CASSAVA
newsletter

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In this issue:

Breeding Cassava for Brazil's "Drought Polygon"*

Orlando Sampaio Passos, Wania Gonçalves Fukuda, and *José de Silva Souza*

Northeast Brazil is a vast region, comprising nine states: Bahia, Sergipe, Alagoas, Pernambuco (including the Island of Fernando de Noronha), Paraíba, Rio Grande do Norte, Ceará, Piauí, and Maranhão. The population, 42.4 million in 1991, is predicted to be 50.1 million in 2000.

With a population density of 22.5 people per square kilometer, Northeast Brazil's current migration rate is the highest in the country (19.46% in 1991). The region's environment is harsh, such that about 50% (i.e., 534,379 km^2) receives less than 750 mm of rain per year, giving it the nickname: "Drought Polygon" (*see* map).

Rainfall in the "Drought Polygon" ranges between 400 and 800 mm over 3 to 5 months; maximum annual temperatures vary between 23 and 27 °C; solar radiation averages 2,800 hours per year; relative humidity is about 50%; and average evaporation is 2,000 mm per year. Under these conditions, the cassava crop, as a primary source of carbohydrates, is a strategic component for alleviating food problems.

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* Based on a paper presented at a meeting on the project, "Development of Cassava Germplasm for Semiarid and Subtropical Regions," held at CIAT, Cali, Colombia, 1-2 June 1993.

CIAT Centro Internacional de Agricultura Tropical
International Center for Tropical Agriculture
International Institute of Tropical Agriculture

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Produced by CIAT's Cassava Program and Communications Unit, and IITA's Root and Tuber Improvement Program

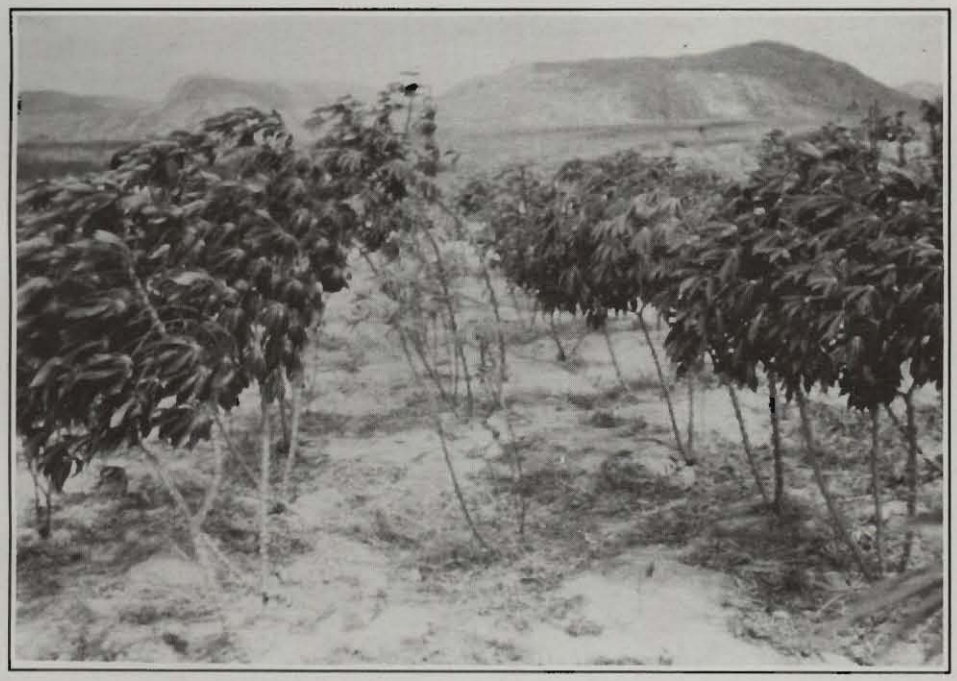
The "Drought Polygon," Northeast Brazil, where cassava for semiarid areas is being bred in a collaborative EMBRAPA/CIAT project, funded by IFAD. ▲ = site where research is being carried out; ● = city; ——— = border of the Drought Polygon; – – – – = state border.

SOURCE: DNOCS, Brazil.

The need to expand cassava cultivation to marginal areas where it is more successful than other crops led to a project for developing cassava germplasm for semiarid regions. The project is possible because wide genetic diversity in cassava is found in the region and representative sites for evaluation and selection are available. The project is carried out by EMBRAPA, Brazil's agency for agricultural research, with collaboration from CIAT and funding from the International Fund for Agricultural Development (IFAD).

The project began in 1990, in the municipalities of Itaberaba (Bahia), Petrolina (Pernambuco), Araripina (Pernambuco), and Quixadá (Ceará). Its objectives are to (a) identify, in the short term, promising genotypes for the farmer; (b) identify, in the medium to long term, genotypes adapted to semiarid environments for use in crossing programs for Northeast Brazil and semiarid Africa; and (c) select clones with specific characteristics for recombination programs.

