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About the Institute
The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

ABSTRACT

An Interdisciplinary Team Approach to the Stduy of Tropical Food Sources

David J. Rogers, Director

Taxisetrics Laboratory
University of Colorado

This brief paper describes the organization and operations of an interdisciplinary research and development team at the University of Colorado Division of Population Studies. This tead addresses the problems of tropical food problems, especially those involving tropical root crops.

The various methods of research planning, reseach execution, developmental program planning for implementation of researhh findings and broad scale public, undergraduate, and graduate education are described.

The use of computer methods and systems modeling is also explained and the relevance to the entire area of tropical food sources and overall development of trppical areas is addressed.

Abstract

Untapped genetic resources for cassava improvement.
David J. Rogers and S.G. Appan

Recent studies have shown that Manihot esculenta can be improved for disease resistance by outcrossing to wild species. There are also some indications that the protein content of the root can be increased by similar processes. Only a small number of wild species have been used in these studies, and these were chosen without regard for the relationships of the wild species to the cultivated species. The basis for choice of breeding material should be made with some degree of rigor, based on the knowledge of the wild species. We have just completed a monographic study of the naturally-occurring species in North America, largely in Mexico and Central America. These studies indicate that a number of these offer much potential for incorporation of useful characteristics in the cassava.

In the study, 18 species are delimited, three of which had not been previously described. Computer-aided classification techniques were used in defining the taxa, giving much clearer pictures of the relations between the species, and indicating their relationships to Manihot esculenta. Some of the species will be described in detail, because of their potential interest in cassava breeding work.

Abstract

A Classification of Manihot esculenta Crantz using the Information Carrying Content of a Character as a Measure of its Classificatory Rank.

H. Fleming and D.J. Rogers
University of Colorado

A method of classifying cultivated plants is proposed using principles derived from 'information theory.' It is typical of cultivars for the plant characteristics to seemingly vary between themselves in a random fashion. Classifications of such groups have usually been based on little else than arbitrary, personal weighing of some plant characters when it has not been simply a key to named or presumed varieties. These types of classification have failed to show the genetic relationships between the reticulately related cultivars.

The present method bases the classification of M. esculenta on

1. the sum of the interdependence or correlations of a set of descriptors and

2. how successfully a given classification preserves the information in a set of descriptors.

A key is developed for 230 cultivars of M. esculenta collected by D.J. Rogers in Central and South America in which the order of the dichotomies is determined by the capability of the character to predict other characters and the amount of of information the character shares with other characters.

This classification would preserve the information necessary for determining the degree of relationship of cultivars for plant breeding as well as give some indication of the phylogony of the crop.

A Systems Approach for Studying Nutirent Synthesis and Transfer in Tropical Areas

G. N. Hersh, David J. Rogers and S. G. Appan

The University of Colorado

It is clear that cassava plays a significant but not well understood role in the general system of human nutrient synthesis and transfer in tropical areas. This paper defines and explains a Systems Analytic approach used to gain a more adequate understanding of this role.

The general object of using this Systems approach is to describe the interrelations and to determine the comparative economics of the various indigenous processes of nutrient production/preparation (synthesis), distribution/acquisition (transfer), and use in a given region; and, to examine how these interrelated processes meet specific human nutritional needs.

The specific object of using this approach is to study the position of cassava in the general regional process of nutrient synthesis and transfer in sufficient detail to understand its relationship and comparative advantage with respect to other food sources.

The paper also discusses the overall cost/benefits of a Systems Analytic approach for research in understanding complex nutritional economic, social, agricultural and related educational processes e especially concerning tropical food sources and problems.

PUBLICATION POLICY FOR THE SECOND INTERNATIONAL SYMPOSIUM AND INTERCHANGE ON TROPICAL ROOT AND TUBER CROPS:

1. The committee will attempt to have the Proceedings published in time to be issued at the August 1970 meeting. This will necessitate offset printing.

2. Informal abstracts of papers (for program and publication planning purposes) will be due by February 1, 1970.

3. Final copies of papers will be due May 1, 1970. Any papers received after the May 1, 1970 deadline cannot be assured publication in the Proceedings.

4. The length of papers will be limited as follows:

   a. Invited plenary papers 5000 words

   b. Panel discussion papers 2000 words

   c. Contributed papers 2000 words

5. Papers will be typed on hard, first quality, bond paper with pre-set margins and in a format and of sufficient quality to be used directly in offset printing. Manuscripts should therefore be single spaced.

