.

FHIA-01 was the first new banana variety from a breeding programme to be adopted for commercial production. It has been released in Australia as "Goldfinger" where it is showing good potential for production in subtropical areas. This variety is resistant to Sigatoka and Fusarium diseases as well as to nematodes. It is cold-tolerant and can therefore be grown in the subtropics with the minimal application of pesticides. It produces good yields of fruit with a sweet-acid flavour, but the texture of the fruit at maturity is rather softer than Cavendish. Similarly, in Costa Rica a local company has been established to export FHIA hybrids as organic bananas. The first shipments to the USA and Holland were well received by consumers.

The potential impact that new *Musa* hybrids may have on banana and plantain production in the future is already evident in Cuba. By the end of 1999 at least 10 000 hectares had been planted with a number of different FHIA hybrids (FHIA-01, FHIA-02, FHIA-03, FHIA-18 and SH-3460). This represents over 12% of the total banana production area. These resistant cultivars are increasingly replacing susceptible banana and plantain clones on the island.

In another initiative, within the framework of a Belgium/Tanzania bilateral project, a number of FHIA hybrids, together with other varieties, are being introduced into the Kagera region of Tanzania. The first plants arrived in 1994 and they are proving to be well appreciated by local farmers. These varieties are grown without pesticides and with only the addition of minimal amounts of organic fertilizer. The first of the FHIA varieties have already been renamed in Swahili - FHIA-01: Goldi (gold), FHIA-02: Mbonwa (good to be seen) and FHIA-03: Bahati (fortune). Multiplication in the field and distribution in the Kagera region is carried out by various different players, including eight non-governmental organizations (NGOs) and the Ministry of Agriculture.

In an effort to enhance the flow of germplasm from breeding programmes to national programmes, INIBAP established the International *Musa* Testing Programme (IMTP) in 1991. This programme provides breeding programmes with worldwide screening sites with a wide range of environmental and disease pressures, while at the same time allowing national programmes early access to improved germplasm. In the recently completed second phase of the programme, improved varieties from four breeding programmes were evaluated in 37 sites worldwide. Results showed that the FHIA-hybrids performed well over a wide range of sites, with FHIA-23, a dessert banana variety, giving the best performance against black Sigatoka (Orjeda *et al.* 1999).

A third phase of IMTP is now starting and an increasing number of breeding programmes are contributing new and promising pest/disease-resistant germplasm for evaluation.

INIBAP's International *Musa* Testing Programme, which now operates within the framework of PRO*MUSA*, also adopts a networking approach for the evaluation of germplasm. In this programme, NARS partners use a common evaluation format developed through a participative process to evaluate germplasm provided by a number of *Musa* breeding programmes. Improved material as well as potential breeding parents may be evaluated within this programme. The multilocational nature of the programme allows genotype ¥ environment effects to be studied in improved varieties. The inclusion

of an evaluation mechanism in PRO*MUSA* also provides the necessary opportunity for the feedback of information to the breeding programmes.

Prospects for future

Although the number of banana breeding programmes in existence today remains small, these programmes do now have excellent diploid parents for future breeding activities. This means that there is good potential for the supply of superior hybrid varieties to continue and even increase in the future.

Market studies indicate that the organic sector is steadily growing and within this context, the prospects for organic bananas are good. However, it is also clear that new approaches are needed where black Sigatoka is present. The organic production of Cavendish is very difficult under a high pressure of black Sigatoka disease. It is therefore strongly recommend that non-Cavendish varieties be considered for organic production systems. New varieties with good potential for organic production already exist, and more will become available in the future.

The introduction of new varieties requires postharvest and marketing studies, and these should be initiated as soon as possible. Equally important are channels for information exchange between producers on the one side and importers and retailers on the other side. Innovative mechanisms need to be developed to ensure good communication flows between all the stakeholders involved in organic banana production and marketing.

Ultimately we believe that the success of organic bananas will depend on the availability of good varieties. Breeding programmes must produce high-yielding, disease- and pest-resistant varieties with highly acceptable consumer qualities. The potential is there for them to do this, but greater investment in banana breeding is needed to ensure that this potential is realized.

