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CARIBBEAN FOOD CROPS SOCIETY



FIRST ANNUAL MEETING
ST. CROIX, U. S. VIRGIN ISLANDS
OCTOBER 11, 1963

VOLUME I

PROCEEDINGS
of the
CARIBBEAN FOOD CROPS SOCIETY

FIRST ANNUAL MEETING
ST. CROIX, U. S. VIRGIN ISLANDS
OCTOBER 7-11, 1963

VOLUME I



Dr. Richard M. Bond, First President of the Caribbean Food Crops Society, and Officer in Charge, Virgin Islands Agricultural Program, Crops Research Division, Agricultural Research Service, United States Department of Agriculture.

OFFICERS

1962-63

President: RICHARD M. BOND,
Virgin Islands Agricultural Program,
United States Department of Agriculture,
Kingshill, St. Croix,
U. S. Virgin Islands.

Vice-President: F. APONTE APONTE,
University of Puerto Rico,
Agricultural Extension Service,
Rio Piedras, Puerto Rico.

Secretary: HUGH C. MILLER,
Caribbean Organization,
Hato Rey, Puerto Rico.

Treasurer: ARNOLD KROCHMAL,
Virgin Islands Agricultural Program,
United States Department of Agriculture,
Kingshill, St. Croix,
U. S. Virgin Islands.

Directors: H. AZZAM,
University of Puerto Rico,
Agricultural Experiment Station,
Rio Piedras, Puerto Rico.

A. deK FRAMPTON,
Chief Agricultural Officer,
Ministry of Agriculture,
Bridgetown, Barbados.

R. OSBORNE,
Banana Board,
Kingston,
Jamaica, W.I.

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1963-64

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Agricultural Extension Service,
University of Puerto Rico,
Rio Piedras, Puerto Rico.

R. OSBORNE,
Banana Board,
Kingston,
Jamaica, W. I.

JOHN PHILLIPS,
Director of Agriculture,
Department of Agriculture,
Plymouth, Montserrat,

CLAUDE PY,
Agriculturist - I. F. A. C. ,
Fort-de-France,
Martinique.

CHARLES HORTH,
Chairman of St. Croix Growers' Association,
Kingshill, St. Croix,
U. S. Virgin Islands.

CHAIRMAN OF COMMITTEES

1963-64

Finance	C. Horth
Plant Introduction	H. Azzam
Plant Pests	G. Stell
Economics and Sociology	P. Ruopp
Technical Assistance	A. Krochmal
Publicity	H.C. Miller
Programme	A. deK Frampton

NUMBER OF ACTIVE MEMBERS BY COUNTRY

1963-64

Antigua	1
Barbados	1
British Virgin Islands	2
Canada	1
Dominican Republic	1
Dominica	1
Haiti	2
Hawaii	1
Honduras	1
Jamaica	10
Martinique-Guadeloupe	2
Mexico	1
Montserrat	2
Puerto Rico	31
Surinam	1
Trinidad & Tobago	4
U.S. Virgin Islands	20
U.S.A.	<u>5</u>
Total	<u>87</u>

REPORT OF THE FIRST ANNUAL GENERAL MEETING
OF THE
CARIBBEAN FOOD CROPS SOCIETY
OCTOBER 7-11, 1963

The First Annual General Meeting of the Caribbean Food Crops Society was held at the Buccaneer Hotel near Christiansted, St. Croix, with 87 members in attendance, representing 11 countries. A large number of visitors also attended the opening session and participated in several of the sessions which were open to the public.

The Meeting was formally declared open by the President, Dr. R. Bond, after extending a warm welcome to members and visitors and to the Honorable Ralph Paiewonsky, Governor of the Virgin Islands of the United States.

The Governor, in his address of welcome to participants on behalf of the Government of the Virgin Islands of the United States and the people of St. Croix, emphasized the expectations which had been aroused by the establishment of the Society and indicated that the decision to hold the First Annual Meeting in St. Croix was most timely. The Island, at present, imported 90 per cent of its food requirements and costs of locally produced food tended to be unduly high. Both at the Federal and local level, strenuous efforts were being made both by way of research and education to alter this pattern and to develop production of food crops and livestock products on a more competitive basis. Water and soil conservation were two of the major problems of the Island and were being vigorously tackled both in St. Croix and in St. Thomas where a well-drilling project had recently proved very successful. Work at the Federal Experiment Station had recently indicated the possibility of developing production of avocados, papayas, pickling cucumbers, and other crops. To stimulate the recovery of the once important beef industry, a modern abattoir had been built. However, the Virgin Islands were fully appreciative of the benefits to be secured from exchange of ideas and experience and from cooperation in the Caribbean area. He had every confidence the Meeting of the Society would be most useful and productive and that the Society's efforts would result in considerable improvement of food crop production in the area.

The Meeting next proceeded to the presentation and discussion of a series of 18 papers which occupied the attention of members until 4.30 p. m. on the afternoon of Tuesday, October 8, 1963.

The Corneli prize of \$100.00 for award to the person whose paper was judged the best by vote of members was won by Dr. Abdul Rahman of the University of Puerto Rico, for his paper entitled "The Effect of Storage and Packaging on the Quality of Dehydrated and Dehydrofrozen Pigeon Peas"; the Caribbean Food Crops Society prize of \$25.00 for the paper judged to be the second best was awarded to George Jackson for his paper entitled "Promising Selection of the Honeyberry (Melicocca bijuga L.) from Puerto Rico".

The morning of Wednesday, October 9, was devoted to discussion on "Marketing Problems of Food Crops in the Caribbean" following introductory remarks by a panel led by Dr. Winn Finner, Deputy Director, Marketing Division, U. S. D. A., and including Dr. Abdul Rahman of the Food Technology Laboratory of the Agricultural Experiment Station of the University of Puerto Rico, and Mr. C. H. Rogers, Technical Officer (Trade and Tourism) of the Caribbean Organization.

During the afternoon of October 9, the Meeting discussed "Problems of Food Crops Production" following introductory statements by a panel of speakers as follows: A. G. Naylor, Plant Pathologist, Ministry of Agriculture, Jamaica; Mario Perez, Entomologist and Velez Fornillo, Plant Breeder, University of Puerto Rico; Patrick Haynes, Agronomist, University of the West Indies, Trinidad; and Panel Leader, Dr. G. Samuels, Agronomist, University of Puerto Rico.

Business Session

The business session of the Meeting was held on Tuesday, October 8, commencing at 8.30 p. m. It was voted to hold the next Annual Meeting in Barbados and the following meeting in Puerto Rico. Mr. A. deK Frampton was elected President and Mr. Hugh Miller, Vice-President for the ensuing year (1963-64).

The By-laws of the Society were approved with minor amendments and six members elected to serve on the Board of Directors as follows: Dr. H. Azzam, Mr. F. Aponte Aponte, Mr. R. Osborne, Mr. John Phillips, Mr. Claude Py, and Mr. C. Horth.

At a meeting of the Board of Directors held immediately following the business meeting, Dr. Arnold Krochmal was appointed Secretary/Treasurer, and at a later meeting, Mr. C. Horth, President of the St. Croix Growers' Association, was appointed Chairman of the Finance Committee of the Society.

The Annual Banquet

The Society's Annual Banquet was held at the Buccaneer Hotel on Wednesday, October 9, with the Premier of Barbados, the Honorable Errol Barrow, as guest speaker.

Dr. Bond, retiring President, addressed the gathering giving the history of the establishment of the Society and extolling the work and enthusiasm of Dr. Krochmal which were largely responsible for the success that had attended the growth and development of the Society. He then invited Mr. Barrow to address the gathering.

Mr. Hugh Miller, on behalf of the members of the Society, then made a presentation to the retiring President, Dr. Bond, "as a token of the appreciation of members of the valuable contributions he had made to the establishment of the Society and of the guidance he had given as President during the first five months of its life".

Dr. Hassan Azzam next presented to Dr. A. Krochmal a gift provided by the Society in token of his initiative and energy on behalf of the Society.

Before closing the proceedings, Dr. Bond proposed that in accordance with the provision of Article 2, Section 2 of the By-laws of the Society, honorary membership be conferred on the following:

The Honorable Ralph Paiewonsky, Governor of the Virgin Islands of the United States

The Honorable Errol Barrow, Premier of Barbados

Mr. Clovis Beauregard, Secretary-General of the Caribbean Organization

This proposal was seconded by Dr. A. Krochmal and approved unanimously.

SPEECH BY THE HONORABLE ERROL BARROW, PREMIER OF BARBADOS

Mr. President, your Excellency, your Honor, Members of the Caribbean Food Crops Society, Ladies and Gentlemen:

The island communities in which we live have been for centuries the traditional suppliers of primary products to the metropolitan powers of the world. Up to quite recent times the agricultural sector of our economies has been predominant in the export field, with an emphasis on the production of a single crop dictated by the demand and requirements of the importing countries. The result of this externally inspired demand has been, by and large, the dereliction of local production of food crops to such an extent that the importation of food into the area from the wealthy industrialized countries confronts the governments of most of these territories with serious balance of payments problems.

If I may be permitted to illustrate this point from our own experience in Barbados: During the year 1962 the total value of our exports was some \$42 million less than the amount which we had to pay to other countries for the goods and services which our population demanded from abroad.

Our imports of food alone amounted to some \$24 million, almost completely off-setting the amount which we earned from overseas sales of our sugar. The total area of land in Barbados is 106,240 acres. Of this 94,000 acres are assigned to agriculture, pasture land accounting for some 12,000 acres; and seven-eighths of the cultivated land is devoted to the planting of sugar cane. This leaves only one-eighth to the production of food crops and the necessary infrastructure of roads and building sites.

Last year our population was estimated at 242,000, or a density of over 1,400 persons per square mile. But a much more startling statistical deduction is that, with only some 5,000 acres allocated to food production, if by any "force majeure" our supplies of imported food were cut off, then forty-eight persons would have to share the production of each acre in the impact period.