6. It will be the responsibility of the individual author to submit his paper by the May 1 deadline in English, and in a suitable style for publication. Editorial services will not be available for most papers; however, any author wishing editorial assistance for his paper may request such assistance by submitting his paper by March 1, 1970. This will allow time for the paper to be edited and returned to the authors for final typing.

7. The official language of the meeting and the proceedings will be English. However, individual authors who may wish to include a brief summary (no more than 150 words) in Spanish or French in the final copy of his paper may do so.

8. All papers will be reported using the metric system of measure. If authors wish to use other methods in individual papers, these units must follow, in parenthesis, for example:

   "yields were 1000 kg per ha (____lbs per acre)."

9. No photographs will be published.

10. Tables and Figures should be simple and few in number. Line drawings will be accepted if they are presented in clear form, on standard paper, on white cardboard, or reproduced photographically. Page size requirements will be followed also for figures.

11. Margins will be limited as follows:

    Upper and right margins = 1 1/8 inch = (2.8 cm)

    Left margin = 1 1/2 inch = (3.8 cm)

    Lower margin = 1 1/4 inch = (3.2 cm)

    Paper size will be:

    8 1/2 inch x 11 inch (22 x 28 cm)

12. References will be cited as follows:

    for journal articles, bulletins: author, year, title, journal, vol. number, first page number.

    for books: author (s) or editor (s), year, title, publisher, city and country of publication.

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UNIVERSITY OF HAWAII

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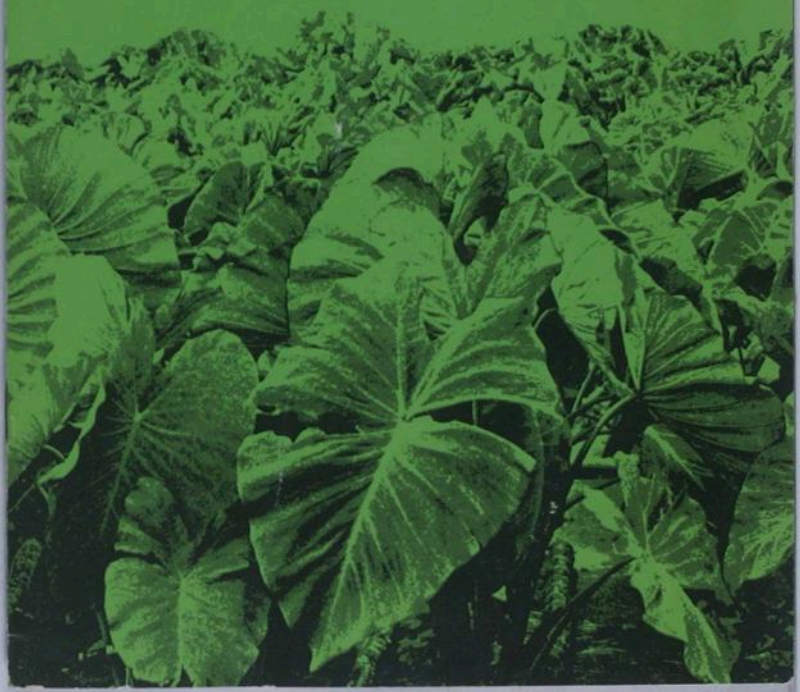

Recorded: 9.9.70
Duration: 18'25"
Tape No.: OR/42L097G

Producer: Michael Pickstock
630 SE Bush
Ext'n: 2476

THE FARMING WORLD

NO. 597

Narrator: Hugh Barrett.

1. DEVELOPING DAIRYING IN KENYA:

Jack Ensoll talks to Bruce MacKenzie, Minister for Agriculture, Kenya, about their plans to import surplus dairy cattle from Europe to promote dairy produce ("white revolution") in Kenya. This is one of the ways in which Kenya hopes to diversify out of coffee.

2. INTERNATIONAL ROOT CROP SYMPOSIUM:

Delegates to the second International Symposium on Tropical Root Crops have been discussing several important but research neglected crops such as sweet potato, cassava, yam and taro. Ken Bean summarises discussions on sweet potato and cassava at the Symposium in Hawaii. Read by Chris Lewis. (Two reports)

3. HELPING SMALL FARMERS IMPROVE:

The Alcan Co. of Jamaica lets 15,000 acres to 4,000 small farmers. Ken Maxwell from Jamaica tells Michael Pickstock how Alcan provide extension and other services to these farmers, who last year sold over £2 million of produce.

