

# GLOBAL NEWSLETTER ON *UNDERUTILIZED* *CROPS*



March 1998

## Editorial

Hello and welcome to our new Newsletter. The last issue was published in 1996 and since then it has not been possible to publish due to a shortage of funds, though we have been inundated with requests for the Newsletter. This is also the first issue since Leipzig. The International Technical Conference adopted a Global Plan of Action which includes an activity on promoting, development and commercialization of underutilized crops and species. Information on this and other relevant activities are found in this Newsletter. We are grateful to FAO for sponsoring the publication of this issue and we are now looking for sponsor(s) for future issues. It is hoped that we will be able to publish the Newsletter twice a year. You may have noticed the new design, including the new logo of ICUC, and setting of this issue and we will continue to improve on this depending on the availability of funds. We would also like to publish a directory of scientists, organizations, and private and public enterprises which have interests in underutilized crops, in forthcoming issues as a regular feature. I hope this will strengthen and improve network co-operation on underutilized crops. Please send your organization's news with details of your interests and addresses (with email and Internet details if available). We have published some addresses as a start (excluding those already included in the text of this Newsletter) and if you do not see your material in this issue we hope to include it in the forthcoming one.

We are determined to promote underutilized species which have the potential to diversify agricultural systems by improving nutrition, rural income and maintaining the environment. You can all help us by sending features following those published in this issue. We thank all

ICUCs Global Newsletter on Underutilized Crops is compiled by N. Haq and P. Lovett.

If you have any queries or material which could be included in the next newsletter please send to:

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of you for your co-operation and for sending material for the Newsletter. We would also like to thank Peter Lovett, Peter Griffiee and Ken Anthony for their assistance with editing and publishing this Newsletter.

N. Haq, Director, ICUC

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### Mission Statement

**Food Security, improved nutrition and economic welfare of human beings through sustainable and increased economic production of food and industrial raw materials. This to be achieved by developing and utilising the untapped biological diversity of underutilized crops.**

### Preface by the Chairman

It is some time since the ICUC was able to produce a Newsletter, but, with the assistance of the Food and Agriculture Organization of the United Nations (FAO), I am pleased that we have been able to publish this issue. The Board of ICUC hopes that you find it informative, useful and interesting.

The ICUC Board meets annually, but has established a Management Committee which meets as required, usually about every three months. You will find a list of the present members of the Board, its Officers and Management Committee in this Newsletter. I wish to thank the Board members for their services, which are all given on a voluntary basis.

ICUC, given its limited financial resources, has continued to be active. In particular, we have managed to run our agreed programmes on research and development, networking for promotion of underutilized species, training and dissemination of information. The Board has been trying to move the headquarters and has now reached an agreement with the Department of Agriculture, Bangkok, Thailand, that its headquarters will move from Southampton to Thailand as soon as our resources permit. The present Director will however remain in the UK, and continue until a replacement resident in Thailand is appointed.

Many other organizations in the world are now persuaded of the need to develop new and underutilized crops as a means of conserving biodiversity through its utilization. We of course welcome this increased awareness of what the ICUC has been working on since its initiation, but need to establish our specific role in the emerging global agenda. By establishing two networks (UTFANET and SEANUC), and by participating in others (such as MESFIN) we believe we have a formula for developing a global network on underutilized crops, based on the co-ordination of regional networks. FAO has commissioned ICUC to organize a meeting to establish a further network in West Africa, and later, a network for the Caribbean and Latin American regions. A paper which suggests a way forward in the establishment of a Global

Network has been presented to FAO, together with a draft logical framework which sets out a programme of activities leading to outputs which would achieve the purpose of establishing the network.

Our initial series of books on underutilized crops has to date only published 2 volumes ('Pulses and Vegetables' and 'Cereals and Pseudocereals'). The next titles in the series ('Fruit and Nuts', and 'Industrial Crops') are on hold, due to a lack of interest by Chapman and Hall in publishing them. ICUC is exploring alternative publication procedures. For example, a proposal is being considered by the DFID, which will involve the publication of five monographs on five specific underutilized tropical fruits. The proposal was initiated by the members of UTFANET, and supported by the members of SEANUC who deal with fruits.