There are three traditional methods of increasing agricultural production within the limits of a given geographical area. Firstly, by extending the acreage under cultivation; clearing wasteland; swamp and forest, or putting pasture land under the plough. Secondly, by intensifying land use by more scientific methods such as the use of fertilizers. Thirdly, by diversification of the agricultural sector of the economy, such diversification being not limited merely to the planting of food crops as a substitute to monoculture, but to include the establishment of dairy and fish farming, hydroponics and forestry, after a comprehensive survey to more accurately assess the best economic land use patterns for the community. All of these problems have been well known to you, gentlemen, in your capacities of agricultural experts, economic planners and advisers to governments in a Caribbean area comprised of countries which are becoming increasingly impatient of the tedious role of primary producers which they have been forced to play up to now.

A pattern of encouragement of manufacturing industries has been established throughout the area, whilst too little attention has been paid by governments to the satisfaction of the most basic of human wants by local food production.

Every politician in the area is vociferous in his insistence that his main objective is to improve nutritional and living standards for the masses of the people. This is usually inspired not by any great philosophical conviction but by simple recognition of an historical fact: that more revolutions are fomented by starvation than by any other circumstance.

Some governments in the area have even succeeded in raising living standards, chiefly by generous application of large doses of imported capital and, to a lesser degree, by increasing price support for their primary products under commodity agreements.

It is however true to state that these improvements in living standards have created further problems, since consumption patterns and consumer demands in the Caribbean area are to a large extent artificial and highly susceptible to press and radio advertising, so that the economic paradox is presented that the more the per capita income in these territories rises the more demand is stimulated for imported food products. Further, as the more the balance

of payments becomes unfavorable the more there is need for imported capital, the greater the proportion of gross national product that has to be exported for the payment of dividends and interest, and the smaller the amount left for new capital formation from internal sources.

It appears to me therefore, gentlemen, that the objectives of your Society and the studies upon which you have been engaged during the past three days are of more than passing or academic interest to the governments of our Caribbean territories. Since governments of emerging countries appear to be unduly suspicious of one another and since they regard other governments as being competitors for external aid, investment capital and industrial expansion, it is appropriate that the impetus for launching this new venture on the sea of regional cooperation should have come from a group of dedicated experts and selfless individuals who are in a position to see the basic problems confronting our countries unfettered by national bigotry, or considerations of political survival.

To see the problem is one thing; to get together with people of similar persuasion in search for solutions is also extremely laudable, and I daresay that many a scholarly contribution will be made to agricultural science and to the archives of universities as the result of your meetings and exchanges of ideas and viewpoints; but the translation of your ideas into specific programs is a harder task than retracing one's steps from the gates of hell to the upper air above.

It is axiomatic in technological societies that agricultural and economic sciences must be viewed with a great deal of suspicion by governments and vested mercantile interests alike. It is also endemic in our communities that people in your field of activity should have a high turnover rate, if you are not actually to contribute to the mortality rate by dying of frustration.

We have a saying in my country, Mr. President and gentlemen, that "while the grass is growing the horse is starving"; this is the reply which I usually get from people who come to my office looking for jobs and are told that the government is working on a plan for increasing overall employment but specific jobs cannot be created on an ad hoc basis.

The restatement for the basic problem has been made. The formation of your Society I hope will swiftly precipitate proposals for its solution.

The implementation of these proposals by the countries for whose benefit they will have been formulated can only come about if governments, farmers, distributors and consumers recognize that our economies are in a state of siege and that an emergency is not only likely to arise, but that the crisis already exists so that firm measures can be introduced, such as compulsory planting of food crops (which we already have in Barbados), measures, moreover, such as restriction and embargo on foreign food imports with correlated agricultural subsidies, where necessary, to keep down prices to the consumer, measures such as proper marketing arrangements and the creation of consumer tastes for local products by enlightened advertising and attractive packaging.

The introduction and, what is much more important, the universal acceptance of such seemingly drastic proposals will be greatly facilitated if the governments in the Caribbean become convinced of the urgency of their situation and the importance of the work of this Society and other similar organizations to the solution of our mutual problems.

Mr. President, Members of the Caribbean Food Crops Society, I can assure you that as far as the Government of Barbados is concerned you will be preaching to the already converted and it is in this spirit that we of the faith have invited you to "come over into Macedonia and help us" by holding your next annual meeting in Barbados in October next year.

That your members, Sir, have so readily accepted this invitation is to me a matter of personal satisfaction, as I am sure it will be to your new President, Mr. Dicky Frampton, the Chief Technical Officer in the Ministry of Agriculture of Barbados.

I feel confident that those of you who come to visit us will have just as much reason for celebration as my visit to St. Croix at your kind invitation has provided.

LIST OF PARTICIPANTS - FIRST ANNUAL MEETING
OCTOBER 7-11, 1963

<u>Name</u>	<u>Address</u>
Hassan Azzam	Plant Breeder, Agricultural Experiment Station, University of Puerto Rico, Rio Piedras, Puerto Rico
M. Apodaca	Grand Union Supermarket, San Juan, Puerto Rico
Carlos M. Aponte	Horticultural Specialist, Agricultural Extension Service, University of Puerto Rico, Rio Piedras, Puerto Rico
Francisco Aponte Aponte	Extension Horticulturist, Agricultural Extension Service, University of Puerto Rico, Rio Piedras, Puerto Rico
Dr. Richard M. Bond	Officer in Charge, Virgin Islands Agricultural Program, U. S. Department of Agriculture, Kingshill, St. Croix, U. S. V. I.
Harold D. Bowman	Inspector in Charge, Plant Quarantine Division, USDA Agricultural Research Service, P. O. Box 3386, San Juan, Puerto Rico
Peter Butland	Chemist, Butland Ind., 603 Evans Avenue, Toronto 14, Ontario, Canada
Carlos Costa	Agricultural Chemical Representative, The Shell Company, 206 Ponce de Leon, San Juan, Puerto Rico
Juan de dios Cubero	Agriculturist, Harvey Alumina, Kingshill, St. Croix, U. S. V. I.
Winston T. Donville	Agronomist, Ministry of Agriculture and Lands, Kingston 6, Jamaica, W. I.
C. J. L. Dupigny	Ridgefield Estate, Dominica, West Indies
Ivan Evans	Agricultural Officer, Department of Agriculture, Road Town, Tortola, British Virgin Islands
Winn F. Finner	Deputy Director, Marketing Economic Division, U. S. Department of Agriculture, Washington, D. C., U. S. A.
R. A. Foreman	Chairman, Agricultural Development Corporation, 83 Hanover Street, Kingston, Jamaica, W. I.
Jesus Velez Fortuna	Head, Plant Breeding Department, Agricultural Experiment Station, Rio Piedras, Puerto Rico
Axel Lambert Frederiksen	Horticulturist, Virgin Islands Agricultural Program, U. S. Department of Agriculture, Kingshill, St. Croix, U. S. V. I.
Enrique Tejera Gonzalez	Assistant Agronomist, Agricultural Experiment Station, Rio Piedras, Puerto Rico
Ernesto Hernandez	Horticulturist, Cisne 796 Dos Pinos, Rio Piedras, Puerto Rico

<u>Name</u>	<u>Address</u>
Charles Horth	P. O. Box 79, Kingshill, St. Croix, U. S. V. I.
Patrick H. Haynes	Lecturer in Crop Production, University of the West Indies, Imperial College of Tropical Agriculture, St. Augustine, Trinidad
James Isherwood	Christiansted, St. Croix, U. S. V. I.
George Jackson	Assistant Horticulturist, Fruit Experimental Sub-Station, P. O. Box 629, University of Puerto Rico, Fortuna, Puerto Rico
Dr. Arnold Krochmal	Horticulturist, Virgin Islands Agricultural Program, U. S. Department of Agriculture, Kingshill, St. Croix, U. S. V. I.
Franklin Margetson	Agriculturist, P. O. Box 78, St. John's, Antigua, W. I.
Mark Madsen	Christiansted, St. Croix, U. S. V. I.
Hugh C. Miller	Development Officer (Natural Resources), Caribbean Organization, 452 Avenida Ponce de Leon, Hato Rey, Puerto Rico
Dr. F. W. Morrissey	Charlotte Amalie, St. Thomas, U. S. V. I.
Mulleaux Antilles Box	Antilles Box Corporation, P. O. Box 544, Cataño, Puerto Rico
A. G. Naylor	Plant Protection Officer, Ministry of Agriculture and Lands, Hope, Kingston, Jamaica, W. I.
William Pennock	Horticulturist, Agricultural Experiment Station, University of Puerto Rico, Rio Piedras, Puerto Rico
Dr. Mario Perez	Entomologist, Agricultural Experiment Station, University of Puerto Rico, Rio Piedras, Puerto Rico
John C. Phillips	Director of Agriculture, Department of Agriculture, Plymouth, Montserrat, W. I.
Abdul Rahman	Associate Food Technologist, Food Technology Laboratory, Agricultural Experiment Station, P. O. Box 516, Rio Piedras, Puerto Rico
C. H. V. Rogers	Technical Officer (Trade and Tourism), Caribbean Organization, 452 Avenida Ponce de Leon, Hato Rey, Puerto Rico
J. Roman	Assistant Nematologist, Department of Entomology, Agricultural Experiment Station, University of Puerto Rico, Rio Piedras, Puerto Rico
Guy Rouanet	Institute of Research, Irat, Guadeloupe, F. W. I.
Angel L. Lopez Rubero	Agricultural Promotion Representative, Autoridad de Tierras de Puerto Rico, Santurce, Puerto Rico
L. Robera	Land Authority of Puerto Rico, San Juan, Puerto Rico

<u>Name</u>	<u>Address</u>
Dr. G. Samuels	University of Puerto Rico, Río Piedras, Puerto Rico
James A. Singmaster III	University of Puerto Rico, Río Piedras, Puerto Rico
Normand Smith	Estate Rataan, Christiansted, St. Croix, U. S. V. I.
Manuel Mejia-Valentin	C. Haeussler & Co., Inc., Agronomist, P. O. Box 1703, Hato Rey, Puerto Rico
Roberto Valentin	Caribbean Container Company, San Juan, Puerto Rico
Pablo Valdes	Dow Chemical Co., Puerto Rico
Ismael Velez	Professor of Botany, Inter American University, San Germán, Puerto Rico
H. E. Warmke	Officer in Charge, Federal Experiment Station, Mayagüez, Puerto Rico
A. C. White	Field Technical Specialist, California Chemical Company, Ortho Division, P. O. Box 7067, Orlando, Florida, U. S. A.
Roy Woodbury	Agricultural Experiment Station, University of Puerto Rico, Río Piedras, Puerto Rico
R. E. Osborne	Plant Breeder, Banana Breeding Research Scheme, Banana Board, Kingston, Jamaica

1963 SUSTAINING MEMBERS

1. Agricultural Development Corporation, Jamaica, W.I.
2. American Foundation, Cleveland, Ohio, U. S. A.
3. Dow Chemicals Inter American Limited
4. Grand Union Corporation
5. Shell Company of Puerto Rico
6. Harvey Alumina, St. Croix, U. S. V. I.
7. Rotary Club, St. Croix, U. S. V. I.
8. Caribbean Atlantic Airline of Puerto Rico

MEETING FOR ESTABLISHMENT OF A CARIBBEAN FOOD CROPS SOCIETY

Held in the Conference Room of the Central Secretariat of the Caribbean Organization, Hato Rey, Friday, May 3, 1963

The Meeting commenced at 10.00 a. m.