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Scope for organic management of postharvest diseases and disorders of bananas[1]

John Orchard[2] and Ulrike Krauss[3]

The tables presented below summarize the differences between current practices and organic options for banana production, covering the areas of preharvest field factors (fertilizer/plant nutrition and diseases), postharvest factors (crown rot disease and dip treatments) and other field practices. Potential problems and research opportunities are highlighted fo each production stage.

Preharvest field factors

Fertilizer / plant nutrition

Current practice	**Organic options**
Synthetic fertilizers	• Composted manures:
	• Animal / Household sources (80/t/ha/yr)
	• Mined, mineral fertilizers
	• Green manures
Organic options - Potential problems	**Research opportunities**
Adequate supply	Sources, quality and cost of organic manures
Reduced nutrient supply:	Optimum organic and mineral fertilizer combinations
• Thin, fragile fruit (low K)	
• Increased/decreased maturation (nitrogen)	Cultivar/agronomy/fertilizer interaction
• Reduced firmness/split peel (low calcium)	
• Low yields	
	Role of green manures
Root damage from incorporation	

[1] Based on overheads presented at the workshop

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(Preharvest field factors, cont.)

Diseases - yellow and black Sigatoka

Normal control	Organic options
Good field sanitary practices (removal of infected material, good drainage)	Field sanitary practices Early harvesting Copper formulations and elemental sulphur are permitted in the US Mineral oils in EU (expires 31/02/2002)
Fungicides	Biological control (bacteria) Disease resistance (FHIA, IITA)

Problems if not controlled	Research opportunities
Reduced yield	Early harvesting/bunch care techniques (e.g. dehanding) Lower plant density/intercropping
Premature ripening and 'ship-ripe'	Resistant cultivars/postharvest handling and market potential Biological control Integrated pest management systems Eradication programme protocols to prevent spread

Post-harvest factors

Crown rot disease

Normal practice	Organic options	Research opportunities
Fungicide control (e.g. benlate)	Good field and packhouse sanitation practices to reduce inoculum	Need for methods to clean cutting tools - restricted use of chlorine solutions limit 4 ppm
	Efficient dehanding and trimming with clean sharp knives	Cl_2
	Use of citric juice or wax on cut end	Natural substances for crown coating
	Modified or controlled atmosphere packaging	Biocontrol agents
	Biocontrol agents	Organic fungicides (Citrex)

(Post-harvest field factors, cont.)

Dip treatments			
Practice	**Normal methods**	**Organic option**	**Research opportunities**
Latex stain control	Alum water tanks	Alum permissible until 3/03/2002	Efficient use of water
			Water disposal systems
		Natural latex drainage e.g. clustering in the field	

Other field practices

Current practice	Normal control	Organic options	Research opportunities
Weed control	Manual Herbicides	Manual Propane/electric burners (<0.5 ha per day) (cost?)	Efficient, low damage and cost effective methods
Nematode control	Synthetic nematicides	Biological control Organic nematicides Good weed control/ sanitation practices	Improved control through antagonistic pests and agronomic practices
Sleeving, propping and tagging	Impregnated sleeves Ordinary twine	Non-coated sleeves and twine	Permitted natural substances and repellents Recycling of materials Biodegradable plastics (costs?)

Methods for disseminating organic methodologies amongst smallholder farmers

Stephanie Williamson, Janny Vos and Jeff Waage[1]

Introduction

The move from conventional to organic production for bananas as for other crops involves substantial change in crop production methods. Classically, a major feature of that change from conventional to organic is the exclusion of synthetic compounded fertilizers, pesticides, plant growth regulators, and consequent greater reliance on crop rotation and intercropping, composting, use of animal manures and plant residues, and biological methods for pest and disease control. Another perspective on organic production is not to focus on inputs and their replacement, but on the concept of the farm as an organism, with its component parts of soil, microorganisms, insects, plants and other species interacting, providing the opportunity to manage this ecological and biological process towards a target of production.

