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Carnegie Mellon University
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Pittsburgh, PA 15213-3890
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Email: huntinst@andrew.cmu.edu
Web site: www.huntbotanical.org

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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.

JOSEF BOGNER
BOTANISCHER GARTEN
MENZINGER STRASSE 63
D-8 MÜNCHEN 19
ALLEMAGNE FÉD.
W. GERMANY

27 - 4 - 77

Dear Dr. Rogers,

Enclosed I am sending you a photograph of a very interesting Manihot, which I saw in Burle Marx' garden near Rio de Janeiro. The plant was wild collected in Brazil.

Manihot sp., Brazil. Bogner 1261.

Small shrub, ca. 1 m high. Leaves coriaceous, glaucous, somewhat waxy, veins pink. Flowers yellowgreen.

I would be very glad if you could name this plant. If necessary I can send you herbarium material. You can keep the photograph.

Sincerely yours

J. Bogner

(J. Bogner)

No doubt *M. peltata* Pohl



UNIVERSITY OF MARYLAND
Division of Agricultural and Life Sciences
College Park 20742

Department of Botany
(301) 454-3812

November 19, 1975

Professor David J. Rogers
Department of Environmental,
Population and Organismic Biology
University of Colorado
Boulder, Colorado 80309

Dear Dave:

First, thanks very much for the precious negatives of manihot cultivars. I shall care for them, have them printed immediately, and return them promptly by insured air mail. I am grateful for your generosity and kindness in sharing them.

Secondly, I have asked our ecologist, John C. Stevenson, to see what he can do to help you in your desire for an ecologist/ethnobotanist. No one in particular came to my mind. I'd suggest you send a blurb to Dr. James A. Duke. Jim, you may know, is with the U.S.D.A., Agricultural Research Service in Beltsville, Maryland. He is in charge of the Plant Taxonomy Section, but most of their plant taxonomy is devoted to economically important plants. He may know of potential candidates since he works closely with universities, including ours.

A few weeks ago, a woman called me saying she was a former student (?) of yours and asked my help in securing a job in this area. I asked her to send me her curriculum vitae so I could have some facts about her background at hand. I told her, then I might be able to help her. So far, no reply. I've forgotten her name, but you must know her. If you write to her, you might ask that she follow through with her vita; I'll see what I can do for her.

Again, thanks for your kindness.

Cordially,

William Louis Stern
Professor of Botany

cc: Professor Oswald Tippe

P. S. You ought also to bring your position of ecologist/ethnobotanist to the attention of F. Raymond Fosberg at the Smithsonian. He often knows of students who might be available.



UNIVERSITY OF MARYLAND
Division of Agricultural and Life Sciences
College Park 20742

Department of Botany
(301) 454-3812

SEP 15 1975

September 12, 1975

Dr. David J. Rogers
Department of Biology
University of Colorado
Boulder, Colorado 80302

Dear Dave:

I wonder if you would be in a position to help me and Oswald Tippo. We are in the final stages of preparing a general botany textbook for the non-science major. Our outlook is humanistic and cultural and, therefore, we place considerable emphasis on the relationships between plants and man. We would like very much to illustrate manihot as one of man's important food plants and we need good photographic material. Would you have any black-and-white or sharp color transparencies of the entire plant and close-ups of the basal parts showing the mass of root tubers? We would be quite willing to prepare our own prints from any originals you might have and to return these to you immediately. Naturally, we would be happy to reimburse you for any out-of-pocket expenses you might incur and to acknowledge your help in print. If you can help us, we will be very grateful.

Sincerely yours,

William Louis Stern
Professor of Botany

WLS:jw

cc: Professor Oswald Tippo

UNIVERSITY OF COLORADO

BOULDER, COLORADO ~~XXXXX~~ 80309

Department of Environmental,
Population and Organismic Biology

Dear Bill:

I am sorry to have delayed so long in answering your request for photos of Manihot cultivars. I enclose several, from which you may choose the ones best suited to your needs. I only have the proof-prints, so can't determine just how sharp the negatives are--you can try them out for yourself. Perhaps a little selective cropping and enlarging can be done to give you more of what you need for your book.

These negatives are keyed to ^{my} ~~xxx~~ herbarium collections, and so constitute some rather valuable documents. Please return them by some form of mail that helps insure their return. Thanks.

Sincerely,



David J. Rogers



UNIVERSITY OF MARYLAND
Division of Agricultural and Life Sciences
College Park 20742

DEC 12 1975

Department of Botany
(301) 454-3812

December 9, 1975

Professor David J. Rogers
Department of Environmental,
Population and Organismic Biology
University of Colorado
Boulder, Colorado 80309

Dear Dave:

I am enclosing your pictures of manihot plants which I hope will arrive in good shape. I had them copied for use in Tippo's and my forthcoming book, "Humanistic Botany." As you requested, the envelope has been sent by registered mail. Despite the ravaging of the postal service, I trust the contents will arrive unsmashed, unbent, unrumpled, and unscathed. This is a great presumption, I know. Again, thanks so very much for allowing us to use your pictures; we appreciate it.

Very good wishes for the holiday season.

Cordially yours,

Bill

William Louis Stern
Professor of Botany

WLS:jw

Enclosure

JUL 23 1975

BRITISH MUSEUM (NATURAL HISTORY)

Cromwell Road,

London, SW7 5BD.

Telegrams: NATHISMUS, LONDON, S.W.7.

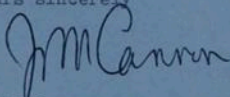
Dr D J Rogers
University of Colorado
Taximetrics Laboratory
Department E.P.O Biology
Boulder
Colorado 80302
U S A

15 July 1975

Dear Dr Rogers

Further to my letter of 12 May 1975, I am writing to inform you that, at their meeting on 10 July 1975, the Trustees of this Museum agreed that the missing sheet of Manihot from our Loan No.1641 should be written off. However, if this specimen does turn up in the future, we should of course be very glad to have it back.

Yours sincerely



J F M Cannon
Deputy Keeper of Botany

DATE RECEIVED: MAY 19 1975

Routing:

	<u>Initial</u>
Abbott, Lois	_____
April, Jay	_____
Bailey, Mark	_____
Bishop, Judy	_____
Hanley, Jim	_____
Hersh, Gil	_____
Louis, Joan	_____
McArthur, Greg	_____
Mount, Janet	_____
Rogers, Connie	_____
Rogers, Dave	⑪ _____
Saldana, Jose	_____
Schiffman, R.	_____
Slater, Chuck	_____
von Borstell, G.	_____
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Filing:

Original Man. bot

Copies:

In ✓ on
Out _____
Internal _____
Administration _____
Fiscal/Contract _____

Organization _____

Project _____

Proposal _____

COMMENTS:

MAY 19 1975
BRITISH MUSEUM (NATURAL HISTORY)
Cromwell Road,
London, SW7 5BD.
Telegrams: NATHISMUS, LONDON, S.W.7.

Dr D J Rogers
University of Colorado
Taximetrics Laboratory
Department E P O Biology
Boulder
Colorado 80302
USA

Our Ref. 2033/12

12 May 1975

Dear *Sam*

Thank you for your letter of 6 May. I shall ask for authority to write off the missing sheet of Manihot at our next Trustees' Meeting.

Sorry I shall not be seeing you in Leningrad.

Yours
Bob

R Ross
Keeper of Botany

maahat

June 16, 1975

Mr. Guy Dresser
Allen Press
Lawrence, Kansas 66044

Dear Mr. Dresser:

I enclose a copy of an article that appeared in Economic Botany
in Volume 27. I would like a quotation on the cost of 50 more of this
article at your earliest convenience.

Sincerely yours,

David J. Rogers
Professor of Biology

DJR:hfr
Enc.

UNIVERSITY OF COLORADO
Taximetrics Laboratory
Department I.P.O. Biology
Boulder, Colorado 80302
Phones: 492-6909
492-8598

February 27, 1975

Mr. Joseph G. Sutton
The New York Botanical Garden
Bronx, New York 10458

Dear Joe:

I would like to inquire about obtaining one hundred additional copies of "A Monograph of Manihot esculenta with an Explanation of the Taximetrics Methods Used", by David J. Rogers and Henry S. Fleming. It was reprinted from ECONOMIC BOTANY Vol. 27, No. 1, January - March 1973, pp. 1 - 113.

My supply of reprints has been exhausted and I need to replenish it. Can you tell me the means of obtaining further copies and the price of each?

Thank you for your help.

Sincerely,

Arly Allen Press - Lawrence Kansas
913 843-1234

66044
David J. Rogers
Professor of Biology

Guy Dresser -

ask Mr Arly Allen cost of reprints

HAFNER PRESS
A DIVISION OF MACMILLAN PUBLISHING CO., INC.
866 Third Avenue, New York, N. Y. 10022

JAN 10 1975

Janet

January 6, 1975

Mrs. Janet M. Mount
Taximetrics Laboratory
Hale 114
Univ. of Colorado
Boulder, Colorado 80302

Dear Mrs. Mount:

Thank you for your letter of December 16 in reference to the purchase of ten copies of *Flora Neotropica* 13. The contract makes no reference to author discounts. I suggest you advise Dr. Rogers to buy the copies you desire directly from the Organization for *Flora Neotropica*. The organization's discount is 30% off list price.

Sincerely,

Eileen Sherry

Eileen Sherry
Editorial Assistant

UNIVERSITY OF COLORADO
Taximetrics Laboratory
Department E.P.O. Biology
Boulder, Colorado 80302
Phones: 492-6909
492-8598

Janet

December 16, 1974

Hafner Press
A Division of Macmillan Publishing Co. Inc.
866 Third Avenue
New York, New York 10022

Dear Sirs:

I would like to make an inquiry for Dr. David J. Rogers of the Taximetrics Laboratory, University of Colorado. We would like to obtain about ten additional copies of Flora Neotropica "Monograph No. 13 - MANIHOT MANIHOTOIDES (Euphorbiaceae)" by David J. Rogers and S. G. Appan, published for Organization for Flora Neotropica by Hafner Press, N. Y., June 22, 1973.

Can you tell me what the cost of each further copy would be and how long it would take for printing?

Thank you for your help.

Sincerely,

Janet M Mount

(Mrs.) Janet M. Mount
Taximetrics Laboratory
Hale 114
University of Colorado
Boulder, Colorado 80302

DATE RECEIVED: 6/25/72

Routing:

	<u>Initial</u>
Abbott, Lois	
April, Jay	
Bailey, Mark	
Bishop, Judy	
Hanley, Jim	
Hersh, Gil	
Louis, Joan	
McArthur, Greg	
Mount, Janet	
Rogers, Connie	
Rogers, Dave	10
Saldana, Jose	
Schiffman, R.	
Slater, Chuck	
von Borstell, G.	

Filing:

Original Manuscript

Copies:

In ✓ (Letter)

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Organization _____

Project _____

Proposal _____

COMMENTS:

July 8, 1975

Dr. J. B. Hanson
Plant Physiologist
Division of Biomedical and
Environmental Research
U. S. Energy Research and
Development Administration
Washington, D.C. 20545

Dear Dr. Hanson:

You asked for my comments on Dr. Carl C. Moh's application for continued studies on cassava breeding. There is no "pure" reaction on this proposal that gives either a green or red light to Moh's work. First of all, our knowledge of cassava is so primitive that, if we did it right, we would start with very straight-forward low-level agronomic improvement and selection of existing cultivars, but we would do this only in light of known economic and social needs. However, as usual, we jump into things at a very high scientific level without evaluating the reasons for doing so.

In answer to your question whether it is valuable to attempt to produce a plant free of the cyanogenic glucoside, the answer is a guarded yes. Because there are no known existing cultivars free of the cyanogen, there is no way we can judge whether the presence of this substance provides any value to the plants as a protective agent or not. If Moh gets a plant free of the agent, then we'd have some capability to find out if the agent does provide such service to the plant. My guess is that the agent doesn't entirely provide this service because there are all kinds of animals that attack some part of the plant. But that is a guess, and not worth as much as definite proof. I would further guess that the only way to get a cyanogen-free plant is by the route Moh is taking. For this reason, I think this part of his work should be supported.

On the production of a suitable growth habit for inter-cropping, I have no basis to judge what it is they're looking for. There exist a large number of growth habits in populations at present, from low, sprawling habit to very slender, unbranched types, with many intermediates. Therefore, on this aspect of mutation breeding, I would assign a lower priority. With respect to vigor, again I have no real basis for judging. If vigor means earliness of production, then there might be some basis for efforts to produce mutagens. But again, there is so much natural variability in the cultigen that it may be more meaningful to set some collectors to work with a well-defined program of collection from areas where earliness would already have been selected for.

Dr. J. B. Hanson
July 8, 1975
Page Two

The above comments do not, I am sure, give you much real help with evaluating Moh's proposals. However, recall my first statement that we know so very little about the cultigen that almost anything we might learn from any approach is, in my opinion, meaningful. I think Moh is a pretty good worker, and his observations might pay off in directions that we have no knowledge of from the direction he is presently following. In the past, he has produced results that were useful, and I see no reason to stop the work. Besides, there is already quite an investment in hardware, which probably would not be put to much use in other directions, so from the standpoint of protecting past investment, this work should continue.

Sincerely yours,

David J. Rogers

DJR:hlf



UNITED STATES
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
WASHINGTON, D.C. 20545

JUN 25 1975

June 20, 1975

Dr. D. J. Rogers
Taximetric Laboratory
University of Colorado
Boulder, Colorado 80302

Dear Dr. Rogers:

I wonder if I might impose upon you for a review of the enclosed renewal proposal of Dr. Carl C. Moh, "Atomic Energy Applied to Agriculture in Latin America." I would appreciate return of the proposal with your comments.

We are particularly concerned as to whether the cassava breeding program has merit. It is necessary to produce mutants in order to obtain low cyanide and upright stature, or would it be more profitable to incorporate these traits by utilizing existing cultivars? It is desirable to produce cultivars low in cyanogenic glucosides (i.e., is there a standoff between hazard to human health and susceptibility to insect attack)? Is the effort to produce a growth habit suitable for intercropping worthwhile? Do the plans for investigating the physiology of vigor and productivity look reasonable?

I ask these questions because I am not satisfied with some of the reviews we have had of Moh's proposal. I suspect the reviewers know as little about cassava as I do! Although I have these questions, please feel free to comment on any part of the proposal.

Sincerely,

J. B. Hanson
Plant Physiologist
Biomedical Programs
Division of Biomedical and
Environmental Research

Enclosure:
As stated



Handwritten:
Hort
Manihot
w/resp.

May 6, 1975

Mr. R. Ross
Keeper of Botany
British Museum (Natural History)
Cromwell Road
London, SW7 5BD.

Dear Bob:

Sorry that the one specimen of Manihot that was missing from my Loan No. 1641 persists in staying lost (although I have attempted to find it). Therefore, I am afraid you will have to ask your trustees for permission to write it off.

I shall not be attending the International Botanical Congress in Leningrad because, unfortunately, I have a commitment to a Wheat Symposium, also to be held in Leningrad, immediately following the Botanical Congress. I am sorry that I can't be there to see you.

Sincerely yours,

David J. Rogers

DJR:hfr

BRITISH MUSEUM (NATURAL HISTORY)

Cromwell Road,

London, SW7 5BD.

Telegrams: NATHISMUS, LONDON, S.W.7.

Dr D J Rogers
Taximetria Laboratory
Department of Biology
University of Colorado
Boulder
Colorado 80302
USA

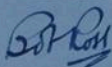
25 April 1975

Dear Dr Rogers

When you returned our Loan No. 1641, which consisted of 100 sheets of *Manihot*, to us in February 1973 there was one sheet outstanding. Is there any possibility of this coming to light or should I request our Trustees for permission to write it off and thus get off our books?

Shall I be seeing you in Leningrad this summer?

Yours sincerely



R Ross
Keeper of Botany

*Manihot
corp*

May 6, 1975

Dr. Bassett Maguire
Executive Director
Organization for Flora Neotropica
The New York Botanical Garden
Bronx, New York 10458

Dear Bassett:

Could you please tell me the procedure to order an additional twenty copies of "Monograph No. 13 - MANIHOT MANIHOTOIDES (Euphorbiaceae)" Flora Neotropica? If you could tell me the cost per copy, I can then send in a purchase request.

Things are moving along quite nicely here and we are very busy with international work on a broad spectrum of activities in economic botany. Please give my regards to one and all at the NYBG, and especially to Celia. Connie sends her regards.

Sincerely,

David J. Rogers

DJR:hfr

DATE RECEIVED: MAY 01 1978

Routing:

	<u>Initial</u>
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April, Jay	_____
Bailey, Mark	_____
Bishop, Judy	_____
Hanley, Jim	_____
Hersh, Gil	_____
Louis, Joan	_____
McArthur, Greg	_____
Mount, Janet	_____
Rogers, Connie	_____
Rogers, Dave	_____
Saldana, Jose	_____
Schiffman, R.	_____
Slater, Chuck	_____
von Borstell, G.	_____
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Copies:

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Project _____

Proposal _____

COMMENTS:

Janet

UNIVERSITY OF COLORADO
Taximetrics Laboratory
Department E.P.O. Biology
Boulder, Colorado 80302
Phones: 492-6909
492-8598

January 13, 1975

Mr. Bassett Maguire
Executive Director
Organization for Flora Neotropica
The New York Botanical Garden
Bronx, New York 10458

Dear Mr. Maguire:

I am writing to you for Dr. David Rogers of the Taximetrics Laboratory of the University of Colorado. We would like to obtain about ten additional copies of Flora Neotropica "Monograph No. 13 - MANIHOT MANIHOTIDES (Euphorbiaceae)" by David J. Rogers and S. G. Appan, published for Organization for Flora Neotropica by Hafner Press, N. Y., June 22, 1973.

Can you tell me what the cost is of each further copy and how long it will take for printing? Is there a special discount for authors?

Thank you for your help.

Sincerely,

Janet M. Mount
(Mrs.) Janet M. Mount
Taximetrics Laboratory
Hale 114
University of Colorado
Boulder, Colorado 80302

DATE RECEIVED: MAR 07 1975

Routing:

	<u>Initial</u>
Abbott, Lois	_____
April, Jay	_____
Bailey, Mark	_____
Bishop, Judy	_____
Hanley, Jim	_____
Hersh, Gil	_____
Louis, Joan	_____
McArthur, Greg	_____
Mount, Janet	_____
Rogers, Connie	_____
Rogers, Dave	_____
Saldana, Jose	_____
Schiffman, R.	_____
Slater, Chuck	_____
von Borstell, G.	_____
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Copies:

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Organization _____

Project _____

Proposal _____

COMMENTS:



MAR 07 1975

Department of Agriculture,
University of Queensland

ST. LUCIA, BRISBANE, 4067

3rd March, 1975.

Dr. David J. Rogers,
Taximetric Laboratory,
University of Colorado,
Boulder,
Colorado, U.S.A. 80302.

Dear Dr. Rogers,

Thank you for your reprint of "Untapped Genetic Resources for
Cassava Improvement". This reprint has just arrived.

Sincerely,

A handwritten signature in blue ink, appearing to read 'E.J. Britten'.

E.J. BRITTEN,
Professor of Agriculture.

DATE RECEIVED:

2-26-75

Routing:

	<u>Initial</u>
Abbott, Lois	
April, Jay	
Bailey, Mark	
Bishop, Judy	
Hanley, Jim	
Hersh, Gil	
Louis, Joan	
McArthur, Greg	
Mount, Janet	
Rogers, Connie	
Rogers, Dave	1
Saldana, Jose	6/29
Schiffman, R.	
Slater, Chuck	
von Borstell, G.	

Filing:

Original Mar. hot Comp.

Copies:

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Out ✓
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Administration _____
Fiscal/Contract _____

Organization _____

Project _____

Proposal _____

COMMENTS:



SOUTH PACIFIC
REGIONAL COLLEGE OF TROPICAL AGRICULTURE
ALAFUA . APIA . WESTERN SAMOA

Principal:

Telephone 677

Our Ref.:

Your Ref.:

17th February. 1975

Professor D.J. Rogers
University of Colorado
Taximetries Laboratory
Dept. E.P.O. Biology Boulder,
Colorado 80302
U.S.A.

Dear Professor Rogers :

Thank you for your letter of 3 January and also the monograph on Manihot esculenta which is most informative. I will adopt your system as a basis for the classification of local cullivars (there are only a few) and will be pleased to forward the information as soon as the study is complete.

Yours sincerely,

Richard C. Hartland
R.C. HARTLAND

(AGRONOMIST)

Manihot

Taximetrics Laboratory

January 20, 1975

Dr. Barry L. Nestel
Associate Director
Agriculture, Food and Nutrition Sciences
International Development Research Centre
P. O. Box 8500
Ottawa, Canada K1G 3H9

Dear Barry:

A few days ago I wrote to you the name of an individual who might have identified Manihot pollen for Dr. Reichel-Dolmatoff. I have since learned that there is another individual who might be even more capable for tropical pollen, and this gentleman is

Mr. Jim West
Department of Anthropology
University of California
Davis, California.

If you correspond with him he may have the capabilities to identify Manihot and other pollen that come from the digs. I hope this is useful information. Best regards,

Sincerely,

David J. Rogers
Professor of Biology

DJR:hfr

January 3, 1975

Mr. R. C. Hartland
South Pacific College
of Tropical Agriculture
P. O. Box 890
Western Samoa

Dear Mr. Hartland:

Please forgive me for not responding to your letter of 11 June 1974 any sooner. I am sorry if this has inconvenienced you in any way. You may recall that you wrote a letter of inquiry concerning some aspects of my work on the classification of Manihot esculenta. The paper that you read from, Proceedings of the Second International Symposium on Tropical Root & Tuber Crops, was an incomplete summary of our work. We have in the meantime completed a monograph of Manihot esculenta, a copy of which is being sent to you in a separate package.

Many of the answers to the questions you posed in your letter will be answered in that monograph. As a further explanation, however, I will say that the characters and the character states implied in that study were those that would be generally available across a large number of samples, and we had to exclude some important data simply because the observations were not sufficiently available from something over one thousand samples.

We are continuing our development of both computer systems for classification as well as their application to the studies of cassava. We are doing this in cooperation with several institutions, one of which is C.I.A.T. Our endeavor not only includes further applications of our computer systems to Manihot classification, but further investigations into the improvement of the crop. At the moment C.I.A.T. has not adopted our set of characteristics, primarily because their endeavors are not in systematic analysis. It is my hope that through our cooperative endeavors we can expand the list of characteristics and get a generally agreeable set of standard definitions that can be used by all workers.

Once again, I apologize for the lateness of this letter. I trust that the information contained in this letter and in the above mentioned paper that I am sending will be of use to you.