ICUC is still pursuing potential donors of core funds, which would enable us to increase our support of regional networks, the undertaking of research activities, the further development of our database, and the dissemination of information through intermediate organizations to the intended ultimate beneficiaries. Fund raising is not easy. The receipt of core funds would also allow us to implement our move to Thailand.

I wish to thank all those organizations which continue to support our activities. In particular, thanks are due to the FAO, the Commonwealth Science Council and the Department For International Development (DFID, formerly ODA).

R.W.Smith. Chairman. ICUC.

### Organizations Concerned with Underutilized Crops

#### ICUC News

The International Centre for Underutilized Crops (ICUC) was established in 1988 specifically to encourage the domestication of wild plant species having the potential to increase the diversity of plants used by mankind for the production of food, medicines and as raw materials for

industry. It gives priority to those species that are gathered from the wild and used by groups of people, for subsistence and life support, within traditional systems. It is also concerned with increasing the utilization of plants which are already accepted as traditional crops. These remain largely unimproved, un-researched, and consequently, they usually have a low, and variable yield of uncertain quality.

ICUC recognizes Agenda 21, which emerged from UNCED, and recognizes the value of subsequent steps taken by Governments through measures such as the Biodiversity Convention and the Global Plan of Action. It holds the view that conservation is usually best achieved through developing sustainable use of germplasm.

Priorities have been set by working in close partnership with those persons who will be the beneficiaries of results obtained and has identified five groups of crops within which the priorities have been or are in the process of being set:

- Cereals and Pseudocereals
- Roots and Tubers
- Pulses and Vegetables
- Fruits and Nuts
- Industrial Crops

It has been involved in research and development in collaboration with its national, regional and international partners since its inception. Several projects have been undertaken by staff, and associate staff, which include: germplasm collection and evaluation; assessment of genetic diversity; propagation and use of wild germplasm in the improvement of *Digitaria*, *Fagopyrum*, Quinoa, *Vigna*, *Psophocarpus*, *Lupinus*, Safflower, Borage, *Cleome*, *Tylosema*, Amaranths, *Plectranthus*, Sheanut tree (conservation, propagation and management) and a range of tropical fruits and nuts. In addition, it was commissioned by DFID to study alternative crops for drug growing areas in Asia and in Latin America.

To meet the objectives, it has established the regional network - Underutilized Tropical Fruits in Asia Network (UTFANET) with the co-operation of FAO and the Commonwealth Science Council (CSC). The network is run by a Steering Committee, consisting of

representatives of nine countries of the region. It has established priority crops, has started implementing projects (assessment of diversity of Jackfruit and Pummelo in the region, capacity building, information dissemination through a Newsletter and publications have begun) and, for the time being, is co-ordinated from Southampton. Work is also starting on the other priority fruits: such as, mangosteen, lychi, guava, soursop and ber.

The regional network for South and East Africa, SEANUC (Southern and Eastern African Network for Underutilized Crops) has been established, in collaboration with FAO and CSC, following a resolution passed at a regional workshop held in Nelspruit, South Africa in 1995. A Steering Committee consisting of representatives from eight countries has been formed and priority species for this network have been identified. The network has begun to implement projects. A project on "Indigenous vegetables of South Africa" was started in 1997 and it is hoped that funds will be available soon to extend the project to Tanzania. Another project on the assessment of diversity of *Plectranthus* species is being formulated with the donor agency for Malawi, Zambia, Tanzania and South Africa.