Whichever perspective we take on organic farming, it is clear that the knowledge required for organic production is generally more intensive and more "local" than for conventional farming. It involves the understanding and management of ecological processes in a particular farmer's field and it relies much more than chemical-based farming on local, farm-derived, renewable resources.

Conventional models for transferring new methodologies to smallholder farmers in tropical crop production have focused on extension of products, messages or technology packages. Most of this technology transfer is undertaken by government extension services or agrochemical companies. In this process, the farmer has usually been considered the passive recipient of external technologies, which he or she is expected to implement. This conventional extension model usually does not consider local processes or variation, messages are intended to be relevant over large areas. For this reason they are simple, for instance "use pesticide X on schedule Y or when pest Z reaches a certain level". Although this remains the principal means of extending new methodologies to farmers, this extension model has not worked well in conventional, input-based agricultural systems and, for reasons given above, is not at all appropriate for organic production systems.

[1] CABI Bioscience, United Kingdom

Farmers often ignore conventional extension messages because these are inappropriate to their local situation. This form of extension often does not increase the farmer's understanding of the crop system or capacity to make decisions beyond following simple instructions. Thus, if what is to be measured cannot be measured, or if the product to be used is not available, then no action can be taken. In such systems, there is also a high risk that external interventions may be so inappropriate to the local situation that they cause even greater problems. The history of banana pest management in tropical America provides some of the classical examples of the failure of this top-down process that ignores the local condition of the farm and farmer, e.g. the outbreaks of insect pests in bananas in Central America several decades ago following aerial insecticide application campaigns.

In bananas and other crops, problems like this have been a stimulus to the development of organic and integrated production systems. They have also stimulated new approaches to the extension of new methodologies based on what we will call for simplicity the "farmer-participatory approach".

In this talk, we would like to tackle the subject of disseminating organic production methodologies for smallholders by considering this recent development of farmer-participatory approaches. In the absence of much experience with extension in organic production on bananas, farmer-participatory systems provides us with an insight into how organic methodologies might be disseminated in a way which satisfies their need to be locally relevant, knowledge-intensive and ecologically-based.

Farmer-participatory approaches

In a farmer-participatory approach, farmers are engaged in problem diagnosis in their specific crop systems, followed by planning, testing and evaluation of farming practice options and strategies in collaboration with research and extension agencies in both public and private sectors. A key element of this approach is a training process whereby farmers gain an ecological understanding of crop production through "learning by doing" and experimentation.

In a pictorial approach, we might depict conventional extension as a one-way flow of information from researcher (R), to extensionist (E) to farmer (F) (Figure 1).

To give an example of how such a farmer-participatory approach can be developed and the effect it has on smallholder systems, we will refer to an IPM (Integrated Pest Management) programme in coffee-vegetable systems in Africa (Loevinsohn *et al.* 1998). We have chosen this because it is well analyzed and has elements of organic production, tree crops and disease management, all relevant to banana systems in tropical America.

Smallholders in the central highlands of East Africa grow cash crops such as coffee in mixed cropping systems with vegetables and increasingly apply pesticides on a calendar basis. The cost of agrochemicals absorbs a large proportion of farmers' income and sometimes pesticides destined for coffee are diverted onto vegetables and other food crops, for which they are not recommended and may pose risks to human health. Many small-scale farmers in these areas have virtually abandoned their coffee bushes due to low coffee prices and the rise in pesticide costs. Although alternative pest and disease control options exist,

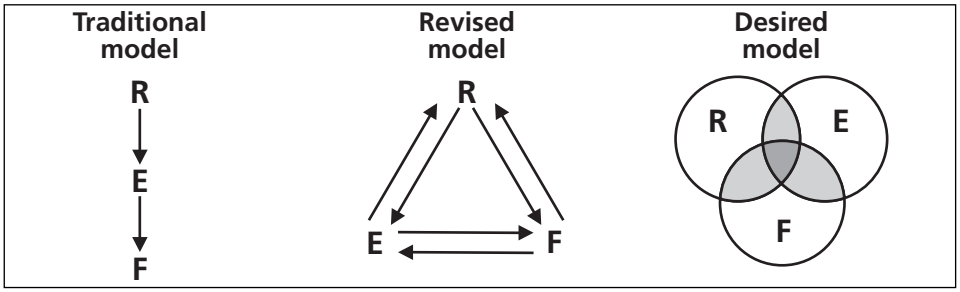

Figure 1. (from Vos 2000). Farmer participation recognizes that information flows in all directions, and research and extension benefit from a farmer's input on his or her local situation, as shown in the revised model. However, the desired farmer-participatory systems involves a true overlap of roles, as in the final model. Farmers, researchers and extensionists have their own activities, but share activities, such as collaborative research and farmer-assisted extension.