A Brazilian farmer is harvesting enough cassava roots to satisfy his immediate needs. Once harvested, roots readily perish and must be consumed within 2 to 4 days. An effective way of storing mature roots is to leave them in the ground, as this farmer has done.



Cassava genotypes, well adapted to semiarid conditions, flourish in a field in Northeast Brazil.

Preliminary results

During 1990-1992, 1,008 cassava accessions were evaluated at the four sites mentioned above. These accessions came from the active cassava germplasm bank of the National Center for Research on Cassava and Fruit (CNPMF). The major selection criteria were root yield, dry matter content of roots, resistance to mites, HCN content, and drought resistance. Roots were harvested between 10 and 12 months after planting to find early maturing genotypes.

Perhaps the most important achievement so far has been the selection of genotypes for three different breeding purposes:

(a) Specific adaptation. About 100 genotypes, specifically adapted to each of the four sites, were selected in 1990-91 and again in 1991-92.

(b) Wide adaptation. Based on their performance across sites and on their superiority over local varieties, 24 clones were selected in 1991-92 and 30 clones in 1992, for advanced uniform and on-farm trials in the four semiarid sites. This material is being multiplied by CNPMF.

(c) Recombination to generate superior hybrids. Those genotypes that adapted to at least two semiarid sites were selected. After obtaining recombinations, more than 40,000 seeds were produced. About 20,000 of these were sent to CIAT and the International Institute of Tropical Agriculture (IITA) in Nigeria, and the other 20,000 are being evaluated in semiarid Northeast Brazil.

Expected outputs

When the initial phase finishes in 1995, the project is expected to:

(a) validate selected clones in several semiarid sites through farmer participation;

(b) provide feedback from farmers involved in selection;

(c) intensify the generation and supply of hybrids for semiarid conditions;

(d) generate new basic information for the project specifically and for semiarid cultivation of cassava generally on socioeconomics, plant biochemistry, physiology, soils, and plant health;

(e) improve orientation and methodology in cassava breeding for semiarid conditions, and improve integration among the research institutions of Northeast Brazil to deploy more efficiently their human resources, logistics, and finances;

(f) link with other on-going projects, such as "Ecologically Sustainable Cassava Plant Protection in South America and Africa: An Environmentally Sound Approach" and "Development of the Cassava Crop in the States of Bahia, Paraíba, and Pernambuco";

(g) acquire external and national resources, together with political support from federal and state governments, to influence directly the economic and social development of Northeast Brazil; and

(h) provide information and germplasm to countries with semiarid climates similar to that of Northeast Brazil.

The Fourth Regional Workshop of the Asian Cassava Network

Reinhardt Howeler

The fourth Regional Workshop of the Asian Cassava Network was held from November 2 to 6, 1993, in Trivandrum, capital of Kerala State, India. The participants included 64 cassava researchers from China, India, Indonesia, Malaysia, Nigeria, the Philippines, Thailand, and Vietnam. Five also came from CIAT's Colombian headquarters and Thai-based regional office. The Workshop was organized by the Central Tuber Crops Research Institute (CTCRI) of the Indian Council of Agricultural Research (ICAR) in collaboration with CIAT. It was funded by the Japanese Ministry of Foreign Affairs.

A triennial event

Regional workshops are held every 3 years to summarize and discuss results of research, carried out in collaboration with CIAT, on cassava varietal improvement and agronomy in various Asian countries.

This year, for the first time, each country also presented a special paper on cassava technology transfer, discussing how to improve dissemination of newly released cassava cultivars and how to work with cassava farmers to test and promote better soil management practices.

Lighting the way

The inaugural address was given by Dr. K. L. Chadha, deputy director of the ICAR. He described the important role cassava plays in the rural and industrial development of southern India. He also officially opened the Workshop by lighting a ceremonial lamp.

Opening addresses were also given by Dr. G. T. Kurup, director of the CTCRI; Dr. K. Kawano, regional coordinator of CIAT's Asian Cassava Program; and Mr. V. Shegaonkar, from SAGOSERVE, a cooperative of cassava starch processors in Salem District, Tamil Nadu, India, which successfully stimulated the production and industrial use of cassava in India.

Participating countries in this Workshop departed from tradition by presenting three papers together as an interdisciplinary effort. Themes were national cassava situations; dominant patterns of utilization; and future trends, present problems, and research results in breeding and agronomy.