ICUC wishes to contribute to an expanded global network involving all concerned parties on underutilized crops. To do this, it will continue to establish regional networks, the next of which will be a West Africa network, for which it is working with the FAO. Later in 1998, it is hoped that CSC will collaborate in organizing this meeting. The Centre intends to organize a similar meeting in the Latin America and Caribbean region with the help of its partners. It also intends developing its database and making it fully available on the Internet, for the benefit of all. ICUC is willing to collaborate with any organization under a Memorandum of Understanding (MOU) on any activities, particularly on conservation of wild species through utilization for food and agriculture.

ICUC has been concentrating on promotion and development of new crops through research. For example, in collaboration with CSC, it is looking into the biodiversity of homestead farming in Bangladesh. It is also

involved in improvement of safflower in Pakistan and is discussing plans with Sri Lanka to develop a project on the genetic assessment of tropical fruits. In another collaboration with CSC, a project on the diversity of underutilized tuber and root crops in Malawi, Zambia and Tanzania is currently being examined. An agreement has also been reached with IAEA to provide support for the rehabilitation of traditional underutilized crops in Africa and to develop a joint database.

In the near future the headquarters of ICUC will be located in the Department of Agriculture, at Bangkok, Bangkok, Thailand.

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### Food and Agriculture Organization (FAO)

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#### Policies, programmes and activities on plant genetic resources

FAO's mandate is to raise levels of nutrition and standards of living, to improve agricultural productivity, and to better the condition of rural population, in the field of food and agriculture (including fisheries and forestry). FAO has several priorities, but Food Security - the access of all people at all times to the food they need for an active and healthy life, has been described as the priority of priorities. Plant genetic resources for food and agriculture (PGRFA) provide the biological basis of world food security and, directly or indirectly, support the livelihoods of every person on Earth. The FAO Global System of PGR, allows both the users and donors of germplasm, funds and technology to discuss, on equal footing, matters related to PGRFA.

#### Crop Genetic Resources

A number of activities contribute to FAOs Crop Genetic Resources programmes, of particular relevance to underutilized crops include:

- *Crop-related Networks* - Supporting various global, inter-regional and regional crop-related networks with the aim of strengthening collections, preserving genetic diversity and integrating conservation and utilization.

- Mediterranean Selected Fruit Inter-country Network (MESFIN)
- Network on Identification, Conservation and Use of Wild Plants of the Mediterranean Region (MEDUSA)
- International Network on Cactus Pear (CACTUSNET)
- Global International Mushroom Conservation Germplasm Conservation Network
- Southern and Eastern African Network for Underutilized Species (SEANUC)
- West Asia and North Africa Network on Plant Genetic Resources (WANANET)
- Underutilized Tropical Fruits in Asia Network (UFTANET)
- Asian Network for Improvement of Food Legumes (FLCGNET)
- Asian Network on Medicinal and Aromatic Plants (ANMAP)
- Technical Cooperation Network on Plant Biotechnology (REDBIO)
- Manihot Genetic Resources Network (MGRN)
- *Acacia/Prosopis* - Genetic Resources of Arid and Semi-arid Zone Arboreal Species. FAO/Danida Forest Seed Centre (Denmark)
- International Neem Network (INN)
- Mahogany Network
- *Intensification and Diversification of Horticultural Crops Production* - Supports the utilization of fruit, vegetable, and root and tuber crop genetic resources, by promoting plant improvement programmes (selection and breeding), and initiatives to enhance plant multiplication systems and encourage the wider use of adapted and productive varieties, for better nutrition and increased income. Much of this work is carried out through crop-related networks.
- *Industrial Crops Promotion for Sustainable Development* - FAO supports the International Council for Medicinal and Aromatic Plants, and activities related to the conservation and utilization of their genetic resources.
- *Strengthening of National Seed Programmes* - Assists governments in formulating and implementing their national seed policies, and smallholders - particularly in poor or remote regions - in adopting appropriate technologies for seed and planting material processing, quality control, storage and distribution.

- *Improved On-farm Seed Production* Helps farmers produce good quality seeds from their own cultivars, and promotes their conservation and continued development.