- PRESENT: Mr. Francisco Aponte Aponte, Horticultural Specialist, Agricultural Extension Service, University of Puerto Rico
- Mr. Miguel Gonzalez Flores, Horticultural Specialist, Agricultural Extension Service, University of Puerto Rico
- Mr. Carlos E. Aponte Moran, Horticultural Specialist, Agricultural Extension Service, University of Puerto Rico
- Mr. Jorge Mejia Mattei, Director, Bureau of Marketing Regulations, Department of Agriculture, Puerto Rico (Representing the Under Secretary of Agriculture)
- Dr. H. Azzam, Plant Breeder, Agricultural Experiment Station, University of Puerto Rico
- Mr. Carlos D. Costa, Agricultural Chemicals Representative, The Shell Co. (P. R.) Ltd.
- Mr. A. deK Frampton, Chief Agricultural Officer, Ministry of Agriculture, Barbados
- Dr. R. M. Bond, Officer in Charge, Federal Experiment Station, Kingshill, St. Croix, U. S. Virgin Islands
- Dr. A. Krochmal, Horticulturist, Federal Experiment Station, Kingshill, St. Croix, U. S. Virgin Islands
- Mr. C. F. Beauregard, Secretary-General, Caribbean Organization
- Mr. C. P. Erskine-Lindop, Chief Administrative Officer, Caribbean Organization
- Mr. G. C. L. Gordon, Development Officer (Social Affairs), Caribbean Organization
- Mr. A. J. Seymour, Development Officer (Culture & Information), Caribbean Organization.
- Mr. H. C. Miller, Development Officer (Natural Resources), Caribbean Organization

A preliminary meeting was held on March 7, 1963, attended by Mr. Francisco Aponte Aponte, Dr. A. Krochmal and Mr. Hugh Miller, to work out plans for the establishment of a Caribbean Food Crops Society.

The persons present were called upon to state their names and interests.

1. Election of Chairman of the Meeting

Dr. R. Bond was elected Chairman of the Meeting.

2. Approval of Agenda

The provisional agenda was approved.

3. Comments on the desirability of a Caribbean Food Crops Society

(a) The Chairman asked the Secretary-General of the Caribbean Organization for his comments in this regard.

The Secretary-General expressed intense interest in the objectives of the Society and promised firm support to its proposed activities. He said:

"The very fact that from the beginning we have shown our keen interest in your work, shows how my Organization is interested in seeing a Society like yours being established in this area. I wish you all the best of luck and every bit of success in your work this morning. I want to confirm that this Secretariat will be very pleased to do whatever we can to assist your Society".

(b) The Chairman stated that by their very presence members had indicated that they felt the establishment of the Society to be a desirable thing. He did not think it necessary to have an official set of favourable remarks which members should use in trying to convince others of the desirability of the Society. This was a problem for the individual members, having in mind the people whose interest and support they wish to enlist.

Mr. Miller read four communications expressing agreement with the idea of establishing a Caribbean Food Crops Society, from:

1. Mr. J. Velez Fortuño, Head, Plant Breeding Department, Agricultural Experiment Station, Puerto Rico
2. Mr. G. P. Tiggelman, Director of Agriculture, Surinam
3. Mr. R. E. Osborne, Plant Breeder, Banana Board Research Department, Jamaica
4. His Honour the Administrator of Montserrat

He stated that the communication addressed to Mr. H. Guyot, Director of IFAC, Guadeloupe, had failed to reach him before he had left the island on vacation.

Mr. Tiggelman's letter raised questions concerning items B(iii) and (vi) of the Notes of the Meeting of March 7, and also expressed the view that as membership dues and publications could not be expected to pay the cost of the Society, special efforts to secure contributions and grants would be necessary.

Mr. Osborne suggested the name "The Caribbean Food and Agriculture Society" as an alternative to "The Caribbean Food Crops Society".

An additional letter from His Honour the Administrator of Montserrat addressed to Dr. Krochmal was also read.

4. Constitution of the Society

a) Name of the Society

There was general agreement that the name "Caribbean Food Crops Society" was preferable since it is desirable, at least in the initial stages, to limit the scope of the Society. Should the Society become a popular organization with a great deal of financial and other support, the scope could be expanded at any time deemed necessary. It was further pointed out that the cultivation of food crops was a neglected activity in the area and that the Society should concentrate on remedying this situation.

It was AGREED that the name of the Society should be the CARIBBEAN FOOD CROPS SOCIETY.

b) Statement of Objectives

The meeting considered a document presented by Dr. Krochmal entitled "By-laws of the Caribbean Food Crops Society". This was patterned on the By-laws of the American Society for Horticultural Science.

It was AGREED that under Article 1, the word "Purposes" should be replaced by the word "Objectives". It was also AGREED to insert as (c) the following additional clause:

"assisting in the general dissemination of information on the production, processing and marketing of food crops in the Caribbean area".

With these and other minor amendments, the Statement of Objectives as proposed in the document was APPROVED.

c) Membership

It was AGREED that the dues of U. S. \$5.00 for Active Members and U. S. \$100.00 for Sustaining Members should be payable in other countries.

d) Meetings of Members

The period of notice of meetings was changed from 30 to 90 days. The meeting decided that a quorum for the annual meeting should be one-fifth of the membership or 20 members, whichever is the less.

It was felt that a policy of rotating the site of annual meetings among various countries of the Caribbean, and the use of grants to help defray the cost of attendance at meetings, would assist greatly to ensure satisfactory attendance at meetings of the Society.

Section 3 under this heading was further amended to read: "In case there shall be less than a quorum present at any meeting, officers and the Board of Directors may be elected by mail solicitation of membership". The legality of voting by mail when a quorum was not present at a meeting was questioned. The Chairman agreed to consult legal opinion on this point and the amendments to this section were accepted subject to this proviso.

e) Officers of the Society

It was decided that until the Society was in a position to employ someone full time to combine the duties of Secretary/Treasurer, these posts should be kept separate. As it would be necessary for the two persons appointed to be within easy contact one with the other, it was decided that officers for these posts should not be elected by the Society in general meeting, but should be chosen by the Board of Directors.

f) Board of Directors

Section 3. Powers. Sub-section (b) was amended to read: "to determine the scope and extent of the annual program of activities of the Society and to define and carry out its policies".

The Constitution as amended was APPROVED.

5. Activities of the Society

a) General

The meeting ACCEPTED the general statement of activities as presented in the approved By-laws attached.

b) Date and location of first annual meeting

Dr. R. Bond extended an invitation that the first annual meeting to be held subsequent to the establishment of the Society be held in St. Croix. He recommended that this invitation be accepted and pointed out:

1. That Harvey Aluminum had donated a cheque for U.S. \$1,000.00 to the Society to help to defray the cost of travel of members to St. Croix from other Caribbean islands
2. That preliminary enquiries made indicated that one of the best hotels in St. Croix was prepared to offer rooms at reasonable rates to persons attending a meeting of the Society in St. Croix provided the meeting was held in the fall of the year. The hotel was located near to an excellent beach and had a suitable meeting room which would be available to the Society

It was also suggested that consideration should be given to the advantage of holding the meeting in Puerto Rico since it would involve reduced travelling costs and assure a large attendance at the first regular annual meeting. However, it was pointed out that the reduction in cost would apply only to persons attending from Jamaica and Puerto Rico and that the Harvey Aluminum travel grant could be utilised to lighten any financial burdens created for members.

The meeting AGREED to accept the invitation extended by Dr. Bond and to hold the first regular annual meeting October 7-9, 1963, in St. Croix, U.S. Virgin Islands.

6. Registration of the Society

The Chairman suggested that the Society be registered in St. Croix. He pointed out that in St. Croix arrangements for registration of the Society would very speedily be completed thus making it possible for contributors to include in their claims for income tax rebates any donations made to the Society.

The meeting AGREED that the Society be registered in St. Croix.

7. Establishment of the Society

On a motion proposed by Mr. Miller, seconded by Dr. Krochmal and put by the Chairman, the persons present unanimously decided that: "The Caribbean Food Crops Society is hereby established with founding members those persons who have indicated in writing their willingness to join the Society, or have appended their signatures to a sheet of paper to be filed by the Secretary".