"Involving the farmer" and other topics

The session on technology transfer was opened by Dr. Louise Sperling, anthropologist with wide experience in

farmer participatory research and once member of CIAT's African Bean Program. She discussed those nonconventional ways of technology development and transfer that consider farmers' socioeconomic needs and indigenous knowledge of the crop and its production. Other session papers discussed the overall structures of national extension services, their objectives, and *modi operandi*. Case studies on the transfer of new cassava varieties or technologies were also given.

Work group discussions were also held on the germplasm network, cassava agronomy and soil management network, cassava biotechnology network, and on cassava technology transfer methodologies.

Toward the Workshop's end, a panel discussion was held on various issues of technology transfer. Although extension and technology transfer were recognized as being essentially policy tools of various national governments—and, thus, not easily modified—participants decided to incorporate more farmer participation in the development and testing of new varieties and technologies and to focus more on the needs and perspectives of end users to improve the rate of adoption of new technologies.

The Workshop concluded with a visit to the CTCRI campus to see several research projects, both in the field and in the biotechnology, microbiology, and processing laboratories.

Foreign participants also had a chance to learn about the history and culture of southern India and even to visit the extreme southern tip of the Indian subcontinent.

In appreciation

CIAT and the Advisory Committee of the Asian Cassava Network thank the ICAR and CTCRI for their willingness to host this fourth Regional Workshop and, in particular, thank all members of the organizing committees who worked so hard to make this Workshop yet another great success. All the foreign participants especially appreciated the efforts and warm friendship of our Indian hosts.

CIAT Offers New Information Services on Cassava

Mariano Mejía and *Elizabeth Goldberg*

CIAT provides information for scientists and technicians involved in cassava research and development. For more than 15 years, the Cassava Documentation Center has systematically identified, compiled, processed, and disseminated global literature on the crop.

Changes in CIAT's organization

Recently, CIAT adapted its research agenda to changes occurring in its environment. Research on land use and on natural resources management in hillsides and tropical lowlands has been added to the existing commodity research agenda, requiring the institution to reorganize its human, technical, and economic resources.

CIAT's Cassava Documentation Center merged with the Information and Documentation Unit to meet this demand and to provide more effective services at lower costs to cassava researchers worldwide. New resources include databases on compact disks (CD-ROM), information networks, and advanced telecommunications for rapid access to and delivery of information.

New information services for cassava researchers

These include:

A question-and-answer service for data, directory information, or referrals to other institutions.

Specialized searches in CIAT's **Cassava Database** and in international databases such as **CAB Abstracts**, **AGRIS**, or **Food Science and Technology Abstracts**. Search results can be sent to clients on paper or disk.

Short bibliographies on specific subjects of current interest, recommended by CIAT's Cassava Program staff as supporting the information needs of national research partners.

A personalized awareness service, **Selective Dissemination of Information** (SDI), which helps researchers keep up to date in their areas of interest.

The **Bibliographic Bulletin**, a quarterly publication that announces new books and journals in CIAT's Library.

Pages of Contents, a monthly generalized service that includes documentation on cassava. It reproduces the tables of contents of over 800 scientific and technical journals received in CIAT's Library. The journals are grouped into themes:

General Agriculture; Agricultural Economics and Rural Development; Natural Resources and the Environment; Pastures, Animal Production, and Nutrition; Plant Physiology, Genetics, and Biotechnology; and Plant Protection.

A photocopying service for cassava documents found in the CIAT Library.

In June 1994, CIAT expects to begin publishing a monthly bulletin specializing in cassava. It will focus on references to regional literature on cassava research and product development, and will be available on paper and disk. It will replace the traditional **Abstracts on Cassava (Resúmenes Analíticos sobre Yuca)**, which ceased publication in December 1992.

For more details, contact:

Public Services Section, Information and Documentation Unit, CIAT, A.A. 6713, Cali, Colombia; Tel.: (57-23) 675050; Fax: (57-23) 647243; E-mail: CIAT-LIBRARY@CGNET.COM (Internet); Telex: 05769 CIAT CO.

Cassava in Southern and Southwestern Ethiopia

Mulugeta Taye

Ethiopia's wettest region, to the south and southwest, covers about 25% of the country, and has about 32% of the country's population. Only 2 to 4 months of the year are dry, with rainfall varying from 200 to 2,600 mm. Altitudes are mostly 1,500 to 2,500 meters above sea level, but can be as low as 200 m. Annual temperatures range from 15 to more than 25 °C.

The region produces maize, sorghum, teff, pulses, and various kinds of tubers and roots, including cassava, ensete, taro, yam, potato, and sweet potato. Bitter cassava (with high cyanide contents) probably arrived in the region at about the end of the 19th century. Sweet cassava (with low cyanide contents), however, was introduced at the beginning of the 1980s.