Other programme activities include:

- *Ex Situ and In Situ Conservation and Networking*
- *Evaluation/Monitoring of the Use of Plant Genetic Resources for Sustainable Agricultural Development*
- *Seed and Planting Material Information and Exchange*
- *Optimization of Diversified Food Crops Production Systems*
- *Implementation of the International Plant Protection Convention*
- *Integrated Pest Management (IPM)*

### *Economic and social aspects of agricultural biological diversity*

The Economic and Social Department (ES) is undertaking a number of activities of relevance to agro-biological diversity, in cooperation with the technical units involved, with the aim of developing and deploying analytical tools for the economic valuation of genetic resources and conservation and utilization strategies. The programme element, *Economics of the valuation and conservation of genetic resources in agriculture* addresses a number of related questions:

- *The valuation of genetic resources*
- *Economically optimal public investment in agro-biodiversity*
- *Biodiversity and trade*
- *Biodiversity Indicators:*
- *Agro-biodiversity in home gardens*

### *Agricultural diversity and gender questions*

The Department of Sustainable Development, through the Women in Development Service, maintains a focus on the inter-relationship between agricultural biological diversity and gender questions.

For further information about any of the above activities or support offered by FAO please contact:

Plant Genetic Resources and Seed Services, AGP, FAO,  
Viale Delle Terme De Caracalla 00100,  
Rome,  
Italy.

## The Leipzig Conference

The FAO International Technical Conference on Plant Genetic Resources took place in Leipzig, Germany, in June 1996, attended by representatives of 150 countries, the EC and 54 inter-governmental and non-governmental organizations. The Conference adopted the *Global Plan of Action (GPA)* and the *Leipzig Declaration*, and welcomed the *Report of the State of the World's Plant Genetic Resources*. The Conference also made a number of decisions concerning the implementation and financing of the *Global Plan of Action*. The Leipzig Declaration commits governments taking the necessary steps to implement the GPA.

The *Global Plan of Action* was prepared through a participatory, country-driven process, guided by the FAO Commission on Genetic Resources for Food and Agriculture, involving a wide variety of stake-holders: governments, non-governmental and industry organizations, and individual scientists. A total of 158 governments prepared Country Reports, assessing the status of their plant genetic resources, as well as their capacity to care for and utilize these resources. Twelve regional and sub-regional meetings were held, where governments considered regional problems and opportunities, and made recommendations for the *Plan*.

The *Global Plan of Action (GPA)* comprises twenty priority "activities", covering *in situ* conservation, *ex situ* conservation, the utilization of plant genetic resources, and institutions and capacity-building. The plan will be reviewed and up-dated periodically, thereby becoming a rolling GPA.

The Plan aims to contribute to sustainable development and to efforts to ensure food security for the growing world population. One of the central approaches of the *Global Plan of Action*, therefore, is to strengthen the linkage between conservation and utilization. The Plan also aims to contribute to diversification of agriculture so that more diversity is maintained in use by, for example, promoting the use of a wider range of species, and through appropriate approaches to plant breeding. The Plan seeks to promote complementarity between the public and private sectors.

One of the objectives of the Plan is to enhance institutional capacity, and in particular to strengthen national programmes. Since the successful conservation and sustainable utilization of Plant Genetic Resources for Food and Agriculture (PGRFA) involves action by a wide range of people in every country, policy makers, planners, scientists, germplasm curators, breeders, rural communities and farmers - high priority is given to establishing national committees or similar coordinating bodies. The objectives of the *Global Plan of Action* are:

- to ensure the conservation of PGRFA
- to promote sustainable use of PGRFA to foster development and to reduce hunger and poverty
- to promote the fair and equitable sharing of the benefits arising from the use of PGRFA
- to assist countries and institutions to identify priorities for action
- to strengthen existing programmes and enhance institutional capacity