there is very little readily available information on Integrated Pest Management (IPM) and integrated crop management (ICM) which reaches this group of farmers, while many of the non-governmental organizations (NGOs) promoting organic farming focus on kitchen gardens and subsistence crops only.

The approach used to disseminate methods of pest and soil management was the farmer field school (FFS). Each farmer field school consisted of about 25 farmers from a village who agreed to a programme of season-long training, meeting monthly to weekly for facilitated exercises. Facilitators were farmer training experts from CABI, scientists from a local coffee research institution, and organic farming specialists from a local NGO. They organized a season-long training of trainers programme for extensionists who then were the support teams for the farmer field schools.

Regular field schools involved three principal activities. Agroecosystem analysis involved farmers in discovering the phenology of their crop and the pest and diseases which affect it, and helped them to develop skills at observing crops and interpreting their growth and health. On a regular basis, they recorded and shared these observations in groups. Group dynamic exercises, often games or role playing, helped farmers to 'own' technical ideas, such as predator and prey relationships, and created group cohesion. Finally, farmers developed experiments to evaluate in their own fields different new methodologies from outside, as well as existing and indigenous methods for crop production and protection.

Decisions about experimentation were made by farmers groups, based on their needs, and also on the methods which were important to them. During and following the season-long FFS training, an analysis of the impact of training was made with the help of local socioeconomists and specialists from International Service for National Agricultural Research (ISNAR).

From this analysis, we pull out a few points of particular relevance to the issue of organic production.

Farmers, through their own efforts, gained a strong degree of agroecological literacy. Participatory exercises gave them an understanding of biological and ecological

processes, including life histories and transmission of disease (which helped them to improve their phytosanitary practices), crop compensation for damage, phenology of the crop and its pests, to better time interventions.

Farmers gained considerable direct benefits from training. FFS farmers harvested 1.05 kg/tree coffee (average 500 trees/farm of 2-4 ha) while non-FFS farmers harvested 0.43 kg/tree. FFS farmers also reduced production costs, relying less on purchased inputs and preventative application and more on monitoring crops and making efficient use of local sources of compost, manure and botanical pesticides. At least some farmers have also reduced their reliance on hired labour, for instance by doing their own pruning of coffee. Cash savings from these changed practices amount to KSh (Kenyan shillings) 8600/yr ($145/yr) per household in conservative estimates. FFS farmers saved an average of 1052 KSh per household in agrochemical inputs on kales and cabbages and 4803 KSh in coffee. While some of the IPM and organic methods, such as compost-making, were more labour-intensive than agrochemicals, most FFS farmers were convinced of the net benefits.

There was a substantial farmer-to-farmer dissemination of new methodologies. The evaluation by ISNAR 18 months after the finish of the pilot FFS indicated considerable spontaneous diffusion of IPM concepts and practices to other farmers, either relatives, friends or neighbours. On average, FFS farmers interviewed had shared their learning with four other farmers, who in turn implemented one or two of the ideas and methods passed on from their FFS farmer contact.

Finally, and most importantly, farmers became active innovators and experimenters. In the year following training, FFS farmers proved to be more innovative in developing new ideas and methods than non-FFS farmers. Facilitators from the coffee research institute, who were initially unwilling to work with farmers because they were not following national guidelines on coffee production, e.g. by intercropping, soon gained respect and ultimately enthusiasm for the participatory approach, because trained farmers were willing and interested to test disease-resistant germplasm which the institute had previously failed to encourage farmers to take up.