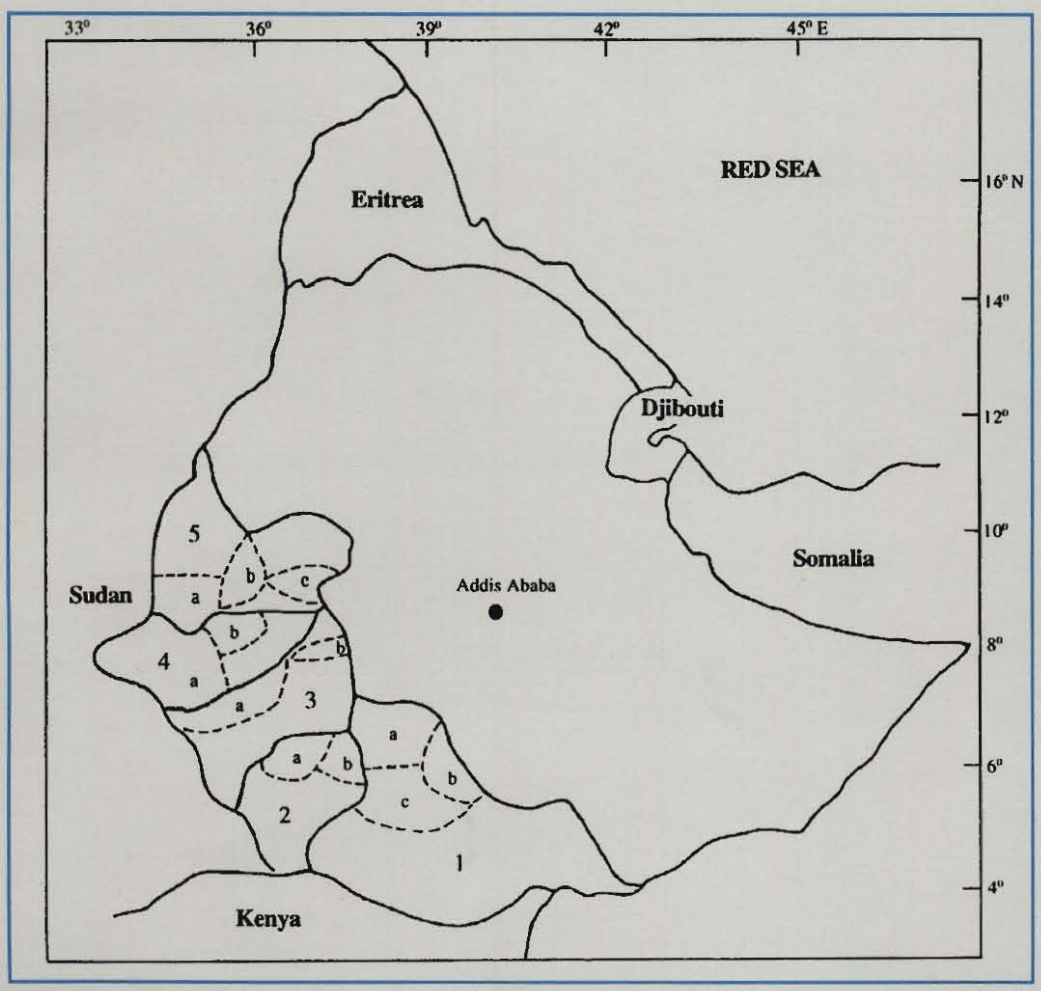
A 2-year survey on cassava production (*see* map) showed that bitter and sweet varieties tended to grow in different areas, but both are cropped at altitudes ranging from 450 to 1,800 m, with annual temperatures between 15 and 31 °C and annual rainfall between 690 and 1,470 mm.

Cassava, known by a variety of local names—*mita boye*, *yenchet boye*, *furno tree*, and *mogo*—is primarily used as a food security crop. It is planted during March to June, in small plots or, especially with bitter varieties, along fences. Farmers use stem cuttings of varying lengths (30-100 cm) as planting material, and leave the cassava to grow for several years, harvesting a root here and there as they need it.

Bitter varieties may take 15 months to mature, whereas sweet varieties mature in 8 to 10 months. In certain sweet varieties root yield per plant is 2-7 kg and root number is 2-5. In the area surveyed, once the crop is planted, it is almost ignored: it is not cultivated, weeded, fertilized, or treated with pesticides.

Only the root is consumed, mostly at home. It is first washed, boiled, peeled, and pithed. In some areas (e.g., Konso in Gamo Gofa and Welayita) where the crop is widely used, *injera* and bread are made by mixing cassava flour with teff, sorghum, or maize flour. In these areas, cassava is also used to make local alcoholic drinks, known as *arekie* and *tella*. In Konso, where cassava is the dominant root crop, fresh roots and flour are also sold in local markets.