### Activities relevant to ICUC mandate

Of the twenty priority activities of the *Global Plan of Action*, **activity 12, "Promoting Development and Commercialization of Underutilized Crops and Species"** is the most relevant to ICUCs mandate. Other activities of direct relevance include:

- 4. Promoting *in situ* conservation of wild crop relatives and wild plants for food production
- 8. Expanding *ex situ* conservation activities
- 14. Developing new markets for local varieties and "diversity-rich" products
- 16. Promoting networks for plant genetic resources for food and agriculture
- 19. Expanding and improving education and training
- 20. Promoting public awareness of the value of plant genetic resources for food and agriculture conservation and use

### Activity (12): Promoting Development and Commercialization of Underutilized Crops and Species

While a small number of plant species provide a large proportion of global food needs, hundreds of other species are utilized at a local level, either through cultivation or harvesting. These underutilized species contribute substantially to household food and

livelihood security, agricultural diversification, income generation and they are often managed or harvested by women. Knowledge concerning the uses and management of these species is likewise often localized and specialized. Many underutilized plants have potential for more widespread use, and their promotion could contribute to food security, agricultural diversification, and income generation. However, current programmes for conservation, research and development tend to neglect these species. The main objectives of this priority activity are:

- To contribute to agricultural diversification, increased food security, and improved farmers' livelihoods;
- To promote the conservation and sustainable management of underutilized species and their genetic resources;
- To develop appropriate conservation strategies and sustainable management practices for underutilized species; to improve selected species;
- To improve the marketing of underutilized crops.

### **Activity (14): Developing New Markets for Local Varieties and "Diversity-Rich" Products**

Increasingly, diversity is being replaced by uniformity in the agricultural market place. Changes in traditional cultures and in consumer preferences are one explanation. Concentration on productivity, the effects of advertising and the rise of global consumer markets leading to stringent requirements being imposed on farmers and the inadvertent disincentives arising from legislation, policies, programmes and other institutional activities offer additional explanations. Farmers worldwide are losing once-strong incentives to provide an array of varieties. Both in developed and developing countries, economic and social incentives could be offered to encourage farmers who continue to grow distinct, local varieties and produce "diversity-rich" agricultural products.

A programme to assist in the creation of specialized niche markets for biodiverse food crops could act as a positive stimulus to farmers to grow landraces/farmers' varieties, obsolete varieties, and other underutilized food crops. Such a program should include

the identification and removal of systemic institutional barriers and disincentives to biodiversity conservation and production/marketing. The main objectives of this priority activity are:

- to stimulate stronger demand and more reliable market mechanisms for land races/farmers' varieties and related agricultural products.
- to encourage farm suppliers, food processors, food distributors, and retail outlets to support the creation of niche markets for diverse foods, varieties and products

### **Activity (4) : Promoting *in situ* Conservation of Wild Crop Relatives and Wild Plants for Food Production**

Through this priority activity, the Global Plan of action aims to promote conservation of genetic resources of wild crop relatives and wild plants of interest for food and agriculture in protected areas and on other lands. The objectives of this activity are:

- to initiate planning and management practices which take into account wild crop relatives and wild plants for food production;
- to gain knowledge of the uses, in particular by women, of wild plants for food production as sources of income and food;
- to create a better understanding of the contributions of PGRFA to local economies, food security, and environmental health;
- to improve management and planning and promote complementarity between conservation and sustainable use in parks and protected areas by *inter alia* broadening the participation of local communities in these processes;

### **Activity (8): Expanding *Ex situ* Conservation Activities**

Many plants of the local importance and those of wild species and wild plants of importance to food and agriculture have been virtually neglected by traditional genebanks. This includes many underutilized species. Collections are *ad hoc* and no comprehensive germplasm collections are maintained for conservation and further development. Some of these plants are vegetatively propagated and others have "recalcitrant" seed. Greater

use of field genebanks and of *in vitro* facilities as well as the development of new technologies is needed to conserve important plant species that cannot be stored as seed. The plan also proposed botanical gardens which play a greater role in conserving these species, as well as many other plants of importance to food and agriculture. The objectives of this activity include:

- To develop management strategies for *ex situ* conservation of vegetatively propagated and recalcitrant seeded plants, as well as for species neglected in current conservation activities;
- To promote the development and transfer of appropriate technologies for the conservation of such plants;
- To encourage and strengthen the involvement of botanic gardens in the conservation of PGRFA.

