

**REPORT OF THE WORKSHOP ON ALTERNATIVE USES OF BANANA  
AND BANANA PRODUCTS  
16-18 APRIL 1997,  
RAINBOW HOTEL, RODNEY BAY,  
SAINT LUCIA**

The workshop on “Alternative uses of banana and banana products” was held at the Rainbow Hotel in Saint Lucia from 16-18 April 1997 under the auspices of the Caribbean Community (CARICOM) Secretariat, the Technical Cooperation among Developing Countries (TCDC) Unit on the United Nations Development Programme (UNDP) and the Caribbean Council for Science and Technology (CCST).

Opening session

1. Ms. Olive St. Ville, Marketing Specialist of the Ministry of Agriculture, Lands, Fisheries and Forestry, St. Lucia, welcomed the local and regional participants, and the presenters and institutions, to the workshop. She said that it was a pleasure to have persons from as far as the United Kingdom and Israel taking part in such a workshop. Ms. St. Ville expressed her hope that the workshop would produce an output that was relevant to the Caribbean in its effort to overcome the problems facing the banana industry.

2. Mr. Donatus St. Aimee, Secretary of the CCST, said that it gave a sense of satisfaction to have put such a project together. He highlighted that the new component of the workshop was to go beyond discussions based on agro-processing, and instead focus on some aspects of industrial development for the banana plant. He also stated that the workshop would give the relevant stakeholders an opportunity to interact with persons who have already established businesses, and persons who have been doing a great amount of research on new products.

3. Mr. St. Aimee stated that the workshop was aimed at finding ways of increasing the level of earnings and provided an opportunity for alternative activities and crops for the banana industry. He stated that while developing the industry, employment would be generated especially for farmers who had to start moving away from the fresh fruit market. In addition, the workshop was intended to develop an integrated industry that would reduce the cost of production and increase the level of income of those involved in production processes.

4. He concluded by saying that he expected the three-day workshop to: (a) begin a process of developing partnerships; (b) put in place a long term programme; (c) create an impact on the economies of the Caribbean islands; and (d) create a new framework for the development of the banana industry.

5. Mr. Cletus Springer, Permanent Secretary of the Ministry of Planning, Saint Lucia, made a few opening remarks. He apologized for the absence of the Minister of Agriculture. He welcomed everyone present at the workshop to Saint Lucia, and stated that the geographic spread of the participants reflected the cognizance of global integration and the need to look to the future. He went on to say that the generosity of the European Market and the changes in the domestic and industrial economy, forced the Caribbean countries to use their natural environment and resources for development.

6. He stated that the banana fruit must be of a good quality for the export market, and that farmers needed to develop new markets for the fruit and to put in place the necessary structure for these markets. He urged participants to see the banana not only as a resource but instead as a marketing resource, and also encouraged institutions to work closely with the small enterprises to develop the economies of the Caribbean islands. He went on to say that technology was an important factor in establishing new markets for the banana products in a sustainable manner and therefore should be looked at critically.

7. Mr. Springer recommended that focus should be placed on options for the diversification of the banana industry, financing mechanisms, training of entrepreneurs and developing marketing strategies. He expressed his confidence that the workshop could undertake these challenges in a sustainable way, and thanked the participants and the experts for their willingness to share their knowledge and expertise with other members of the banana industry.

8. Mr. John Kissoon of the CARICOM Secretariat commended the CCST for mobilizing a workshop that was important to the economic history of the region and, in particular, to the banana industry. He pointed out that the workshop was a vital undertaking, as efforts were continuously being made to ensure the well-being of the banana producers and associated ancillary service providers.

9. He recommended three pillars of defense against the problems presently facing the banana industry: the need for continued lobbying efforts against the erosion of support

from the European banana regime; increased international competitiveness; and diversification through alternative production and uses of bananas. He hoped that the workshop would facilitate an exchange of ideas, put forward discussions and propose solutions to create projects and programmes that would be beneficial to all.

10. Mrs. Jacinta Helene, Permanent Secretary of the Ministry of Trade and Industry, Saint Lucia, expressed her sincere thanks and appreciation for the efforts of the CCST for taking the initiative and manifesting a project of this sort. She pointed out that it was a very timely and necessary undertaking, and stated that due to the increasing competition in the global market, the Caribbean countries must learn to adapt to the economic and environmental changes that affected them tremendously.

#### Attendance

11. The participants included representatives of the banking sector, development corporations, research institutions, entrepreneurs and policy makers. Resource persons were chosen from Israel, the United Kingdom, Costa Rica, Guyana and Guadeloupe. Dr. Akio Mita, Executive President of the Society for Research and Information on Tropical Zones in Japan was unable to attend the workshop. However, he sent a copy of his presentation. The representative of the Caribbean Development Bank (CDB) was also unable to attend. A list of participants is given at Annex 1.