Cassava is growing in importance as more and more people use low-cyanide cultivars, and realize how easy it is to grow and manage. Planting material is accessible and easily propagated, and, above all, the crop is drought tolerant. Cassava production and use would increase if well-adapted cultivars with low cyanide contents and high yields were introduced. Further research is also needed, particularly on cassava agronomy, storage, and utilization.



Region	District
1. Sidamo	a. Welayita b. Sidama c. Gedeo
2. Gamo Gofa	a. Gamo b. Gofa
3. Kefa	a. Gimira b. Jimma
4. Ilubabor	a. Gambella b. Gore
5. Welega	a. Kelem b. Gimbi c. Nekemte

——— Regional boundary

— — — District boundary

Administrative areas surveyed for cassava production in southern and southwestern Ethiopia.

What is Fufu?*

Fufu, a starchy West African food, is an essential accompaniment to the many kinds of stew and soups found in West African diets. Almost unknown in South America, the product is found in many varying forms throughout West Africa, including *amala*, *toh*, *ugali*, *kowon*, *atap*, *nchima*, *nsima*, *ubugali*, and *funge*. Fufu, spelled in a variety of ways—*foofoo*, *foufou*, *foutou*, *fuifui*, *vou-vou*—is basically a cooked porridge, stiff paste, or sticky dough. It is white and either bland with almost no aroma or sourish with a characteristic fufu aroma.

Fufu may be unfermented or fermented. The unfermented state is made by boiling or steaming and pounding cassava, yam, green plantain, or cocoyam, or any combination of these. This technique was traditionally used to process toxic yams.

Fermented fufu is made from cassava roots that have been soaked for 3 or 4 days, then processed by grounding and sieving into a paste. How the paste is treated next varies from country to country, but, usually, it is either shaped into balls, cooked, and pounded or simply mixed into a stiff dough over heat. Sometimes the paste is fermented again, or pounded again, or sun-dried before being prepared for eating.

Fufu is also packed into plastic bags and sold at urban markets, where it is growing in importance as a convenience food, even though contamination in storage can be a problem.

* Based on a paper of the same name by M. O. Sanni.

Other forms of fufu are made from grated cassava, cassava flour, and cassava starch. Usually the flour or starch is mixed into hot water to form a paste or porridge, which is then eaten with stew or soup. Cassava flour may also be mixed with other flours, such as millet, cowpea, or guinea corn, to make the paste.

Another popular form of fufu is *gari-fufu*, which is made by stirring a finely sieved *gari* into hot water until it becomes a stiff smooth paste. Gari is a granular meal made from cooked cassava roots, but processed by peeling, grating, pressing, fermenting, sieving, and roasting. Sometimes palm oil is added during roasting to prevent burning and to give color (light yellow).

Because such a variety of fufus exist, authors need to take care in indicating which types they refer to.

NEW PUBLICATIONS

Cassava as livestock feed in Africa: Proceedings of the IITA/ILCA/University of Ibadan Workshop on the potential utilization of cassava as livestock feed in Africa

These proceedings, edited by S. K. Hahn from IITA, L. Reynolds from ILCA, and G. N. Egbunike from the University of Ibadan, were jointly published by the International Institute of Tropical Agriculture (IITA) and the International Livestock Centre for Africa (ILCA).

In 159 pages, the book discusses cassava's limitations and potential as livestock feed, existing technologies in four African countries for the processing and use of cassava as livestock feed, research gaps, and future research strategies and action plans.

The Workshop, held in 1988, was organized by IITA, ILCA, and the University of Ibadan, and funded by Canada's International Development Research Centre (IDRC). Thirty-eight participants from 10 countries presented 15 session papers and 3 working group papers.

For further information, contact:

International Institute of Tropical Agriculture, Oyo Road, PMB 5320, Ibadan, Nigeria; Tel.: (234-22) 400300-400318; Telex: 31417 or 31159 TROPIB NG; Fax: (INMARSAT) 874-1772276.

Product development for root and tuber crops

Volume III: Africa

This third and last volume of the series was jointly published in English, in 1993 by the International Potato Center (CIP) and the International Institute of Tropical Agriculture (IITA). Edited by G. J. Scott, P. I. Ferguson, and J. E. Herrera, **Africa** presents, in 506 pages, information on root and tuber production, processing, marketing, research, and trade, with case studies on 11 African countries, Vietnam, the Philippines, Peru, and Colombia. Although cassava and sweet potato were highlighted, other crops included potato, cocoyam, and yam.

The 45 papers were presented at the International Workshop on Root and Tuber Crop Processing, Marketing, and Utilization in Africa held at IITA in 1991. The Workshop was organized by CIP, IITA, and CIAT, and funded by the United Nations Development Programme (UNDP).