Sincerely yours,

David J. Rogers
Professor of Biology

DJR:hfr

UNIVERSITY OF COLORADO
Department of Biology
Boulder, Colorado 80302
(303) 492-8598

January 3, 1975

Dr. Barry L. Nestel
Associate Director
Agriculture, Food and Nutrition Sciences
International Development Research Centre
P. O. Box 8500
Ottawa, Canada

Dear Barry:

On 20 September 1974 you wrote with the interesting information that Dr. Reichel-Dolmatoff is working on some digs in Cartagena and that he and his wife are extracting pollen samples from the digs. I personally am no palynologist and could not identify any large numbers of pollens. We do have a young man on campus, Dr. Harvey Nichols, who is such an individual. His address is The Institute of Arctic and Alpine Research, on this campus. He, however, is a specialist in Northern Canadian and other arctic pollens and probably would not be knowledgeable of tropical types. However, he might have some idea of who could identify the pollens.

You further asked what is the significance of M. carthaginenses today. The significance of this species is simply that it is well adapted to the very arid zones immediately adjacent to the Caribbean Sea. It is an extremely poisonous species with some enlarged roots. It might have possibly been a source of food in drought times, but it does not constitute any relation of specific importance to the cultigen M. esculenta.

I hope that these points are interesting to you and I am very sorry for the great delay in answering your letter of the 20th. You must know that we have just been awarded a contract from the new International Board for Plant Genetic Resources (IBPGR) to forge a global information system for genetic resources. This keeps us very busy and we have had very little time for pursuit of Manihot studies, although I trust that we will get back into it when I can hire a young man to assist in this purpose.

With best wishes for the New Year,

Sincerely,

David J. Rogers
Professor of Biology

DJR:hcf

Department of Agriculture

B.S. Kuppaswami,
Horticulturist.

Tapioca Research Station,
Salem-1.
(South India)
Dt. 18-6-74.

To
Dr. D. J. Rogers,
Taximetrics Laboratory,
Department of Biology,
University of Colorado,
Boulder, Colorado, 80302 (U.S.A)

B.1551/74 dt. 17-6-74.

Dear Doctor Rogers,

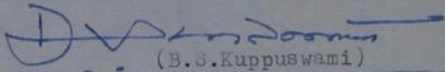
Sub: Publications on tapioca - acknowledged.

...

I acknowledge with grateful thanks the receipt of reprints of articles on Manihot esculenta Grantz so kindly sent by you. They have been of great help in drawing up ~~our~~ our programme of work at this newly started research station.

Thanking you,

Yours truly,


(B.S.Kuppaswami)
18/6/74

9-2-1975

January 14, 1975

Dr. F. Wangati
East African Agriculture and Forestry
Research Organization (EAAARO)
P. O. Box 30148
Nairobi, Kenya

Dear Dr. Wangati:

Recently Mr. Michel Frere asked if I could give you addresses where you might be able to learn more about the possible importation of cassavas resistant to a mite that is a problem for you there. May I suggest to you that you correspond with Dr. Hahn at the International Institute of Tropical Agriculture, Oyo Road, P.M.B. 5320, Ibadan, Nigeria. Dr. Hahn should have the most up-to-date information and possible resources of resistance there. I know of no work on this particular mite myself and hope that you will be able to get some information from Dr. Hahn.

Sincerely yours,

David J. Rogers
Professor of Biology

DJR:hcf

OCT 2 1974

Washington 16-10-1974

Dear Dave,

I am writing to you from Washington where I am attending the 6th Session of the Commission for Agricultural Interology of WCO, on behalf of FAO. During my conversations here I came across a problem for which perhaps your experience might be of some help:

It appears that recently in East Africa, the cassava crop is infested by a mite which has been identified as *MONONYCHELLUS TANANICIA*.

This mite which is found in Brazil where its action is insignificant on yield, reveals very noxious in Tanzania where crop loss from 20 to 40% have been registered.

According to conversations I had, the action of the government in the East African Confederation would tend to orient itself towards the introduction of disease resistant variety of cassava.

Their problem is however that they ~~cannot~~ do not know exactly whom to consult in this

inspect.

Since I remember your great interest in Maunabo, maybe you could help in providing them with some references regarding in this respect.

The person to whom the information would be useful is

Dr. F. WANGATI

East African Agriculture and Forestry Research
Organization (EAAFRo) . P.O. Box 30148 NAIROBI

~~Mogoga~~ - ~~NAIROBI~~ KENYA.

I would be extremely grateful for any
information you could pass on the subject
to Dr. WANGATI.

Best regards to you and your wife.
Yours sincerely,

C. B. B. B.

FRERE

DATE RECEIVED:

FEB 11 1975

Routing:

	<u>Initial</u>
Abbott, Lois	_____
April, Jay	_____
Bailey, Mark	_____
Bishop, Judy	_____
Hanley, Jim	_____
Hersh, Gil	_____
Louis, Joan	_____
McArthur, Greg	_____
Mount, Janet	_____
Rogers, Connie	_____
Rogers, Dave	_____
Saldana, Jose	_____
Schiffman, R.	_____
Slater, Chuck	_____
von Borstell, G.	_____
_____	_____
_____	_____
_____	_____

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Original Misc ² Manuscript

Copies:

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Internal

Administration

Fiscal/Contract

Organization

Project

Proposal

COMMENTS:

2) File in Manuscript

Correspondence -

1) Please find my letter
to Harley on this subject.

FEB 11 1975

Please address any reply to
THE DIRECTOR
and quote:
Your reference:

ROYAL BOTANIC GARDENS
Kew, RICHMOND, Surrey, England
Telegrams: Kewgar, Richmond, Surrey
Telephone: 01-940 1171

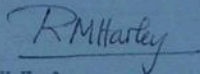
3 February 1975

Prof. D J Rogers
University of Colorado
Taximetries Laboratory
Dept. E.P.O. Biology
BOULDER
Colorado 80302

Dear Professor Rogers

Thank you for your letter of December 2 1974 concerning
the identification of our Manihot specimens from Bahia,
Brazil. We shall be pleased to despatch the material
in the summer for your attention. *If you would care to see
them then.*

Yours sincerely



R M Harley

DC

Manihot

February 20, 1975

Dr. R. M. Harley
Director
Royal Botanic Gardens
Kew, Richmond
Surrey, England

Dear Dr. Harley:

Following your letter of 3 February, I will expect to receive Manihot specimens from you from Bahia, Brazil, in July or August. Thank you for your willingness to wait until that time.

Sincerely yours,

David J. Rogers

DJR:hfr

December 2, 1974

Dr. R. M. Harley
The Director
Royal Botanic Gardens
Kew, Richmond
Surrey, England

Dear Dr. Harley:

I am sorry that time pressures prevent me from accepting your request for identification of Manihot specimens. If you could save your collections, we might be in a better position to make identifications next summer -- July or August.

Will you be kind enough to let me know if this alternate suggestion is feasible in your own time frame? Thank you for thinking of me for assistance.

Sincerely yours,

David J. Rogers
Professor of Biology

DJR:jkb

Please address any reply to
THE DIRECTOR
and quote:
Your reference:

Dr D J Rogers
University of Colorado Herbarium
University of Colorado
Boulder
Colorado U S A

ROYAL BOTANIC GARDENS
Kew, RICHMOND, Surrey, England
Telegrams: Kewgar, Richmond, Surrey
Telephone: 01-940 1171

12 November 1974

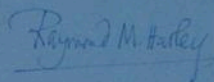
Dear Dr Rogers

Duplicates of plant material collected on the Kew expedition
to Bahia, Brazil (1974) will shortly be ready for study.

We are anxious to despatch sets, where appropriate to specialists
for determination. I am writing therefore to ask whether you
are prepared to determine our material of *Manihot* amounting
to approximately 10 sheets. If so I should be pleased to send
these as soon as they are ready.

I would be grateful if you could give me some estimate as to
how long the commitment will take you, if you wish to
undertake it.

Yours sincerely



R M Harley

JB.

UNIVERSITY OF COLORADO
Taximetrics Laboratory
Department E.P.O. Biology
Boulder, Colorado 80302
Phones: 492-6909
492-8598

December 5, 1974

Dr. S. K. Hahn
IITA
Oyo Road
P.M.B. 5320
Ibadan, Nigeria

Dear Dr. Hahn:

I am sending in a separate package two monographs on Manihot. I am very sorry that I have delayed so long in sending these papers to you. I trust that they will be useful and that you will share with me any evident errors that you may encounter in either of the papers.

With kindest personal regards,

Sincerely yours,

David J. Rogers
Professor of Biology

DJR:jkb

Erlant Norden sköld - The Ethnography of South America.
Seen from Mojos in Bolivia -
(Göteborg: Elanders boktryckeri
aktiebolag, 1924), *Comparative
Ethnographic Studies III*, pp. 34 ff.,
map 3, p. 254, and Table to Map 3,
pp. 38-43

H. Stehle "La nomenclatura de vegetales, etc.
Revue de botanique appliquée et d'agriculture
tropicale, XXVI (1946), p. 263

Tucupy - a sauce made from squeezed cassava juice
^{or} ticupy, or ticupy-pixuna, or coaracy-ticupy.

See Ross, pp. 46-52 for Indian vocabulary on E. Coast
taken from E. Stradelli, *Vocabularios da Lingua
Gera. Portuguesa - Nheêngatu e Nheêngatu Portuguesa*
Rio de Janeiro, Livraria J. Leite, 1929.)

The Tupinamba Indians.

says that Tupinambas used leaves, and fermented the roots.

anthropologists
Need to spend more time on food preparation to help understand origins.



GENERAL FOODS CORPORATION / W. North Street, Dover, Delaware 19901

JELL-O DIVISION

JELL-O/DOVER OPERATION

January 15, 1970

David J. Rogers
Professor of Biology
University of Colorado
Boulder, Colorado 80302

Dear Professor Rogers:

Your letter to Frank Hollis, of our Central Research Laboratory in Tarrytown, New York, has been forwarded to me. We are still continuing in our technical interest in Tapioca as it is one of our important raw materials.

In answer to your question, the most recent publication on Tapioca can be found in Chapter 5 of the following book:

"STARCH: CHEMISTRY AND TECHNOLOGY
VOLUME II, INDUSTRIAL ASPECTS"
Whistler, R. L. and Paschall, E. F.
Academic Press, 1967

~~Whistler~~

TP415
W55

Volume 1.

If we can be of any further service, please let us know.

Swain
Chem. Lib.

Sincerely yours,

Lee Shipman

Lee Shipman
Quality Control Superintendent

LS/lw

cc: Mr. J. L. Hegadorn
Mr. F. Hollis



INSTITUTO INTERAMERICANO DE CIENCIAS AGRICOLAS DE LA OEA

El Instituto es un organismo especializado de la Organización de los Estados Americanos. Fue establecido por los Gobiernos de las Repúblicas Americanas en 1942 para promover su desarrollo económico y social a través de la educación y la investigación.

Centro de Enseñanza e Investigación
TURRIALBA, COSTA RICA

Cable: IICA - Turrialba

February 13, 1970

Dr. David Rogers
Department of Botany
Colorado State University
Fort Collins, Colorado

Dear Dr. Rogers:

I am writing to inquire about information on the genetics of Manihot. Recently the Program would like to start some work on induced somatic mutations of this species and would like to have some literature concerning the genetic work. If I remember correctly, when we met in the New York Botanical Gardens you had a complete collection of literature of these species. I would appreciate it if you could give me a few of the most recent works on the genetics of Manihot, since the library here has no such literature at present.

My best regards,

Sincerely,

Carl C. Moh, Head
Nuclear Energy Program

El Instituto tiene su Dirección General en Costa Rica, Apartado 4359, San José. Sus tres Oficinas Regionales abarcan los siguientes países: Zona Andina, Apartado 478, Lima, Perú (Bolivia, Colombia, Ecuador, Perú y Venezuela); Zona Norte, Apartado 1815, Guatemala, Guatemala (México, Reino Centroamericano y Antillas Mayores); Zona Sur, Casilla de Correos 1217, Montevideo, Uruguay (Argentina, Brasil, Chile, Paraguay y Uruguay). Mantiene dos centros: Centro de Enseñanza e Investigación, Turrialba, Costa Rica; y Centro de Investigación y Enseñanza para la Zona Templada como parte del Centro de Investigaciones Agrícolas del Uruguay, La Estanzuela, Colonia, Uruguay. Administra el Proyecto 208 (Reforma Agraria) del Programa de Cooperación Técnica de la OEA, patrocinado por el Consejo Interamericano Económico y Social (CIES). Mantiene también núcleos de investigación y enseñanza para graduados en instituciones de los países miembros.

From

Dr. D. W. Kent-Jones BSc, FRIC

(Chairman, British Industrial Biological Research Association, Woodmansterne Road, Carshalton, Surrey)

Please reply to:

18 Welsby Court
Eaton Rise
Ealing
London W5
(01-997 5724)

Dr. David T. Rogers,
Department of Botany,
University of Colorado,
Boulder,
COLORADO,
U.S.A.

14th. November, 1969

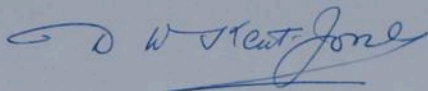
Dear Dr. Rogers,

I hope that you will not mind me (a complete stranger) writing you. I have studied cereals all my life and my book *Modern Cereal Chemistry* 6th. Edition. (Food Trade Press Garrick St., London. W.C.2) is reasonably well known. It is perhaps for this reason that the *Encyclopaedia Britannica* (now centred in Chicago) have approached me to write some 28,000 words for their new edition on Cereals & Cereal Products.

In the "headings" they have sent me they have included Cassava which is not a cereal and on which my knowledge is very limited. Thanks to contact with Dr. Howard S. Irvin of the New York Botanical Gardens I got your address as he thought you might be able to send me some short notes or useful reprints of papers.

I have just discovered a publication of F.A.O. (Rome 1956) on *Processing of Cassava & Cassava Products in Rural Industries* and this is quite helpful. I shall only be writing some 3-500 words on Cassava, but if you can help, without too much trouble to yourself, I shall be much obliged.

Yours sincerely,



EAST AFRICAN COMMON SERVICES ORGANIZATION

(EAST AFRICAN AGRICULTURE & FORESTRY RESEARCH ORGANIZATION)

TELEGRAMS: "HERBARIUM", NAIROBI
TELEPHONE: 20923. NAIROBI



EAST AFRICAN HERBARIUM,
AINSWORTH HILL,
P. O. Box 5166,
NAIROBI,
Kenya.

22nd. January 1970

OUR REF. B.136/70

Prof. David J. Rogers,
Taximetric Laboratory,
Department of Biology,
Armory 101,
University of Colorado,
Boulder, Colorado 80302,
U. S. A.

Dear Prof. Rogers,

I very ^{much} regret my long delay in replying to your letter of the 22nd. September 1969 about breeding for resistance to mosaic virus for Manihot esculenta, but I mislaid it and it has only just turned up.

As far as I am aware the work has not been continued, there appears to be no comments in the Organisation's annual reports and Dr. Storey was in failing health and died last year.

Contributory causes were the death of Dr. Storey's assistant, Mr. R.F.W. Nichols in a nasty and fatal motor accident who was doing all the work in a low level research station.

Then the transference of all the staff from Amani, Tanganyika (3,000ft. alt.) to Muguga some 18 miles north of Nairobi at 6,500ft. alt.

There is no documentary herbarium material in the E. A. Herbarium and as far as I know Dr. Storey very seldom made any with any material he was working on much to my surprise.

At the time material thought to be resistant was distributed to various Agricultural Departments in East Africa for trial but it was as far back as 1940 to 1950.

I expect you know all the papers that were published on the subject, if not I suggest you write to the Librarian, E.A. & F.R.O. P.O. Box 30148, Nairobi, Republic of Kenya,

E. Africa, the E.A.A. & F. Journal of the early days might contain some information as well as the Annual Reports of the Organisation between 1935 up to 1948.

Yours sincerely,

P.J. Greenway.

First fold here

AIR MAIL
AIR MAIL
AIR MAIL



Prof. David J. Rogers,
Taximetric Laboratory,
Department of Biology,
Armory 101,
University of Colorado,
Boulder, Colorado 80302,
U.S.A.

Second fold here

Sender's name and address:

EAST AFRICAN HERBARIUM

P.O. Box 5166,

NAIROBI,

KENYA.

AN AIR LETTER SHOULD NOT CONTAIN ANY
ENCLOSURE; IF IT DOES IT WILL BE SURCHARGED
OR SENT BY ORDINARY MAIL.

Issued by the Postmaster General, East Africa

Send postcard to

Universidade Federal Rural do Rio de Janeiro
Dep. de Fitotecnia
km 47, via Campo Grande, Gb

January 10, 1970

Prof. David J. Rogers
Dep. of Biology
Univ. of Colorado
Boulder, Colorado 80302

Dear Professor Rogers

Thank you very much for your letter from November 21, 1969, which I got only now because I went off for some holidays.

I will try to get propagating material of Manihot saxicola from the station at Paramaribo, many thanks.

Unfortunately my Cassava breeding work perhaps will not be continued because of my going abroad for the next two years. I will try to have the University admit a new staff member for this work. I was accepted for graduate studies at the University of Wisconsin (Madison), Department of Agronomy, beginning September 1970. But till then I am here to your disposal.

Sincerely Yours

Joel Butler

THE NEW YORK BOTANICAL GARDEN
BRONX • NEW YORK 10458 212/933-9400

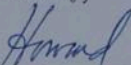
September 16, 1970

Dr. David J. Rogers
Taximetries Laboratory
Department of Biology
University of Colorado
Boulder, Colorado 80302

Dear Dave:

Do you have any record authorizing the transferral
of borrowed Museu Goeldi Manihot from New York to
Fort Collins and/or Boulder? We cannot find any here
in our files. If not, can you let me know just what
Museu Goeldi material you have?

Sincerely,


Howard S. Irwin
Head Curator

4-9 gub
HSI:hr
Encl.

CHARLES B. HARDING, *President* • FREDERICK S. MOSELEY, JR., *Vice President* • MRS. HERMANN G. PLACE,
Vice President • DALE E. SHARP, *Treasurer* • OAKLEIGH L. THORNE, *Secretary* • WILLIAM C. STEERE, *Director*

September 16, 1970

Dr. Paulo Bezerra Cavalcante
Head of Botany Division
Instituto Nacional de Pesquisas da Amazonia
Museu Paraense "Emílio Goeldi"
Caixa Postal, 399
Belém, Pará, Brazil

Caro Paulo:

Recebemos sua carta de 2 de Júlio para o Dr. Maguire referente ao material de Manihot que nos emprestamos para os estudos do Dr. David J. Rogers. Desde 1962 o Dr. Rogers passou a fora deste instituto para a universidade de Colorado, Boulder, Colorado, EUA, onde ele continua o trabalho dele com as mandiocas. Naquela época o Dr. Maguire foi o chefe curador, e eu acho que ele pediu do Museu Goeldi a licença para transfirir o material emprestado do Museu Goeldi ao Colorado, onde foi o Dr. Rogers. Se não existe esta carta em seus arquivos, favor aceitar nossas desculpas, mas informe-me assim. Então, posse determinar o que tem o Dr. Rogers do Museu Goeldi lá em Colorado. O trabalho dele, sendo baseado com tratamento dos dados pelo computadores, naturalmente gastou muito tempo, e porisso eu pedo sua paciência.

Com graças para sua cooperação e amizade,

Sinceramente,


Howard S. Irwin
Chefe curador

HSI:hr
cc Dr. David J. Rogers

TAXIMETRICS LAB.
ARMORY 101

June 8, 1970

Handwritten:
Write to!

Mr. Arturo Chavez J.,
UNDP
866 United Nations Plaza
Room A-3578
New York, N. Y. 10017

Dear Mr. Chavez:

I am sorry to have delayed the return of my forms on personal data, which you requested in May. I trust that you have not been inconvenienced.

It will be a pleasure to serve in whatever capacity you have in mind. If there is any useful service which I may perform with respect to tropical agricultural-economic problems, I will be happy to do so. This applies especially to cassava (yuca), but if there are other root crop problems, I think I can advise on them as well.

I look forward to hearing from you.

Very sincerely yours,

David J. Rogers
Professor of Biology

DJR/ g

Taximetrics Lab.
Armory 101

October 24, 1970

Dr. Max Milner
UNICEF
866 United Nations Plaza
New York, N.Y. 10017

Dear Max:

I enclose a letter copy to Mr. Chavez in UNDP. He asked me to send in my forms which would allow me to consult, but I haven't had the courtesy of a reply. Can you find out what happened?

I also sent in a letter, following your recommendations, to the new agricultural director, Omer Kelly, in AID. Again, no issue. Any ideas what has happened to that outfit?

What chances would there be to submit a research proposal to you for studies of protein development in cassava, either by enrichment from other sources, or by microbial manipulation? I think we have something going on this, and would like to get going on it. Please let me hear from you.

Sincerely,

David J. Rogers
Professor of Biology

Encl.

TAXIMETRICS LAB.
ARMORY 101

Oct. 5, 1970

Dear Dick:

This paper is all right, but doesn't contribute very much. There are a few interpretations of my work which I would not have interpreted the way the author does, but nothing is hurt by her interpretations.

The paper is a literature survey, and no new information is given concerning the origins. If you need copy, this paper will suffice. It certainly will not take up much space, and might be useful to some who teach economic botany courses.

Passing from the paper above to the possibilities for publication of my own paper on the classification of the cultivars of M. esculenta, what chances are there for publication of work in EB? There are perhaps 75 pages of manuscript, 20 black and white photos, an equal number of line drawings (actually graphs) and 30 tables. This is a bit large for a regular paper in EB, but I recall that the Society set aside some funds back in the beginning to support papers of interest but whose length was greater than the ordinary. Are you willing to examine the ms? I'm on the verge of submitting it elsewhere, but would much rather see it appear in EB.

Sincerely,

David J. Rogers



Manihot esculenta

mosaic symptoms, Puerto Rico

Rodrigo Alemán 1970

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
CROPS RESEARCH DIVISION
FEDERAL EXPERIMENT STATION
MAYAGUEZ, PUERTO RICO 00708

September 14, 1970

AIRMAIL

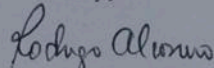
Dr. David J. Rogers
Department of Biology
University of Colorado
Boulder, Colorado 80302

Dear Dr. Rogers:

Thank you very much for your answer to my letter of September 9. I would indeed be interested in having species of Manihot other than M. esculenta for my virus studies. I would appreciate your cooperation in obtaining them.

Your comments about M. glaziovii are most interesting. We have at least one plant of that species here and I hope to include it on our tests. I think it may be of general interest to you to see what the mosaic looks like on M. esculenta here in Puerto Rico. Included in this letter is a photograph of some plants with symptoms.