4. BRITISH ASSOCIATION:

John Newell interviews Dr. H.C. Pereira.

TRANSMISSIONS:

WS Wednesday 9th September 1970 at 1715 GMT
WS Thursday 10th September 1970 at 0730 GMT
WS Friday 11th September 1970 at 0030 GMT

BARRETT: Bruce MacKenzie, Kenya's Minister of Agriculture, and a very ambitious plan, . w h i c h to succeed and fully exploit the potential of animals from Europe will call for a well planed support organisation on the farms in Kenya.

Now from cattle in Kenya to Hawaii where the second international symposium on tropical root crops has just ended. Now perhaps because they are so widely grown - so much accepted as part of the food landscape - root crops have not until recently attracted the research they merit. Well, from Hawii, Ken Dean editor of the World Crops magazine has sent us two reports on the discussions there. The first on cassava - is read for us by Chris Lewis.

LEWIS: Cassava was seen as the source of industrial starch for the future by Dr. Franklin Martin, Plant Geneticist at the Department of Agriculture's Experimental Station at Mayaguez in Puerto Rico. He pointed out that even in its present unadvanced state of evolution, it provides more starch per acre per year than any other crop known - and yet world industry relies for its' starch on two lesser sources, maize and potatoes.

Another potential for cassava exists as a cattle food. For this purpose Thailand, Brazil, Angola and Nigeria have major markets in West Germany, The Netherlands and Belgium. This potential for cassava was confirmed by Edgard Normanha, agronomist at the Instituto Agronomico, Sao Paulo, Brazil. Brazil is the world's largest producer of cassava.

Considerable interest has centered on the work of a team headed by Prof. David J. Rogers of the University of Colorado. They have been using a computer in classifying wild and cultivated species of cassava as a source of material for improvement in breeding.

For someone working in the biological sciences, to be specialising in a crop which is basically a peasant one was sensational enough, but when one of his team, Graham Hersh, turned out to be a systems analyst, a job more normally associated with big business, the effect was startling. David Rogers said "we must have a computer to make sense of all the information we have - no one mans brain can retain it. Now it seems logical to use someone like an analyst to ensure we use that information for practical purposes, and don't get carried off into useless projects".

The systems analyst, Mr. Hersh himself, brought the conference up with a jolt, when in describing his function he posed the question "why do you want to improve cassava? Isn't there a better way of improving the lot of the farmer's at present growing it? And if there isn't is there a better way of doing it than breeding?"

His employment did, then, seem to have more than a novelty value. Specialists - like plant geneticists can easily forget the farmer who is waiting for the results of research. It is to the credit of Rogers that he, a specialist himself, should recognise this.

BARRETT: Thank you Chris.
We shall have another report from Hawaii, but before

BARRETT: Ken Maxwell from Jamaica, and how very encouraging to hear of such small farmers successes.

And now before we go back to the root crops symposium let me remind you that you're listening to The Farming World broadcast in the BBC's World Service from London.

So following on from the potential of cassava as a root crop in the tropics - here's Chris Lewis again with a second report from Ken Bean in Hawaii which summarises the discussions on that important root vegetable the sweet potato.

LEWIS: Sweet potato is the only tropical root to have entered into commerce in a big way, and it occupied a whole day of the conference.

Apparently there's a temptation for breeders to use varieties evolved in one society, for a specific purpose, as the base of improvement in other parts of the world. And a warning against this came from Dr. Alfred Jones of the U.S. Department of Agriculture, Georgia.

He pointed out that there is a wide genetic variety in most developing countries, from which it would be better to breed to suit local needs, which are often different from those of the United States, where sweet potato is extensively cultivated in the south for table use.

Dr. Jones compared the American table varieties with the sort of sweet potato grown in Japan, where it's used widely as a source of industrial starch and as a stock feed. But, he said, even in America the sweet potato is a crop in its infancy, because of this concentration on one type - the table vegetable.

In conclusion, he said, properly developed sweet potato varieties should be available to fulfil four demands: first, as a luxury table vegetable, second, as a staple diet crop, third, as a livestock feed, and fourthly as a source of starch for industry.

This view was supported by Pat Haynes of the University of the West Indies in Trinidad. He was also concerned with possible mis-interpretation of comparative trials and experiments with sweet potato. Local varieties grown for subsistence often show poor response to fertilisers, but said Pat Haynes, this does not mean that it is impossible to breed a sweet potato that will respond to fertilisers and yet still maintain the character of the local type in such things as disease resistance.