The first two volumes, **Asia** (volume I) and **América Latina** (volume II), were reviewed in *Desarrollo de productos de raíces y tubérculos*, **Cassava newsletter**, vol. 17, no. 2, p. 11.

Volume III costs US$40.oo for developed countries, including postage and handling, but some copies are available, free of charge, to researchers in developing countries. Copies can be obtained from CIP offices in Kenya, Cameroon, and Peru; IITA in Nigeria; PRAPACE in Rwanda; and CIAT in Colombia.

For further information, contact:

International Potato Center (CIP), P.O. Box 5969, Lima, Peru; Fax: (51) 14-351570; E-mail: CGI801 (CIP).

Or you may contact:

International Institute of Tropical Agriculture (IITA), Oyo Road, PMB 5320, Ibadan, Nigeria; Fax: (INMARSAT) 874-1772276; E-mail: CGI072.

Les bibliographies du CIRAD, 3: Valorisation du manioc

(CIRAD bibliographies, 3: Valuating cassava)

This 321-page bibliography contains 747 references, with four indexes, on the commercialization of cassava and its byproducts. It was published in French, in 1993, by the Département des Systèmes Agroalimentaires et Ruraux of the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD-SAR).

The bibliography is divided into six sections: conservation and storage of fresh roots; product quality; transition

from a traditional to industrial crop, with emphasis on gari, sour starch, and chikwangue; use in bread-making; other potential end uses of cassava; and general topics.

The bibliography complements publications from CIAT and IITA, which usually deal with the agronomic characteristics of varieties, cultivation practices, and diseases and pests.

For further information, contact:

CIRAD-SAR, 2477, avenue du Val de Montferrand, BP 5035, 34032 Montpellier Cedex 1, France.

CBN Newsletter

The **CBN Newsletter**, a biannual, 16-page newsletter, was first published in 1993 by the Cassava Biotechnology Network (CBN), headquartered at CIAT. The publication is supported by the Dutch Directorate General for International Cooperation through its Special Programme for Biotechnology and Development.

The newsletter aims to spread news of the network's organizational and technical activities among its members. It also provides short feature articles on current aspects of cassava biotechnology research such as understanding *Manihot* phylogeny through RFLP analysis of chloroplast DNA, status of cassava regeneration and transformation, or how biotechnology can help improve cassava's value as a source of rural income and food supply. Lists of useful publications are also given.

Contributions and requests for further information and subscription (free) may be sent to:

Dr. Ann Marie Thro, CBN Coordinator, c/o CIAT, A.A. 6713, Cali, Colombia; Fax: 57-23-647243; E-mail: CGI456 or a. thro@cgnet. com; Tel.: 57-23-675050; Telex: 05769 CIAT CO.

Directory Cassava Biotechnology Network and collaborators: To promote communication among cassava biotechnology researchers

Published in 1993, the 215-page directory contains 415 entries of people interested in cassava biotechnology. Each entry contains the name of the person, his or her address, with telecommunications numbers, research interests, and the titles of biotechnological projects with which they may be involved.

The idea is to promote communication about the research and objectives of the Cassava Biotechnology Network (CBN) among cassava biotechnology researchers. Founded in 1988, the CBN aims to contribute to the increase of incomes and agricultural sustainability in less-favored rural areas, and to improve cassava production for different end uses. Currently, it is involved in more than 20 funded projects.

For further information, contact:

Dr. Ann Marie Thro, CBN Coordinator, c/o CIAT, A.A. 6713, Cali, Colombia; Fax: 57-23-647243; E-mail: CGI456 or a. thro@cgnet. com; Tel.: 57-23-675050; Telex: 05769 CIAT CO.

Cassava Program report, 1987-1989 and Cassava Program 1987-1991

The 1987, 1988, and 1989 annual reports of CIAT's Cassava Program were published in 1993 under one cover as a CIAT Working Document (No. 91), entitled "Cassava Program report, 1987-1989." Each report describes the year's activities of all Program sections: agronomy, breeding, cropping systems, entomology, pathology, physiology, soil research, utilization, and virology.

Following the format of the Cassava Program reports of previous years, each is about 200 pages, totaling 640 pages, and illustrated with figures, tables, and photos.

This collection of annual reports is not to be confused with another work, entitled "Cassava Program 1987-1991," which summarizes the Program's work and achievements during these years, and tells the Cassava Program's history. This 510-page document was published in 1992 as CIAT Working Document No. 116 and reviewed in **Cassava newsletter**, vol. 17, no. 2, p. 10.

For further information, contact:

Cassava Program, CIAT, A.A. 6713, Cali, Colombia; Fax: 57-23-647243; Tel.: 57-23-675050; ITT Dialcom ID 57: CGI301; CIAT@CGNET.COM; Telex: 05769 CIAT CO.