CONSTITUTION AND BY-LAWS OF THE CARIBBEAN FOOD CROPS SOCIETY

Section 1. Objectives: The objectives of the CARIBBEAN FOOD CROPS SOCIETY (hereafter called the Society*) are: to advance Caribbean food production and distribution in all their aspects to the end of improving levels of nutrition and standards of living in the Caribbean through:

- (a) facilitating exchange of material and of information on all aspects of food production, processing and marketing in the Caribbean area
- (b) stimulating the presentation of information available on food crop production, processing and marketing in the Caribbean area
- (c) assisting in the general dissemination of information on the production, processing and marketing of food crops in the Caribbean area
- (d) provide a regional consultant service on food crops for the Caribbean area
- (e) maintaining close contact with research problems and progress in the fields of food crop production, processing and marketing
- (f) working towards the coordination of research and development programs and the optimum use of the resources available in the Caribbean area and stimulating the development of joint projects of research or development where such projects can be of value to the region as a whole
- (g) cooperation with the Caribbean Organization and other organizations dedicated to the fostering of cooperation between the countries of the Caribbean area

ARTICLE 2

MEMBERSHIP

Section 1. Eligibility: Any person, corporation, partnership or unincorporated association in sympathy with the objects and purposes and cooperating with the aims of the Society shall be eligible for membership. There shall be no limit to the number of members.

Section 2. Classes of Members: Members shall be divided into classes as follows:

Active Membership shall be available to interested persons engaged in research, educational, regulatory, development, production or commercial activities associated with the production, processing or marketing of food crops

Honorary Membership may be awarded by the Board of Directors of the Society to any distinguished person who, in the opinion of the Board, has made an outstanding contribution to the development of improvement of food crop production in the Caribbean area

Sustaining Membership shall consist of individuals or organizations contributing to the support of the Society

Section 3. Annual Dues: The annual dues of the Active Members of the Society shall be five U. S. dollars or its equivalent. The annual dues of Sustaining Members of the Society shall be a minimum of one hundred U. S. dollars or its equivalent.

ARTICLE 3

MEETINGS OF MEMBERS

Section 1. Annual Meetings: The annual meeting of the Society for the election of a Board of Directors and officers and the transaction of such other business as may properly come before the meeting shall be held at such

time and place as may be voted by members at a previous annual meeting.

Section 2. Notice of Meetings: Notice of each annual meeting and each special meeting of members shall be given by mailing, not less than ninety days preceeding the date of the meeting, a notice thereof in writing addressed to each member at his last known address as shown in the books or records of the Society.

Section 3. Quorum: One-fifth of the membership of the Society, or 20 members, whichever is less, shall constitute a quorum for the transaction of business at an annual meeting. Officers of the Board of Directors may be elected by mail solicitation of the membership of the Society.

Section 4. Voting: Each member present shall be entitled to one vote on each question submitted to an annual or special meeting of members of the Society. All questions at all meetings at which a quorum is present shall be decided by a majority vote of members present, except as otherwise provided by law. A member shall not be entitled to vote by proxy.

ARTICLE 4 BOARD OF DIRECTORS

Section 1. Number and Qualifications: The Board of Directors shall consist of the retiring President (who shall be Chairman), the President, the Vice-President, the Secretary, the Treasurer or the Secretary/Treasurer and six elected members. Each elected member shall serve for a period of three years after which he will retire but be eligible for re-election. However, insofar as the members elected at the First Annual Meeting are concerned, two shall serve for a period of one year before retiring, two for a period of two years and two for a period of three years. All shall be eligible for re-election.

Section 2. Vacancies: Vacancies existing on the Board of Directors from whatever cause arising, may be filled for the unexpired term by vote of the remaining Directors.

Section 3. Powers: The Board is authorised:

- (a) to manage the property and affairs of the Society
- (b) to determine the scope and extent of the annual program of activities of the Society and to define and carry out its policies
- (c) to adopt such rules and regulations for the conduct of the meetings of the Board and of the members, and for the management of the affairs of the Society as the Board may deem proper and not inconsistent with the laws of the country in which the Society is registered
- (d) to accept contributions and subscriptions
- (e) to authorise the preparation and circulation of documents and the publication of articles
- (f) to audit bills, disburse the funds of the Society, establish one or more offices, purchase equipment and supplies
- (g) to elect, appoint and employ such officers, agents and employees or committees as the Board shall deem necessary or desirable, and to delegate such powers of the Board as may be lawfully delegated
- (h) to advise and cause to be carried into effect all measures which the Board may deem proper and expedient to promote the objects and purposes of the Society
- (i) to determine who shall be authorised to sign the Society's behalf notes, receipts, acceptances, endorsements, cheques, releases, contracts and documents

Section 4. Meetings of the Directors: The Board of Directors may meet without notice immediately after the annual meeting of members, provided a quorum be present. Special meetings of the Board of Directors may be held at any time at the call of the Chairman of the Board of Directors, the President or three members of the Board. Notice of any special meeting shall be given in such manner as may be determined by the Board from time to time, or in default of such determination, by causing at least five days' notice of the time and place of any such meeting to be given to all directors personally or by mail, telephone, telegraph, radio or cable. Regular meetings of the Board of Directors may be held without notice at such times and places as the Board may determine from time to time.

Section 5. Quorum: At any meeting of the Board of Directors three of the Directors then in office shall constitute a quorum, and the vote of a majority of the Directors present at any meeting at which a quorum is present shall be necessary for the transaction of any business. If there is less than a quorum present at any meeting, the meeting may be adjourned by those present. Notice of any adjourned meeting shall be given in the same manner as notice of the original meeting.

ARTICLE 5

OFFICERS

Section 1. Election of Officers: The members shall elect annually a President, and a Vice-President of the Society and after the first annual meeting, two directors to serve for a period of three years. These officers shall hold office for one year (except Directors) until their successors are elected and qualified. The Secretary and the Treasurer, or the Secretary/Treasurer shall be appointed by the Board of Directors for terms of one calendar year and shall be eligible for re-appointment. No member shall hold two elective offices concurrently.

Section 2. Chairman of the Board: The retiring President of the Society shall be Chairman of the Board of Directors. The Chairman shall preside at all meetings of the Board of Directors and shall perform such other duties and have such other powers as may be prescribed by the Board of Directors.

Section 3. President: The President shall be the chief executive officer of the Society and shall be ex officio a member of the Board of Directors. He shall have the general powers of supervision and management usually vested in his office, subject, however, to the right of the Board of Directors to delegate any specific power or powers to any other officer or officers of the Society. The President shall preside at meetings of the members and, in the absence of the Chairman of the Board of Directors, the President shall preside at the meetings of the Board. The President shall deliver an Address at the annual meeting of the members and shall perform such other duties and have such other powers as may be prescribed by the Board of Directors, any duly constituted committee, or the By-laws.

Section 4. Vice-President: The Vice-President shall assist the President in the discharge of such of the President's responsibilities in such manner and at such times as he may be requested to so assist the President. In the absence of the President, he shall preside at any meeting of the members and, in the absence of the Chairman and the President, he shall preside over meetings of the Board of Directors. When presiding at a meeting of members or of the Board of Directors, he shall have responsibilities and powers as would devolve upon the President had he been present.

Section 5. Treasurer: The Treasurer shall keep all financial records of the Society, collect dues from the members, conduct the financial affairs of the Society with the aid and advice of the Chairman of the Board of Directors, and shall work in close cooperation with the Secretary.

Section 6. Secretary: The Secretary shall have the responsibilities to record the proceedings at all meetings of members or of the Board of Directors or of Sub-Committees appointed by the Board of Directors, unless the Board shall direct otherwise, to send to members all papers and reports as directed by the President or the Board of Directors and to generally ensure implementation of the decisions of the Board of Directors.

CONTENTS

	<u>Page</u>
Frontispiece: Dr. Richard M. Bond, First President of the Caribbean Food Crops Society	2
Officers	3
Number of Active Members by Country	6
Report of the First Annual Meeting	7
Speech by the Honorable Errol Barrow, Premier of Barbados	9
1963 Sustaining Members	14
Meeting for Establishment of the Society	15
Constitution and By-laws	19
St. Croix Growers' Association, Charles Horth	24
Some Considerations of the Effect of the Physical Environment on Food Crop Research, P. H. Haynes (Abstract)	26
Pesticide Residue Problems, J. A. Singmaster III (Abstract)	27
Promising Selections of the Honeyberry (<u>Melicocca bijuga</u> L.) from Puerto Rico, George C. Jackson (Abstract)	28
Research of the Puerto Rico Agricultural Experiment Station in the Control of the Nematodes Associated with Pineapple decline, Jesse Roman (Abstract)	29
Marketing Problems of a Small Island, John Phillips	30
The Effect of Storage and Packaging on the Quality of Dehydrated and Dehydrofrozen Pigeon Peas, Abdul Rahman (Abstract)	32
The Plant Quarantine Story, H. D. Bowman	33
Pigeon Pea Pod Borer Control, M. E. Perez (Abstract)	34
Chemical Weed Control in Tropical Food Crops, L. Kasasian (Abstract)	35
Native Plants as a Source of Food and Genetical Germ Plasm, Roy Woodbury (Abstract)	37
Improving Tropical Food Crops by Plant Breeding, Harry Warmke (Abstract)	38
Water for Irrigation in the American Virgin Islands, R. F. Scott (Abstract)	39
Seedless Watermelon Production in Puerto Rico, Hassan Azzam (Abstract)	40
The Response of Seedless Watermelon to Fertilizers in Puerto Rico, Hassan Azzam and George Samuels (Abstract)	41
Sphaeropsis Knot Disease of Citrus in Jamaica, A. G. Naylor	42

	<u>Page</u>
The Propagation of Guavas from Stem Cuttings, W. Pennock and G. Maldonado (Abstract)	44
Magnesium: An Important Nutrient in Pineapple Production in Puerto Rico, E. Hernandez-Medina (Abstract)	46
Panel: Problems of Food Crop Marketing and Production (Summary)	47

ST. CROIX GROWERS' ASSOCIATION

by
Charles Horth¹

The St. Croix Growers' Association was organized in March 1963 with eighteen members and now, a few months later, we have fifty members. The purpose of the Association is to advance the common interest of its members in achieving better production of farm crops, particularly fruits and vegetables, and to examine and provide ways and means of obtaining for its members operating economies, such as the bulk purchase of farm requirements and the unit marketing of crops.