BARRETT: Chris Lewis, with a report from Ken Bean, at the International Symposium on Tropical Root Crops in Hawaii. Next week we hope to have further reports on the yam the taro and plans to set up an International body to further research into these rather neglected tropical crops.

Recorded: 17th September 1970 Produced by: Michael Pickstock
Duration: 18'30" 630 SE Bush
Tape No.: OR/42L098G PABX 2476

THE FARMING WORLD

NO. 598

Narrator: Hugh Barrett.

1. E.E.C. Negotiations.

Negotiations for U.K. entry start again this week. Jim Murray, political economics correspondent has just returned from an extensive tour of E.E.C. countries and institutions and talks to Hugh Barrett about his impressions.

2. International Root Crops Symposium.

Ken Bean, who covered this symposium in Hawaii for his own magazine "World Crops", summarises discussions on the yam and taro and talks to Hugh Barrett about the new international body set up to co-ordinate research into this neglected group of food plants.

3. Research and Development.

Biological control of Dutch Elm Disease; size of calf pellets affects growth rate; new system for marking livestock - by ball-point type pen; infra red milk testing; bald chickens a white elephant! Read by Chris Lewis and Michael Pickstock.

4. Carobs for Cattle Feed.

Dr. Chuck Vlitos, Director of Research, Tate and Lyle, describes to Aubrey Wilson their project for building a pilot plant in Cyprus which will use microbial synthesis to make 33% protein cattle food from carobs (locust bean).

TRANSMISSIONS:

WS Wednesday 16th September 1970 at 1715 GMT
WS Thursday 17th September 1970 at 0730 GMT
WS Friday 18th September 1970 at 0030 GMT

from him last week on cassava and sweet potato with a summary of the discussions on yam and taro. These were the main crop subjects at the International Symposium on Tropical Root crops in Hawaii. Very glad to have you here in person Ken.'

BEAN: Thank you Hugh it's nice to be back. It was a feature of this conference that breeding and the improvement of varieties dominated the attention of delegates. This is perhaps natural, for roots tend to be principally subsistance crops which often fail to respond to fertilisers, They can't be harvested mechanically because of their awkward shape, they resist mechanised planting for the same reason and generally they are in danger of being overlooked as a major source of food, which of course they are. Because modern agriculture is completely incapable of helping.

Inevitably they are compared with the potato - the Irish potato that is - which itself originated from a tropical region and has been improved out of all recognition by breeding. The inference is obvious to agricultural scientists that the first step in developing this immense range of useful crops as a means of improving the welfare of the people who live by them is to improve those varieties.

But there was a Prof. Enyi a Nigerian agronomist working at the Faculty of Agriculture of Dar-Es-Salaam University, in Tanzania, who spoke out against this approach. He said "the limiting factor in the improvement of yams is not availability of suitable breeding material, but more in the unsatisfactory cultivation practices employed" he said this to a conference which tended throughout to be sold on the idea that root crops could only be improved by making better varieties available. He thought this was nonsense - at least whilst those root crops were so badly farmed.

Delegates on Hawaii, also saw taro being grown traditionally by flood irrigation. There they use methods that are remarkably similar to the cultivation of rice with ploughing levelling and planting into the puddled field. The main purpose of the irrigation seems to have been for weed control as in rice. But the Kauai Branch of the Hawaii College of Tropical Agriculture they have developed an improved system - or it appears to be improved - by which they are growing on ridges and furrow irrigating only twice a week. On comparative plots - believe it or not - they have shown that the furrow irrigated taro was growing better than that which was flood irrigated by the traditional means. The possible advantages of furrow irrigating as opposed to flood irrigation is that it will enable them to get machinery on to the land whilst the field is dry so that they could use such equipment as a semi-mounted tomato transplanter for actually transplanting the taro. At the time of harvesting perhaps they could use a modified potato harvester.

BARRETT: Ken, I believe there's a proposal now to set up an international Society for Tropical Root crops. What would be it's aims?

BEAN: Well their main object is to improve the utilisation of tropical roots and of course to improve the varieties and they hope to do this by one or two methods. Having set up the Society they now propose to set up an international centre - information centre where anyone can go for information on root crops. And also from there of course they will publish various manuscripts - hand books, this sort of thing.

BARRETT: How do people interested get in touch with this organisation?