Sincerely,



Rodrigo Alconero
Plant Pathologist

Enclosure

TAXIMETRIGS LABORATORY
ARMORY 101

May 27, 1970

Dr. Max Milner
Encyclopedia of Food and Food Science
605 Third Avenue
New York, N. Y. 10016

Dear Max:

Thanks for the reference by Strasser, et al. on protein enrichment of cassava. Have you seen the program for the 3rd Intern. Congr. of Food Sci. & Technol.? Four people from the Tropical Products Inst. are giving a 15 min. paper "Cassava fermentation for protein production." I'd like to hear that, but have no funds for such travel. Have you any suggestions for travel to that meeting in Washington?

With respect to your request on commercial applications of our computer systems, I'm a not certain about the breadth and depth that my reply should have. If I don't give you the answers you want, let this be the opening of a dialogue, until I have given the necessary and sufficient responses.

There are three major programs developed here: (1) an information management/retrieval system referred to as TAXIR, (2) an information evaluation system referred to as CHARANAL and, (3) a similarity-clustering program referred to as GRAPH. All of these are valuable in certain contexts, but I believe the first one to be of broadest commercial application because it does what a good retrieval system should, and some of the activities for other statistical-type output. Let me explain some of our ideas in TAXIR.

Since our work is biologically oriented, we knew that we would have to deal with enormous quantities of data. With even the most recently developed computer memory, we still must be extremely efficient in methods of data storage, so we discovered a method of compression of data logarithmically. The compression method pays off in increased storage, but even more significantly, in terms of speed of retrieval. In comparisons of search time, we have compared our system against one other system now in the national picture, and retrieval is significantly faster, more accurate, and actually less expensive. I will not trouble you with details of the method here-- I guarantee that it exists, and is available. The system is user-oriented, which means that an individual communicates to the computer his desires for information in his own natural language. Input to the system is also user-oriented, in that the system does not require any apriori thesaurus of terms, but the user's own language becomes his thesaurus as the information is put into the system. Questions to the system can be a simple request for a list of items, or a combination of several descriptive words precisely defined by Boolean operators and, or, not. Another question lets one ask for the number of items which the system contains for any particular query, so that if you ask a question that has fifty thousand responses, you can decide in advance that you don't want that much printed out. There are a number of options for the format of the responses, from straight-forward listing to alphabetic or numeric ordering, to

hierarchical listing. Subsets of data can be prepared for statistical studies, as needed. Informal interaction is possible through on-line interactive systems (through a battery of different devices, up to CRT, if desired), or batch mode is possible. The TAXIR system is thus a compiler for an information retrieval system, written in FORTRAN IV, now operative on a CDC 6400 system, and partially operative on an IBM 360/65.

The programs are not fully documented as yet, but the most complex part of the system is flow-charted, documented, and fully commented. We do not have a user's manual, which is needed, but we do not have the funds to do this at the moment.

In terms of applications, we have not found any application for which TAXIR is not applicable, but I do not guarantee that there won't be some that cannot be accommodated. We have thought of its application in the "bioindustries" of agriculture, medicine, food processing, etc., as well as those chemical applications for plastics, or other organics, fertilizers, pesticides, etc. We have ourselves used the system in a number of interesting applications, among which are museum data, weather data, building code data for the city of Boulder, for student and faculty records in the Office of Institutional Planning, Univ. of Colorado, and for a survey of garbage disposal in Boulder County! One more area that wants the system, and has applied for funds to install it, is in the oceanographic disciplines. The combined Gulf Universities Research Corporation will employ the system, provided the Federal funding for the International Oceanographic Decade is sponsored.

I personally use the system for my own research data, where all records are put into the banks, essentially replacing all my old 3-5 card files, as well as my letter files. All the research bibliography on Manihot now resides on tapes, ready for querying. We can draw from the bank any combination of references you want. What I imply here is that the system can be used in a variety of ways, from the large organization down to the individual researcher. Design for this variability was intentional, not accidental.

Now there are many different facets of information on TAXIR which I have not included here. However, I trust that you now have a little better idea of the system, and will want to know more about it. I include two papers: one tells you about the storage of the system mathematically, and the other is a description put out by Washington State University.

Let me know what more is needed. Best regards to Dr. Teply.

Sincerely,

David J. Rogers
Professor of Biology

DJR:gm

Incl.

ENCYCLOPEDIA OF FOOD AND FOOD SCIENCE

INTERSCIENCE PUBLISHERS, A DIVISION OF JOHN WILEY & SONS, INC.

MAX MILNER, Editor-in-Chief
EVA P. DUKES, Executive Editor

605 Third Avenue
New York, N. Y. 10016
TEL. (212) TN 7-9800

May 22, 1970

Dr. David Rogers
Department of Botany
University of Colorado
Boulder, Colorado

Dear Dave:

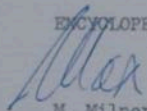
You will want to read:

Strasser J., Abbott, J. A. and Battey, R. D.
Process enriches Cassava with protein
Food Engineering p. 112, May 1970.

Please let me know about commercial applications of your
computerized data recovery activities.

Sincerely,

ENCYCLOPEDIA OF FOOD AND FOOD SCIENCE



M. Milner
Editor-in-Chief

MM:pd
cc: Dr. L. J. Teply

ENCYCLOPEDIA OF FOOD AND FOOD SCIENCE

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EVA P. DUKES, Executive Editor

605 Third Avenue
New York, N. Y. 10016
TEL. (212) TN 7-9800

June 4, 1970

Dr. David Rogers
Taximetries Laboratory
Armory 101
University of Colorado
Boulder, Colorado 80302

Dear Dave:

Thank you for your letter of 27 May and the attached material.

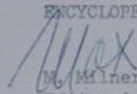
As for SOS/70, I am substantively involved (chairing the Food Acceptance symposium) but unfortunately I have no leverage on travel funds. You might write to the following:

1. Dr. Richard Hall
Chairman, SOS/70
McCormick and Co.
Baltimore, Md.
2. Dr. Willis Gortner
Division of Human Nutrition
U.S. Department of Agriculture
Beltsville, Md.
3. Dr. Calvert L. Willey, Exec. Director
Institute of Food Technologists
221 N. LaSalle Street
Chicago, Illinois 60601

As for the information on computer retrieval of biological data, I am referring your letter and its attachments to the appropriate people in John Wiley. I suspect you will hear from them directly if there appears to be some mutuality of interest.

Sincerely,

ENCYCLOPEDIA OF FOOD AND FOOD SCIENCE


M. Milner
Editor-in-Chief

MM:pd

TAXIMETRICS LAB.
ARMORY 101

June 8, 1970

Mr. Arturo Chavez J.,
UNDP
866 United Nations Plaza
Room A-3578
New York, N. Y. 10017

Dear Mr. Chavez:

I am sorry to have delayed the return of my forms on personal data, which you requested in May. I trust that you have not been inconvenienced.

It will be a pleasure to serve in whatever capacity you have in mind. If there is any useful service which I may perform with respect to tropical agricultural-economic problems, I will be happy to do so. This applies especially to cassava (yuca), but if there are other root crop problems, I think I can advise on them as well.

I look forward to hearing from you.

Very sincerely yours,

David J. Rogers
Professor of Biology

DJR/ g

Department of Agriculture
Extension Division
Central Farm, Cayo
British Honduras
12th October, 1971.

Mr. David J. Rog
Taximetrics Laboratory
University of Colorado,
U.S.A.

Sir,

I have read with great interest your article 'What's so great about Cassava?' in the July issue of World Farming.

Could you provide me with information on work done by W.D. Gray on increasing the protein of cassava. Also I should like to get more information on the preparation of cassava meal for livestock feed.



(Godsmen C. Ellis)

Head, Extension Division

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ETHIOPIA



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PHONE { 17128

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CABLE - MERMIRU

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P.O.B. {

IMPERIAL ETHIOPIAN GOVERNMENT
INSTITUTE OF AGRICULTURAL RESEARCH

ቁጥር፡
Ref. No. 147/64

ቀን፡
Date 12 October, 1971

Dr. David J. Rogers
Taximetrics Laboratory
University of Colorado
U.S.A.

Dear Dr. Rogers,

I was very much interested in the paper you and Dr. Appan wrote on cassava in the July issue of World Farming.

The northern two provinces and some parts of eastern Ethiopia have frequent crop failures due to a combination of insufficient rainfall, poor soils, and occasional locust damage. We have been looking for "insurance crops" for these areas. It seems to me that from your descriptions of the virtues of cassava, which is virtually unknown in Ethiopia, it would be the ideal plant for these areas.

I would appreciate it very much if you would give me the addresses of people or institutions from which we could get varieties of cassava that would thrive under low rainfall, in poor soils and under cool temperatures (the altitude of these areas ranges from 1500 to 2400 meters).

Yours sincerely,



Dagnatchew Yirgou
Dagnatchew Yirgou
General Manager

Hunt Botanical Library
Carnegie-Mellon University Pittsburgh Pennsylvania 15213

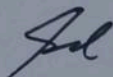
28 June 1971

Dr. David J. Rogers
Taximetrics Laboratory
Department of Biology
University of Colorado
Boulder, Colorado 80302

Dear Dave:

Excuse the delay in answering your letter of April 29, but we have been trying to track down the citations therein. Enclosed herewith are xeroxes of the Dillen item, as well as some pages from a 1758 Swedish edition of Loeffling which may be of interest to you. None of the other items that you ask for are available to us at this Library.

Very truly yours,



GSD:kk

Gilbert S. Daniels
Director

Enclosures: Xerox copies, as mentioned above.

Telephone (412) 621-4619

April 29, 1971

Dr. Gibert Daniels
The Hunt Botanical Library
Carnegie-Mellon University
Pittsburgh, Penna.

Dear Gil:

May I impose on your good nature and cooperation to send me xerox copies of any or all of the following references on Manihot? I am not certain that you have the one serial reference, but I put it in just in case you do. Just send me a bill for the costs.

1. Vellozo, Fr. Josephus Marianus A Conceptione. Flora Fluminensis, 1825, Atlas, Vol. 10, Tab. 80, 81, 82, 83. The plates are labelled Jatropha manihot, J. palmata, J. stipularis, and J. sylvestris.

We understand that the text of this work is incomplete, and includes descriptions for plants only up through volume 7 or 8 of the plants illustrated in the Atlas. However, Stafleu indicates that reprints appeared in 1881 which include the remaining descriptions for volumes 8 to 12. If you have this reprint, and can find descriptions of the 4 above-mentioned plants, I would appreciate xeroxes of these as well. Unfortunately I do not have the page references for the text.

2. Dillen, Johann Jakob. Hortus Elthamensis t. 173 f. 213. 1732.

Again, according to Stafleu, "A Leiden edition of Hortus Elthamensis was later published in 1774, Horti elthamensis ~~palmatarum~~ rariorum icones et nomina. This is without the text but has all the plates." The particular plant we are after is Manihot multifida.

Although this is a pre-Linnean publication, Crantz in 1763 cites Dillen's work for one of the Manihot species, M. Multifida, thus possibly making it the earliest names for another species.

3. Loeffling, Pehr. Iter hispanicum. German edition. edited by Kolpin, A.B., published in 1766, p. 309, 397. The plants of interest are Jatropha frutescens and Janipha frutescens.
4. Link, J.H.F. Handbuch 2: 436. 1831. We are interested in the generic description of Mandioca given in this citation as a possible generic synonym.
5. Graham, Edinb. Philos. J. 24: 172. 1840. This is the one serial reference, which may not be a part of your holdings. We are interested in the names Janipha loefferlingii var. multifida Graham (which may be listed in this publication as Manihot loefferlingii var. multifida).

Any or all of the above will be much appreciated. Sincerely,



INSTITUTO INTERAMERICANO DE CIENCIAS AGRICOLAS DE LA OEA

El Instituto es un organismo especializado de la Organización de los Estados Americanos. Fue establecido por los Gobiernos de las Repúblicas Americanas en 1942 para promover su desarrollo económico y social a través de la educación y la investigación.

Centro de Enseñanza e Investigación

TURRIALBA, COSTA RICA

Cable: IICA - Turrialba

May 28, 1971

Dr. David J. Rogers
Taximetrics Laboratory
Department of Biology
Armory 101
University of Colorado
Boulder, Colorado 80302

Dear Dave:

I am writing to request one or two cuttings of Manihot species other than Manihot esculenta, which you may have in Fort Collins. Please let me know when the cuttings will be available so that I can prepare an entry permit for you to send them down here. Of course, we will reimburse the air mailing costs of the package. I need this material urgently because I would like to use it for inter-specific hybridization with the objective of obtaining an haploid.

My best regards.

Sincerely,

Carl C. Moh, Head
Nuclear Energy Program

El Instituto Interamericano de Ciencias Agrícolas de la OEA tiene su sede en Turrialba, Costa Rica. Su Dirección General en Costa Rica, Apartado 4359, San José. Sus tres Oficinas Regionales abarcan los siguientes países: Zona Andina, Perú (Bolivia, Colombia, Ecuador, Perú y Venezuela); Zona Norte, Apartado 1815, Guatemala, Guatemala (México, El Salvador, Honduras); Zona Sur, Casilla de Correos 1217, Montevideo, Uruguay (Argentina, Brasil, Chile, Paraguay y Uruguay). Mantiene dos Centros de Investigación, Turrialba, Costa Rica; y Centro de Investigación y Enseñanza para la Zona Templada como parte del Centro de Investigación y Enseñanza para la Zona Templada del Uruguay, La Esmeralda, Colonia, Uruguay. Administra el Proyecto 206 (Reforma Agraria) del Programa de Cooperación Agraria patrocinado por el Consejo Interamericano Económico y Social (CIES). Mantiene también núcleos de investigación y enseñanza para algunos de los países miembros.



Fairchild Tropical Garden

10901 OLD CUTLER ROAD

MIAMI, FLORIDA 33156

April 14, 1971

Dr. David Rogers
Taximetrics Lab
University of Colorado
Boulder, Colorado 80302

Dear Dave:

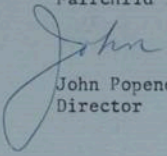
We are just coming out of the winter season and the Manihot collection looks a little ragged. We have one good plant of M. pringlei which has flowered but set no seed. I think we could root cuttings from it but I don't know how well it roots. If you think it especially important, I could send cuttings elsewhere for trial. If I don't hear from you in the next few weeks about this, I'll plant cuttings here and try to get more material growing. M. Walkerae and M. angustiloba have set seed which I have saved. They both do well here. M. subspicata is also growing well and made some seed but it disappeared before I could harvest it. We have young plants of M. flabellifolia and M. glaziovii to set out as soon as the rains start. These will have to be in a more acid soil.

We got one plant of M. esculenta cv. llanera to grow. This is the cv. with 6% protein in the roots from the C.I.A.T. I have not found anyone to analyse the roots yet but we have just ^{planted} more cuttings from this along with our other cultivars. The cultivars must be replanted annually here. We have 14 cultivars and this is all I want.

We have never been able to make contacts who will send us species material of Manihot so I guess we'll just have to wait until you make another trip.

Sincerely yours,

Fairchild Tropical Garden



John Popenoe
Director

JP/pw

Taximetrics Lab.

May 3, 1971

Mr. Rollie Henkes
World Farming
1014 Wyandotte Street
Kansas City, Mo. 64105

Dear Mr. Henkes:

In general, we like and approve the job of rewriting you have done. There are a few places in the text which needed some modification or interpretation, which you will see.

We are opposed to the idea of putting Jennings' and Martin's picture of the future in with our work, because we disagree with them. To give their ideas currency under our authorship would be incongruous. I have taken the liberty of writing our own "look into the future", which is quite a different one than that held by the other two workers. I hope you can understand our point of view.

Sincerely,

David J. Rogers
Professor of Biology



World Farming

THE MAGAZINE OF MODERN AGRICULTURE

April 26, 1971

Published by:
Agricultura de las Américas
1014 WYANDOTTE STREET
KANSAS CITY, MO. 64105, U.S.A.
CODE 913-888-4664

David J. Rogers
Teximetrics Laboratory
University of Colorado
Boulder, Colorado

Dear Mr. Rogers:

Many thanks for sending the excellent paper on cassava.

I have popularized it somewhat to fit our style and have enclosed the edited version for your review and return with any corrections revisions or additions.

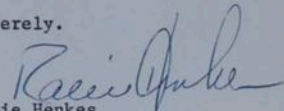
I have taken the liberty of adding some material from the University of Wisconsin and from the proceedings of the International Symposium (D.L. Jennings and Franklin Martin). You are certainly free to delete or revise this material if you don't feel it fits.

We would like to present the article under yours and Mr. Appan's byline.

My deadline is close at hand, so I hope it will be convenient for you to return this manuscript within a few days.

Many thanks.

Sincerely,


Rollie Henkes
Editor

RH:bp

↑
*by return
air mail?*



Subsidiary of Howard W. Sams & Co., Inc.

April 8, 1971

Dear Mr. Bloch:

I have your letter of March 31, requesting information on our cassava bibliographic data bank.

You may have noted in the Rootcrop Newsletter that I am in charge of the Root Crop Societies Information system, and that we hope to maintain and disseminate to members of the Society bibliographies not only on Manihot, but also on various other root and tuber crops of importance in tropical areas. We are at present expecting to work with the Tropical Products Institute, London, where one of the finest libraries on tropical plants is maintained. The important matter that has to be settled first, of course, is the matter of financing.

The reason that I bring this to your attention is that I note that you are planning to gather bibliographic material on cassava, and I wonder if there not isn't some way in which the activity above cannot be coordinated with your endeavor. Since we are set up to produce bibliographies in the computer, with the latest means of information retrieval, it would seem to be somewhat of a duplication of effort for both of us to go over the same ground. At the same time, we could also provide the necessary bibliographies for your sister institution, IITA, in Nigeria. If such cooperation is interesting to you, I will be glad to hear about it.

With respect to your specific questions, the cassava bibliography is maintained on magnetic tape, and we can have one run off for you, if you can pay \$25.00, plus mailing charges. We have no budget to provide this service free. The standard bibliographic citations are included, but no abstracts. In answer to your second question, we have about 375 publications (documents) in my personal file. These include separate publications, reprints, pamphlets, mimeographed materials, and a few research notes given me by various workers. Many of the papers are now out of print, or generally unavailable. I have been collecting these papers more or less consistently over the past 18 years, but have not attempted to make a complete library on cassava. (There has been no money for this type endeavor.) Your third question, "how did I go about collecting the references" is partially answered above. I used the standard sources--BIOSIS, Bibl. of Agriculture, Ag. Index, et al., compiled references from private indexes, and collaborated with Dr. Montaldo in Venezuela on his publication, which you have no doubt seen. Because many people all over the world know of my interest, over a long time, I have received many additional materials that are not usually covered in the major bibliographic sources.

You may be interested to know that I have a year off next year, during which time I expect to write a book which will review the past and present knowledge on cassava. I will be working at the Stanford Food Research Institute, where an excellent library is maintained on cassava and other tropical crops.

CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL

BIBLIOTECA

March 31, 1971

Dr. David J. Rogers
Taximetrics Laboratory
Dept of Biology
Armory 101
University of Colorado
Boulder, Colorado 80302

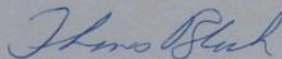
Dear Dr. Rogers:

I have read in the Tropical Root and Tuber Crops Newsletter that you have built a computer bank of cassava literature.

CIAT, as you know, has a strong interest in cassava, and is thinking of beginning a cassava literature collection project. I wonder if you could give me some information about your computer bank, including (1) Do you have available a list of the publications on cassava, and if so, how may we obtain it; (2) Do you have available the publications listed in your bank or copies of them; (3) How did you go about collecting the references for the computer bank?

Thanking you in advance for any assistance you may give.

Sincerely yours,



Thomas Bloch
Librarian

TB:gsc

cc: Dr. Alvarez

April 8, 1971

Dear Mr. Bloch:

I have your letter of March 31, requesting information on our cassava bibliographic data bank.

You may have noted in the Rootcrop Newsletter that I am in charge of the Root Crop Society's Information system, and that we hope to maintain and disseminate to members of the Society bibliographies on *Manihot* and other root and tuber crops of importance in tropical areas, as well as other pertinent information on root crop research workers. We expect to work with the Tropical Products Institute, London, where one of the finest libraries on tropical crops is maintained. The important matter that has to be settled first, of course, is the matter of how to finance the endeavor.

The reason that I bring this to your attention is that I note that you are planning to gather bibliographic material on cassava, and I wonder if there isn't some way in which the activity above cannot be coordinated with your endeavor. Since we are set up to produce bibliographies in the computer, with the latest means of information retrieval, it would seem to be somewhat of a duplication of effort for both of us to go over the same ground. At the same time, we could also provide the necessary bibliographies for your sister institution, IITA, in Nigeria. If such cooperation is interesting to you, I will be glad to hear about it.

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You may be interested to know that I have a year off next year, during which time I expect to write a book which will review the past and present knowledge on cassava. I will be working at the Stanford Food Research Institute, where an excellent library is maintained on cassava and other tropical crops.



FMC CORPORATION

CENTRAL ENGINEERING LABORATORIES

1185 COLEMAN AVENUE, BOX 380, SANTA CLARA, CALIFORNIA 95052

TELEPHONE: (408) 289-0111

January 20, 1971

Dr. David J. Rogers
Professor of Biology
University of Colorado
Boulder, Colorado 80302

Dear Dr. Rogers:

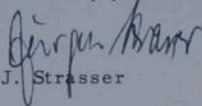
Thank you for your kind letter of January 5, 1971. I appreciate your open statements on the difficulties I may face with new ventures in cassava processing. I already found out that it is a problem to get financial support from sources outside FMC for a single-cell protein or leaf protein enrichment project with cassava.

I wish I could be of help to support your work of botanical research. I can only recommend to you to approach the Rockefeller Foundation in New York who has supported botanical studies in the past. But you have probably contacted them already.

May I please ask you to send me a reprint of your anticipated publications on classification of cultivated and wild cassava species as soon as they become available. Or you may just inform me where and when your papers have been published.

You will be interested to know that the Columbian Center (Cali) has reported isolating a variety of cassava which has yielded nearly six percent protein. They are in the process of increasing this variety for subsequent distribution to developing countries.

Sincerely yours,



J. Strasser

JS/tf



INSTITUTO INTERAMERICANO DE CIENCIAS AGRICOLAS DE LA OEA

El Instituto es un organismo especializado de la Organización de los Estados Americanos. Fue establecido por los Gobiernos de las Repúblicas Americanas en 1942 para promover su desarrollo económico y social a través de la educación y la investigación.

Centro de Enseñanza e Investigación
TURRIALBA, COSTA RICA

Cable: IICA - Turrialba

March 23, 1971

Dr. D. J. Rogers
Taximetrics Laboratory
University of Colorado
Boulder, Colorado

Dear David:

I am writing to inquire as to the information of the haploid Manihot. Do you know where I could obtain a few cuttings of the haploid material? Any information you can give me would be greatly appreciated.

Best wishes.