#### Presentations

12. Dr. Jehuda Orshan, Israel, focused his presentation on the processing of banana and banana products. Dr. Orshan suggested that the banana industry needed to identify activities that could be undertaken by the small farmers in the promotion of technology transfer, and the products that could be generated from the banana plant using the branch, stalks, stem and unused banana as the raw material. Alternatively, he suggested that the banana could be used as a raw material for starch and the stems and stalks could be utilized for animal feed either by itself or combined with another product.

13. Dr. Orshan highlighted several other products that could be developed from the banana fruit. Such products included banana flour, candied slices, fruit cocktail, chips, cereal and baby food. Dr. Orshan outlined a few conditions under which the banana fruit

and the banana products should be stored.

14. He recommended that several enterprises should be established to manufacture and market this new range of products that could be derived from the banana fruit and the banana plant. In addition, he suggested that there was a need to have continuous training and an upgrade of skills for this new generation of industrial workers. He also recommended that a research and development centre be established with a mandate to introduce new technological approaches to the industry.

15. Ms. Judith Ann Francis, Food Technologist at the Caribbean Industrial Research Institute (CARIRI), provided an overview of the agro-processing industries in the region. She recommended that in order for the food processing industry to develop, the availability and quality of fresh fruits must be increased. She stated that training must be provided at all levels and that the industry needed to identify new markets and focus its efforts on research and on the development of networks in the Caribbean.

16. Mr. Nicholas Sellito, Managing Director of Tropical Organic Produce (TOP) Limited, provided the participants with an insight into the steps he took before establishing a processing facility in Guyana. He observed that a similar operation could be established in the Organization of Eastern Caribbean States (OECS). He pointed out that the processing facility was used for the dehydration of tropical produce and, in particular, bananas. He said that they initially based the processing facility on the utilization of the waste stream from existing banana production and transitioning to organically grown produce.

17. Mr. Sellito stated that farmers should be encouraged to participate in such a project on an equity basis either through direct investment or through an association to ensure cooperation and guarantee a steady and adequate supply of raw material.

18. He pointed out that the transition of farm practices to organic agriculture would have many benefits, the most significant being the production of a more valuable commodity that would usually attract 20-30 per cent higher prices in the health food markets, after the product was certified as organically grown. He stressed that a major necessity in organic agriculture would be the production of natural fertilizers. He suggested that such production could be accomplished utilizing the waste stream of other industries such as fish processing, sugar, coconut and animal waste. These activities would create other business opportunities that would spin off related industries creating employment, while supplying the organic farms.

19. Mr. Sellito stated that it would be necessary to create “Model” organic farms that would provide hands on teaching environments where farmers could probably participate and help develop appropriate methods to suit local conditions in the transition to organic agriculture. He also stated that these farms could also assist in training local agricultural students in the latest organic farming techniques. Mr. Sellito indicated the willingness of TOP to provide the expertise and technology in establishing a production facility that would use the latest dehydration technology to produce high quality products in the most cost effective manner.

20. Ms. Lila Ram, Production Manager of TOP, provided an overview of the market trends and potential for organic agriculture and the organic industry. She stated that organic agriculture sought to reverse the petrochemical-based agribusiness that has disrupted the delicate balance of nature by causing pest infestations and the depletion of top soil.

21. Ms. Ram outlined the four basic principles of organic horticulture. She stated that organic horticulture used the nitrogen cycle as the main source of crop growing energy and it recovered and used the farm, fishery and municipal waste as fertilizers and soil enhancers. She stated that such methods provided complete, balanced nutrition to the plants and crops and employed nutritional non-toxic pest control strategies that did not pollute land, water or foods. Ms. Ram highlighted the obvious benefits to the farmers as an eventual reduction in the cost of operation due to the higher yields. The diversification into other cash crops would remove some of the vagaries found in the single crop dependence while reducing the use of expensive and potentially harmful chemicals on the land. Other benefits included the manufacture of natural fertilizers and pesticides which presented an excellent opportunity for micro-enterprise development.

22. Ms. Ram went on to say that there has been a widespread acceptance of organically grown fruit in the mainstream sector as people had become more health conscious and had become more aware of health problems and nutrient deficient foods caused by chemical intensive agriculture. It was estimated that the market for organic products increased at an annual rate of 20 per cent. She concluded by saying that the development of alternative uses of banana and banana products should begin by utilizing organic agricultural practices.