BULLETIN BOARD

Irradiation can help preserve industrial cassava

Industrial cassava is usually preserved by chipping the raw roots and drying the chips. This helps counteract the root's rapid (3 to 4 days) postharvest deterioration. During storage, however, dried-cassava chips are attacked by microorganisms and especially insects. One technique for solving this problem is irradiation.

A study on the effects of gamma rays on stored dried-cassava chips was carried out by the Food Technology and Enzyme Engineering Division of the Bhabha Atomic Research Centre, Bombay, India. Roots were sliced 3.5 mm thick and dried to a 12%-14% moisture content. The slices, weighing 250 g, were sealed in two, airtight, polyethylene bags. One bag was irradiated with ^{60}Co at 20 Krad, whereas the control was not. Both samples were stored at 25-30 °C, under identical conditions.

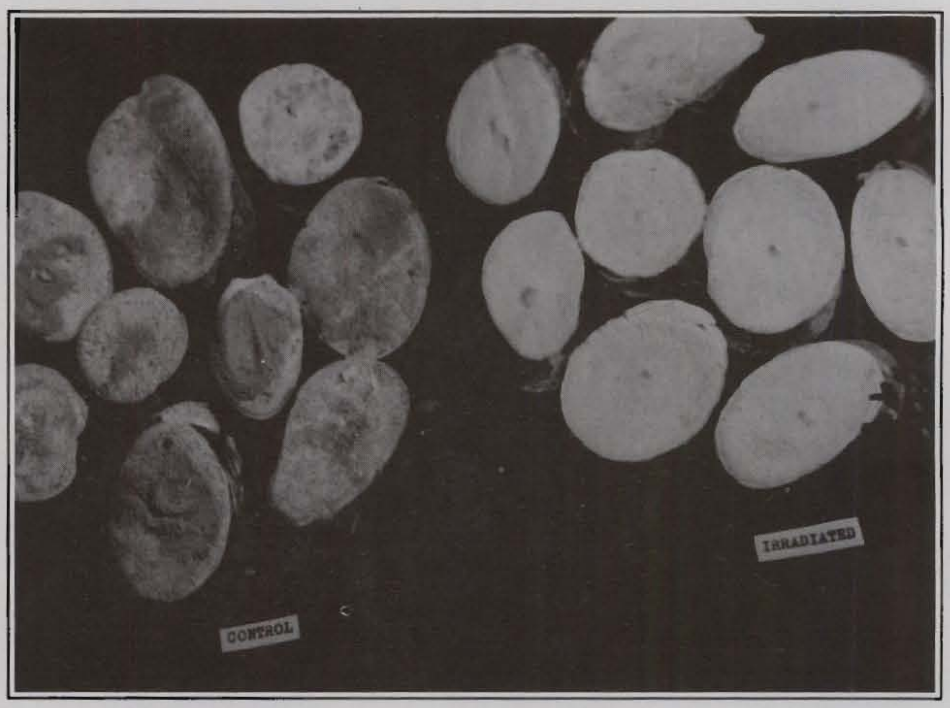


Figure 1. Slices of dried cassava after 12 months of storage. The sample on the right has been irradiated with gamma rays, whereas that on the left received no irradiation.

After 12 months, the irradiated sample was unchanged and white, but the control was blackened and contaminated by small insects, accompanied by a quantity of powdery material (Figure 1). Even at 4 months, the control had signs of spoilage.

By destroying insects and their eggs, irradiation prevented colonies from establishing. This method can therefore help conserve dried-cassava chips destined for industry.

Further study is being carried out on the biochemical aspects of irradiation.

First Regional Meeting of Root and Tuber Crops Research Collaborators in Western West Africa

The first biennial meeting of West African root and tuber crop researchers was held at the Njala Institute for Agricultural Research, Sierra Leone, from 15-17 December, 1993.

The meeting was a step toward strengthening regional collaboration among national agricultural research programs (NARs) who work with root and tuber crops in western West Africa. Such collaboration would encourage the exchange of germplasm, staff, scientific literature, and visits; standardize research methodology that would include multidisciplinary approaches and involve extensionists and farmers; help develop regional training; and encourage publication and information exchange. IITA is expected to help facilitate these activities.

Other topics brought up in the meeting were funding by national governments and donors; diversification of end uses of roots and tubers, particularly as composite flours and animal feed; postharvest technology and marketing; and mechanisms for recognizing outstanding research contributions.

Participants came from Guinea, Guinea Bissau, Senegal, and the host country Sierra Leone. The Government of Sierra Leone provided logistic support for the meeting; IITA provided financial and technical backup; and the National Agricultural Research Coordinating Council, the Njala Institute for Agricultural Research, and the Njala University College (University of Sierra Leone) helped organize the meeting.