Sincerely,

Carl C. Moh, Head
Nuclear Energy Program

ML Magan
Director

Grasslands Research Institute

JAANSI. HP. Uttar Pradesh INDIA

*Ans.
4/1/71*

brochy/sbb, Muel. Aug.

El Instituto tiene su Dirección General en Costa Rica, Apartado 4359, San José. Sus tres Oficinas Regionales abarcan los siguientes países: Zona Andina, Apartado 478, Lima, Perú (Bolivia, Colombia, Ecuador, Perú y Venezuela); Zona Norte, Apartado 1815, Guatemala, Guatemala (México, Istmo Centroamericano y Antillas Mayores); Zona Sur, Casilla de Correos 1217, Montevideo, Uruguay (Argentina, Brasil, Chile, Paraguay y Uruguay). Mantiene dos centros: Centro de Enseñanza e Investigación, Turrialba, Costa Rica; y Centro de Investigación y Enseñanza para la Zona Templada como parte del Centro de Investigaciones Agrícolas del Uruguay, La Estanuela, Colonia, Uruguay. Administra el Proyecto 206 (Reforma Agraria) del Programa de Cooperación Técnica de la OEA, patrocinado por el Consejo Interamericano Económico y Social (CIES). Mantiene también núcleos de investigación en colaboración con las instituciones de los países miembros.

Dr. José de la. Jiménez
Calle Máximo Gómez 34
SANTIAO DE LOS CAJALLERON
Rep. Dominicana, Antillas (W.I.)

MARCH 22, 1971

DR. D. J. ROGERS
UNIV. OF COLORADO
BOULDER, COLORADO

DEAR DR. ROGERS:

IN "TROPICAL ROOT AND TUBER CROPS NEWSLETTER", NO 4,
1971, PAGE 17, I SAW THAT YOU & APAN ARE PUBLISHING A MONOGRAPH
ON "NORTH AMERICAN SP. OF MANIHOT".

WILL YOU ^{be} SO KIND TO INFORM ME IF THIS MONOGRAPH IS ON SALE
AND WHERE? DID YOU INCLUDE OUR M. SP. (DOMINGENSIS?)

WITH BEST THANKS I AM YOURS MOSTLY SINCERE

José de la. Jiménez

P.S.- I AM VERY INTERESTED IN HAVING DR. APPAN' S WORK ON "NORTH
AMERICAN SPECIES OF MANIHOT DELIMITED BY COMPUTER AIDED
BY COMPUTER AND TAXIMETRIC METHODS". THANKS A LOT

Ans 4/1/71



THE UNIVERSITY OF NEW MEXICO | ALBUQUERQUE, NEW MEXICO 87106

DEPARTMENT OF ANTHROPOLOGY
TELEPHONE 505 277-4524

4 January 1971

Prof. D. J. Rogers
Department of Biology
Division of Population Studies
University of Colorado
Boulder, Colorado 80302

Dear Mr. Rogers:

Forgive me if I appear to have misinterpreted your emphasis on the probable importance of Mesoamerica in the development of cultivated Manihot esculenta as we know it today. I am pleased to see by your note of last October that we are in fundamental agreement on this subject (although we undoubtedly do differ on some details).

Have you or anyone else any indication of the genetic relationships, relative fertility, etc. between the Mesoamerican varieties and the Brazilian varieties of M. esculenta? I should be very pleased to receive reprints of all future publications which you produce on the subject of manioc, and related species.

Enclosed is a copy of a paper which should appear in print in another year or so. It deals with a topic much broader than the origins of any particular cultivated plant, but since manioc is considered to have had an important role in the earlier stages of the cultural development which is discussed here, the paper may be of some interest to you.

Sincerely yours,

Karl H. Schwerin
Karl H. Schwerin
Assoc. Professor

Paper presented at the
XXXIX Congreso Internacional
de Americanistas, Lima, Peru
August 2 - 9, 1970. To be
Published in Proceedings of the
Congress

ARAWAK, CARIB, GE, TUPI: CULTURAL ADAPTATION AND CULTURE HISTORY IN THE
TROPICAL FOREST, SOUTH AMERICA

by Karl H. Schwerin

Since the researches of von den Steinen and Ehrenreich at the end of the 19th century there has been a growing interest in elucidating the culture history of the Tropical Forest region of South America. Beginning with Ehrenreich many scholars have identified the Arawakans as important bearers of cultural ideas throughout the lowland region. Later scholars added the Caribans and Tupians. In the Handbook of South American Indians Steward more or less concurred with these interpretations, but maintained that most distinctive cultural traits of the zone had originated ultimately in the Circum-Caribbean or Andean regions.

Research conducted in the last two decades has thrown new light on these questions and modified our perspective considerably. I should like to consider the data provided by this research in formulating a hypothesis of the origin and spread of the major features of Tropical Forest culture, with the hope that it will also serve to point up those areas most critical for future investigation. This hypothesis proposes that the culture history of the Tropical Forest peoples has been relatively independent in both origins and later influences. If anything, it has had more influence on adjacent areas than the latter have had on it. Not three, but four widespread linguistic groups have played a major role in the spread and diversification of these patterns.

Arawak

Carl Sauer (1952: 40-46) has long pointed to northwestern South America as the most likely hearth for vegetative root crop horticulture in the New World. This is a pattern which is essentially tropical in character, although it has also extended into the Andean highlands.

Climatic changes in this area created a dramatic modification in the subsistence patterns of the inhabitants sometime between 7000-5000 B.C. Former hunters of big game became dependent on littoral and riparian sources of protein-- fish, aquatic reptiles and mammals, and especially shellfish. Habitation sites from this period are invariably marked by large shellmounds. This life style apparently permitted a semi-sedentary to fully sedentary settlement pattern (Reichel-Dolmatoff 1959: 156). Increased sedentarism provided the opportunity to develop a more intensive knowledge of local floral resources and permitted the experimentation which, in some places, led to domestication and purposeful cultivation of the more rewarding plants.

Manioc was certainly a part of this early horticulture and may have been among the first plants to be domesticated. Archeological evidence has now been unearthed to indicate that manioc was being cultivated at Rancho Peludo in the Lake Maracaibo basin by 2700 B.C. (Rouse y Crucent s.f. 58-60). This interpretation is based on the finding of manioc griddle sherds among the archeological remains.

The curious thing about Rancho Peludo culture is that it seems to have had a limited influence in northwestern South America. The descendant Dabajuroid series remained confined in the Lake Maracaibo basin until after 1000 A.D., when it spread widely along the Venezuelan coast. Yet the Rancho Peludo people shared a number of traits, such as plant cultivation, pottery, burial urns,

etc., which occur far beyond the confines of this region. This suggests that, far from being cultural innovators at 2700 B.C., the Rancho Peludo people were borrowing ideas from more advanced neighbors who had already possessed these traits for some time prior to that date, and whose presence in adjacent territories effectively prevented expansion of the former.

It is, of course, possible that there was more direct communication between the Rancho Peludo people of the Lake Maracaibo basin and the inhabitants of the western llanos by means of the relatively low Cucuta-San Cristobal pass. The western llanos are, unfortunately, poorly known archeologically, but it is certainly possible that Rancho Peludo influences were there blended with traits from other areas (such as Puerto Hormiga or Zambrano).

Archeological proof of manioc cultivation rests on the finding of griddle fragments. Preparation of manioc for roasting on these griddles is a complex process, probably developed after long experience in preparing the root for food. Manioc can be satisfactorily prepared in other ways, and it certainly seems likely that it was being roasted, steamed, grilled and/or boiled long before the technique was perfected of preparing it on a griddle (Reichel-Dolmatoff 1959: 156; Sauer 1959: 221; Schwerin 1970: 24).

Thus, at Puerto Hormiga, which had a well-developed pottery by 3000 B.C., griddles are lacking (Reichel-Dolmatoff 1965b: 6, 45, 49-50). "...the poor quality of the pottery together with the lack of soot-blackened, heavily fired basal sherds suggests that neither at Puerto Hormiga nor among the later shell-mound dwellers was pottery used directly on the fire" (Reichel-Dolmatoff 1965a: 59). But manioc and other crops might well have been stone-boiled as carbohydrate supplements to the predominantly protein diet of shellfish (Sauer 1959: 221).

Unfortunately the same sort of pot serves equally well for boiling manioc and boiling shellfish. Consequently the archeological data can neither support nor disprove the use of manioc.

It may also be that there was a seasonal cycle alternating between shellfish near rivers, swamps and shorelines in the dry season when waters were low, and root crops in areas more suited to their cultivation in the wet season, particularly since Reichel-Dolmatoff (1965b: 45) identifies the Puerto Hormiga people as "groups of nomadic gatherers."

An interesting feature of Puerto Hormiga ceramics is that there are numerous resemblances to the Barrancoid style, widespread in central and eastern Venezuela from ca. 1000 B.C.-1000 A.D., or even later on the central coast (Rouse y Cruikshank s.f. 102-03). Yet, recent excavations at the Malambo site on the lower Magdalena, have revealed a ceramic tradition closely related to the Venezuelan Barrancoid style and contemporaneous with the first millennium of the latter's existence (Angulo Valdes 1962; Reichel-Dolmatoff 1965a: 66).

This evidence suggests to me that communities which were very similar culturally and linguistically were already occupying much of the Caribbean coastland. With the development of a simple horticulture, pottery and the like, there was rapid and widespread movement of both ideas and groups of humans out of this cultural hearth in northern Colombia and northwestern Venezuela. The orientation to rivers, swamps and ocean shores suggests the possession of water craft-probably dugout canoes-which would have facilitated rapid long-distance travel.

These people probably moved up the Magdalena into the interior of Colombia. Gradual subsidence of the land along the Magdalena Valley has probably put many of these sites under water, but early sherds in the Puerto Hormiga style and

dating from the 3rd millenium B.C. have been found in the vicinity of Zambrano on the lower Magdalena. Zambrano is "almost to the fringes of the mountains," some 150 kilometers upriver from the sea (Reichel-Dolmatoff 1965a: 59-60). From here these peoples could have crossed the Cordillera Oriental into the Llanos, from whence they moved downstream onto the shores of the Orinoco. Alternatively there could have been movement along the Caribbean coast, into the Lake Valencia basin and from there across the Llanos to the Orinoco. Or, they may have followed both routes.¹

For such people the rivers and shorelines were highways as well as sources of fish and game. Alluvial silts on the shores and islands were rich, easy to cultivate, probably because of periodic inundation relatively free of heavy growth, and perpetually moist. Adaptation to these environmental conditions made possible a comfortable life. But appropriate sites would have been limited and as population grew it was necessary to move along the streams in search of new settlement sites. At the same time stream travel facilitated continued contact with the inhabitants of the original community. Lathrap (1968a) emphasizes that this is precisely the kind of adaptation which characterized the most important and widespread "Tropical Forest" tribes in the Amazon basin, particularly those belonging to Arawakan and Tupian linguistic stocks.

Lathrap (1968b: 28) traces origin of the earliest ceramic tradition on the central Ucayali, Early Tutishcainyo (dated conservatively ca. 2000 B.C.), to the flood plains of the central Amazon. Related styles are found distributed in a broad band along the fluvial zones throughout the Montana from the Rio Napo in the north, southward at least as far as the central Ucayali (Lathrap 1968b: 25-26) and perhaps even further south.

On the contrary, I believe that the central Amazon served merely as a

secondary staging area for cultural movements which originated much further away. On the basis of the data and inferences so far presented, I suggest that the cultivation of root crops (principally manioc) and the manufacture of ceramics were first mastered by several groups of closely-related Arawakan speakers in northwestern South America. These were people oriented also to the protein resources of rivers, lakes and coastline, who possessed canoes and were accustomed to travel considerable distances by water. As population grew these people were stimulated to spread. Their riparian-horticultural subsistence pattern gave them a significant adaptive advantage over other groups and they spread rapidly. Some pursued the coastline. Some followed the rivers of the interior. They entered the Orinoco basin and spread along the major affluents wherever alluvial deposits were suitable for agriculture. The principal movement, however, I believe to have been upstream along the Orinoco, across the Casiquiare canal and into the Rio Negro drainage. From this point the whole Amazon basin is opened up to travel, settlement and exploitation. It is easy to understand how a riverine people could spread rapidly downstream along the Rio Negro to the Amazon. From there upstream travel along the purus, Jurua, Ucayali, Marañón, Napo, Putumayo, Caquetá and smaller affluents would have been natural and it is only a short distance downstream from the confluence of the Negro and the Amazon to the mouth of the Madeira which opens up yet another extensive area leading to the slopes of the Bolivian plateau.

If it is true, as frequently suggested, that the tropical forest was essentially uninhabited prior to the horticultural peoples, dispersal into this cultural vacuum would have been even more natural, and more rapid.

It is unlikely that all of the suggested routes were traveled at this time, but the archeological evidence indicates that many of them were. I further

suggest that this initial spread contributed to the primary division of the Arawakan stock into its major linguistic branches. In addition it is probable that this movement carried with it such traits as the dugout canoe, urn burial, the rubber ball game and the hammock.

I am fully aware of the problems inherent in glottochronological dating of language divergence, but nonetheless the data on Arawakan are suggestive. According to the percentage of cognate pairs counted among various Arawakan languages, Noble (1965: 110-11) places the differentiation of the main branches of Arawakan at around 1300 B.C. Careful inspection of his figures, however, suggests that the Apolista and Chamicura branches separated from Maipuran at a later date, perhaps 500 years later. Maipuran itself may have broken up 500 years later than that. If we take this relative chronology, but try to associate it with the archeological record, we will have to push it back at least a millenium. Thus the initial spread of Arawakan speakers out of northwestern South America appears to have occurred between 3000-2000 B.C. (Complete linguistic separation may not have occurred until 2300 B.C.).

These peoples moved into the western Llanos of Venezuela and Colombia and the Arauan and Amuesha branches continued into the Rio Negro and Amazonian drainages. It is probably this group which spread as far as western Amazonia by circa 2000 B.C. introducing such ceramic complexes as early Tutishcainyo and related styles known from various parts of the Montana. From these settlements cultural influences (and perhaps even groups of immigrants) reached the Andean highlands and the Peruvian coast (cf. Uhle 1920: 44; Tello 1942; Carrion 1958; Lathrap 1963, 1965, 1968b).²

If the Arawakans spread so far south by water, it seems strange there were no movements to the north. Lothrop (1937: 27, 203; 1940: 425; Kidder 1940:

446, 448) has identified what he believes were Arawakan elements in Coles' and suggests these were carried as far north as the Maya area. Primary among these were manioc, the rubber ball game, the hammock and secondary urn burial--all features which were distributed widely throughout the Amazon and Orinoco drainages as well. Is it possible that introduction of manioc in Mesoamerica contributed to the rise of the Olmec cultures around 1200 B.C. in southern Veracruz?³ Obviously, whatever Arawakan speakers occupied the Isthmus and Mesoamerica, they had all been absorbed or become extinct by the time of Spanish conquest.⁴

Between 2000-1500 B.C. the Maipuran, Apolistan and Chamicuran branches separated and at least the latter two groups moved away from the putative center on the western Llanos to the shores of the upper Orinoco, Casiquiare and upper Rio Negro where they remained for several centuries.

There is reason to think that the Barrancoid tradition was also carried by Arawakan speakers--I suggest of the Maipuran branch. As we have seen the Barrancoid tradition was widespread along the Colombian and Venezuelan coasts, in central Venezuela and on the lower Orinoco. Puerto Hormiga or Zaabreno would seem to have been the original center of dispersal for this tradition. At the same time it is probable that an important secondary center of dispersal was located somewhere in the western Llanos, perhaps along the Apure, Meta or one or several of the other rivers which flow across these plains (Rouse y Gruent s.f. 108). This location is consistent with the suggestion, made above, that Puerto Hormiga peoples traveled up the Magdalena and crossed over the Cordillera Oriental to the western Llanos. From there the Barrancas people then traveled downstream the Orinoco while several other branches of Arawakans moved into the Amazon basin.

Adjacent spatially and slightly earlier, but overlapping the appearance of Barrancas ceramics on the lower Orinoco is the Saladero style, quite distinctive from the former. It shows a close relationship to the earliest ceramic remains from the Antilles. It seems safe to assume, as have Rouse, Cruikshank and Goggin (1959: 509) that the makers of Saladero style ceramics were speakers of Arawakan languages of the Taino branch. Rouse and Cruikshank (s.f. 141) believe that the arrival of Barrancoid peoples on the lower Orinoco caused the Saladero people to move in two directions. One group migrated to the coast and thence, about 1 A.D. out into the Antilles. The other group moved up the Orinoco. The former survived until arrival of the Spanish, but the latter appears to have become extinct by the end of "Period III" (ca. 1000 A.D.) (Rouse y Cruikshank s.f. 150-52).

About 1000-900 B.C. the Maipuran branch broke up into several groups. Some may have remained on the western Llanos. Others moved downstream to the lower Orinoco where their arrival may be identified with the appearance of Barrancas ceramics. Still others moved northward into the Valencia basin and the coast, as indicated by the occurrence of Barrancoid style ceramics there.

We may guess that the same expansion of Maipuran groups which brought the Barrancoid peoples to coastal Venezuela and the lower Orinoco, led closely related groups into the upper Orinoco, Casiquiare canal and upper Rio Negro, pushing the Apolistan and Chamicuran groups further downstream to the Amazon from whence they gradually moved upstream to their contact period locations in the Montana.

A majority of the Maipuran groups remained in the Orinoco and Rio Negro drainages, but a few apparently moved quickly beyond the Amazon, following it and a number of its major tributaries upstream to the Montana where Huapa-ya ceramics, showing a clear link to the Barrancoid series of Venezuela, appears

on the central Ucayali by 500 A.D.

What was it that stimulated the Maipuran peoples to expand at this time, moving in several directions and even entering the Amazon Basin at the expense of their linguistic relatives? They obviously possessed some cultural advantage, and I suspect that this was related to development of a distinctive technique of ridged-field agriculture, causeways and raised habitation mounds. This enabled them to cultivate seasonally flooded lowland areas such as the western Llanos of Venezuela-Colombia. In this region, unfortunately, flooding and associated alluviation seem to have buried much of the evidence for these early developments, but William Denevan (personal communication) has recently obtained aerial photographs which show what appear to be ridged fields along the Apure river east of San Fernando de Apure in the Venezuelan Llanos.

Similar earth constructions are found in many of the areas known to have been inhabited by Maipuran peoples at the time of contact, viz. Llanos de Mojos, Guayana coast, the Orinoco delta, the island of Marajo at the mouth of the Amazon (Parsons & Denevan 1967: 96-97), in the Pareisi country of the Mato Grosso (Denevan 1966: 129), and perhaps in the Casiquiare canal region between the Orinoco and Rio Negro drainages.

Carib

Unfortunately there is little archeology which can be linked, even tentatively, to occupation of lowland areas by Cariban tribes. Nonetheless, we do have sufficient cultural and linguistic evidence to suggest a reconstruction of this stock's culture history.

Manioc is clearly older than the Cariban expansion, yet it must have been obtained by the proto-Cariban groups prior to their dispersal, since of ten Cariban groups reviewed, nine showed cognate terms referring either to bitter or sweet manioc. Distribution of the terms occurs in such a way as to suggest that originally no distinction was made between the bitter and sweet types.

The term for maize is also clearly cognate in eight of the ten tribes (the Yupa term mayisa may be disregarded as a post-contact Spanish loan word). Only Makiritare is aberrant. Consequently it seems safe to assume that the Caribans did not begin to expand until after obtaining maize. Although maize appears in north coastal Peru by 1500 - 1400 B.C. (Lanning 1967: 56-57), it does not reach southern Colombia until ca. 500 B.C. (Reichel-Dolmatoff 1965: 84-85).

Sometime during the next 500 years it must have reached the proto-Cariban tribes who were, I suggest, occupying the eastern slopes of the Cordillera Oriental, probably somewhere north of the Guaviare river. The cultivation of maize, with its seasonal cycle (in contrast to manioc which is cultivated the year round) provided some sort of advantage that enabled the Caribans to move down out of the flanks of the Cordillera, expanding into most of the Orinoco drainage and interior Guayana. Perhaps it was the storability of maize and its utility as a travel ration which made this possible; maize

kernels are light and easily transported (Chagnon 1968: 36). However, cassava (manioc cakes) is also storable and can be used in travel so long as it is kept dry. Perhaps maize was more useful as rations for warriors. It is doubtful that the higher protein content of maize over manioc was significant here, for almost all of the lowland riverine tribes depend on riparian sources of fish and game for the protein complement of their diet.

Their superiority, however, was apparently less than that of the neighboring Maipuran Arawaks, for almost all the Cariban tribes remained north of the principal area of occupation of Maipuran groups south of the Meta and the upper Orinoco. Even so, the Caribans must have had to cross Arawakan territory in order to reach the middle Orinoco. Perhaps it was hostile encounters during this traverse which drove the Arara, Palmella, Bakairi and upper Xingu Caribans into the Amazon basin, down the Rio Negro, and up the Madeira from whence they dispersed to their contact period locations.

In addition to maize and manioc, these Cariban groups undoubtedly carried with them the pineapple, the papaya, perhaps the New World yam (Dioscorea trifida), cotton, squash (Cucurbita moschata) and tobacco.⁵

It is interesting to note the relative lack of ceremonialism associated with agricultural practises among the Caribans. But then agriculture is a relatively certain, non-stressful activity. Tropical Forest agriculture is productive with a minimum of care, and failure is practically unknown. There is no need for the psychic reassurance of ritual.

Non-agricultural ritual did, however, develop within one branch of the Cariban peoples, probably ca. 1000 A.D. or thereafter. This was a ceremonialism related to warfare, trophy taking and ritual cannibalism. Trade

in such items as bixa, arrow poisons, turtle oil⁶ may also have been involved. At least, Raleigh's late 16th century description (1928: 57) of a well-organized Canibal market town near the lower Orinoco suggests that trade was a well-established pattern among these people prior to European contact. Trade, warfare and ritual cannibalism all led these Cannibal Caribs to travel widely, to conquer and to settle all along the Orinoco river, as well as the Caribbean coast of Venezuela, the Atlantic coast of the Guianas and the lesser Antilles. Whether it was hostile contacts made by trading parties or the desire for sacrificial victims which led to warfare, or booty taken in war that led to trade with friendlier tribes, I cannot say at the present. For the moment it must suffice to indicate the relationship among these three activities.

Ge

The Ge-speaking tribes (*sensu stricto*) have long been improperly classified as "marginal tribes" or "incipient horticulturists." One reason has been that historically they were viewed through the eyes of Tupinamba and other coastal Tupians who indiscriminately lumped them with other non-Tupian enemy tribes as "Tapuya." Examination of the ethnographic data shows however, that this includes both truly marginal peoples pushed back from the coast into the coastal highlands by the expansion of Tupian peoples, and the Ge proper of the central Brazilian *campa*. Ge occupation of savanna rather than tropical forest and their practise of extended hunting expeditions further contribute to the popular misconception that these peoples are "marginal."