### **Other activities**

For integrated approach of promotion and commercialization, the following activities are also highly relevant towards the identification, conservation and use of wild plants of interest to food and agriculture.

The Plan recommended that training and capacity building for scientists and extension specialists and for farmers and local communities, with particular emphasis on women, should be provided (Activity 19). In addition, the plan also calls for promoting public awareness of the value of PGRFA conservation and use and to generate support for PGR activities at local, national, regional and international levels (Activity 20)

A strong role was envisaged for regional, crop specific or thematic networks (e.g *in situ* conservation networks, wild foods utilization networks, farming systems networks etc) to promote the development of underutilized crops and wild plants species. Activity 16 of the Global Plan of Action calls for strengthening existing regional, crop and thematic networks as well as to establish new networks in areas not covered by such.

Dr David Cooper,  
Officer-in-Charge,  
ICPPGR, AGP, FAO.

### FAO and Non-wood Forest Products (NWFPs)

Non-wood forest products have attracted considerable global interest in recent years due to increasing recognition of their contribution to household economies and food security, to national economies and to environmental objectives, including the conservation of biological diversity. About 80 percent of the population of the developing world use NWFP for health and nutritional needs. Several million households world-wide depend heavily on these products for subsistence consumption and/or income. NWFP also provide raw materials for large-scale industrial processing, including for internationally traded commodities as foods and beverages, confectionery, flavorings, perfumes, medicines, paints or polishes. Presently, at least 150 NWFP are significant in terms of international trade, including honey, gum arabic, rattan cork, forest nuts and mushrooms, essential oils, and plant or animal parts for pharmaceutical products.

Since 1991 the FAO Forestry Department has maintained a programme, "The promotion and development of Non-Wood Forest Products", aimed at enhancing the sustainable utilization of Non-Wood Forest Products in order to contribute to the wise management of the world's forests and the conservation of their biodiversity, and to improve food security for rural people. The programme, which is among FAO's priority forestry activities, comprises three main elements:

- 1 gathering, analysis and dissemination of key technical information on NWFP;
- 2 full appraisal of the socio-economic contribution of NWFP;
- 3 improved networking among individuals and organizations concerned with NWFP.

#### *Gathering, analysis and dissemination of key technical information*

Specific categories of NWFP and relevant issues in relation to their development are highlighted in the publication series, 'Non-Wood Forest Products' and 11 volumes have been published to date. In line with the recommendations of the World Food Summit (Rome 1996), special attention has been focused on non-wood forest resources that are (or have the potential to be) used as food, food additives, or for medicinal purposes.

#### *Appraisal of the socio-economic contribution of NWFP*

Comprehensive statistical data on production and trade of NWFP is essential for accurate appraisal of their true socio-economic contribution to sustainable development. This, in turn, will facilitate the elaboration (and acceptance by policy and senior decision makers) of appropriate policies leading to a more equitable access to non-wood forest resources and to a fair distribution of benefits obtained from NWFP. Although FAO has already assembled a wealth of information on the socio-economic role of many NWFP, the information base is still far from being comprehensive or global in scope.