A new "Earth Observing" data center is established

The ninth data center of the Earth Observing System Data Information System

(EOSDIS) has been named by the U.S. National Aeronautics and Space Administration (NASA). The center, known as the Consortium for International Earth Science Information Network (CIESIN), provides access to and enhances the use of information on the interactions between humans and the changing global environment. CIESIN identifies, documents, integrates, shares, and distributes data through a worldwide data-cataloging network. It provides electronic linkage and user services such as telephone, fax, and postal service to access the data.

CIESIN focuses on eight areas of information, one of which is "human dimensions of agriculture." This includes the following aspects of agriculture: extension and education, technology development, agricultural products and processing, marketing, policies, agroforestry, animal husbandry, biodiversity and genetic resources, cropping systems, dryland management, food and nutritional security, fisheries, indigenous knowledge systems, integrated pest management, plant nutrient management, soil and water management, and women in agriculture.

If you would like to contribute or receive information and/or data on the "human dimensions of agriculture," contact:

B. Rajasekaran, Coordinator (Agriculture), CIESIN, 2250 Pierce Road, Saginaw, Michigan 48710, USA; Tel.: (517) 790-2749; E-mail: raja@qm.ciesin.org.

Did You Know . . .

That we have more than 2,200 readers? We found out through IITA and the questionnaire you returned us in 1992. About 1,016 of you receive the English version, 866 the Spanish version, and 175 the French version. The biggest circulation is in Latin America and the Caribbean, followed by Asia and Africa.

You are especially interested in the agronomy of cassava, followed by cassava flour and starch and their byproducts, genetics and breeding, fresh conservation, and animal nutrition, in that order.

We also circulate the **Newsletter** to the following networks: the Cassava Biotechnology N., the Southern Cone N., and the Genetic Improvement N. About 362 English-speaking, 468 Spanish-speaking, and 245 French-speaking institutions also subscribe to the **Newsletter**.

The Editorial Committee thanks all those who answered the questionnaire, and welcomes comments you may have toward improving the **Newsletter**. We look forward to receiving your contributions for the next issues.

Farewell to Our Managing Editor

Ana Lucía García de Román, CIAT editor, managed the **Cassava newsletter** during 1990-1993. Responsible for both the Spanish and English versions of the **Newsletter**, she coordinated these versions with the French one, which IITA began publishing in 1992. She was also translator and contributor.

Before joining CIAT's Communications Unit in 1982, de Román was editor at ICA, Colombia's agricultural research program. Previous to that, she worked as agronomist—at a time when few Colombian women, with a rural back-ground, had university degrees.

The **Newsletter** Editorial Committee is sorry to lose such a sincere and dedicated editor and wishes her well in her new ventures.

We welcome Elizabeth McAdam de Páez, CIAT editor, as her replacement.

Meeting Announcements

1. *Second International Scientific Meeting of the Cassava Biotechnology Network (CBN)* — Second announcement

   Place: Bogor, Indonesia

   Date: 22-26 August 1994

   Contact: Dr. Ann Marie Thro, Coordinator, CBN, CIAT, A.A. 6713, Cali, Colombia; Tel.: 57-23-675050; Fax: 57-23-647243; Telex: 05769 CIAT CO; E-mail: a.thro@cgnet.com.

2. *8th Cassava Brazilian Congress*

   Place: Salvador, Bahia, Brazil

   NEW date: 9-12 November 1994

   Contact: Mario Augusto Pinto da Cunha, EMBRAPA/CNPMF, Caixa Postal 007, 44.380 Cruz das Almas, Bahia, Brazil; Fax: (55 75) 721 11 18.

3. *10th Symposium of the International Society of Tropical Root and Tuber Crops (ISTRC)*

   Place: Salvador, Bahia, Brazil

   NEW date: 13-19 November 1994

   Contact: As for (2)

Errata

We apologize to our IITA colleagues for errors that crept into the African articles in vol. 17, no. 2, of the **Cassava newsletter**. In particular, we apologize to the Malawian farmer whose sex we wrongly designated as male. In Figure 2 on p. 3, we should have said "her cassava crop", not "his". In Figure 4 on p. 4 of the same article, it should have said "As with other country members of ESARRN, Mozambique receives assistance from IITA cassava researchers and technicians." Finally, in Figure 1 on p. 9, we should have said, "this disease devastated the 1988 crop", not "wiped out", that is, the crop had been about 90%-95% lost, not 100%.

In vol. 17, no. 1, of the **Cassava newsletter**, we erred again by writing Spanish words for English text: in Table 2 on p. 5, we wrote "Cinetina" instead of "Kinetin". For the same page, third column, the authors would like to point out that it was they who "analyzed total starch and sugar contents in *M. tristis* at three levels", not Nelson and Somogyi whose method of analysis they used.