Again, pertinent archeological investigation is almost non-existent. But there is considerable circumstantial evidence to belie the popular classification.

One glance at a linguistic map of South America should raise questions on this point (see Map I). Most of the peoples classed as marginal are either pushed off to the far margins of the continent or are to be found as small groups speaking isolated languages in scattered spots all through the tropical forest region. Not so the Ge. They are clustered together in the center of the continent over an area which compares favorably in extent with that occupied by Cariban or Tupian speaking tribes, and far larger than that inhabited by Panoan or Tucanoan speakers. This certainly does not look like a Marginal feature.

If one compares a climatic map of South America with a linguistic map it becomes clear that the extent of Ge speakers (*sensu stricto*) is al-

most exactly congruent with the campo-savanna of central Brazil (see Map I). Where there are Ge there is campo. Where there is no campo there are no Ge.

This strongly suggests that Ge cultures, with all their attendant peculiarities, represent not Marginal survivals, but rather cultural adaptation to a distinctive and perhaps difficult ecological zone. The Ge tribes were all engaged in extensive farming at the time of first contact (Nimuendaju 1939: 87-91; Lowie 1946: 480). Levi-Strauss (1950: 468-69) finds no major differences of technique in the horticulture of any of the tribes of the tropical lowlands, whether they inhabit the tropical forest or the savanna. In point of fact, the Ge who inhabit the savanna also attempt to maintain a Tropical Forest horticulture since they invariably turn to the strips of gallery forest which occur along savanna streams for the cultivation of crops. Most non-European crop plants have cognate names in the different Ge tribes, which is a strong argument for their having had horticulture before they became linguistically separated.

But the savanna climate is a seasonal climate. This and other environmental differences from the tropical forest have led to emphasis on crops other than manioc and maize (though these are also grown)--such as sweet potatoes, *Dioscorea* sp. and *Cissus* sp. (Lowie 1946: 480). Scarcity of game on the savannas may necessitate extensive travel during the non-growing season in order to survive.

The Ge are noted for their complex social organization and their relative development of ritual. I suggest that at least in a general way these patterns are also adaptations to the rigors of savanna living. Savanna weather is less predictable, crops are more likely to fail, and game is scarcer than in the tropical forest. The cross-cutting and interlocking

linkages of Ge social organization facilitate, nay ensure, cooperation among a maximum number of individuals. Ritual celebrations undoubtedly ease the anxieties which arise from the uncertainties of the environment and make more bearable continued existence in the savanna.

Ge crops are all Tropical Forest in origin, and, as indicated above, so are their horticultural techniques. I believe, therefore, that sometime during the period 1 A.D. - 1000 A.D. the proto-Ge groups received horticulture from the Tropical Forest tribes (Arawakan?) adjacent to the northwestern section of the campo. The crops which were introduced at that time probably included the sweet potato, maize, cotton, tobacco, gourds, and perhaps *Dioscorea trifida* and *Bixa* (*Bixa orellana*) (cf. Wilbert 1964). The Ge were unable to enter the tropical forest proper because that region was already occupied by well-established horticulturists. Consequently the only route of expansion open was to the east and south. The Ge peoples therefore moved to fill that vacuum until they occupied the whole of the campo. At the same time their culture evolved and adapted to the exigencies of that environment, which perhaps discouraged the Ge from moving beyond into the caatinga and upland forests of eastern Brazil. It would appear, however, that some distantly related peoples on their margins (perhaps pushed ahead of the expanding Ge proper) such as the Caingang learned about horticulture from them (Maunder 1930: 774).

Tupi

At the time of European discovery the Tupians made up the fourth linguistic group that was widespread in lowland tropical South America. Metraux (1927) in his classic study of Tupian migration details their movements

from the time of European contact up to the end of the 19th century.

He also indicates, however, that Chiriguano movement up the Parana into Paraguay and eastern Bolivia had occurred early in the 16th century, with definitive relocation probably taking place with the expedition of Alejo Garcia in 1522 (Mettraux 1927: 18-20). There is reason to believe further that the Guaraní had not occupied the lower Parana for long before the arrival of Europeans, although it is extremely difficult to put any sort of time depth on it. Nonetheless, I would guess that they had not been in the region for more than a couple centuries.

A comparable time depth may be assigned to the Tupians of the Brazilian coast. At the time of Portuguese discovery the Tupinamba and their linguistic congeners were still in the process of driving out the older inhabitants of the coast, referred to generically by the former as "Tapuya" (Mettraux 1927: 2-6).

These tribes apparently arrived on the coast from the São Francisco drainage, but their original point of departure must have been further within the interior. The most logical center for Tupian dispersal is the area south of the Amazon between the Madeira and the Xingu rivers, bounded linguistically by the Arawakans on the west and the Ge on the east. Some dispersal followed the Amazon, ascending its southern tributaries. But the available evidence also suggests that the coast was not reached by following the great river to the Atlantic and then moving down the coast. Rather, it would appear that there was movement overland from the lower Amazon to the São Francisco drainage and thence to the coast, crossing territory occupied by Ge-speakers between the Amazon and the São Francisco.

In historic times the majority of Tupian migration has been fomented by the search for the Land of Nanderuvuçu, a terrestrial paradise at the shores of, or beyond, the sea. Influential shamans, driven by mystical visions have played a central role in these migrations. (Metraux 1927: 12-15). Hostilities arising out of incursion into alien territory have encouraged bellicosity among the Tupians, almost all of whom were extremely warlike at the time of discovery.

I suggest here that this is a cultural pattern of some antiquity among the Tupian speakers, and that it was central to dispersal of at least the Guaraní branch of Tupi from their ancestral homeland in south central Amazonia. Migrations in search of the terrestrial paradise may have begun as early as 1000 A.D. and Tupian groups must have reached the Brazilian coast by 1300 - 1400. Continuing migration brought ever increasing numbers eastward, pushing out or annihilating the ancient inhabitants of that region.

Arrival of Europeans with their trade, cane plantations and demand for slaves created new pressures and stimulated migrations in other directions, but as documented by Metraux the main thrust of Tupian movement continued eastward right up to the present century.

No doubt the separation of the Tupi-Guarani "language" into eleven dialects (as defined by Rodrigues 1952" 234) occurred early in this dispersal, for these groups were separate at the time of Portuguese discovery. Nonetheless, such migration does not seem to have been limited to this group, for the Oyampi and Emerillon entered Guayana after European contact, and the Omagua were moving about in the upper Amazon for several centuries. These are peoples whose languages have been separated from Tupi-Guarani

proper for more than a millenium. Yet they must have either a) shared a common basic culture with the latter, or b) received strong cultural influences from them. In neither case does this negate the probability that the Tupians were occupying a relatively compact area in southern Amazonia prior to their later pre-contact expansion, in spite of the fact that their languages were relatively well differentiated. The great differentiation of dialects within the Tupi-Guarani "language" in contrast to the one or two languages in most other subdivisions of the Tupian stock (Rodrigues 1958) indicates that the focus of dispersal was among the Tupi-Guarani and that movement by other Tupian peoples must have been stimulated by them.

Conclusion

Four major linguistic stocks have played key roles in the spread and development of Tropical Forest culture. Movement of both peoples and culture traits has been generally from north-west to southeast and upstream along the rivers, occupying more territory through time. The striking rapidity of movement during certain periods was facilitated by travel along the great rivers of the Orinoco and Amazon basins as well as along the Caribbean and Atlantic coasts. Although of some regional importance in the western Amazon, the Panoan, Tucanoan, and other smaller linguistic groups have been of relatively little importance in the cultural history of the region as a whole.

The major points of the hypothesis presented here are summarized in Table II. The hypothesis is based on the present state of knowledge, but it is obvious that there are giant lacunae, particularly in the archeological data. Verification of the hypothesis depends on continued

research in many critical areas--northeastern Colombia, the Venezuelan Llanos, the central Amazon, the Madeira drainage. But most critical of all, and the area where most intensive research is indicated, is the upper Rio Negro - Casiquiare canal. A thorough archeological survey should be mounted there, with intensive follow-up excavation of selected sites. It may even be possible to show definitively whether that anomalous geographical phenomenon, the Casiquiare canal, which connects two major rivers and carries a part of the Orinoco's flow into the Rio Negro, is really a natural phenomenon or, as is sometimes suggested, is a man-made feature (Bennett 1949: 57). A continuous aquatic highway linking the Orinoco and Amazon basins would have been desirable for any of the riparian peoples who passed that way over the millennia but perhaps most desirable of all to the early Arawakans as they passed back and forth between the two river drainages. Only time and continued culture-historical research can provide the answers to these intriguing questions.

Notes

1. It is unlikely that they continued along the coast to the mouth of the Orinoco, or if they did they never established settlements in that stretch and avoided contact with local peoples, for the archeological evidence shows this area remained in the hands of essentially non-horticultural shell fishermen until quite late (Rouse y Cruxent s.f. 69-72).
2. The exact relationship of the Andean Uru-Chipsayan speakers to the Arawakan stock is not at all clear. Nor is much known of the prehistoric cultural achievements of this group, but it is worth noting that to this day they are intimately associated with lakes, boats, fishing and other lacustrine resources (Metrax 1934a:189-90; 1934b; Posnansky 1934).
3. This northward spread of Arawakan influences may also have contributed to some of the similarities cited by Ford (1969) in his recent study of New World Formative cultures, although I am in strong disagreement with the general interpretations presented therein.
4. Absorption of the Nahuatl-speaking Toltec conquerors by various Mayan groups at a later date proves this a not unlikely occurrence.
5. Tobacco was probably chewed or drunk as an infusion, for the smoking of tobacco appears to be a later introduction associated with the term kawai.
6. After European contact, slaves, tobacco, metal tools, cloth, firearms and trinkets were also incorporated into Caribbean trade networks.

TABLE I

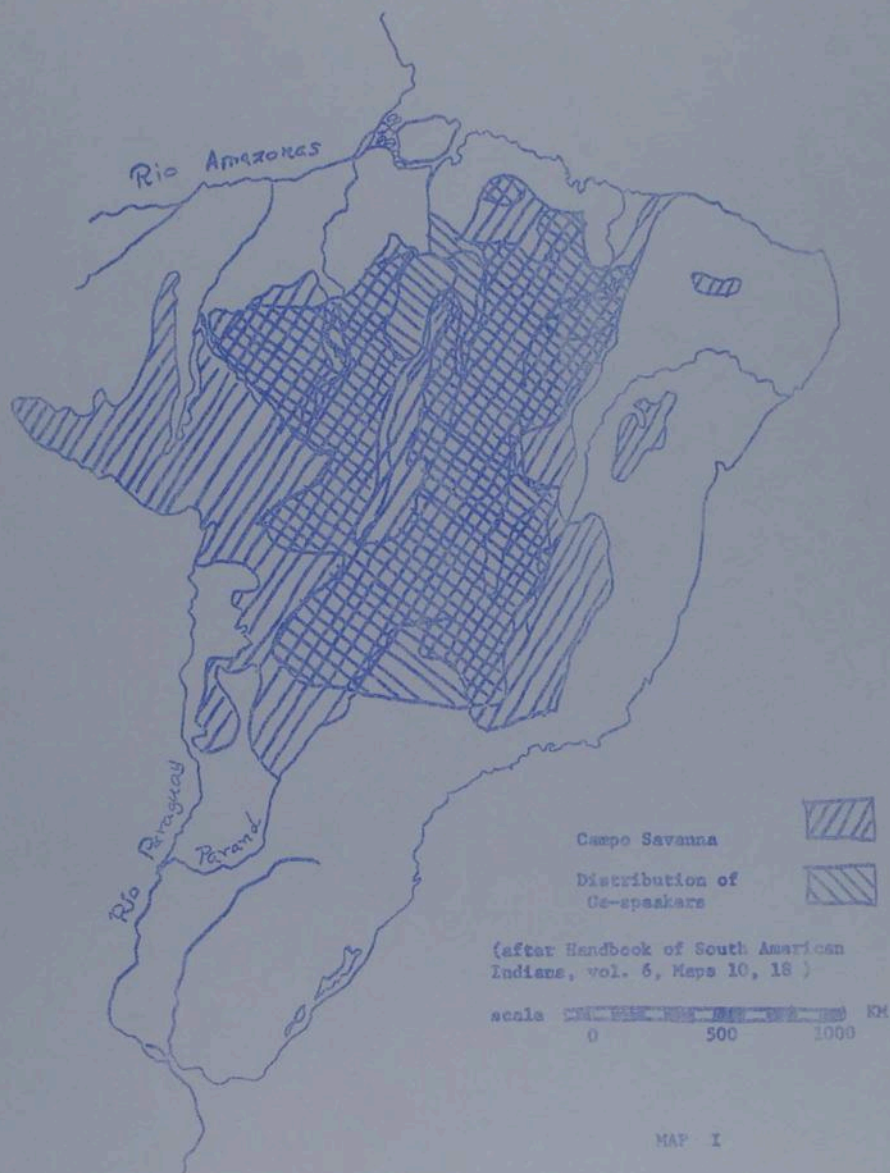
Cariban Lexical Terms for Basic Crop Plants

Tribe	Bitter Manioc	Sweet Manioc	Maize	Pineapple	Papaya
Cumanagoto	kičarapo	kačite	anyaze	onora, nana	
Cachama	kera	dup.po	abañi	anañi	kapada
Mamo	küdere	dupwo	abañi	aneñi, nana	kapada
Barana	kiédi		swañi	nana	puku pai ya
Macusi	Kitsixa, kénara		anai	anai-i	mapada
Kamarakoto	kōsera		anai?		mapada
Makiritare	kiéde, siéde		cennya	anédeke	mahaya
Apalai	wui		swañi	nana	mamau
Yupa		po	mayisa		mapaya
Bakairi	opa	taise	anji		

TABLE II

Major Cultural Movements in Tropical Lowland South America

Linguistic Group	Center of Dispersal	Destination	Cause of Dispersal	Time Depth
I. Arwakan	NW Venezuela - N Colombia	Caribbean Coast, Llanos, Amazon Basin, Mesoamerica?	horticulture	3000 - 2000 B.C.
II. Arwakan (Maipuran)	Llanos	Lower Orinoco, Rio Negro, Montana, Antilles, Middle Orinoco	ridged fields?	1000 - 900 B.C.
III. Arwakan (Tainan)	Lower Orinoco	Antilles, Middle Orinoco	Maipuran expansion	ca. 1 A.D.
IV. Cariban	Colombian Cordillera Oriental	Orinoco, Guayana, Amazonia	maize?	500 B.C. - 1 A.D.
V. Ge	NW <u>campo</u>	whole of central Brazilian <u>campo</u>	horticulture	1 - 1000 A.D.
VI. Cariban (Canibal)	middle Orinoco?	Orinoco, northern coastal South America, Antilles	trade, warfare, ritual cannibalism	ca. 1000 A.D.
VII. Tupian	southern Amazonia	Atlantic coast, Paraná drainage	Grandfather cult	1000 - 1900 A.D.



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Handwritten
Correspondence

Taximetrics Lab.

December 31, 1970

Dr. Eduardo Alvarez-Luna , Head
Plant Sciences Department
Centro Internacional de Agricultura Tropical
Apartado Aereo 58-13
Bogota, Colombia

Dear Dr. Alvarez-Luna:

Last August, Dr. Victor Patino visited in the Taximetrics Laboratory. I had already left for Hawaii, but Dr. Patiño was shown our work with yuca by my assistants, Dr. S. G. Appan and Mr. Henry Fleming. I later had a chance for brief discussions with Dr. Patiño in Hawaii. He told me that you are gathering a large collection of varieties of M. esculenta at CIAT.

Since I have long been engaged in varietal studies of yuca, and have just submitted a comprehensive classification of the species for publication in ECONOMIC BOTANY, I wonder if we might not be able to collaborate on continuing studies. I do not claim that the classification is complete, because it does not take into account many of the necessary data regarding such qualities as time to maturity, starch content, HCM concentrations, protein values, etc., all of which are important. However, since our work was done with a computer, it is possible to rapidly incorporate the additional data, given the cooperation which you might be able to provide.

I would like to offer our services to aid in evaluation of the various cultivars of yuca. I believe that it would add significantly to the work of CIAT, providing research knowledge which will be valuable in your work. We have computer systems which are powerful allies in the studies of the complexities of yuca, and are willing to put these at your disposal, if some means for collaboration can be established.

I believe that we could save valuable time in meeting your objectives since we have already done most of the preliminary work. I am willing to share my knowledge about the species, and only need to find some way in which this can be accomplished most efficiently.

If you and your colleagues are at all interested in such collaborative effort, I will be pleased to hear from you.

Sincerely yours,

David J. Rogers,
Professor of Biology

CC: Dr. Ralph Richardson
Dr. U. J. Grant
Dr. Victor Patino

ms. Courtesy
January 5, 1971

Dr. J. Strasser
FMC Corporation
1185 Coleman Ave, Box 580
Santa Clara, Califo. 95052

Dear Dr. Strasser:

Thank you for your recent letter on cassava leaf protein. Unfortunately, I have not had an opportunity to continue this type of work. Instead, I have concentrated on the more basic botanical type endeavor, and have just completed classifications of the varieties of the cultivated species, and another on the related wild species. Both manuscripts have been submitted for publication, but I have not heard that either has been accepted.

It is very difficult to get publishing money for basic botanical research. If you have any means of supporting such work, I would be pleased to hear about it. Your support would be a really great contribution to agriculture.

As far as leaf protein from cassava, I really have very little advice to offer. I know that Bill Pirie's methods for crude protein extraction has not been very favorably received, even though he claims that the product is not objectionable.

There are many factors, social and economic, which operated to prevent acceptance. I think that it would be important to find out what kinds of things can be expected to be accepted before one goes ahead and does a complicated research job on the production end. The literature is full of failures on this subject. My advice is, therefore, don't leap into such endeavor until you have some very strong indications that your efforts will be acceptable to those who would use it. Sorry to be so pessimistic, but I can't be otherwise. Incidentally, I note that you cited studies by Akinrele in your enclosed reprint. It might be well to point out that his work is suspect, and the real results were not reported.

Sincerely,

David J. Rogers
Professor of Biology



FMC CORPORATION

CENTRAL ENGINEERING LABORATORIES

1185 COLEMAN AVENUE, BOX 580, SANTA CLARA, CALIFORNIA 95052
TELEPHONE: 294-8124, AREA CODE: 408

December 28, 1970

Dr. David Rogers
Taximetrics Laboratory, Armory 10
Department of Biology
Division of Population Studies
University of Colorado
Boulder, Colorado 80302

Dear Dr. Rogers:

I have read several of your publications on cassava. Recently, I was able to obtain your new address from Mr. Milner.

Have you been able to continue your studies on cassava? Since some time, researchers here at Central Engineering Laboratories of FMC Corporation, have been studying the aspects of protein enrichment of cassava. The use of single-cell protein was one area we looked into. I enclose a reprint for your information. However, there is still more R & D work necessary before it is shown that single-cell protein is completely safe for human consumption.

In one of your publications you proposed the use of cassava leaf protein. Recently, researchers at the Western Regional Research Laboratory in Albany, California have been very successful with the extraction of protein from alfalfa leaves and we wonder if the same process could not be applied for the production of cassava leaf protein. I would appreciate any information you could give us which would help us in evaluating such a process.

Sincerely yours,

Dr. J. Strasser
Process Development Department

JS/tf
Enclosure

THE NEW YORK BOTANICAL GARDEN
BRONX • NEW YORK 10458 212/933-9400

October 15, 1970

Dr. David J. Rogers
Taximetrics Laboratory
Department of Biology
University of Colorado
Boulder, Colorado 80302

Dear Dave:

Thanks for yours of the 1st, giving an account of your progress with Manihot. It will be great to finally see it all in print. I hope its usefulness will extend beyond the Euphorbiaceae to taxonomy generally, and serve as yet another first in the use of computers in taxonomy, rather as our Cassia-Apoucouita paper did a few years ago.

Sorry financial stringencies have reduced your shop, but I guess, as you suggest, such low blows can be therapeutic in the long run.

Now, as to the article in the Times, we are involved with Flora North America, as you know, with Bill Steere, John Mickel, and me representing the Garden on the three principal committees: steering, editorial, and advisory. Rather early in the game the Type Register arose as a trial balloon for banking and retrieving herbarium data, using a subset of the herbarium that everyone would be interested in. Walter Lewis and I agreed to work with the Smithsonian on this not as an endorsement of their methods, but rather as a means for us to find out, inexpensively, what data banking entails in local manpower, competence, time, expense, and the like. Nobody can give us information like this because except for a few minute trial projects there is no basis. We've been feeding data in for about 18 months now and at least they are sending back to us what they promised. There are lots of problems, yes, and I'm still not sure how workable the setup will be in the long run. But the fact of the hour is, as you know only too well, there is no money in the Washington coffers for us to glom onto for this toe-wetting operation, and until we go through the machinations, we won't know what we're talking about. So, to find out for ourselves, we've tied up with the Smithsonian because they're nearby, because the only thing we've had to pay for thus far is the time our people have put into it, because the Smithsonian crowd came up here last June and gave us a three-day symposium-demonstration almost entirely at their expense, and because thus far, at least, our students have been able to learn a lot about types that they wouldn't have before getting into their dissertations. So even if it bombs out, I don't feel we would have lost much, and in the meantime we will have gained something -- in tangible results (an index to type collections) as well as in understanding.

CHARLES B. HARDING, *President* • FREDERICK S. MOSELEY, JR., *Vice President* • MRS. HERMANN G. PLACE, *Vice President* • DALE E. SHARP, *Treasurer* • OAKLEIGH L. THORNE, *Secretary* • WILLIAM C. STEERE, *Director*

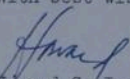
I too am sorry that TAXIR hasn't had this much of a test. Naturally we all wish you could develop a case for it while it operated in your own backyard, in the University of Colorado Museums. There are aspects of the Smithsonian setup that even I don't like, such as the use of the very expensive VIP transmission device for external or remote input and costly core storage for the entry and retrieval of data. Of course they are not blind to these problems or to their affect on the acceptability of the system, even in the trial stages, by outside institutions.

I am very pragmatic about all this, Dave, and, as I find myself lost in a fog of jargon everytime I try to mix medicine with IR and EDP types, as I did last spring at the IR meeting at the Metropolitan Museum of Art where a number of systems were propounded, to say nothing of devastating remarks given behind the hand by nearly every proponent about all other competing ideas, I am going to simply have to try out what is operable.

It is likely that the Type Register will soon be separately funded and free to go its own way, free of FNA, with Walter Lewis its helmsman. I think that if TAXIR and Type Register seem a hand-in-glove combination, you would do well to discuss this with Walter, for there is no built-in wedding between Type Register and the Smithsonian system. If TAXIR has special advantages for this kind of project, they should be made known.