Following the FFS period, farmers and researchers continued to experiment together. A group of organic tomato farmers developed a joint research activity to look at seedbed improvement, testing pesticides, burning of crop residues, and local botanical preparations and milk for disease and insect suppression. Some local preparations proved as effective and less expensive than pesticides, and their adoption reduced production costs for farmers.

Relevance to banana production

Results like these are typical of FFS programmes in a range of crops such as vegetables, rice and cotton, but application of this method to tree crops has been limited. FFS approaches are but one of a range of participatory methods. Others include Local Agricultural Research Committees (CIALs) and the *Campesino a Campesino* programme based, like the FFS approach, on the common principles of discovery-learning, group experimentation and community action. For instance, CIAL farmer members in Latin America are conducting location-specific research on agronomic and natural resource

management problems in maize, beans and potato, with an emphasis on appropriate varieties and management practices. In the area of soil fertility and conservation, discovery-learning and group study tools are used in Zimbabwe and Australia to help farmers understand soil biophysics and the causes and effects of erosion.

We are only aware of the limited application of participatory methods in banana production to date. In Ghana, the FFS approach is being applied in plantains as part of a larger cocoa and vegetable production system. Farmers there undertake agroecosystem analysis and place particular focus on methods to improve nursery production. They also conduct experiments comparing their own practices for control of black Sigatoka, nematodes and banana weevil with new methods, which included trimming roots at planting and warm water treatment for control of nematodes and weevils, and pruning for control of Sigatoka.

Plaintain production has also been a component of the CATIE (*Centro Agronómico Tropical de Investigación y Enseñanza*) IPM programme in Nicaragua. This has involved seven groups of farmers, 60 in all, who meet with facilitators from government agencies and NGOs for training and decision-making at critical points during the production season. Farmers study the phenology of the crop and pests and experiment with the use of clean planting material to reduce nematodes and weevils, green manure for weed and fertility management, methods for measuring weevil populations and the fungus *Beauveria bassiana*, for weevil control.

Many elements of farmer-participatory training on other crops are directly applicable to bananas. For instance, the fungus *Beauveria* is important as a non-chemical control method for banana weevil in many Latin American countries. In coffee FFS systems, it is also used for control of coffee berry borer (CBB). Training curricula for coffee FFS farmers include the following activities to help farmers understand the biology and reproduction of *Beauveria*, which are easily adapted to banana systems:

- Paintbrush application of fungal spore solution in jam jars to show fungal infection on insects.
- Recognition of fungal infection in bored berries on trees.
- Disease transfer under humid conditions (insect zoos using plastic bags, infected berries and CBB adults).
- Best application times and methods (study UV degradation/fungicide and endosulphan compatibility/surfactants for water-based knapsack application)
- How to measure efficacy of a fungus application, field level sampling/assessment
- Viability testing of commercial products using paintbrush/leaf dip methods.

Back to organics

Let us now bring all this back to the issue of dissemination of new methodologies for organic banana production. Farmer-participatory methods have already had some application in organic production systems in Latin America, for instance with coffee. The Colombian Organic Coffee-growers Association (ACOC) uses participatory methods in training families who wish to become members. The training is based around on-farm

workshops and demonstrations and each new family is assigned an experienced ACOC farmer as mentor during their first 1-2 years. Organic production practices are tested and adapted from various sources including formal research, advice from research organizations, like CENICAFE, and farmers' knowledge. ACOC's principles are, however, in line with discovery-learning in that they stress that "each farm is a world of its own" and each farmer has to find out what works best for her/his situation.

There is little qualitative difference between farmer-participatory methods for disseminating new methods for integrated crop or pest management and for organic production. Much of the technology is similar, e.g. biological, varietal and cultural control of pests and diseases, and use of composts and other natural fertilizers. IPM and ICM systems, however, have evolved as reactions to conventional production and protection gone wrong. Organic production systems are developed by design, rather than by default. There is the possibility, perhaps it should be called a risk, that organic systems are presented to farmers as technology packages in a top-down rather than a participatory manner. As such, they may face the same problems as conventional agriculture has with respect to local applicability and farmer uptake. Fortunately, the strongly ecological nature of organic farming places emphasis on understanding and managing local systems and finding local solutions to problems, for which a participatory approach is highly desirable, as we have seen.