The organization of a Growers' Association on the island of St. Croix marks the first step in the activation of a program which had its beginning at the Federal Experiment Station at Kingshill, St. Croix, under the guidance of Dr. Richard Bond, Head of the Experiment Station, and Dr. Arnold Krochmal, Horticulturist.

Over a period of time, the program at the Experiment Station came to the attention of certain individual land owners and farmers on the island who were interested in cooperating in the development of such a program. Certain aspects of the program appeared at first blush to have very definite commercial possibilities - 'Solo' papaya, Winter avocado, pineapple, all appeared to hold much promise. Many vegetables also appeared to hold considerable promise, provided that large-scale production and distribution could be achieved so as to take advantage of the economies that are inherent in large-scale operations.

Virtually all of the individual growers who had become interested in the program were small operators with from five to perhaps twenty-five acres of land that could be put into a diversified program. Interest focused upon the organization of a production and marketing Co-operative as the ultimate solution to the joint problems of many small growers, none with any great experience in the marketing of fruits and vegetables under a Co-operative arrangement.

The first problem to confront the group, was whether they were far enough along to warrant the organization of a Co-operative now. Out of the discussions that ensued came the suggestion, as a first step, to organize a Growers' Association which would undertake to conduct a study of the interrelated problems of production, transportation and marketing. It was hoped that out of a continuing study, over a period of perhaps a year, would come a clearer understanding of the problems. By identifying the problems in advance we hoped to avoid many serious mistakes.

The major effort to date has been on the 'Solo' papaya program, because it appeared to hold the greatest promise for reasonably quick commercial operations with unusually promising financial results. Negotiations with the President of Caribair have resulted in a substantial reduction of air freight rates to San Juan and to St. Thomas.

It appears that we are just about at the point where we can give serious consideration to the organization of a PRODUCTION and MARKETING CO-OPERATIVE. A pattern is beginning to emerge involving sufficient acreage of 'Solo' papaya to warrant the formation of a business organization to coordinate the production, harvesting, grading, packing, transportation and marketing of many small growers.

Once the legal technicalities have been surmounted and we have a full-fledged PRODUCTION and MARKETING CO-OPERATIVE, we will be confronted with the practical problem of financing its operations, largely working capital in the early stages to finance inventories while in transit from the growers' field to market, and receivables arising from the sale of the inventories to distributors.

Of one thing we are certain - the CO-OPERATIVE, when organized, must be operated as a business if it is to be successful. The rock upon which many CO-OPS have foundered in the past has been the rock of unbusinesslike operations.

¹
President of St. Croix Growers' Association, St. Croix, U. S. V. I.

It is our hope that the people of St. Croix will benefit by the development of a new agricultural industry with diversification of crop risk. The long-term objective is a well diversified program of tropical fruits and vegetables which may be sold locally at reasonable prices. The grower will benefit from diversifications of risk. The grower and the consumer will both benefit from large-scale production which will eventually bring consumer prices down while assuring the grower of a fair return.

SOME CONSIDERATIONS OF THE EFFECT OF THE PHYSICAL ENVIRONMENT
ON FOOD CROP RESEARCH (Abstract)

by
Patrick H. Haynes¹

Crop production involves the interaction between the plant, the soil, and the atmosphere. In recent years there has been an appreciation of this need and agriculturists are exploring the physiological basis of crop yield. This topic is of considerable interest to plant breeders as it could form the basis of a selection technique. Agronomists are also showing a concern for determinations other than those of classical field experimentation involving soil plant interactions, for example, Collis George and Davey have suggested that complete descriptions of experiments be used to determine the quantitative importance of environment and its interaction with fertilizer and cultivation practices. These workers also claim that such an approach could result in the acquisition of more information than is now obtainable from a large number of day field trials.

The environmental factors of greatest significance to crop production are:

Atmosphere

Energy	Light Heat
Moisture	Humidity Rainfall
Wind Movements	(May be considered as part of heat as these result from energy transfer from hot to cold areas)
Soil	Nutrient supply Root Room Aeration Moisture Toxins

¹ Crops Agronomy Department, University of the West Indies, Trinidad

PESTICIDE RESIDUE PROBLEMS (Abstract)

by
James A. Singmaster III¹

A number of pesticide residue problems may have an important influence on food crops in the Caribbean area. Since some of these crops are produced for export to the United States, information about U. S. regulations and problems with them will be presented. The effective use of pesticides in the tropics frequently does not correspond with U. S. regulations, causing additional problems.

Procedures involved in residue analysis will be outlined with special emphasis on sampling and extraction problems. The results of these analyses will be reviewed broadly on the basis of the chemicals used and their application to crops. The results of these analyses on wildlife and other non-crop material and the controversy arising from these in the United States will be discussed.

Recent work in residue analysis indicates several new problems in using pesticides which need investigation. Briefly these are:

1. Translocation and concentration in oil and fat deposits of plants of so-called non-translocated insecticides
2. Uneven residue levels in fruits from a single tree if pesticide is applied unevenly in ground application
3. Varietal differences in residue levels

The methods of residue analysis are also used to find how pesticides are involved in living systems and soils. Plans for residue analysis on sugar-cane from planting through ratoon and seed piece crops of certain herbicides, which may be affecting these second crops rather than the initial crop, will be presented. Residue analysis for pesticide absorption in soils will be discussed with reference to effectiveness of the pesticide. Residue analysis for determining effective levels of systemic pesticides will be mentioned.

Several problems related to residue analysis will also be presented. The problem of controlling pesticide uses and residues in tropical crops will be discussed with reference to the Caribbean area. The need for education of the users of pesticides will be stressed. Certain safety precautions will be outlined for working with some of these pesticides.

¹ Assistant Chemist, Agricultural Experiment Station, University of Puerto Rico, Rio Piedras, Puerto Rico

PROMISING SELECTIONS OF THE HONEYBERRY (Melicocca bijuga L.)
FROM PUERTO RICO (Abstract)

by
George C. Jackson¹

The fruits of this tropical tree are very much appreciated when those of quality can be obtained. Literature search indicated that very little selection work has been accomplished. More than 54 trees in south Puerto Rico were selected on the basis of previous reports as yielding fruit of excellent quality. These trees were visited during season and subjected to critical organoleptic examination in the field. Nine trees produced fruit considered worthy of further testing. Fruit samples were collected from these nine trees for physical and chemical evaluation, which consisted of: total fruit weight, peel weight, seed weight, percent edible pulp, total soluble solids, pH of fruit juice, citric and ascorbic acid, percent total sugars, and percent moisture of fresh pulp. On the basis of this evaluation, four selections were made for further study. These selections produced fruits which have more than 45 percent edible pulp by weight, and contain more than 20 percent total sugars, with smooth peel and firm flesh, which is easily removed from the seed.

¹ Assistant Horticulturist, Fortuna Sub-Station, Agricultural Experiment Station, University of Puerto Rico

RESEARCH OF THE PUERTO RICO AGRICULTURAL EXPERIMENT STATION IN THE CONTROL
OF THE NEMATODES ASSOCIATED WITH PINEAPPLE DECLINE (Abstract)

by
Jesse Roman¹

Among the fruits of Puerto Rico, pineapple ranks as the most important cash crop. In spite of the fact that during pineapple cultivation several diseases, insects and other parasites are encountered, nematodes seem to be the most troublesome. The Agricultural Experiment Station, aware of this fact, has conducted several experiments with the purpose of controlling the nematodes associated with pineapple decline.

The first experiment was conducted by Alvarez-Garcia and Lopez in 1951 with the purpose of investigating the role of parasitic nematodes in pineapple production. Although exceedingly high dosages of 5 different nematocides were used, it was proved that nematodes are the primary factor in the decline of pineapple in Puerto Rico.

By the time this first experiment was conducted, the damage caused by nematodes to pineapple was attributed mainly to the root-knot nematode. However, in a survey made by Ayala in 1957, it was found that reniform, spiral and lesion nematodes are more numerous than root-knot.

A second experiment was conducted by Ayala, Roman and Gandia in 1957 in which a different method of application was used. In this case, a high dosage was split and two treatments given in 10-15 days interval. The purpose of this system was to control the nematodes present in the top few inches of soil which generally escape fumigation. After the first treatment was given, the soil was ploughed again so as to incorporate the top layer dip into the soil, and a second application followed. As a result, the double treatments were significantly better than the single treatments and the controls.

The next step was to make an experiment with the purpose of selecting the most effective nematocides for pineapple. Ayala in 1961 used 9 different nematocides with the recommended dosages. The results demonstrated that the plots fumigated with D-D gave the highest pineapple yield.

The Puerto Rico Agricultural Experiment Station, aware of the fact that soil fumigation is difficult and expensive, is now investigating the possible use of crop rotation for the control of nematodes that affect pineapple production.

¹ Assistant Nematologist, Agricultural Experiment Station, University of Puerto Rico

MARKETING PROBLEMS OF A SMALL ISLAND

by
John Phillips¹

Montserrat, the smallest self-contained unit in this part of the world, is an island shaped like a leg of ham and lies some 27 miles south-west of Antigua and some 40 miles north-west of Guadeloupe, and has a total area of 32½ square miles. Of this area, about 9,000 acres are suitable for cultivation. The island is of volcanic origin and is extremely mountainous, the highest peaks being over 3,000 feet.

The climate is tropical, the mean maximum temperature being 86° Fahrenheit and the mean minimum temperature 73° Fahrenheit. Annual average rainfall is about 55 inches, but the range in the cultivable area varies from 40 inches to 70 inches being much drier in the extreme North and South. The wettest period is September to November, with a drier season from December to June. The island is wind-swept for most of the year which markedly reduces the effect of a high relative humidity.

Labour rates have forced the estates out of production of the traditional crop, cotton, and virtually all agriculture is today carried on by smallholders who usually rent their holdings on a year-to-year lease from the estates. The only estate, Agricultural Enterprise, which is at present functioning is an enterprise of some 120 acres of bananas and about 80 acres of limes.

Prior to World War II, Montserrat used to export 1,600 bales of cotton, 100 tons of carrots, 400 tons of tomatoes each year. The cotton all went to the United Kingdom, but the bulk of the vegetables went to Bermuda and Canada.