23. Dr. R. J. Rickson focused on the potential of the banana plant products in the

manufacture and application of geotextiles. She pointed out that geotextiles could be used for filtration, separation, drainage, soil reinforcement, soil erosion control and vegetation management. She noted that the banana plant mat could have a very high potential for erosion control, vegetation management and the protection of water courses and banks. The banana plant produced fibres with a high tensile strength that were thick, long, durable and drapable. These properties of the banana fibres fit the requirement of an effective soil erosion control mat. She noted that a low fibre content, labour intensive and costly procedures for fibre extraction and the presence of diseases and pests might cause as few problems when using the banana plant products.

24. Dr. Rickson pointed out that in 1990, 15.8 million m<sup>2</sup> of erosion control geotextiles were used in the United States alone, 80-85 per cent of this amount comprised natural products (12.6 million m<sup>2</sup>). There was a similar demand for silt fences. In 1990 the erosion control market in the United States was using twenty-five million m<sup>2</sup> of natural geotextiles that was half the global market. At that time growth in the industry was estimated at 15 per cent annually.

25. Dr. Rickson stated that the potential end users of the geotextiles might be public works departments, transport and highway authorities, civil engineering contractors, public utilities, national park authorities, recreational planners, agricultural services, forestry services and environmental conservationists. She concluded by stating that the banana plant products had some potential in the manufacture of geotextiles for erosion control and vegetation management. Therefore, value might be added to the banana plant products as the supply and demand for geotextiles had yet to reach their full potential.

26. Dr. Atul Wad of the Institute for International Entrepreneurship focused on the issues, opportunities and obstacles for the economic diversification in the Caribbean. He suggested that the problem in the Caribbean was that most donor agencies were locked up in government bureaucracy and therefore private sector policy was critical to the development of the region. He recommended that there was a need for integration among all sectors of the banana industry.

27. Dr. Fred Lee of ENERGAZ (Renewable Energy and Gas) Ltd. presented a project for transforming and valorizing banana plant waste with the production of renewable energy and by-products. Dr. Lee stated that nature could provide the Caribbean islands with all its energy needs at a reasonable cost in a sustainable manner. He said that the avenue for sustainable development was to produce non-polluting energy and to valorize the waste generated. He stated that such a process would not only preserve the environment, but

also assist in the development of the economy of these islands.

28. He argued that the process of methanisation was best adapted to the island States where the costs of energy production using traditional methods (combustion fuels) were quite high. Biomethanisation was one source which was economically viable for islands that were poor in energy resources. Dr. Lee pointed out that the best solution for the islands to deal with waste generated was through methanisation or anaerobic fermentation. He stated that methanisation could be applied to most agricultural practices, biodegradable domestic waste, waste from purification stations and farm animals. He highlighted the fact that the cost of such a process was low and environmentally friendly. He pointed out that the prospects for enhancing the banana plant waste were quite interesting. Firstly, the process would increase production by using manure which enriched the soil, provided increased revenue and employment, while ensuring the continuity and development of banana cultivation. Additionally the substantial quantity of bio-gas generated could meet a significant portion of the islands' energy demand in an environmentally friendly manner.

29. Mr. Dimitrios Hondroulis of the FyBX Corporation, stated that due to the rising cost of technology and the dwindling of resources, the FyBX Corporation had adapted strategies for utilizing more effectively the by-products from several raw materials, including bananas. Initially, FyBX was focused on the manufacture of hand-made paper from the natural fibre. To date, the company had done a considerable amount of research on ways of efficiently extracting the natural fibre from bananas, a process which they were presently undertaking in Costa Rica. He stated that such an approach could be used to provide the Windward Islands with a marketing edge for the development of tourism. He pointed out that the project could also incorporate training to preserve the environment and encourage the establishment of cottage industries.

30. Mrs. Tracy Berquist of FyBX Environmental(FyBXE), informed the participants that the Atlanta-based company had developed a significant product for the use in the environmental marketplace. She said that using the fibrous material derived from the harvesting of tropical agricultural products, specifically bananas, FyBXE had developed a manufacturing method which provided a fibre with sorbent qualities comparable to those of synthetic and other natural sorbents currently available, through today's limited technology base.

31. Mrs Berquist said that the FyBXE's researchers had developed a manufacturing method which utilized the stalk, which was formerly considered a waste product, for the

production of an efficient and cost effective environmental sorbent. She also pointed out that for every ton of banana fibre used an estimated 17 trees were saved.