Beyond its general applicability, the specific detail of farmer-participatory IPM models is relevant to organic production, in that it has developed discovery-learning curricula for understanding soil and pest ecology and alternatives to fertilizer and pesticide use, including disease control, clean germplasm, the use of resistant varieties, intercropping and composting.

One feature of banana and other tropical cash crops is the diversity of production systems, which range from smallholders to large plantations. Are farmer-participatory methodologies for dissemination relevant only to smallholder systems? To answer this, consider that there are three players of importance in an organic production system, as in an IPM system: the farmer, the local expert and a technology provider. The local expert is critical, because of the need to develop production and protection systems based on local processes and local knowledge, and to adapt technology from the technology provider to the local conditions. For the smallholder system, in the absence of effective local extension services, the farmer-participatory approach has focused on making the farmer the local expert, as there is no one else.

Where cooperatives exist and production is still local, the task of a local expert might fall to a specialist who makes decisions for a number of farmers in the cooperative and accesses the technologies required from outside and from the farming community. At a large plantation level, then that role may still be played by a specialist crop protection officer, who works with labourers to implement decisions based, again, on a good knowledge of the local situation.

As we have seen, farmer-participatory systems are well established in parts of Latin America on coffee and a few other crops. In the Caribbean, there is a long tradition of non-chemical control of pests, but not of farmer-participatory IPM. However, the recent establishment of CIPMNET (regional network for IPM) under PROCICARIBE (the Caribbean Agricultural Science and Technology Network System), and a regional

workshop on farmer-participatory IPM being organized in 2000 by CABI, will begin to build a capacity in this area which can benefit organic banana production in the future.

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Annexes

Annex 1

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Annex 2

List of acronyms and abbreviations

AIBGA	All Banana Growers Association (Windward Islands)
BECO	Banana Export Company (Jamaica)
BLS	black leaf streak
BS	black Sigatoka
CABI	Commonwealth Agricultural Bureau International (UK)
CARDI	Caribbean Agricultural Research and Development Institute (Barbados)
CEDAF	Centro para el Desarrollo Agropecuario y Forestal (Dominican Republic)
CIDA	Canadian International Development Agency
CIRAD	Centre de coopération internationale en recherche agronomique pour le développement (France)
COSUDE	Cooperación Suiza para el Desarrollo
CTA	Technical Centre for Rural and Agricultural Co-operation (The Netherlands)
DBMC	Dominica Banana Marketing Corporation
EU	European Union
FAO	Food and Agriculture Organization of the United Nations (Italy)
FFS	farmers field schools
FHIA	Fundación Hondureña de Investigación Agrícola
FTO	Fair Trade Organization
GBCS	Grenada Banana Cooperative Society
GDP	gross domestic product
GMO	genetically modified organism
GTZ	German Agency for Technical Cooperation
HACCP	hazard analysis and critical control point
HELVETAS	Swiss Association for International Cooperation
IFOAM	International Federation of Organic Agriculture Movements
IICA	Instituto Interamericano de Cooperación para la Agricultura (Costa Rica)
IPM	integrated pest management
MAELA	Movimiento Agroecológico de América Latina y el Caribe
MAP	modified atmosphere packing

MRLS	maximum residue levels
NGO	Non-Governmental Organization
OCIA	Organic Crop Improvement Association
OECS	Organization of the Eastern Caribbean States
PUWS	percentage unit within specification
SIDA	Swedish International Development Cooperation Agency
SLBC	St Lucia Banana Corporation
SPC	statistical process control
SPS	sanitary and phytosanitary (regulations)
SVGA	St Vincent Banana Growers' Association
TQFC	Tropical Quality Fruit Company (St Lucia)
USAID	United States Agency for International Development
VAM	Vesicular-arbuscular-mycorrhizal (fungi)
WIBDECO	Windward Island Banana Development and Exporting Company
WINBAN	Windward Islands Banana Growers' Association
WOSC	World Organic Supermarkets Club
WTO	World Trade Organization