In 1960 a tomato paste factory was established by a Canadian Company. Unfortunately, due to the company's failure to control a disease problem in their fields and also their failure to pay an attractive enough price to the small farmer, this scheme also failed.

Since the failure of the shipping services, most of the produce that has been exported has gone to the neighbouring islands of Dominica and Antigua. Private small traders who buy from farmers and sell in markets export annually some 1,000 tons of sweet potatoes, carrots, cabbages and other vegetables. However, they buy in small quantities and their prices vary considerably. It is widely believed by the farmers that their profits are large, and in addition, as their handling is very rough they can only sell on an unselective market which does not command a top price.

In the past, our activities were confined to tomatoes, cabbages and carrots. Since April, besides these traditional crops, we have exported shallots to British Guiana and Barbados, mangoes to Bermuda, pineapples to Antigua and hot peppers to the United Kingdom. It has become obvious that there is no shortage of markets.

Montserrat is badly served by ship. Three lines call regularly:

- (1) The West Indies Shipping Service ships - the "Federal Maple" and the "Federal Palm" call twice a month in each direction. These vessels have three grades of refrigerated accommodation. Their rates, in spite of a high subsidy, are not low, and it is essential to ship in their refrigerated space as these vessels take a long time to reach the chief markets of Barbados and Trinidad, four days to Barbados and seven days to Trinidad
- (2) The M. V. Ripon, a locally owned vessel of 1,000 tons carries cargo to St. Kitts, Puerto Rico and Dominica once each month, while the Harrison Line have a monthly service direct to the United Kingdom.
- (3) In addition, government controls a small sloop, designed for fishing but which is now used mainly for short freight hauls between the nearby islands.

¹ Director of Agriculture, Montserrat

Air transport is difficult. Our airport is a 3,000 feet grass strip with an angled approach. The largest plane that can land and take off at the moment is a D.H. Heron. This plane has a freight pay load of 1,600 kilos or about 80 boxes of mangoes. This then is our shipping unit and it has to be filled exactly to make air freight a paying proposition. The airline which operates in Montserrat owns only two Herons, fully engaged in passenger services, and a freight charter at short notice is difficult to obtain.

Our potential is great but our present production is about 10% of that potential. Our estate agriculture is practically dead and no foundations have yet been laid to establish a dynamic small-farmer economy. The present volume of produce is such that many orders cannot be adequately filled. However, this problem is being tackled by offering the producer a guaranteed minimum price which is weighted to encourage the producer to spread his production season so that gluts are minimised. A more dynamic marketing policy is being pursued, and by December we hope to be organized to deal with the export in large quantities of tomatoes, peppers, carrots, cabbages, cantaloupes and shallots by sea or air to many points both inside and outside the Caribbean area.

One of our hardest jobs is to obtain reliable up-to-date market information. A request for offers on a certain commodity is cabled in and one has little or no knowledge as to what the current retail prices should be. The inclusion of regular markets reports in radio newscasts would be of immense value and is something that this Society should lobby for.

THE EFFECT OF STORAGE AND PACKAGING ON THE QUALITY OF DEHYDRATED
AND DEHYDROFROZEN PIGEON PEAS (Abstract)

by
Abdul R. Rahman¹

Study was undertaken to determine the effect of storage and packaging on the quality of dehydrated and dehydrofrozen pigeon peas. Dehydrated pigeon peas were packed in polyethylene bags and in tin cans and stored for one year at room temperature as well as at 100° Fahrenheit, whereas dehydrofrozen pigeon peas were packed in polyethylene bags and stored at -10° Fahrenheit. The results showed that the dehydrofrozen pigeon peas were superior in quality to the rest of the samples. However, organoleptic appraisals indicated that dehydrated pigeon peas packed in polyethylene bags and stored for one year at room temperature as well as at 100° Fahrenheit possessed a fairly good quality and received a considerable degree of acceptance from the tasting panel.

¹Food Technologist, Agricultural Experiment Station, University of Puerto Rico, Rio Piedras, Puerto Rico

THE PLANT QUARANTINE STORY

by
Harold Bowman¹

A host of uninvited "guests" costs the United States more than \$7 billion a year. That is the cost chargeable to plant pests and diseases. Many of these are not native to the country but have "hitchhiked" into the U. S. from abroad.

High as this "board bill" is, it would be many times higher except for the Plant Quarantine Division of the U. S. Department of Agriculture. Each year, Plant Quarantine inspectors stop thousands of plant pests at the Nation's borders.

Most of the serious plant pests came to the United States before the Plant Quarantine Act was passed in 1912. During the 58 years prior to 1912, it has been estimated that at least 92 species of economically important insects were introduced into the country. This includes such damaging ones as the European corn borer, gypsy moth, alfalfa weevil, San Jose scale, stem rust fungus, hessian fly, and boll weevil.

Many destructive pests - such as insects, snails, nematodes, plant diseases, and the like - may be concealed in or on fruit, vegetables, plants or seeds brought by tourists or shipped commercially from abroad. Commercial shipments of agricultural products move through a system of permits, inspection, and treatments to eliminate the danger of introducing costly plant pests.

Increased tourist travel in recent years presents a different problem. In order to keep border clearance requirements to a minimum, agricultural inspectors cooperate closely with the Customs Service in baggage inspection. Last year, Plant Quarantine inspectors, in cooperation with Customs officials, examined more than 23½ million pieces of luggage. More than 33,000 lots of incoming plant pests of quarantine significance were intercepted by Plant Quarantine inspectors - an average of one every 16 minutes around the clock during the year.

These included such damaging pests as the Mediterranean fruit fly, which last invaded Florida in 1929 and again in 1956 and 1962. The 1956 invasion was eradicated at a cost of \$10 million; khapra beetle, world's worst enemy of stored grain that threatens stocks of grain valued at \$8 billion in the U. S., a destructive cotton pest; and many other serious pests.

Air passenger traffic into the United States now exceeds four million persons a year, steamship traffic has more than doubled since World War II, and more than 24 million cars enter the U. S. from Mexico each year. Few travellers attempt to smuggle in plant materials, and many plants can be brought to the United States if travellers make proper arrangements in advance.

1

Plant Quarantine Division, Agricultural Research Service, U. S. Department of Agriculture, San Juan, Puerto Rico

PIGEON PEA POD BORER CONTROL (Abstract)

by
Mario Pérez¹

Screening experiments testing four insecticides, applied three times for four days following peak blossoming, showed DDT to be best for pod borer control. A spraying schedule test using this material indicated that two applications, if properly timed with respect to peak blossoming, can yield as many borer-free pods as eight applications throughout all the period of blossoming and pod formation.

¹Entomologist, Agricultural Experiment Station, University of Puerto Rico, Rio Piedras, Puerto Rico

CHEMICAL WEED CONTROL IN TROPICAL FOOD CROPS (Abstract)

by
L. Kasasian¹

Three-year greenhouse and field trials on a number of food crops are reported and the results of pre-emergence greenhouse screening trials given. Results from trials other than the routine greenhouse screening trials gave the following results:

- | | | | | | |
|---|---|--------------------------------------|--|--|--|
| 1 | - | no crop injury and good weed control | | | |
| 2 | - | " " " " poor " " | | | |
| 3 | - | injury to crop " good " " | | | |
| 4 | - | " " " " poor " " | | | |

Pigeon Peas

PRE-EMERGE - (1) amiben, ametryne, prometryne
(2) PCP, Alipur, diphenamid, NPA
(3) prometone
(4) trifluralin

POST-EMERGE - (1) paraquat (directed)
(2) Tenoran, linuron, trifluralin
(3) simazine, atrazine, diuron
(4) dalapon, TCA, Aresin, Stam, Solan, Dicryl

Cassava

PRE-EMERGE - (1) simazine, atrazine, prometone, ametryne, prometryne, diuron, amiben
(2) neburon, TCA, PCP
(3) atratone, fenac

Yams

PRE-EMERGE - (1) simazine, atrazine, atratone, prometone, ametryne, prometryne, amiben, diuron
(2) neburon, TCA, dalapon, Alipur
(3) fenac

Sweet Potato

POST-EMERGE - (1) amiben
(2) neburon, TCA, dalapon, Alipur
(3) simazine, atrazine, atratone, prometone, ametryne, prometryne, 2,4-DES, diuron, fenac
(4) NPA, Stam, Solan, Dicryl, Zytan

Tannia and Dasheen

PRE-EMERGE - (1) amiben, ametryne, prometryne, prometone
(2) neburon, TCA, dalapon, Alipur
(3) simazine, atrazine, atratone, diuron, fenac

Bush Beans (Phaseolus vulgaris)

PRE-EMERGE - (1) amiben
(2) DNOC, dioseb, PCP, aresin, trifluralin
(3) ametryne, prometryne, G. 34360

¹Herbicide Agronomist, Regional Research Centre, University of the West Indies, Trinidad

POST-EMERGE- (1) paraquat (directed)
(4) PCP, Dinoseb, DNOC

Bodi Bean (Vigna sesquipedalis)

PRE-EMERGE - (1) prometryne, ametryne, prometone, amiben
(2) Alipur, neburon
(4) dalapon, PCP, linuron

Tomato

POST-EMERGE- (1) directed amiben and paraquat
(2) diphenamid, Solan, trifluralin, Stam (directed)
(4) overall Stam

Cabbage

POST-EMERGE- (1) amiben + TCA
(2) diphenamid, Sodium monochloracetate
(3) paraquat, ametryne, G. 34360
(4) dalapon, dicryl, trifluralin

NATIVE PLANTS AS A SOURCE OF FOOD AND GENETICAL GERM PLASM (Abstract)

by
Roy Woodbury¹

The first source of new Germ Plasm for our growing agricultural economy should start at home by examining every possible plant of known use (no matter how insignificant it may seem). There are numerous edible native plants on the island of Puerto Rico, as well as numerous other West Indian islands, which have not undergone a detailed or planned research program to establish their ultimate potentials.