I'll be heading back to Brasilia in January once again. My '70 collections have just made the scene here in New York and we'll be getting the mandiocas to you shortly.

With best wishes,


Howard S. Irwin
Head Curator

HSI:hr

Encl.

TAXIMETRICS LAB.
ARMORY 101

October 1, 1970

Dear Howard:

Sorry not to have responded to your inquiry about the Manihot loan from Museu Goeldi. Yes, I have it--49 sheets. Yes, I will return it this year, along with all the others.

We are really quite close to the finish now, after all these years. It has been well worth it to hang on to the materials, because they have not only required tremendous effort on their own part, but these same specimens have been the test case for most of our ideas on the computer programs. Hopefully, the work on Manihot will be helpful to other Euphorbiologists, who have always had a terrific struggle in getting a grasp on species concepts in this family.

I am still putting along on one cylinder--Henry is still with me, but hasn't been paid since last January. His wife Mary keeps them going with a job as librarian at the National Center for Atmospheric Studies. The poor guy is working harder now than he had to when he was on salary. What we are doing (he and I) is to really get our various programs to the user's stage. When we had programmers around, we sort of left the interface with the computer up to them, but now that we're having to do it ourselves, we are really bringing the programs to the level where anyone should be able to use them without the intersection with the computernik. TAXIR is still a very hot commodity, and I'm sorry that it isn't getting a chance to be used where it was intended. We had a grant request to install the system in our museum, but it got shot down at NSF, largely because of all the bickering that's been going on in the Smithsonian and other large museums.

Which reminds me--I saw a news item (New York Times?) that NYBG had joined with the Smithsonian and somebody else for an IR system. If that's true, I'm sorry to hear it--you'll get bad luck if you try to use what the Smithsonian has cooked up. Let me know what really is going on.

Best Regards,

David J. Rogers
Professor of Biology

THE NEW YORK BOTANICAL GARDEN
BRONX • NEW YORK 10458 212/933-9400

DEC 4 1973

27 November 1973

Dr. David J. Rogers
Herbarium
University of Colorado
Boulder, Colorado 80302

Dear Dave:

Many thanks for determining the Irwin et al.
and Anderson et al. *Manihot* material. We appreciate
your help with these specimens.

I have notified the pertinent persons that you
will be leaving the University on January 1st. We wish
you the best of luck in your new post.

Sincerely,

Pat

Patricia K. Holmgren
Herbarium Administrator

PKH/amk

NOV 21 1973

UNIVERSITY OF CALIFORNIA, BERKELEY

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SANTA BARBARA • SANTA CRUZ

LANGUAGE-BEHAVIOR RESEARCH LABORATORY

2224 PIEDMONT AVENUE
BERKELEY, CALIFORNIA 94720

17 November 1973

Professor David J. Rogers
Department of Biology
University of Colorado
Boulder, Colorado

Dear Dave,

I'm grateful for the monograph on manioc and the suggestions for collecting. I am afraid that most of the herbarium specimens that we took last field session are inadequate by your standards as most were sterile. However, leaf character should be obvious from them and we did take color slides. If you would like to see these materials, I am sure Tom Croat at the Missouri Botanical Garden would be more than happy for you to have them.

Meanwhile, my wife and I will begin thinking about further collections when we return to the Alto Marañón next summer. I am hopeful we may be able to come up with something of interest for your research.

All the best,

A handwritten signature in dark ink, appearing to read 'Brent Berlin'.

Brent Berlin

Oct. 9, 1973

Dr. Brent Berlin
Department of Anthropology
University of California, Berkeley
Berkeley, Calif. 94720

Dear Brent:

I indeed recall your visit when I was at Stanford, and wondered how you had progressed since. I see you have been busy.

Under separate cover I am sending a copy of my Monograph of Manihot esculenta. The second half of that paper, discussing the Groups of manioc, will be most useful to you. I hope that you will be able to assign each of your collections of manioc to one of these groups. You may have the necessary information in your notes on each of the cultivars to assign them. However, if you do not, I am also sending with the reprint a rather complete set of instructions for collection to make assignment to one of my Groups possible after your next expedition. By following the instructions given on page 35, Aids to identification of an unknown cultivar, you probably should be able to assign any one of your collections to one of my Groups.

I trust that you will prepare documenting herbarium specimens to be deposited in the herbarium at the University of California, Berkeley. These will be valuable to document your work for anyone else who may wish to examine and determine your activities in the future.

Thanks for writing, and please let me have any papers which appear as a result of your endeavors. I think it to be extremely vital type of research.

Sincerely,

David J. Rogers
Professor of Biology



FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

Via delle Terme di Caracalla, 00100-ROME

Cables: FOODAGRI ROME

Telex: 61181 FOODAGRI

Telephone: 5797

Ref.

Rome, 20th June 1973

Dear Professor Rogers,

Thank you for having let me know of the forthcoming publication of your monograph on Manihot. Its appearance will be of considerable assistance to me.

CIAT is establishing a collection of as much of the world literature on cassava as possible, and will thence make available abstracts and fuller information through its Cassava Information Centre. My role has been to prepare a structured vocabulary to make the retrieval of this information as meaningful as possible; the resultant thesaurus will be published by CIAT. The first issue will be a tentative one, and in a subsequent issue I would hope to extend the taxonomic coverage.

With my thanks,

Yours sincerely,

Donald Leatherdale

Professor David J. Rogers
Taximetrics Laboratory
Department of Biology
University of Colorado
Boulder, Colorado 80320, USA

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Director C. E. Taylor BSc, PhD
Secretary N. D. Anderson

DLJ/MC
28th May, 1973

Prof. David J. Rogers,
Dept. of Environmental, Population & Organismic Biology,
University of Colorado,
Boulder,
Colorado 80302
USA

Dear Dave,

Thank you for your letter of May 15. I'm glad you like our efforts and I much appreciate your comments. Some comments on your points are:

1. It seems a good idea to mention FAO/IBP if there is a possibility of attracting their support. A sentence in the introduction may serve the purpose, e.g., to follow the 3rd sentence: "The subject is also topical in view of the considerable interest being shown in the conservation of genetic resources by FAO and the international biological program."
2. I know that bacterial wilt has been found at IITA and I have also seen the recent report of a devastating disease in Zaïre. But I do not know if the Zaïre situation has been looked at by a pathologist and am not sure that we know the cause or the extent of the problem there for certain. My general sentences at the end of p.2a and top of p.3 cover a general problem of this kind and I think we should be content to leave it as such.
3. The sections on yield and labour-saving are part of the larger section on breeding goals (p.2), where we first emphasise the importance of local problems, and state that they determine breeding goals which consequently differ in different parts of the world. We restate this more or less on p.6. But we could insert your point about decision-makers at the end of the paragraph at the top of p.2A, e.g., "Hence it is often desirable for breeders to consult with economists and even politicians before determining their breeding priorities".
4. We tried on p.6 to keep the idea that breeding for peasants' holdings must continue in spite of interest in mechanical devices. But perhaps more emphasis to the point is required. A possible change at the foot of p.6 is "Cassava cultivation on peasants' small-holdings will

Prof. David J. Rogers, Colorado 80302

28.5.73

certainly continue to be of major importance for the foreseeable future and may increase in importance. Breeders must always keep the needs of these cultivators in mind, though selection for the special characteristics required for mechanised systems is not likely to produce cultivars unsuitable for growing on small-holdings".

At the practical level I imagine that breeders will choose parents with these special characteristics, but will select in the progenies for material that is promising either for the mechanised or the peasant system. Selection for the former will usually satisfy the latter but not always vice-versa!

I am sending a copy of this to Frank, who I hope will be seeing the MS through the final stage.

Yours sincerely,

Derek

D.L. Jennings

February 26, 1973

Dr. Jose de J. Jimenez A.
Calle Maximo Gomez 34
Santiago de los Caballeros
Republica Dominicana
Antillas

Dear Dr. Jimenez:

Thank you kindly for your inquiry on the publication of my monograph of Manihot. The monograph is entitled: Manihot and Manihotoides (Euphorbiaceae): Flora Neotropica Monograph No. 13. We are now in page-proof stage, and it will be some few months before the monograph appears.

I am sending a copy of this letter to the publisher:

Mr. Harry Lubrecht
Hafner Publishing Company
866 Third Avenue,
New York, New York

and I trust that they will notify you when the book is available. If they do not notify you, you can either inquire directly from the above, or by writing to Dr. Clark Rogerson, The New York Botanical Garden, Bronx, New York, 10458 for further information.

I wish to acknowledge my indebtedness to you once again for your kind assistance in collecting important material for this study.

Sincerely yours,

David J. Rogers

Dr. JOSE DE JS. JIMENEZ A.
Calle Máximo Gómez 34
Santiago de los Caballeros
República Dominicana
ANTILLAS

FEBRUARY 6, 1973

DR. DAVID J. ROGERS
PROF. OF BIOLOGY
UNIVERSITY OF COLORADO
BOULDER, COLORADO

DEAR DR. ROGERS:

IN A NOTE OF YOURS DATED APRIL 1, 1971, REPLY-
ING TO A LETTER OF MINE WHERE I WAS ASKING INFORMATION ABOUT
YOUR PAPER ON MANIHOT, YOU VERY KINDLY INFORMED ME THAT THAT
PAPER WAS IN PRESS.

I DO NOT WISH TO DISTURB YOU IN ANY WAY BUT WILL APPRECIATE
TO GIVE ME THE ADDRESS OF THE PERSON INVOLVED IN THE SALE OF
YOUR WORK IF IT IS FINISHED AND READY ON SALE.

HOPING THAT EVERYTHING IS O. K. WITH YOU & YOURS I AM YOURS
MOST SINCERELY

Feb. 26, 1973

Dean Carl W. Borgmann
Graduate School

Dear Dean Borgmann:

In response to your request of Feb. 5, for results of my two grants, CROW grant-in-aid 1967/68, and FF assoc. grant 1971/72, I have the following report.

Two papers, presented in 1970, in Hawaii, are direct outgrowths of the first of the above. The are enclosed. In addition to the published papers above, there are additional results which are off a different sort. One of these is that genetic material and growing plants of Manihot pringlei are now found in at least a dozen centers around the world interested in plant breeding and genetic improvement of an important world crop, cassava. There are also documenting herbarium specimens deposited in many of the world's major herbaria, which I collected and sent to these institutions.

As a result of the second grant above, a book is now in page-proof stage, published by Stechert-Hafner, in a series edited at the New York Botanical Garden, Flora Neotropica. Final pagination should run to about 275 pp. The title: Manihot and Manihotoideae (Euphorbiaceae): Flora Neotropica Monograph No. 13. I do not have the final figures from the publisher on costs, but a preliminary estimate is \$23.50. If you wish, you may correspond with Mr. Harry Lubrecht, Hafner Publishing Company, 866 Third Avenue, New York, concerning final publishing date and cost.

I trust the above is satisfactory explanation of the activities and results of the work I did using the funds from these sources. If not, please let me know what further is required.

Personally, I found the awards very useful, and coming at a time when I needed them badly. These awards assisted greatly in furthering my studies, and allowed me to produce some needed work which otherwise would not have been accomplished. I think the program is very effective, and should be continued (and increased if that is at all possible.

Sincerely yours,

David J. Rogers
Professor of Biology

Taxometrics Lab.
Dept. of EFO Biology
Univ. of Colorado
Boulder, Colorado 80302
Dec. 20, 1972

Dr. Ilse S. Gottsberger
Depto. Botanica
Botacatu-Sao Paulo, Brasil

Dear Dr. Gottsberger:

I am sorry to report that neither your first letter, nor the specimen of Manihot from the Brazilian Cerrado were ever received. The fact that I was on leave away from my regular position may explain it.

If you care to, I would like to receive any other specimen of Manihot from the cerrado which you may still have.

I am sorry that you have been delayed in your work by the problems of the postal service. But please take great care in wrapping the specimens for mailing--they are generally very brittle plants.

Sincerely,

David J. Rogers
Professor of Biology

Dec. 20, 1972

Dr. John H. Beaman
Dept. of Botany and Plant Pathology
Michigan State University
East Lansing, Michigan 48823

Dear John:

I will do Manihot for FNA. It will be no sweat, there being only two species that get into the US, and the fact that the generic monograph of the genus is now in press for Flora Neotropica.

Having completed my monograph on Manihot, I am now looking into the possibilities of taking up the genus Vitis for my next study of cultivated plants and their relatives. However, I have not yet committed myself to this work, and want to do a little more investigation before saying I'll do the North American species for FNA. If and when I do decide to do the grapes, I'll let you know.

I look forward to receiving the Guidebook for FNA.

Sincerely,

David J. Rogers
Professor of Biology

November 6, 1972

Dr. L. A. Hunt
Dept. of Crop Science
University of Guelph
Guelph, Ontario
Canada

Dear Dr. Hunt:

This letter replies to yours of Oct. 20, mailed to me at the Food Research Institute, Stanford.

I am surprised that you appeal to me for assistance with live material of Manihot species when the Canadian International Development and Research Centre has so handsomely supported CIAT to accomplish this mission! I have had relatively little contact with their work, but I understand that they have made intensive efforts to bring in living material, and probably have the material, the staff and the money to support such requests as yours. They have, for example, a documentation specialist who should be up-to-date on all such matters.

Unfortunately, I have no funds for support of such efforts, and am, therefore, unable to help you very much. The only living material I have is of one very large species, M. grahami, which occupies all the greenhouse space allotted to me. At the moment, we have cut this plant back severely, and unfortunately, tossed out any extra propagating material. It would not be safe to mail this material at this time of the year, anyway, as I am sure you are well aware.

Thank you for your inquiry.

Sincerely,

David J. Rogers
Professor of Biology

cc: Dr. Barry Nestle

Nov. 6, 1972

Dear Jim:

You asked my comments on the origins of Manihot esculenta cultivation, specifically about its MesoAmerican domestication.

Botanically, the most closely related wild species to M. esculenta, M. aesculifolia, has a range which is mostly MesoAmerican. This species shares much in common (morphologically) with the cultigen. Other candidates for near relationship are also found in Mexico. If you're looking for potential candidates as precursors to the cultigen, you look botanically first, and ethnologically second. In South America several species also look very much like the cultigen, but they exist in regions mostly outside the posited centers of domestication. These, I suggest, are very strong reasons for a MesoAmerican origin. One of the most respected ethnobotanists in Latin America, Ephraim Hernandez X., at Chapingo, Mexico, concurs in my hypothesis.

Yuca unfortunately does not lend itself well to archeological remnants. The only possible plant material from archeological digs that has actually been uncovered are in the places I cited. No plant remains have been documented from South America. While I agree that these are late dates, I suggest that this is because of the nature of the plants themselves. In South America, the arguments for various places of earliest domestication are based upon (1) poor classifications and weak knowledge of the genus Manihot, or a broad-ranging knowledge of the cultigen itself, or (2) upon "griddles" found in northern S. America. These two are tenuous arguments at best. An artifact which might have been used to bake the cassabe on could as easily have been used for some other starchy vegetable, of which there are a number of candidates.

My arguments are best bolstered by two publications now in press: one is a monograph of the cultigen, and the other a monograph of the genus, including the cultigen. The first is to appear in the journal Economic Botany, which is long overdue, and the second is to appear in the series, Flora Neotropica, published from the New York Botanical Garden. When these appear, you will have the best available botanical synthesis of the problem that I can put together.

I think that there has been too much armchair speculation on this subject, and not nearly enough digging in the field. For example, one should look very closely at present-day use of the crop by whatever remnant "native" peoples exist. Yucatan has some such people whose way of life is little changed from pre-European contact. But clearly, South America has as much need as any other place. But the field work should be done in teams--a botanist (who might be a plant geographer as well) along with anthropologists and archeologists. A real pragmatic agronomist would help to keep the "pure" types down to earth.

More recently, I have moved greatly by the arguments of Jack Harlan, whose paper in Science on centers and noncenters of origins is a very realistic approach to these hairy problems. I feel that yuca fits well within his arguments. May I recommend his readings to you.

Sincerely,



UNIVERSITY OF GUELPH · GUELPH · ONTARIO · CANADA

AREA CODE 519 · 824-4120

Oct. 20, 1972.

Dr. David J. Rogers,
c/o Food Research Institute,
Stanford University,
Stanford, California 94305,
U.S.A.

Dear Dr. Rogers:

As you are probably aware, the Canadian Government and a number of Canadian Institutes are becoming involved in a cassava improvement programme. The work in Canada, which is being linked to the programme at Cali, Colombia, is quite naturally restricted to laboratory studies. One study which could be carried out here and which could be of value in a breeding programme is concerned with the photosynthetic activity of Manihot plants--in particular, in determining whether any of the Manihot species have the potential for much higher photosynthetic rates than the cultivated cassava. I am keen to proceed with such a project, but must first determine whether it is possible to lay hands on various species which could be hybridized with M. esculenta. Dr. Barry Nestel of the Canadian International Development and Research Centre suggested that you may be able to help me in this connection. Accordingly, I would be most grateful if you would let me know if you have live material of any of the Manihot species, and if you would be willing to let me have cuttings from such material. Also, I would be most appreciative if you would let me have the addresses of other individuals who might have such material.

With my sincere thanks,

Yours sincerely,

L.A. Hunt.

LAH/jms

L.A. Hunt,
Assoc. Professor.

Professor Rogers:

I am a graduate student in geography at UCLA doing a paper for Professor Sauer on the frontiers of manioc cultivation in the New World. I am primarily interested in the changing patterns of cultivation and distribution of the plant through time. I have read your articles on manioc in the various journals but as yet have found little real evidence for the existence and cultivation of domesticated forms in Mesoamerica before the Spanish, and very little on its cultivation there today. Because you seem to believe that Mesoamerica might have been a second domestication center for manioc, I would like to know what evidence you have which supports this viewpoint. The finds of MacNeish at Tamaulipas and Tehuacan do not seem to vindicate your position, at least from what I've been able to get from them. I would most appreciate any references or information that you might have on this subject which could point me in the right direction. Dr. Sauer has also expressed interest to me on this subject and is the one who suggested I write you. Again, any information, data, references etc. will be greatly appreciated.

Thanking you I remain respectfully yours,

Jim Powers

Jim Powers
Department of Geography
UCLA
Los Angeles, Calif.

October 24, 1972

Dr. Frank Martin
Federal Experiment Station
Mayaguez, Puerto Rico 00708

Dear Frank:

Responding to your letter of Sept 15, I have the following comments you may wish to consider for the 5th section of the study "Utilization of Cassava Variability on an International Basis".

The major comments deal with documentation of work, which seems to be excluded entirely from your document. This deals with the business of herbarium samples of the variations to be studied. Over the years, I have attempted to find out which variations were actually used when this or that agronomic trial was made, but almost totally without success. The workers only described their trials with the plants in terms of local cultivar names--no possible way to determine what they were using. I therefore plead with you plant breeders to document what you do, or it will be totally useless. Documentation involved taking specimens of the plant, and giving a description to accompany the specimen, according to the enclosed outline. Just a fragment of the leaf of the plant is not satisfactory--it must be accompanied by descriptions of the whole plant, according to the suggestions I enclose with this letter. This procedure will allow someone in another country to determine whether he has the same or similar plant material, and whether his own work is similar to, or different, from that analysis done in another part of the world.

This basic function is so fundamentally important that I simply cannot understand why it is so seldom done. Are workers afraid to reveal the work they've done, or what? Maybe you plant breeders know something that I do not--maybe you have some procedures for sharing information that I have failed to discover--but if you have, you have kept it well hidden from the literature.

I might say that this is true in nearly every crop that I have looked at--not just cassava. So, something is being left out which should be a standard procedure for any and all workers. Herbarium samples may be scorned by geneticists, because they are dead, and you only work with live material. But if you would use the herbarium sample as a document to show you what is useful to work on, you might not have this scornful attitude. Just because herbarium specimens are generally those things that taxonomists work on should not prevent you from using the best documenting system there is to know something about work done earlier, or to provide a basis of understanding what you did to later generations.

Hopefully, I have made some imprint on your thinking. I will keep trying, even though it seems almost futile to me at the moment.

Sincerely,

Encl.

David J. Rogers

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
~~OFFICE OF RESEARCH AND COMMUNICATIONS~~
FEDERAL EXPERIMENT STATION
MAYAGUEZ, PUERTO RICO 00708

September 15, 1972

AIRMAIL

Dr. David Rogers
Dept. of Biology
University of Colorado
Boulder, Colorado 70302

Dear Dave:

I am sending herewith the 5th section of the study "Utilization of Cassava Variability on an International Basis". I would appreciate any comments or criticisms you care to make on it. This particular section follows closely the CIAT publication on field testing, and I hope to elicit a good criticism of it.

I am now ready for contributions on the following section, "Assembly and Inter-change of Relevant Data".

Sincerely,


Franklin W. Martin
Plant Geneticist

Enclosure

Standardization of Testing and Evaluatory Procedures

The high cost of experimental work means that experiments must be planned to give a maximum amount of information that is useful, when possible, in many geographical areas. The experiments must be well done and therefore trustworthy. A good experimental system with accurate reporting should make unnecessary the continuous repetition of the same experiment in distinct regions.

The general problem of experimental designs has been handled admirably in "A Guide for Cassava Field Trials" printed by Centro Internacional de Agricultura Tropical (CIAT). The information given is too extensive to include in this report but should be consulted by persons interested in the agronomy of cassava. Of particular value are a series of standard forms for planning experiments, recording background information, maintaining a diary of experimental procedures, recording economic data, recording harvest data, maintaining information on climate, recording plant disease notes, and preserving samples. These forms should make it possible to compare the details of experimental results in diverse regions, and constitute a manner of enriching the typical report of an agronomic experiment. Permission has been given in the manual to reproduce and use such forms.

With respect to the current report, standard procedures will be considered only for the purpose of varietal testing. Furthermore, within the concept of varietal testing the measurement of yield (however defined) under a given set of conditions will be emphasized. This suggests that conditions be selected in advance when possible, and recorded with the report of the test. If investigators on a world wide basis use similar reporting techniques, then their results will be more interesting and useful to other investigators.

It must be recognized that varietal testing is managed at several levels. At least one of these involves the possibility of international cooperation, while others do not. It is not necessary that all varietal tests be standardized, but it is highly desirable that tests involving exchanges of materials be standardized. Some kinds of varietal comparisons are mentioned below.

1. Preliminary screening among seedlings or new accessions for suitable cultivars. Such tests usually will include selection for other factors as well as yields. Selections may be based on single plants.
2. Unreplicated comparisons of short rows of preliminary selections. This procedure may be used to further reduce a large number of selections to a workable number.
3. Replicated variety trials for the purpose of selecting a few varieties for trial under well-defined conditions. See later notes.
4. Final yield trials involving replicated testing of large blocks at several locations.