#### *Improved networking*

To improve networking, an annual bulletin, 'Non-Wood News', compiled from voluntary contributions links more than 1,200 relevant individuals and organizations world-wide. Recent issues of this bulletin are available on the Internet

To increase awareness and strengthen collaboration at the national, regional and global level. A number of activities have been started recently in collaboration with other agencies and NGOs, dealing with specific aspects of NWFP, including: UNIDO (processing), ICRAF (domestication), Gifts of Health (a UK-based NGO on medicinal plants). FAO's Wood and Non-Wood Products Utilization Branch (FOPW) has organized two global expert consultations: "Social, Economic and Cultural Dimensions of NWFP", Bangkok, Thailand in 1994, and "Interregional Expert Consultations on NWFP", Yogyakarta, Indonesia in 1995. The following regional expert consultations have also been organized by FOPW, or in collaboration with other agencies: Asia and Pacific Region, Bangkok, Thailand, 1991; Anglophone African Countries, Arusha, Tanzania, 1993; Latin America and Caribbean, Santiago, Chile, 1994; Near East, Cairo, Egypt, 1997; Boreal and cold temperate Forests, Joensuu, 1998 (EFI/ECE). An expert consultation on NWFP in the Congo Basin is also planned to be held in Cameroon (May 1998).

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### DIVERSITAS – An International Programme of Biodiversity Science

DIVERSITAS is a programme of scientific research established in 1991 to promote and catalyze knowledge about biodiversity, including its origin, composition, ecosystem function, maintenance and conservation. Based on collaborative research and communication that are international in scope, DIVERSITAS is entering a new phase of organization and activity. In 1996 the programme is incorporating new sponsorship organizations, enlarging its administrative capacity, and initiating a number of new research elements and activities designed to expand the research efforts already underway. DIVERSITAS currently has ten Programme elements, each focused on a fundamental question about life's diversity:

1. The effect of biodiversity on ecosystem functioning
  2. Origins, maintenance and change of biodiversity
  3. Systematics, inventorying and classification
  4. Monitoring of biodiversity
  5. Conservation, restoration and sustainable use of biodiversity
- And the Special Target Areas of Research
6. Soil and sediment biodiversity
  7. Marine biodiversity
  8. Microbial diversity
  9. Freshwater biodiversity
  10. Human dimensions

In addition to this broad spectrum of research activities DIVERSITAS will sponsor workshops and symposia designed to develop and communicate the results of its scientific programme, produce manuals for selected topics where methodological procedures are as yet unavailable and place particular emphasis on programmatic activities that promote the building of scientific infrastructure and human resources, especially in developing regions of the world currently lacking such capacity. For further details please contact:

DIVERSITAS c/o MAB-UNESCO, 1 rue Miollis, 75015 Paris, France.

Tel: 33-1-45684093 / 33-1-45684054,  
Fax: 33-1-45685832  
Email: [diversitas@unesco.org](mailto:diversitas@unesco.org)

### IPGRI's contribution for conservation and use of Neglected and Underutilized Crop Species (NUC)

While there are thousands of plant species that humans can use as food, thirty or so crop species became intensively and widely used and were the focus of much attention by commerce and science world-wide. The rest were neglected or replaced and/or declined in use. Some species were replaced and fell into disuse, as with the case of hulled wheats in Europe, quinoa in South America. Others remained important in their centres of origin or secondary centres of diversity. Here they have not yet been replaced, but have been neglected in commerce and science. Despite the narrowing of the number of species upon which global food security depends, it was those choices that fuelled, or better said, fed the explosion in human population over the last two hundred and fifty years.

Work on NUC is therefore needed for the preservation of such neglected diversity: many species - no more under cultivation - are being lost at a rapid pace, whereas on the other hand, those being discovered and promoted by the market tend to be over-exploited from the wild and the depletion of their genetic diversity may be a matter of a very short time. Promotion of NUC species must necessarily pass through a sustainable use of their diversity.

IPGRI's strategy is based on the premise that the deployment of plant genetic diversity in agriculture will lead to more balanced and sustainable patterns of development. This is very much true for NUC, which play an important, but often unrecognized role in local production and consumption systems.