32. In addition, Mrs Berquist highlighted a number of benefits of the banana fibre products as an environmental sorbent. She stated that through the FyBXE Technology, the material could absorb up to 20 times its own weight in oil and petroleum products. Since the fibre could float indefinitely it made recovery of the oil from oil spills uncomplicated and inexpensive. In addition it was light-weight which made transportation inexpensive; it was biodegradable, flame resistant, cheap to produce and had both olephilic and hydrophobic characteristics.

33. Mrs. Berquist concluded that the use of this technology to create a natural fibre from a banana product that was being disposed as a waste material provided environmental benefits consistent with current government legislation, private sector protocols and public philosophy.

34. Mr. Dunstan Campbell, Lecturer at University of the West Indies (UWI), made a presentation on the Enterprise Support System (ESS) software which the Ministry of Agriculture was presently using in Saint Lucia to analyze the potential of projects. Mr. Campbell pointed out that such a system could be used for diversification programmes to analyze the success of the enterprises including the banana industry. He stated that the software had proven to have a very high capability in the region.

35. Mr. Campbell stated that the ESS was based on systems that supported enterprise design, strategic product planning and product development. He pointed out that these systems not only provided expert guidance, training and advice but most importantly it provided instant responses to enterprise managers and product developers on the assessment and enhancement of the success potential of their product plans. It provided information on the viability, acceptability and validity of new ideas. He highlighted the fact that the use of the software must be based on a team approach and that the quality of information given the system for analysis must be of the highest quality. In addition, he stated that the cost of the software right now was \$50,000.00 (US) however, businesses could access the software free of charge from the Small Enterprise Development Unit (SEDU) in Saint Lucia.

### Discussions

36. Some concerns were expressed about the types of agro-processing industries that should be set up in the Caribbean since the industries that existed in the larger countries might not be suitable models for the smaller islands.

37. It was pointed out that the programme of investment policy needed to be reviewed or approached differently as there were problems experienced in establishing small businesses, even though the appropriate technology and markets had been accessed.

38. The participants also expressed their concerns that the small islands had to deal with fluctuations in their supplies. In addition, they might have to acquire organic certification once they had made a transition to organic agriculture and take into consideration the cost of monitoring the environment.

39. The meeting suggested that there was a need for the islands to source appropriate technology and to avoid the duplication of services. In that regard, it was suggested that the CCST could serve as a focal point to the islands on technology matters.

40. The National Development Banks and several financial institutions informed the participants of the various financial services that could be provided to the banana industry, and the requirements that needed to be satisfied before a business could access the necessary funds.

41. It was pointed out that record-keeping was an important aspect of small business development and that small business operators should be trained to keep proper records for future decision-making, especially in identifying appropriate and efficient development strategies.

42. It was suggested that the competition that presently existed between commercial and development banks needed to be reduced if funds were to be made more accessible to small and medium-sized businesses and enterprises.

### Recommendations

43. The tourist industry should be targeted as a means of expanding the market of alternative banana products. In addition, the banana industry needed to readily develop new products from the excess fruit capacity and devise new methods to make the

industrialization processes more efficient.

44. A banana diversification programme aimed at fostering small and medium-sized enterprises should be created to assist in the development of new products and to encourage the transfer of new technologies.

45. Training should be provided to improve the technical capabilities, methods of quality control, marketing and financial strategies.

46. The need for methods or policies for the verification of the technologies should be included in the programme of alternative uses of banana. Such verification methods would assist lending institutions to make informed decisions and lending policies.

47. Governments should procure the service of the ESS for their small and medium sized enterprises.

48. The organizations of the Caribbean region needed to share their technological experience and knowledge with other businesses through the process of networking and the CCST should be designed to facilitate this function.

49. A private corporation should be set up to work for the region by pooling all the resources in the islands together, instead of the businesses in the region competing with each other in the same market. This initiative could start with the alternative uses of banana programme in the identification of technology and financing mobilisation.

50. The pharmaceutical and medicinal uses of bananas should be looked at in the programme of alternative use of bananas.

51. A venture capital and/or a trust fund should be established to promote entrepreneurship and small business development

52. Research and development work in alternative uses of bananas should be more focused and the technologies with the greatest potential adapted to suit local conditions.

#### Closing session

53. On behalf of the participants, Dr. Jean Dixon of Scientific Research Council (SRC) in Jamaica thanked the CCST for giving them the opportunity to refocus their ideas of the

banana industry and suggested that they consider this as the beginning of a new era for the banana industry. A number of other organizations including CARIRI and the Grenada Industrial Development Cooperation (GIDC) expressed their gratitude to the CCST for undertaking such a fruitful activity.

54. Mr. St. Aimee thanked all the resource persons, local and regional participants for attending the workshop and expressed his confidence that the workshop was beneficial to all and that the recommendations would be followed through.