BEAN: Well the man to contact, is Pat Haynes at the University of West Indies, in St. Augustin, Trinidad.

BARRETT: Good.

Ken I'm just a bit puzzled. Why this sudden surge of interest in tropical root crops?

BEAN: Well it's not so much a sudden surge; there has been this interest for a long time now. But of course there is no denying that it has only been an interest amongst a relatively select few. People who have concerned themselves with it. Tropical root crops have not drawn the attention of shall we say the more commercially minded organisations. For the simple reason they are subsistance crops. But they are one of the principle food crops of the world.

BARRETT: Ken, just leaving the Symposium for a moment and talking about agriculture generally in Hawaii. Did you feel that farmers there were taking advantage of such research as is already available to them?

BEAN: Yes, as far as Hawaii is concerned I am sure they are. Because they have there the College of Tropical Agriculture in Hawaii and I feel that because they are in close proximity to it they are using it.

BARRETT: Thank you Ken for coming to join us for this edition of The Farming World of the BBC's World Service from London, and Ken, I hope that we can expect a more full report on this root crop symposium in Hawaii in the next edition of "World Crops" can we?

BEAN: Oh yes. This was one of the main purposes of my going there.

BARRETT: Good, thank you. Well now to our bulletin of research news from Michael Pickstock and Chris Lewis.

And that's almost it for this week, but Ken Bean who is still with me has just passed a note to say that the first part of the proceedings of the Tropical Root Crop Symposium in Hawaii are already printed and available from this address. Dr. Donald Plucknett at the College of Tropical Agriculture, University of Hawaii, Honolulu. Price $3.

Thank you Ken and from all of us here, goodbye.

→ Prof. D. Rogers

With Compliments

world crops

RIVERSIDE HOUSE, HOUGH STREET, WOOLWICH, LONDON, S.E.18.
Telephone: 01-855 7001

The enclosed transcripts of broadcasts I did at the time of the Hawaii Conference may interest you

Ken Blackburn

ROOT
&
TUBER CROPS
TOMORROW

SECOND INTERNATIONAL SYMPOSIUM AND INTERCHANGE
ON TROPICAL ROOT AND TUBER CROPS

AUGUST 22 - 31, 1970

2525 Varney Circle
University of Hawaii
Honolulu, Hawaii USA
96822
Cable Address: UNIHAW

March 31, 1970

TO: All authors

SUBJECT: Proceedings Second International Symposium and Interchange on Tropical Root and Tuber Crops

I would like to remind you that manuscripts to be published in the Proceedings are due May 1. Please be prompt in sending your papers to me, as the Proceedings must go to press shortly thereafter.

Also, it will now be possible to publish some photographs in the Proceedings. These should be pertinent to the paper and must be of high quality. The following specifications have been set for photographs: glossy print, 12.5 x 17.5 cm or larger in size.

Your cooperation on these matters will be appreciated.

Donald L. Plucknett

Donald L. Plucknett
Chairman
Organizing Committee

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&
TUBER CROPS
TOMORROW

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Your cooperation on these matters will be appreciated.

Donald L. Plucknett

Donald L. Plucknett
Chairman
Organizing Committee

Taximetrics Laboratory
101 Armory

January 28, 1970

Dr. Donald L. Plucknett
Univ. of Hawaii
College of Tropical Agriculture
Kauai Branch Station
Kapa, Hawaii 96746

Dear Dr. Plucknett:

We mailed to you yesterday the informal abstracts of the 5 papers to be presented at the forthcoming Intl. Root and Tuber Crops Symposium, by the members of this Lab. One of these 5 is "UNTAPPED GENETIC RESOURCES FOR CASSAVA BREEDING, BY D.J.ROGERS & S.G.APPAN". By mistake the 2 file copies of this abstract was also mailed to you yesterday along with the original. I would very much appreciate the return of the 2 file copies as soon as possible, because we do not have a copy with us.

Thanking you in anticipation

Yours sincerely

Dr. S.G.Appan
Research Associate

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TO Dr. Donald L. Plucknett
Univ. of Hawaii Kauai Branch
Sta., Kapaa, Hawaii ZIP CODE 96746

PDD Form 3806, Feb. 1968 RECEIPT FOR REGISTERED MAIL

26 January 1970

Dr. Donald L. Plucknett
University of Hawaii
College of Tropical Agriculture
Kauai Brnach Station.Kapaa, Hawaii 96746

Dear Dr. Plucknett:

Enclosed are five abstracts of papers we wish to present at the Second International Symposium and Interchange om Tropical Root and Tuber Crops.