Normally the kinds of materials moved internationally will be special breeding stocks with known characteristics, and high-yielding varieties. The latter can be tested directly in replicated yield trials once quarantine restrictions have been met, and sufficient material is available. Multiplication of new stocks may take some time, and therefore new rapid propagation methods must be perfected.

Some suggested standardized conditions:

1. Randomized block design.
2. Four to six replications.
3. Each plot of 3 rows of 36 plants each. The middle 30 plants of the middle row to serve as test plants.
4. Uniform seed materials, spacings, fertilizer, insecticidal, fungicidal, and other treatments.

The recording of data could be most effectively managed using the forms in the CIAT manual. However, since these forms are extensive and require (and merit) considerable dedication, many times when it is appropriate to use them they will not be used, or they will not be completed. Therefore, a shortened form has been devised which could serve as a medium of exchange of varietal testing information.

It is obvious that many important items of information are not included on the suggested short report form. Many of the appropriate evaluations will not be made for a particular varietal test, but when made they can easily be reported on the reverse side of the form.

It is appropriate here to consider standardized measurements of some of other variables.

Dry matter determinations: Dry-matter determinations sufficiently accurate for most purposes can be made quite readily by measuring fresh root weight, and chipping and drying the cassava chips to a constant weight in an oven at approximately 55-60°C. To determine the percent of dry matter, divide the oven dry weight by the original fresh weight and multiply by 100.

Mechanical determination of starch: Duplicate fifty-gram samples of fresh cassava roots in 500 ml of water are macerated in a blender for 5 minutes and the starch washed out of the pulp through a 200-mesh screen with 500 ml of water. The washings are dried in a convenient-sized pan in a forced-draft oven at 85°C and then weighed. The results are expressed as a percentage of the fresh root weight.

Estimation of starch content by root density methods: Estimates of starch content can be made from specific density of the root. Root density is obtained by weighing a sample of roots in the air and again under water and then calculated using a formula. By using large samples (5-10 kg) for density evaluation, small variations between samples can

be detected. The CIAT manual gives a chart developed to convert density to starch content. It may be desirable to verify this chart locally.

$$\text{Density} = \frac{\text{Root weight in air}}{(\text{Root weight in air}) - (\text{Root weight in water})}$$

Measurement of HCN: (To be added later)

CASSAVA VARIETY TEST RESULTS

Name and address of investigator _____

Area where varietal trial held _____

General characteristics of climate _____

General characteristics of soil _____

Factors which limited the test _____

Propagating material _____

Planting method and spacing _____

Fertilizers and soil amendments _____

Insect and fungicidal control measures _____

<u>Varieties</u>	<u>Fresh weight marketable yields per hectare</u>	<u>Dry weight yields on conversion</u>	<u>Significance of differences</u>
------------------	---	--	--

Interpretations: (See other side.)

Noteworthy characteristics or limitations of varieties: (See other side.)

October 28, 1972

Engo. Agrono. Milton de Albuquerque
IPEAN
Caixa Postal, 48
66.000 Belem, Para
Brasil

Dear Milton:

I am finally responding to your letter of 29 July, requesting a copy of the book, "Manioc in Africa" by W. O. Jones. I have ordered a copy of the book, and asked that it be mailed directly to you from the publisher, The Stanford University Press. I am glad to contribute this book because of the outstanding work you have done on Manihot esculenta, and because of all the help you gave me in my work with this important crop.

I have not done much publication of importance recently, but at this moment, I have galley proof of two studies that have been my major work, the classification of the species of the genus Manihot, and another on the classification of the cultivars of Manihot esculenta. It is my hope that it will not be much longer before these two publications are available, and I will be certain that you get copies of them.

Thank you very much for writing. I am always very pleased to hear from you. I trust that it will not be too long before we meet again.

Please give my best regards to all of the fine workers there at IPEAN.

Sincerely yours,

David J. Rogers
Professor of Biology

Belém, 29 de julho de 1972

Caro amigo Rogers:

Mais uma vez te escrevo pedindo um favor.

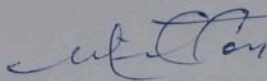
Queria, caso possível, que me orientasses/ sôbre o que devo fazer para adquirir um exemplar do conhecido livro de W.O. Jones "Manioc in Africa". Embora tenha sido editado em 1959, até ho je não consegui adquirir a obra, a qual também não existe na Biblioteca do IPEAN. Gostaria não sômente de conhecer o livro como também de enriquecer minha pequena coleção de trabalhos sôbre Mandioca.

Muito agradecerei, portanto, uma indicação do local de aquisição, do preço e das possibilidades de envio.

Desejando ao bom amigo e família muita paz e tranquilidade, aqui estaremos sempre à disposição para o que estiver ao nosso alcance.

Pedindo excusas pelo trabalho que estou dando,

Um forte abraço do



~~Eng. Agrô~~ MILTON DE ALBUQUERQUE

*Manihot correspondence
file.*

Oct. 12, 1972

Dear Carole:

Please forgive me for not sending you the requested information on collections of manioc. Your letter, written on June 26, has just now reached me. It went to about five different places, including England!

The enclosed data form should give you the necessary instructions. In this form, we tried to include all types of data that are pertinent both from the botanical and use standpoint. You may want to extract some of the details, and add other data points of your own. This is just a guide, not an absolute requirement.

Please let me know if this form reaches you, and tell me how you are progressing.

Sincerely,

David J. Rogers
Professor of Biology

Planning Division,
Kachcheri,
Colombo,
SRI LANKA.

21st September, 1972.

David J. Roger Esqr.,
Taximetrics Laboratory,
University of Colorado,
U.S.A.

Dear Sir,

I have read with interest your article on Cassava and was particularly interested in the section making reference to the possibilities of utilising cassava leaves as a feed for chicken. In Ceylon, where at the moment non-availability of animal feed is acting as a constraint to the further development of animal husbandry, the break-through in cassava leaf research is going to be very helpful.

I shall therefore very grateful if you will kindly give me details of how cassava leaves can be used in compounding feeds, and whether it can be done without extracting the protein component in the leaves, a process technologically and cost-wise beyond our easy reach.

I shall be very grateful if you will send me all the information available with you at an early date.

Yours faithfully,

Mervyn D. De Silva Ph. D., Edif

Dr. Mervyn D. De Silva
Deputy Director (Planning)

PS. What about HCN content
in leaves?
dw/





World Farming

THE MAGAZINE OF MODERN AGRICULTURE

Published by:
Agricultura de las Américas
1014 WYANDOTTE STREET
KANSAS CITY, MO. 64105, U.S.A.
CODE 913-888-4664

Mr. David J. Rogers
Taximetrics Lab.
University of Colorado
Boulder, Colorado 80302

Dear Mr. Rogers:

Enclosed is a response to the article, "What's so great about Cassava?".

Would you be able to provide this gentleman with the information he seeks?

Thank you.

Sincerely,

Rollie Henkes
Editor



Subsidiary of Howard W. Sams & Co., Inc.



CARE INC.

COOPERATIVE FOR AMERICAN RELIEF EVERYWHERE, Inc.

P.O. Box 612
BELIZE CITY, BRITISH HONDURAS

August 22, 1972

CABLE: CAREDEL
BELIZE

Reference: 35-73

Roller

Mr. Kenneth Long
Technical Services
World Farming
1014 Wyandotte Street
Kansas City, Missouri 64105
U. S. A.

Dear Mr. Long:

Going through some of last year's copies of World Farming, I came upon an excellent article about cassava ("WHAT'S SO GREAT ABOUT CASSAVA", July 1971) and would like to learn a bit more about it.

I am particularly intrigued over the use of cassava in livestock feeding, specifically cattle. In another Department of the same issue the use of the cassava tuber for making insilage was discussed. I wonder in that connection why the high protein leaves were not used as well?

I would very much like to have a listing of Journals or Monographs that have treated the subject of cassava as a cattle feed.

Sincerely,

Neil R. Huff
Neil R. Huff
CARE Director

dls

FOOD RESEARCH INSTITUTE
STANFORD UNIVERSITY
STANFORD, CALIFORNIA 94305

Telephone: 312-1300

Cable: FOODRES STANFORD

January 25, 1972

Dr. Ralph K. Davidson
Deputy Director
Social Sciences
The Rockefeller Foundation
111 West 50th Street
New York, New York 10020

Dear Kirby:

This is just a note to say that Bruce has written to Peter Hopcraft about the possibility of his coming here to complete his dissertation, and I am sure that you will hear from Peter in the near future.

We should be very happy to have him here and can assure you that we will give him all the support we are able to. It seems very important for him to complete this degree so that he can have maximum effectiveness.

The Cali conference was an interesting one but still, for me, a somewhat puzzling affair. I hope I may have an opportunity to talk with you about it. Various things make me slightly uneasy, but what is most worrisome is the danger that CIDA's announced intentions to review the progress of the work in cassava after three years may lead people in the cassava program to try for some flashy achievement by that time and as a result to neglect the basic longer-term approach that most of us feel is necessary.

My very best regards,

Sincerely,



William O. Jones
Director

WOJ:hh



The University of Georgia College of Agriculture

ATHENS, GEORGIA 30601

April 18, 1972

DEPARTMENT OF HORTICULTURE

PLEASE REPLY TO:
LIVESTOCK-POULTRY BUILDING

404 / 542-2471

Dr. David J. Rogers
Gulf Universities Research Consortium
Building 1100, Room B313
Mississippi Test Facility
Bay St. Louis, Mississippi 39520

Dear Dave:

The cassava report has been printed. I am sending you six copies under separate cover. I trust you will see that Appan and any others get copies if they want them.

Rotolux Any large request for copies should be forwarded to C. A. Breitenbach
TA/AGF/AID, Department of State, Washington, D. C. 20523.

I have enjoyed working with you and hope we can meet again some day. You did an excellent job with our team. Good luck in your future endeavors.

Sincerely,

C. H. Hendershott
Div. Chmn. & Dept. Hd.

CHH:1sh

Copy

University of Colorado
Boulder
Aug 1 1972 Dept.

Dear Barbara:

The ~~Manion~~^{Art} specimens arrived to-day forwarded from my temporary home last year at Stanford. Unfortunately, they suffered from the mailing services and are badly damaged.

However, a quick glance indicates ~~there are~~ no problems for identification. However, it will take a little time because of the press of other buizness.

Thanks for sending these to me. I will get around to these as soon as I can.

Sincerely,

David J. Rogers
Professor of Biology

DJR/CR

File Cassava corresp.



THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85721

COLLEGE OF LIBERAL ARTS

DEPARTMENT OF BIOLOGICAL SCIENCES

March 22, 1972

Dr. David G. Rogers
Taximetrics Laboratory
Department of Biology
Armory 101
University of Colorado
Boulder, Colorado 80302

Dear Dr. Rogers:

We are interested in starting work here at the Environmental Research Laboratory with cassava and other root crops in controlled environments. Your name has been given to me by D. G. Coursey of the Tropical Products Institute as being that of one of the leading experts on cassava.

Since we never have grown cassava before, I thought it would be profitable to talk with you briefly before we get deeply involved. Fortunately, I will be attending the SW and Rocky Mt. Div. of AAAS meeting in Fort Collins next month and will be passing close by Boulder. Maybe you will be at the same meeting. If not, though, and if you would be willing to visit for a few hours, could I stop by and see you? The most convenient time for me (and two associates traveling with me) would be on Wednesday, April 26. We will arrive in Denver at 10:00 a.m. and rent a car to drive to Fort Collins. We could be in Boulder shortly before lunch-time, I assume. Then, if your schedule permits, we could visit for a few hours and be on our way.

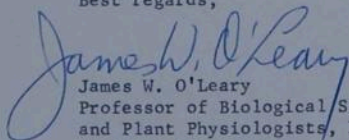
I don't know what you specifically are doing with cassava, but I would be interested in any information or advice you might give to us concerning the culture and growth of the crop. I'll explain

Dr. David Rogers
March 22, 1972
Page 2

to you what we are doing at the lab and why I now am interested in root crops when we meet. Until then, I enclose a copy of one of our reports to the Rockefeller Foundation to give you some idea of our interests and goals.

I look forward to your reply.

Best regards,

A handwritten signature in blue ink, reading "James W. O'Leary". The signature is fluid and cursive, with the first name "James" being the most prominent part.

James W. O'Leary
Professor of Biological Sciences,
and Plant Physiologists, Environmental
Research Laboratory

lp

enclosure



DIRECCION DE INVESTIGACION
CENTRO DE INVESTIGACIONES AGRONOMICAS

CABLE: MACIN

SECCION
FITOPATOLOGIA.

No. 013

Maracay, 18 de Enero de 1.972.-

Dr. David J. Rogers
Department of Biology
Armory 101 - University of Colorado
Boulder, Colorado 80302
U. S. A.-

Dear Dr. Rogers.

I am writing this letter to you on behalf of the Sociedad Venezolana de Ingenieros Agrónomos (Venezuelan Society of Agronomists). This year in June 21 to 24 we are having our annual meeting in Cagua, a town 10 miles away from Maracay. It is customary with us to invite a relevant scientist to talk about a subject of special interest.

Considering the promising future of the yuca crop and the excellent research work you has been doing on it, we will be honored with your attendance. Please, accept this letter as a formal invitation to give us a talk in our meeting. Of course, our Society will cover all the expenses of your trip and stay here.

Hoping to hear from you at your convenience

Very truly yours

Jose Agustín González
I. Agr. José Agustín González
Sección de Fitopatología M.A.C.
C.I.A.- Maracay - Edo. Aragua.
VENEZUELA.-



/abg.-



THE UNIVERSITY OF NEW MEXICO

ALBUQUERQUE, NEW MEXICO 87106

DEPARTMENT OF ANTHROPOLOGY

TELEPHONE 505 277-4524

9 December 1971

Dr. David J. Rogers
Taximetrics Laboratory
University of Colorado
Boulder, Colo. 80302

Dear Dr. Rogers:

The participants in the Manioc Symposium were all very sorry that you could not attend, as we found your paper to be a most interesting contribution to our discussion. I find myself in agreement with you on almost every point except that of origins, and our differences there appear to be primarily because we are asking different kinds of questions which are being answered with different kinds of data.

If we derived any conclusions, it is that there is an appalling lack of information about manioc and that we must try to answer a whole series of questions before we will be able to develop any real perspective on the plant and its uses and potential uses. Unfortunately some of the most critical problems seem to center around the question of prussic acid content under different conditions of growth and preparation, as well as the general nutritional value of the plant when prepared in different ways. Carl Spath's paper was a valuable initial contribution here. However, we anthropologists are lacking in the necessary laboratory training to check out these questions, so we are going to have to rely on you laboratory men (or else convince you to give us some laboratory training) to pursue these questions for us.

By the way, I find I'm not the only one who misinterpreted your earlier papers as arguing for a Mesoamerican origin for cultivated manioc. I think the paper you contributed to the symposium may have helped clarify this somewhat (though the interpretation was that you have "changed your mind"). I have the impression that there has been a hell of a lot of hybridization among wild, feral and different varieties of cultivated manioc in developing the present cultivated forms. Is this a correct interpretation? How far can this be carried in explaining the tremendous varietal diversification at the two extremes of the aboriginal range of the cultivated plant, with or without consideration of the question of region of origin?

Enclosed is a copy of my own contribution to the symposium. I hope you will find it useful.

Sincerely yours,

Karl H. Schwerin
Assoc. Professor



FMC CORPORATION

CENTRAL ENGINEERING LABORATORIES

1185 COLEMAN AVENUE, BOX 380, SANTA CLARA, CALIFORNIA 95052
TELEPHONE: (408) 269-0111

December 18, 1971

Dr. David Rogers
Food Research Institute
Stanford University
Stanford, California 94305

Dear Dr. Rogers:

Enclosed please find copies of letters which I sent to some of the persons who had responded to your article.

On January 9, 1972, I will be leaving for Campinas, Brazil, and will stay there for 4 weeks. I understand that they have recently received new fermentation equipment and would like to study intensively the single-cell protein enrichment of cassava.

I hope to see you again before my departure. I shall get in touch with you by phone.

With best wishes for a joyous holiday season.

Sincerely yours,

John Strasser
J. Strasser

JS/tf
Enclosures



FMC CORPORATION

CENTRAL ENGINEERING LABORATORIES

1185 COLEMAN AVENUE, BOX 580, SANTA CLARA, CALIFORNIA 95052
TELEPHONE: (408) 289-0111

December 18, 1971

Mr. S. F. Masri
Managing Director
Edgar, Masri & Co., Ltd.
Bathurst
The Gambia, West Africa

Dear Mr. Masri:

Dr. David Rogers, the author of the article in World Farming "What's so great about cassava?", informed me of your interest in the FMC process for incorporation of single-cell protein into gari. Enclosed please find a reprint which gives a broad description of the process.

The developments are still in the pilot stage and no large scale processing plant has been built yet. Last August, I spent several weeks in Nigeria at the Federal Institute of Industrial Research in Oshodi where they are actively working in improving cassava processing. They are considering an implication of the single-cell process with the help of the United Nations. Next month, I will be going to Brazil where they are also growing cassava to a large extent.

I would very much appreciate it if you could describe to me your fully mechanized gari process (machinery, input, output, etc.). I could then propose what type of equipment would be necessary for protein enrichment.

Sincerely yours,

J. Strasser, Ph.D.
Advanced Technology Branch

JS/tf

cc: Dr. D. Rogers
R. Hartzell, Nairobi
P. Weber, FMC International

Enclosure



FMC CORPORATION

CENTRAL ENGINEERING LABORATORIES

1185 COLEMAN AVENUE, BOX 580, SANTA CLARA, CALIFORNIA 95052
TELEPHONE: (408) 289-0111

December 18, 1971

Kilifi Plantations Limited
Private Bag
Kilifi, Kenya

Dear Sirs:

Dr. David Rogers, the author of the article in World Farming "What's so great about cassava?", informed me of your interest in the FMC process for incorporation of single-cell protein into gari. Enclosed please find a reprint which gives a broad description of the process.

We would appreciate if you could inform us what price increase you would consider tolerable for a protein enriched cassava product for livestock feeding. To what protein levels would you like to enrich your product? In which form are you presently producing the livestock feed? What processing steps are you presently following?

With this information we may be able to see if our process is feasible for your specific application.

Sincerely yours,

J. Strasser Ph. D.
Advanced Technology Branch

JS/tf

cc: Dr. D. Rogers
R. Hartzell, Nairobi
P. Weber, FMC International

Enclosure



FMC CORPORATION

CENTRAL ENGINEERING LABORATORIES

1125 COLEMAN AVENUE, BOX 580, SANTA CLARA, CALIFORNIA 95052
TELEPHONE: (408) 269-0111

December 18, 1971

Mr. Catalino C. Catanaoan
Bolinao
Pangasinan C-314
Philippines

Dear Mr. Catanaoan:

Dr. David Rogers, the author of the article in World Farming "What's so great about cassava?", informed me of your interest in the FMC process for incorporation of single-cell protein into gari. Enclosed please find a reprint which gives a broad description of the process.

Sincerely yours,

A handwritten signature in cursive script, appearing to read 'J. Strasser'.

J. Strasser, Ph.D.
Advanced Technology Branch

JS/tf

cc: Dr. D. Rogers

Enclosure



FMC CORPORATION

CENTRAL ENGINEERING LABORATORIES

1185 COLEMAN AVENUE BOX 580, SANTA CLARA, CALIFORNIA 95052

TELEPHONE: (408) 289-0111

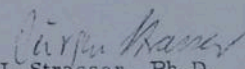
December 18, 1971

Mr. Michael Heath
P.O. Box 155
Silu, Sarewek
Malaysia

Dear Mr. Heath:

Dr. David Rogers, the author of the article in World Farming "What's so great about cassava?" informed me of your interest in the FMC process for incorporation of single-cell protein into gari. Enclosed please find a reprint which gives a broad description of the process. Please let me know if you like more information.

Sincerely yours,


J. Strasser, Ph.D.
Advanced Technology Branch

JS/tf
cc: Dr. D. Rogers

Enclosure



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1185 COLEMAN AVENUE, BOX 580, SANTA CLARA, CALIFORNIA 95052

TELEPHONE: (408) 289-0111

December 18, 1971

Mr. H. K. Aderibigbe
P. M. B. 5085
Ibadan,
Nigeria

Dear Mr. Aderibigbe:

Dr. David Rogers, the author of the article in World Farming "What's so great about cassava?", informed me of your interest in the FMC process for incorporation of single-cell protein into gari. Enclosed please find a reprint which gives a broad description of the process.

Last August I spent several weeks in Oshodi (near Lagos, P. M. B. 1023, Ikeja) at the Federal Institute of Industrial Research to study if our process could be incorporated into a mechanized system which was developed there. You may get in touch with Mr. F. Olatunji there to obtain more information about their programs.

Sincerely yours,

J. Strasser, Ph.D.
Advanced Technology Branch

JS/tf
cc: Dr. D. Rogers

Enclosure



FMC CORPORATION

CENTRAL ENGINEERING LABORATORIES

1185 COLEMAN AVENUE, BOX 580, SANTA CLARA, CALIFORNIA 95052

TELEPHONE: (408) 289-0111

December 18, 1971

A. J. Casebow
P.O. Diptipur
Sambalpur District
Orissa
India

Dear Mr. Casebow:

Dr. David Rogers, the author of the article in World Farming "What's so great about cassava?", informed me of your interest in the FMC process for incorporation of single-cell protein into gari. Enclosed please find a reprint which gives a broad description of the process.

In which forms is cassava presently consumed in peasant villages in India? What would be the tolerable increase in cost for a product enriched with 5% protein? Your information will be appreciated.

Sincerely yours,

J. Strasser, Ph. D.
Advanced Technology Branch

JS/tf

cc: Dr. D. Rogers

Enclosure



FMC CORPORATION

CENTRAL ENGINEERING LABORATORIES

1185 COLEMAN AVENUE, BOX 580, SANTA CLARA, CALIFORNIA 95052

TELEPHONE: (408) 289-0111

December 17, 1971

Mr. James H. Purcell
Assistant Program Officer USAID
c/o U.S. Embassy
Kinshasa
Zaire-Congo

Dear Mr. Purcell:

During a recent discussion with Dr. David Rogers, he mentioned that you had written to him and would like more information about our single-cell protein process. Enclosed, I am sending you a reprint of an article which was published in Food Engineering. Please do not hesitate to get in touch with me if you have any further questions.

Last August I spent one month in West Africa under a sponsorship of UNIDO as a consultant to the Government of Nigeria. I worked with the people at the Federal Institute of Industrial Research in Oshodi near Lagos. You may write to Dr. M. Mautner or Mr. George Parman, UNIDO, P.O. Box 707, 1011 Vienna, Austria, and get more information about the UNIDO programs on cassava.