In the past our agriculture was and still is dependent on seed of introductions. This is realized but let us also use some of our own plants at least in a breeding program. Because they are native, they have become adapted to our special climate and, therefore, must have some genetical factors which should be explored.

It is not necessary to stop with food plants but ornamentals and industrial crops should also be included.

1. Review of literature and information sources for potential native plants of economic importance
2. Methods to be established for:
 - a. Selection of material to be studied
 - b. Collecting the material
 - c. Testing the material for possible use in agriculture or industry
 - d. Making information available to others

I feel that the plant kingdom is a treasure house of unexplored and potential source of foods and useful chemical and raw materials just waiting to be tapped. So let us start exploring these potentials in our own back yard.

¹
Taxonomist, Agricultural Experiment Station, University of Puerto Rico, Rio Piedras, Puerto Rico

IMPROVING TROPICAL FOOD CROPS BY PLANT BREEDING (Abstract)

by
Harry Warmke¹

Important contributions to tropical food production can be made by application of the principles and techniques of plant breeding. No two sexually reproducing plants are exact counterparts. By observing the many differences and adding up those useful to him and eliminating those that are detrimental, the plant breeder is able to produce new and superior plant varieties. Such characters as insect and disease resistance, climatic adaptation, quality, and productivity are of special interest in the Tropics and can be dealt with successfully by the plant breeder.

Some important techniques in plant improvement through methods of breeding and selection are the following:

- (1) Identification of deficiencies in present crop plants
- (2) Location of desirable characters in the same or related species
- (3) Introduction of desirable characteristic into deficient variety by means of controlled cross pollinations
- (4) Selfing or back-crossing of hybrid plants to retain desired combination of characters
- (5) Stabilization of new variety by inbreeding and selection.

Through all of these steps the investigator will do well to breed for one principal character at a time and to develop screening procedures that enable him to positively identify and retain this character through successive generations.

¹Officer in Charge, U. S. Department of Agriculture Federal Experiment Station, Mayaguez, Puerto Rico

WATER FOR IRRIGATION IN THE AMERICAN VIRGIN ISLANDS (Abstract)

by
Robert F. Scott¹

The rainfall in the Virgin Islands varies from 25-60 inches a year, with a rather erratic distribution pattern. Because of the year-round growing season, the apparently adequate rainfall, and fertile soil, it would seem that there is no major problem standing in the way of unlimited vegetable production in the Virgin Islands. However, even under these ideal conditions, the availability of water for limited irrigation and other miscellaneous uses has posed a serious problem in these Islands. Underground water is limited and is often of a high salt content. There are no major streams or sites for impounding large quantities of water. However, during the past decade the conservation of water through every available source has shown that the minimum needs can be met.

Water for irrigation of truck crops in the Virgin Islands is obtained from wells, concrete catchments, roadway catchments, earthen dams, spring development, roof catchments, and various other sources. About the only source not being tapped for agricultural purposes is salt water distillation. Some individual farmers and at least one group of farmers have found it necessary to obtain water from a combination of as many as five methods at one time.

Although water shortage has been a critical problem through the years, experience has shown that the wise use and development of the available water resources can go a long way toward solving the need for water on small, intensive truck garden farms in the American Virgin Islands.

¹ Work Unit Conservationist, Soil Conservation Service, U. S. Department of Agriculture, St. Croix, Virgin Islands

SEEDLESS WATERMELON PRODUCTION IN PUERTO RICO (Abstract)

by
Hassan Azzam¹

Various trials, at several locations, were conducted to determine the adaptability of some triploid watermelon varieties. The most promising ones were the Japanese line 1 and 2. The planting ratio of triploid:diploid, cost of production and market acceptability were also studied.

¹ Plant Breeder, Agricultural Experiment Station, University of Puerto Rico, Rio Piedras, Puerto Rico

THE RESPONSE OF SEEDLESS WATERMELONS TO FERTILIZERS IN PUERTO RICO (Abstract)

by
H. Azzam¹ and G. Samuels²

Fertilizer experiments with a Japanese seedless watermelon variety were established at five sites including irrigated, semi-arid, humid coastal, and humid mountain soils. The results of the fertilizer applications were:

1. A significant increase in yields due to the use of fertilizer at all sites over the no fertilizer check
2. Varied response to nitrogen favoring 112 pounds of nitrogen per acre for most soils except the semi-arid soils where 56 pounds of nitrogen per acre was best.
3. Phosphates gave the greatest yield responses with 75 pounds P_2O_5 optimum for most soils. Responses were highest for the Coto Clay at Isabela, a coastal soil known for its phosphate needs
4. Potash responses were poor and variable
5. Splitting of the nitrogen in two applications was not better than one application
6. Foliar sprays of fertilizer did not increase yields over that obtained with fertilizer applied to the soil
7. Filter-press cake plus fertilizer did not increase yields over the use of fertilizer alone.

¹Plant Breeder, Agricultural Experiment Station, University of Puerto Rico, Rio Piedras, Puerto Rico

²Agronomist, Agricultural Experiment Station, University of Puerto Rico, Rio Piedras, Puerto Rico

SPHAEROPSIS KNOT DISEASE OF CITRUS IN JAMAICA

by
A. G. Naylor¹

Introduction

The fungus, Sphaeropsis tumefaciens, was first isolated in Florida in 1904 by Hedges⁽¹⁾ from knot-affected lime material from Jamaica. A different strain of the fungus from that found on lime was obtained by the same worker from orange stems, also from Jamaica. The parasitic nature of the fungus isolated was proved by repeated inoculations, development of symptoms and re-isolation. In 1911, a similar disease was observed on a lime tree in Florida and the major work on this fungus, using material from Jamaica, was done in Florida by Hedges and Tenny and published in 1912⁽²⁾.

The attention of these workers was confined mostly to the cultural characteristics of the fungus on a number of media and to the susceptibility of different citrus species to artificial inoculation.

Sphaeropsis knot disease is either not a problem or does not exist in the larger citrus-producing countries, and very little work has been reported on it from any source. Besides Jamaica, it is to be found in Florida, Cuba and possibly Venezuela. In Jamaica this disease has been destroying large numbers of lime and to a less extent rough lemon plants every year, but no detailed work on it has been done in the island. Recently, the disease was found on the Ortanique variety which is regarded as a natural cross between the sweet orange and tangerine and is now fairly extensively grown. This is a popular variety and commands a good price in both local and foreign markets.

Symptoms of Disease

The knots produced by the causal fungus mainly on young branches or new growths on the stem are hard woody galls which are either elongated along the stem or rounded, and may girdle the affected parts. Knots may also be found on older parts of the stem and have even been found in Jamaica on rough lemon rootstocks below or close to ground level.

The surface of the knot is usually smooth at first but in old infections it may become broken, fissured, sunken or cankerous. It may also remain intact with small outgrowths or uneven elevated swellings. The galls have a broad basal attachment and cannot be easily broken from affected portions. On limes a witchbroom type of growth is often produced from the galls and the ends of branches die back. Severe infection will result in death of the affected plants in a few years. Seedling infection or infection near the base of mature plants can cause death in shorter time.

Disease in Jamaica

For many years sphaeropsis knot disease (Sphaeropsis tumefaciens) has been the limiting factor in the successful production of West Indian limes in Jamaica. It occurs mostly along the north coast, the south-western and south-eastern sections of the island, and has destroyed many plantations of limes. The disease is often seen on rough lemon but very rarely on sweet oranges or tangerines. It has never been observed or reported on grapefruits or other citrus varieties in Jamaica other than the ones mentioned above.

During January 1963 new interest in the knot disease was aroused with the discovery of galls on the 'Ortanique' variety of citrus on one estate in the north-west section of the island.

As the disease on lime is widespread throughout most of the island and occurs in areas with 'Ortaniques', preliminary studies were conducted to ascertain the following:

- (1) whether the strain of the fungus from lime can infect the ortanique variety
- (2) whether the fungus was seed-borne or not
- (3) how far below the knots the fungus could be found

¹Plant Protection Officer, Ministry of Agriculture and Lands, Kingston, Jamaica

- (4) how the disease is spread
- (5) how the disease can be controlled

Materials and Methods

Cultures of knot-affected lime and knot-affected 'Ortanique' branches were made on potato dextrose agar and held at lab temperature varying from approximately 80°-85° Fahrenheit. The fungal growths obtained from the lime material were similar in color, pattern of growth, shape and thickness of the mycelium to that produced from the ortanique material. The mycelium was 2-3.5 thick and in mass was almost black, with individual strands reddish brown. Side buds or warts were common on the mycelium, but sporing was absent even on cultures several months old.

Cultures were also made of Ortanique, lime and rough lemon seeds taken from fruits growing close to knots and also of stem sections at different distances from knots.

Discussions

From the results of the work done, it appears that the same strain of the fungus as found on limes has been the cause of the outbreak of knot on Ortaniques. In areas where Ortaniques are being grown all lime plants with knot should therefore be cut and burnt.

There was no evidence to indicate that the disease was seed-borne and although the fungus could occasionally be found in the fruit it was not isolated from the seeds. Since the fungus can be found in the fruit it is not advisable to use seeds from knot-affected plants for planting as this will avoid possible surface contamination.

Pruning of branches at least 18 inches below the last gall and burning of diseased material appear a possible method of control, although new growths may become quickly infected. Where the knots are low on the main stem the type of pruning recommended will eliminate the entire plant. Spraying of affected trees to prevent sporulation of the fungus has not yet been tried, but is envisaged, though it is not expected to give good control.

This disease of citrus is a serious one and efforts should be made to keep it out of all citrus-producing areas and countries in which it is not yet found.

Literature Cited

- (1) Hedges, Florence, (1911). Sphaeropsis tumefaciens, Nov. Sp., the cause of the lime and orange knot. *Phytopathology* 1:63-65.
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THE PROPAGATION OF GUAVAS FROM STEM CUTTINGS (Abstract)

by
W. Pennock¹ and G. Maldonado²

1. A highly successful propagation method is described in which hundreds of side sprouts are first induced in the parent guava tree. These are later cut and rooted under alternating mist with leaves attached.
2. An experiment is described and discussed which shows that different rooting media have no appreciable effect on rooting but treatment with a relatively high concentration of indole butyric acid (200 P. P. M.) improves and accelerates rooting markedly. When sugar at 2% is combined with the indole butyric acid treatment rooting is further improved.
3. The high susceptibility of cuttings under mist to anthracnose disease is mentioned and the usual course of the disease described. Recommendations are suggested on how to reduce the incidence of this disease. The use of bottom heat to this end is highly recommended.