These are by various members of the Taximetrics Laboratory which is currently a part of the Division of Population Studies.

Also enclosed is the formal registration (application) forms from Mr. Gilbert N. Hersh and Dr. Henry S. Fleming.

Thank you for your time and cooperation.

Sincerely,

David J. Rogers
Professor of Biology and Division Chairman

DJR:ng
Air mail, special delivery

First questionnaire filled out and sent to Donald Plucknett on 1st Oct. 69.

Paper to be presented by Dave:

Biological economics of Cassava.

Requested for dormitory accommodation and reservations for the pre meeting tour of Island of Hawaii (probably on Aug 21 or 22) for 2 persons, and also the post meeting tour of the Island of Kauai (prob. on Aug 30 or 31) for 2 persons.

Paper to be presented by Appan:

A strategic crop improvement program for Cassava.

same tours as Dave requested

ROOT
&
TUBER CROPS
TOMORROW

SECOND INTERNATIONAL SYMPOSIUM AND INTERCHANGE
ON TROPICAL ROOT AND TUBER CROPS

AUGUST 22 - 31, 1970

2525 Varney Circle
University of Hawaii
Honolulu, Hawaii USA
96822
Cable Address: UNIHAW

The Second International Symposium and Interchange on Tropical Root and Tuber Crops will be held at the University of Hawaii, Honolulu, Hawaii from August 22-31, 1970. The meetings will be co-sponsored by the College of Tropical Agriculture and the Institute for Technical Interchange-East West Center, University of Hawaii. There will be two sites for the meetings; the main campus of the University of Hawaii in Honolulu and the Island of Kauai.

The meeting will emphasize one major crop or group of crops per day. Each day will begin with an invited speaker who will review the status and the future for the crop, followed by a panel discussion consisting of regional authorities. Contributed papers dealing with the crop will also be presented.

Field trips and excursions to pineapple and sugarcane plantations and other agricultural industries will be scheduled. Tours to the Island of Hawaii will be scheduled for those interested. The islands of Oahu and Kauai will be visited as part of the program of the meeting.

Dormitory housing will be available at the University during the sessions in Honolulu. Commercial hotels are also available for those desiring such accommodation. On Kauai hotel accommodations will be used.

A Proceedings of the meetings will be published. Publication procedures and information will be mailed to those persons who plan to deliver papers.

For program and publication planning purposes, informal abstracts of contributed papers should reach the Secretary by Feb. 1, 1970.

International flights to Hawaii arrive at Honolulu International Airport. For persons travelling to or from the Mainland United States, flights are also available on a number of U.S. carriers to Hilo Airport on the Island of Hawaii. Thus it is possible to arrive in Honolulu and leave for the mainland via Hilo, or vice versa. A tour of the island of Hawaii will be scheduled prior to the meeting in order to utilize this travel option for persons arriving in Hilo from the mainland United States.

A questionnaire concerning arrangements for the meeting is enclosed. Could you please complete and return this form to the Secretary as soon as possible?

Could you please call attention of other persons in your organization to this meeting? If further information is desired, please contact the Secretary. Also, photocopies of the questionnaire can be made for use by other interested parties.

Donald L. Plucknett
Chairman, Organizing Committee

Sponsoring Institutions: University of Hawaii—College of Tropical Agriculture, East West Center—Institute for Technical Interchange

GENERAL PROGRAM

Second International Symposium and Interchange for
Tropical Root and Tuber Crops

Aug. 21-23 pre-meeting tours

Aug. 21-22	Island of Hawaii
Aug. 23	Island of Oahu

University of Hawaii, Honolulu

Aug. 24	The sweet potato.
Aug. 25	Cassava
Aug. 26	The potato in the Tropics.
Aug. 27	Yams (travel to Island of Kauai in afternoon).

Island of Kauai

Aug. 28	A.M.	Aroids
	P.M.	Miscellaneous crops.
Aug. 29	A.M.	Research needs and recommendations. Discussion and review of a proposal to establish an "International Tropical Root add Tuber Crop Association".
	P.M.	Field trip - Hanalei Valley, taro production center, and other agricultural centers.
Aug. 30		Field trip "Lawaikai" gardens. This garden is proposed as one of the sites for a National Tropical Botanic Garden.
Aug. 31		Post-meeting tour of Oahu or Kauai.