Sincerely yours,

J. Strasser, Ph.D.
Advanced Technology Branch

JS/tf

cc: Dr. D. Rogers
R. Hartzell, Nairobi

Enclosure



World Farming

THE MAGAZINE OF MODERN AGRICULTURE

Published by:
Agricultura de las Américas
1014 WYANDOTTE STREET
KANSAS CITY, MO. 64105, U.S.A.
CODE 913-888-4664

September 9, 1971

David J. Rogers
Taximetrics Lab.
University of Colorado
Boulder, Colorado 80302

Dear Mr. Rogers:

Enclosed is a response to the article, What's so great about cassava?

Would you be able to provide this gentleman with the information
he seeks?

Thank you.

Sincerely,

Rollie Henkes
Editor



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Your signature Maria Ana Santos Date 8/22/71

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July, 1971



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September 1, 1971

David J. Rogers
Taximetrics Lab.
University of Colorado
Boulder, Colorado 80302

Dear Mr. Rogers:

Enclosed is a response to the article, What's so great about cassava?

Would you be able to provide this gentleman with the information
he seeks?

Thank you.

Sincerely,

Rollie Henkes
Editor



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Your signature Carlton C. Cassar Date 20th Aug, 1971

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September 1, 1971

David J. Rogers
Taximetrics Lab.
University of Colorado
Boulder, Colorado 80302

Dear Mr. Rogers:

Enclosed is a response to the article, What's so great about cassava?

Would you be able to provide this gentleman with the information
he seeks?

Thank you.

Sincerely,

Rolie Henkes
Editor



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Your signature B. W. Pennfather Date 20th August 1971

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July, 1971

Guatemala, January 11, 1972

Dr. David J. Rogers
Professor of Biology
Taximetrics Laboratory (Armory 101)
University of Colorado
Boulder, Colorado 80302
U. S. A.

My dear Dr. Rogers:

It has been some time since I had the honor of discussing the manihot (yuca) and your interesting publications with you.

Through a well-documented ethno-historical investigation I have carried out, I have arrived to the conclusion that the processing of the so-called poisonous yuca, with tipiti, as a food originated in Northwestern Central America by peoples of arawac culture. These peoples had known how to cultivate the so-called sweet yuca; they eventually emigrated from Central America to the south. The sweet yuca is, therefore, older in Central America than the bitter yuca of South America.

As I have already told you, the Maya-quiché myths refer to the origin of the tubercles that were cultivated in the Maya area during the period of incipient agriculture, and that the Chilam Balam of Chumayel mentions three roots that were cultivated traditionally by the Maya from time immemorial to the date, but without specifying the cultural horizon.

This letter is the result of a trip I made to Chapin-go where both Professor Hernández and myself thought of you very often as he admires you as well as I do. He told me you would attend a symposium on manihot to be held in Cali, between the 10th and the 12th of January.

As you know, I am very interested in everything related to yuca, sweet potato and other tubercles because I believe these were grown in America by primitive harvesters. The origin of agriculture in the Western Hemisphere does not identify itself with corn. This fact coincides with the teachings of mythical sources which state that the first god that protects plants is not corn but yuca and other plants which were cultivated in the first horizon of the incipient

agricultural cultures. Corn appears only in the next stage and it is the child of the god of cultivated plants. These "stages" of mythical sources correspond to homotaxial stages in the development of the Maya-quiché agriculture.

Please be kind enough to inform me concerning the results of the above-mentioned symposium. I would also appreciate your telling me how I can obtain the respective publication.

Likewise, I should like to know if you keep the results of your former research work which were published in the pamphlets you kindly sent me. A confirmation of your former theories would be extremely valuable from the scientific view point.

I am still working on my book about a story of the ancient civilizations of America. I have already written nearly 1700 pages, fully illustrated. In it I quote your admirable works on the yuca. You are, therefore, entitled to a copy of this book as soon as it is published. It will be a five-volume book. A third edition of my work "Esoterismo en Español" will be published this year. If you are interested in it, I will be glad to send you a copy.

I look forward with great interest to hearing from you. I thank you with all my heart for giving me your valuable collaboration.

I wish you great success in your scientific enterprises this year, and hope you are in the best of health.

I remain, most sincerely,

Your friend and admirer,

Rafael Girard



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January 4, 1972

Our file #361-1

Dr. David J. Rogers, Professor
Biology Department
University of Colorado
Boulder, Colorado

Dear Dr. Rogers:

We are in need of information on the production techniques for cassava flour. Can you kindly send us references and/or reprints on this topic?

Thank you for your help.

Cordial season's greetings!

Sincerely yours,

Samuel M. Weisberg

Samuel M. Weisberg
Executive Director

Jan. 20, 1972

Dear Frank:

The recent Cali meeting stimulated an idea, and I thought it might be worth about 3 or 4 paragraphs in the Root Crop Newsletter. If you care to include it, I submit the idea herewith. It might make a filler.

It was a pleasure to see you again, and I'm sorry we didn't get to pursue further your statement that you would like to get more involved in the study of the genetics of cassava. Let me encourage you to do so--there's plenty need for it, and I don't think the CIAT people will have time to get deeply into this aspect.

Hope we can get together again sooner than the next meeting of the Society in Africa. Sincerely--

Dwarf, or Short-Stemmed Cassava?

D. J. Rogers

University of Colorado

One of the plant characters that supported the development of the green revolution is the dwarf, or short stem of the grain crops, wheat and rice. This type of character could, for quite different reasons, be useful for development in modern cultivars of Manihot esculenta. From the standpoint of mechanical cultivation and harvesting machines, such a short-stemmed cultivar would be ideal. Development of short-stemmed cassava plants becomes more reasonable if new methods of plant propagation (such a single node cuttings or tissue culture reproduction) become available.

The present plant of cassava has, at maturity, a ground cover of about 2 meters diameter or more and stands from 1.5 to 4.0 meters tall. The root area is generally much less in extent. The stems, which provide the next generation's propagules, are slender, brittle, and produce bulky residues at harvest. The stems are difficult to store, cause problems for machine harvesting, etc. These reasons are sufficient to desire a new type of cultivar with more compact form, provided there is no appreciable reduction in leaf area or photosynthesizing index.

There are some cultivars with some of the characteristics proposed, that is, are fairly short-stemmed, but these cultivars generally possess leaves distributed at normal nodal intervals. For example, my collections numbered 390, 391, from eastern Pernambuco, Brasil, are cultivars with very low growth habit, and frequent branching, and have fairly dense canopies of leaves. This type could serve as a beginning point in a breeding program.

Some wild species have potentialities of contributing short-stemmed, dense canopy characteristics to the cultigen. Manihot anomala, broadly

distributed in Brasil, extending westward into Bolivia and Peru, is a prime candidate for anyone interested in such a development.

M. stipularis, a very short-stemmed, almost acaulescent species is found near Brasilia, Federal District. This compact plant produces a rounded leaf cover no more than 25-30 cm. in diameter, with a cluster of tubercous roots, individually about 10-15 cm. long. This species is not necessarily recommended for breeding work with M. esculenta, but would make a handsome plant in tropical floriculture.

Jan. 20, 72

Dear Barbara:

Your letter of Jan. 10th just reached me. I've just returned from a meeting on cassava at CIAT, trying to advise on a new program. They have not worked out proper quarantine methods for introduction of either cultivars or wild species of Manihot, so my advice is not to be a party to any unrestricted international shipment of propagating materials, either seeds or cuttings until there is some guarantee that there will be no transfer of pathogens. We know so very little about host-parasite relations in the crop that we cannot be certain that a particular disease in one area is the same or different from that in another.

The best alternative, in my mind, is to ask the local agricultural agencies, both state and federal, to take in propagules of Manihot from local areas, and at least get them started on conservation of genetic materials nearby. Perhaps these could then be transferred after it is certain that they are at least phenotypically free of pathogens. But I strongly advise against direct shipment to the CIAT or the IITA stations, even though they may claim to have a quarantine system. Evidence that they do not have such a system is that the large cultivar collection they had in Cali was nearly wiped out by an unsuspected bacterial pathogen, and is still not under control.

Now, for your collections, I would be glad to identify herbarium specimens which are vouchers for your own work, and for living collections in Pernambuco. But please try to get the records kept uniformly between your own numbering system and that of whatever state or federal experiment station that can be convinced to cooperate with you. I believe the people at Dois Irmões (spelling) or at Tambe would be glad to cooperate with you.

Hope this reaches you, even though you note that you may not be picking up mail at this address after Jan. 20.

Sincerely,

David J. Rogers
(Visiting Scholar)

c/o British Consulate

Recife

Pernambuco

Brasil.

January 10th 1972

Dear Dr. Rogers,

I am at present in north-east Brazil with three of our students who graduated last July. Our object is to collect material of a number of crop plants of this region for crop evolutionary studies and for evaluation in plant breeding programmes. Our main interest in the beginning was cotton - the dry and under-collected regions of the interior of the north-east seemed to us a possible area in which dihybrid cottons might have survived. The recent discovery of what has been claimed as a new wild tetraploid cotton from this area confirmed our feeling that the area would repay further study.

We have since added other genera to the list of those we intend to collect, and among these is Manihot. Workers at both CIAT (Cali, Colombia) and IITA (Ibadan, Nigeria) are interested in material of any drought-resistant, early-bulking forms we may come across. I also gather that, although the wild species may be of interest to breeders and students of crop evolution, these have seldom been available in living collections.

I learn from Frank Bishby and the people at Kew that your monograph of Manihot has either appeared, or is in press. I don't know whether it is possible for you to let us have any sort of a copy of this, but it would be extremely valuable to us in the field. We are almost certain to encounter wild Manihot species, but I have found very little guidance in the literature as to what species are in ~~our~~ area and what species are likely to cross with esculenta.

We would, of course, be pleased to collect duplicate specimens for you should these be of interest. We would be even more pleased if you would determine our specimens for us!

We are having mail sent to our Consulate in Recife, and we shall be picking up mail here at least until 20 Jan.

Yours sincerely



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January 13, 1972

David J. Rogers
Taximetrics Lab.
University of Colorado
Boulder, Colorado 80302

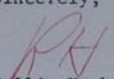
Dear Mr. Rogers:

Enclosed is a response to the article, What's so great about
Cassava?

Would you be able to provide this gentleman with the information
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Thank you.

Sincerely,


Rollie Henkes
Editor



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Specifically, I would like to know more about feeding poultry and pigs with cassava and how to ferment the cassava
feeding livestock with cassava pulp, growing yuca in hydroponic cassava
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December 14, 1971

David J. Rogers
Taximetrics Lab.
University of Colorado
Boulder, Colorado 80302

Dear Mr. Rogers:

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Would you be able to provide this gentleman with the information
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Thank you.

Sincerely,

RH
Rollie Henkes
Editor



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| ☐ What's new in farming | 31 |
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Specifically, I would like to know.....

*the the process of making
fermented beverages such as beer*

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Your signature *Joseph Mendis* Date *1st November 71*

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July, 1971



World Farming

THE MAGAZINE OF MODERN AGRICULTURE

Published by:
Agricultura de las Américas
1014 WYANDOTTE STREET
KANSAS CITY, MO. 64105, U.S.A.
CODE 913-888-4664

December 15, 1971

David J. Rogers
Taximetrics Lab.
University of Colorado
Boulder, Colorado 80302

Dear Mr. Rogers:

Enclosed is a response to the article, What's so great about
cassava?

Would you be able to provide this gentleman with the information
he seeks?

Thank you.

Sincerely,

Rollie Henkes
Editor



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Specifically, I would like to know ^(A) Cassava - @ more details on how precise work could be removed from the harvested Cassava so that the roots could be kept a long time before consumption @ Method of increasing protein content.
(B) Controlling cattle lice - Quote a few actual brand names of insecticides that could be used to control ticks/lice on milking cattle

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Your signature M. C. Samarasinghe Date 12-11-71

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July, 1971

September 6, 1971

Dear Dr. Rogers:

Kohala Sugar Co. is engaging in a search for crops to replace sugarcane which in the Kohala district is no longer profitable. Can you tell me where cuttings of a comprehensive collection of cassava varieties might be obtained? Cassava seed collected from a situation where a number of superior varieties are interspersed, would also be of interest. Can you suggest such a source?

With thanks for your help, I am

Sincerely yours

A. J. Mangelson



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October 14, 1971

David J. Rogers
Taximetrics Lab.
University of Colorado
Boulder, Colorado 80302

Dear Mr. Rogers:

Needless to say, I'm pleased with the response to your article on cassava. So far, we have forwarded on 25 responses, which makes it the top article of that issue.

I was particularly interested to note that many readers requested more information on fermentation processes to increase protein content of cassava, and believe this would be worth an article in itself.

Two questions: Would you be interested in preparing the article for us for an honorarium in the range of \$70 to \$100? Or, if not, could you refer us to some of the people who are doing work in this area: such as, J. Strasser with FMC Corp., in California, The Tropical Products Institute in London, and Gray and Abou-el-seoud at the University of Southern Illinois. Is there anyone else who should be contacted regarding this work?

San Jose

I look forward to hearing from you at your earliest convenience.

Sincerely,

Rollee Henkes
Editor

*FMC Corp.-
1185 Coleman Ave.
Santa Clara, Cal. 95052*

RH/lrs

(76) 289-2392



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October 6, 1971

David J. Rogers
Taximetrics Lab.
University of Colorado
Boulder, Colorado 80302

Dear Mr. Rogers:

Enclosed ^{are} ~~is~~ a response ^s to the article, What's so great about cassava.

Would you be able to provide this gentleman with the information
he seeks?

Thank you.

Sincerely,

Rollie Henkes
Editor



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Specifically, I would like to know leafhopper prices of all chemicals of Nordisk Alkali Blokem Ltd. (3)
Does the fruit store other than apple where this method can be applied? (3)
Can the author please supply more information on cultivation

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July, 1971

Pawa,
Ugi,
British Solomon Islands.
9th September 1971.

The Officer in Charge,
Reader Service,
"World Farming",
KANSAS CITY.

Dear Sir,
Re the article in the July issue -

WHAT'S SO GREAT ABOUT CASSAVA?

Specifically, I would like to know

more detailed information on ways in which
natives of other countries remove toxic contents of roots
more information on ways of increasing protein
especially such as might be practised by people here at village level, or by
schools,

reference to books I might get to help me
recognise species already introduced here and find out about whether there are
still more useful ones we might try - here of course I can also get help from
local agricultural officers and experts on the South Pacific Commission.

Cassava here is eaten in two main ways - boiled, or grated and mixed
with coconut 'milk' and baked in an oven of hot stones to make a pudding or
'laplap'. A Dutchman from Indonesia once told me how they used to
put lime juice, I think it was, on to cooked cassava and leave it to ferment.
I have read about ways Africans soak cassava roots in water, but have not
got a clear picture of how it is done. I have tried parboiling bitter
cassava pieces and then drying them for later use as stock food, but the
pieces went so hard they were difficult to grind up, though very resistant to
deterioration.

I am headmaster of a senior primary boarding school where we grow a lot
of our own food. Next year I am to be in a rural training centre for
older boys and hence the interest in better methods of using crops we
already know and use.

Thank you for help re recent enquiry about an article on helping
cows in difficult calvings. Your magazine with its view of worldwide
developments is most stimulating to one in a place like mine.

Yours faithfully

N.J.I. Hunt.

(The Reverend) N.J.I. Hunt.

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Specifically, I would like to know how cassava can be grown on a large scale. The economic benefits to the farmer. Its export potential and its uses (other than primary staple). Its susceptibility to processing.

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Your signature T. Samnadda Date 13th Sept. 1971

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Specifically, I would like to know what were the
reference cited

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Your signature Jerry Dell Date Sept 12, 1971

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Specifically, I would like to know *more information on "CASSAVA" we call this MANOC - we are growers & processors of this. Any information promotion of good yield - harvesting will be appreciated.*

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Name MR. IGNATIUS M. K. PILIAY Company (if applicable) GLOMINT ENTERPRISES
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Your signature [Signature] Date 1st October, 1971

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July, 1971



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August 30, 1971

David J. Rogers
Taximetrics Lab.
University of Colorado
Boulder, Colorado 80302,

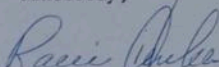
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Specifically, I would like to know

Q. Since you are in a position and would like to be a judge, would you like to be a judge?
A. Since you are a judge, would you like to be a judge?
Q. You are a judge, would you like to be a judge?
A. Since you are a judge, would you like to be a judge?
Q. You are a judge, would you like to be a judge?
A. Since you are a judge, would you like to be a judge?
Q. You are a judge, would you like to be a judge?
A. Since you are a judge, would you like to be a judge?

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September 8, 1971

David J. Rogers
Taximetrics Lab.
University of Colorado
Boulder, Colorado 80302

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Would you be able to provide this gentleman with the information
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Thank you.

Sincerely,

Rollie Henkes
Editor



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| ☐ Livestock | 33 |

Specifically, I would like to know

the process of fertilizer enrichment & the hydration of Cassava edible starch by m/p. J. Stosser and Society for Food Experiments, S.E. 139.

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Your signature C. R. Ramanathan Date 27.8.1971

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July, 1971



World Farming

THE MAGAZINE OF MODERN AGRICULTURE

Published by:
Agricultura de las Américas
1014 WYANDOTTE STREET
KANSAS CITY, MO. 64105, U.S.A.
CODE 913-888-4664

September 8, 1971

David J. Rogers
Taximetrics Lab.
University of Colorado
Boulder, Colorado 80302

Dear Mr. Rogers:

Enclosed is a response to the article, What's so great about cassava?

Would you be able to provide this gentleman with the information
he seeks?

Thank you.

Sincerely,

Rollie Henkes
Editor



Subsidiary of Howard W. Sams & Co., Inc.

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- ☐ New products 29
- ☐ What's new in farming 31
- ☐ Livestock 33

Specifically, I would like to know..... from Messrs. J. Strasser and associates at FMC Corporation Santa Clara, California U.S.A. the process for growing grass on hydrolyzed cassava to produce a dehydrated product containing 32% protein.

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Your signature Handwritten Date 30th August 71

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July, 1971



World Farming

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July 30, 1971

Published by:
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KANSAS CITY, MO. 64105, U.S.A.
CODE 913-888-4664

Dear Sir:

Enclosed is a response^{are} to the article, What's so great about cassava?

Would you be able to provide this gentleman with the information
he seeks?

Thank you.

Sincerely,

Rollie Henkes
Editor

You received some sample copies of this issue, right?



Subsidiary of Howard W. Sams & Co., Inc.

At present I am outside in England. Please send reply to this address

READER INFORMATION SERVICE

Dr. A.J. Canebo, 93 George V Avenue, WORTHING, Sussex, ENGLAND.

7-27

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| ☐ Rebuilding compacted sugarcane soils .. 27 |
| ☐ New products 29 |
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| ☐ Livestock 33 |

Specifically, I would like to know 1. Further details of the method of fermentation and preparation of cassava root suitable for peasant villagers in which the cassava root nutritional value is improved through microbial synthesis of protein. - 2. Suggestions as to how the resultant product can be used in the diet of villagers. - What about its flavour and appearance?

disregard

3. If possible I should like to have two further reprints of this article.

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Name A.J. Canebo Company (if applicable) East Africa Agricultural Centre
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Your signature A.J. Canebo Date 28th July 1971

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| ☐ New products | 29 |
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| ☐ Livestock | 33 |

Specifically, I would like to know: Has ANY RESEARCH BEEN CONDUCTED ON CASSAVA AS HOST PATIENT?

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| ☐ Livestock | 33 |

Specifically, I would like to know.....

*more about the use of cassava
as a source of food for pigs. I am interested
in knowing how cassava that is produced from a
seed has to be stored and the birds and pigs can
eat it without harm.*

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Published by:
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CODE 913-888-4664

November 2, 1971

David J. Rogers
Taximetrics Lab.
University of Colorado
Boulder, Colorado 80302

Dear Mr. Rogers:

Enclosed is a response to the article, What's so great about
Cassava?

Would you be able to provide this gentleman with the information
he seeks?

Thank you.

Sincerely,

Rollie Henkes
Editor



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Specifically, I would like to know..... *How to prepare Cassava so that mice will increase its protein content. I am especially interested in using Cassava as the main component in both pig and poultry rations. Also "Livestock" - "Replacement for Mice" - the pig feed the cassava silage, more details on making the silage & the ration of the concentrate fed with the silage.*

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State or Province *TAKEUVA* Country *F.I.*

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Your signature *Devin Kennedy* Date *21 10 '71*

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July, 1971



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Published by:
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November 11, 1971

David J. Rogers
Taximetrics Lab.
University of Colorado
Boulder, Colorado 80302

Dear Mr. Rogers:

Enclosed is a response to the article, What's so great about
cassava?

Would you be able to provide this gentleman with the information
he seeks?

Thank you.

Sincerely,

Rollie Henkes
Editor



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Specifically, I would like to know.....

Methods for preventing cassava and resulting competition - want to see in animal feed. Will be out and possibly prepared form to feed livestock

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Name *Michael L. Heath* Company (if applicable)

Street or Post Office Box *155* City *Sibu*

State or Province *Malaysia* Country *Malaysia*

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Your signature *Michael L. Heath* Date *Feb 26 1971*

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July, 1971



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August 18, 1971

David J. Rogers
Taximetrics Lab.
University of Colorado
Boulder, Colorado 80302

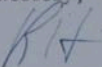
Dear Mr. Rogers:

Enclosed is a response to the article, What's so great about
Cassava.

Would you be able to provide this gentleman with the information
he seeks?

Thank you.

Sincerely,


Rollie Henkes
Editor



Subsidiary of Howard W. Sams & Co., Inc.

- Specifically, I would like to know (What's so great about cassava?)
1. If cassava is No. 6, what are the top 5 world crops?
 2. How is cassava prepared as staple in Brazil, Africa and in other countries using cassava as staple?
 3. More detailed information on increasing protein by Gray, Strasser and others. Cassava is an important crop in the Philippines.

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Your signature Catalino C. Catanaoan Date August 5, 1971

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September 16, 1971

David J. Rogers
Taximetrics Lab.
University of Colorado
Boulder, Colorado 80302

Dear Mr. Rogers:

Enclosed ~~xxxx~~^{are} responses to the article, What's so great about cassava.

Would you be able to provide this gentleman with the information
he seeks?

Thank you.

Sincerely,

Rollie Henkes
Editor



Subsidiary of Howard W. Sams & Co., Inc.

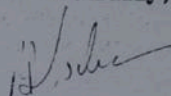
7th. September, 1971.

World Farming,
1014 Wyandotte Street,
Kansas City,
Missouri 64105, U.S.A.

Dear Sirs;

We are most interested in your article on Cassava in "World Farming" July Issue. In particular the fermentation to increase the protein. We grow Cassava primararily as a food for livestock, and are most interested in increasing the protein value of their rations. Any further information would be most welcome.

Yours faithfully,



KILIFI PLANTATIONS LIMITED.

PRIVATE BAG - KILIFI
KENYA

ADW/MSR.

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