¹Horticulturist, Agricultural Experiment Station, University of Puerto Rico, Río Piedras, Puerto Rico

²Resident Assistant in Horticulture, Agricultural Experiment Station, University of Puerto Rico, Río Piedras, Puerto Rico

TABLE I - The rooting and anthracnose incidence which occurred in guava cuttings when subjected to heated as against un-heated conditions under mist. The use of contaminated rooting media and a shorter rooting period in the treatment made the improved performance attributable to heat more difficult

CLONES	Rooting and anthracnose incidence shown under treatments indicated												
	Hot Water Mist ¹						Cold Water Mist						
	Bottom Heat Supplied by Soil Heating Cable ²						No Bottom Heat ²						
	Rooting Media contaminated by previous use						New uncontaminated rooting media						
Rooting Method	Cuttings						Rooting Period	Cuttings					
	Planted			Rooted				Rooted			and free of disease		
days	number	percent	number	percent	number	percent	days	number	percent	number	percent	number	percent
Cibuco #3	100	68	68	52	76	76	40	184	110	60	60	0	0
D 13	100	92	92	71	77	77	40	203	175	86	86	0	0
D 18	204	101	48	79	78	78	40	176	65	31	31	0	0
Totals	29 ³	404	261	65	202	77.4	40 ³	563	350	62	62	0 ⁴	0 ⁴

1 Temperature of water at nozzles before misting 58°C; after misting when collected in a beaker at soil surface 32°C

2 Media temperature 36°-38°C at 1"-2.5" depth when heated; 30°C when not heated

3 Arithmetic mean

4 Although disease lesions were present in all cuttings, about 65% survived a fier removal from mist

MAGNESIUM AN IMPORTANT NUTRIENT IN PINEAPPLE PRODUCTION
IN PUERTO RICO (Abstract)

by
E. Hernandez-Medina¹

This paper reports the results obtained in studies undertaken to determine the influence of magnesium and trace elements on the yield of pineapples grown in a Bayamon sandy clay, a soil typical of the pineapple-growing area of the island. The trace elements tested were iron, boron, zinc, copper and molybdenum. The experimental results gathered are briefly summarized as follows:

1. Neither the use of trace elements nor lime were effective in increasing significantly yields of pineapples
2. In most cases magnesium was the only nutrient which significantly influenced pineapple yields. Magnesium-treated plants produced on the average 2.7 tons more fruit per acre than the check plants
3. Highest fruit yields were associated with the highest leaf magnesium contents
4. A significant correlation was found between relative yields and leaf-magnesium values
5. Based on the data presented herein it is suggested that magnesium be incorporated in the fertilizer mix or in foliar sprays so as to increase fruit yields per acre

¹ Horticulturist, Agricultural Experiment Station, University of Puerto Rico, Rio Piedras, Puerto Rico

PANEL: PROBLEMS OF FOOD CROP MARKETING AND PRODUCTION

SUMMARY

Dr. W. F. Finner stressed the important role of markets in determining the pattern of agriculture in a country and cited changes in agricultural production in Mexico to exploit the withdrawal of Cuban supplies from the U. S. market as an example of this. Proper organization of marketing not only provided incentive for production but could exert a marked influence on the economic development of a country and assist in raising the nutritional level of a population by improving distribution efficiency. He emphasized that no single blueprint for marketing organizations was adequate or suitable for adoption by all countries at all times. A market which will not pay the extra cost of standardization and improved presentation of goods cannot justify provision of such services, while such services may be essential to develop competitiveness of goods where the market insists on improved presentation and standardization.

He then proceeded to outline and discuss the following aspects of a properly organized marketing system:

- (a) Ensuring of regular supplies
- (b) Maintenance of quality standards
- (c) Reasonable transportation costs
- (d) Processing problems including the use of suitable varieties for processing which often are unsuitable for the fresh fruit market and the need for maintaining continuity of supplies
- (e) Operation of an efficient and accurate market information service which is related to the existence of proper facilities for rapid communication
- (f) Provision of storage and processing facilities on an adequate but economical scale
- (g) Favourable tariff situations
- (h) Physical availability of a market, and
- (i) Wise judgment in the selection of the crop to be produced and avoiding the mistake of endeavouring to produce too wide a range of crops and of failure to specialize, in order to accelerate acquisition of the skills and technique necessary for efficient production

Dr. Abdul Rahman, in his remarks, described various methods of processing, e. g., canning, freezing, dehydration, dehydrofreezing, salting, fermentation, candying, pickling, each differing as to cost and in acceptability of the end product. He stressed the need to adopt a method which resulted in a product of acceptable quality at least cost, e. g. dehydrofreezing vs. freezing and preparation of plantain flour from green plantains including the skin by use of potassium meta-bisulphide.

Mr. Rogers informed the meeting of the emphasis placed by the Caribbean Organization on the importance of developing intra-Caribbean trade especially in vegetables and food crops and the reasons for this emphasis and the activities to this end in which the Caribbean Organization is currently engaged. He pointed out the fallacy of the idea that production in all the Caribbean islands was competitive. He dealt briefly with the objectives of the Organization's Caribbean Plan and outlined the work and progress of the Clearing House for Trade and Tourism Information operating in the Secretariat. He referred to Drs. de Boer's assignment as Market Analyst, and to the latter's expressed view that lack of assured markets was a major obstacle to expansion of production in many countries of the Caribbean. He referred to ideas under consideration by the Organization including the establishment of a Caribbean trade market.

In the discussion which ensued, speakers referred to the need to educate farmers, particularly small farmers, to accept the idea of expanding production in order to cheapen selling price and expanding consumption of their products.

The possibility of Caribbean countries producing food to meet the U. S. market, which is likely to be in short supply in certain months of the year, was indicated, and the necessity to select varieties which the market requires and which ship and transport well was stressed. It was pointed out that Florida does not can any of her tomato crop even when there is a surplus for the fresh fruit market because the requirements of the market for canned fruit and for fresh fruit differ markedly. It was also pointed out that the limited number of daylight hours in the Caribbean area made it difficult to produce tomatoes which can match the yields secured in areas with longer daylight. This was also probably associated with relatively low assimilation of carbon dioxide by tomatoes grown in the area.

It was also pointed out that lack of knowledge as regards the status of disease and pest problems of plants and animals in the various countries of the Caribbean was operating as a handicap to intra-Caribbean trade. There was also a tendency towards a lack of confidence in certificates of health issued in some countries and it was agreed that an urgent need existed for a careful study to be made by experts of the situation in each of the countries of the area and the formulation of realistic quarantine and import regulations.

The Meeting agreed that, at this stage, there was a need for an experimental approach to the problems of marketing in the Caribbean, bearing in mind that the main aim is cheaper food for the population; and the approach should include studies for more efficient distribution of imported foods.

Mr. Naylor outlined some of the crop losses occurring in the Caribbean area through attack of fungi, bacteria, viruses and nematodes, illustrating his talk with color slides. He emphasized the need for surveys and evaluation of crop damage through diseases and for full exchange of ideas and information on problems and methods of control.

Dr. Mario Perez described some of the problems of economics involved in control of pest infestation, the need for more information on insecticide residues and phytotoxicity of various chemicals, their effect on crop yields and their behaviour under different ecological conditions and the need for improved exchange of information between countries. He stressed the need for quarantine regulations to be based on knowledge of the pests occurring in the various countries, noting that the pineapple fruit worm occurring in Puerto Rico was not recorded elsewhere in the Caribbean.

Dr. Velez Fortuño pointed to the limited scope of plant breeding work currently in progress in the Caribbean and emphasized the need for:

- (a) a survey to provide complete information on pests and diseases of food crops in the Caribbean region
- (b) the establishment of a regional plant introduction centre to supply planting materials of improved varieties in the region
- (c) organizing Caribbean plant breeders in the Caribbean to plan their work as a team in a manner similar to the way in which the workers in Puerto Rico plan their programs in cooperation with the States of the Southern Region of the United States. A suitable project for attention might be the selection of a tomato variety adapted to the fewer daylight hours in the Caribbean as compared with temperate regions. Testing of varieties should also be carried out throughout the region as part of a cooperative plan to determine adaptability of the varieties under a wide range of conditions
- (d) a careful survey of genetic material available in the region would be a necessary first step. It was to be noted that some of the most promising varieties of papaya tested in Puerto Rico were of local origin, and material valuable for development or for breeding work might be uncovered.

- (e) evaluation of material secured from other areas would be the next step. The initiative of the Caribbean Organization in attempting to secure new ecotypes of pangola for introduction to the region was cited as an example of the type of action needed
- (f) establishment of a gene bank for the use of plant breeders in the region

He also stressed the importance of securing realistic plant quarantine regulations to prevent the spread of pests and diseases within the Caribbean area.

Mr. Haynes commented on the proposal for establishment of a regional centre for plant introduction and testing and pointed to the need to ensure that a wide range of ecological conditions should be presented at such a centre. He stressed that there would be a need for the establishment of sub-centres for testings. For this work, use of uniform standardized criteria for climatological descriptions was an essential.

Dr. Samuels indicated the long list of variables which operated to restrict the applicability of fertilizer trials to areas, crops and seasons other than those dealt with in actual field experiments. Of special interest to members was a chart he exhibited illustrating the influence of time of planting on yields of potatoes - sweet and Irish - corn, tomatoes, pigeon peas and cucumbers.

He summarized the practical suggestions proposed by other members of the panel and added the suggestion that in some of the smaller islands which could not afford the services of a qualified entomologist, technicians be trained to identify major pests and diseases. Attention was also called to the need for more intensive research on the use of foliar nutrient sprays, especially on soil, with a high pH value.