The work of IPGRI on NUC is in harmony with the Institute's overall mandate and institutional structure. Based on its mandate, IPGRI has set itself the following four objectives:

- To assist countries, particularly developing nations, to assess and meet their needs for plant genetic resources conservation, and to strengthen links to users;
- To strengthen and contribute to international collaboration in the

conservation and use of plant genetic resources;

- To develop and promote improved strategies and technologies for plant genetic resources conservation and
- To provide and international information service on plant genetic resources.

Because of their local specificity, NUC will never command a large percentage of national resources and therefore require a different conservation and use approach from other crops. In order to devise such an approach, IPGRI is engaged in various activities aiming at:

- promoting the conservation and increased use of diversity of NUC;
- identifying and overcoming the socio-economic and technical constraints to the conservation and use of diversity in NUC species and
- focusing on the local value and uses of the crops, in order to link and promote cooperation between actors.

In addition, IPGRI also encourages the development of mechanisms for the equitable sharing of information and benefits related to the use and development of locally important crops, in the framework of its institutional commitment in the specific area of plant genetic resources access and use. IPGRI is currently in the process of publishing a series of twenty books on NUC species and some of the most recent publications are given in "Publications of Interest" section of this Newsletter.

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### The Overseas Development Institute (ODI)

The Overseas Development Institute is an independent non-governmental centre for the study of development and humanitarian issues and a forum for discussion of the problems facing developing countries. ODI holds regular discussion meetings, workshops and seminars on development topics of general interest, addressed by speakers from the UK and overseas. ODI organizes several specialist networks. In

Natural Resources, the Agricultural Research and Extension Network and the Rural Development Forestry Network link some 3500 policy-makers, practitioners and researchers throughout the world.

The publications programme includes: an extensive range of books (in association with leading publishers); Special Reports; Development Policy Studies (in association with Routledge) Research Studies; Working Papers which present preliminary research findings on current ODI projects. Available on our Webpages are ODI Briefing Papers on contemporary development issues and ODI Natural Resource Perspectives Papers.

### Neglected Species, Livelihoods And Biodiversity In Difficult Areas: How Should The Public Sector Respond?

Recent research on neglected crop and animals suggests that there exists an important gap between the priorities of development/research agencies and the way small farmers, both in Africa and elsewhere in the world, treat such species. The most important aspects are:

- Farmers use a wider range of crops and livestock than are usually enumerated in standard texts.
- They regularly experiment with 'new' species.
- Crops and livestock leave and enter domestication, a process that should not be conceptualised as one-way.
- Species can remain tamed or cultivated for millennia until domestication becomes appropriate.
- Research focuses almost entirely on species of interest to Western donors and promotes a vision of agriculture that is far less fluid and responsive than the existing smallholder systems.
- Exotic crops and livestock are heavily promoted as having significant production advantages over existing species, but
- when inadequately adapted, almost always have high long-term costs and may impoverish smallholders.

A consequence of this situation is that very often the main promoters of neglected species are individual enthusiasts or amateurs and this sometimes acts as a further deterrent to major agencies.

Neglected species are almost always found in 'difficult' areas comprising combinations of poor soils, unreliable rainfall, hilly topography and degraded vegetation. High proportions of the poor live in these areas, and neglected species are often the only ones capable of coping with these conditions and thereby contributing to their livelihoods.

There is a sense in which the reduction in diversified systems represents a version of the 'tragedy of the commons' writ large. In biodiverse resource management systems communities manage private and common pool resources in an integrated fashion over long periods. High-input single-species systems can produce more from a unit area for a defined market over a shorter time-span and it is often therefore in the interest of individuals to produce them. But in doing so they may weaken joint management systems by withdrawing from them or, even worse, by seeking to privatise parts of the resource.

*Summary taken from an article by Roger Blench, Natural Resource Perspectives No. 23 Sept. 1997. Overseas Development Institute 1997. Papers in this series can be accessed on the ODI's internet pages.*

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## Regional News

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### Africa

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#### Research work into underutilized crops at ARC-Roodeplaat Vegetable and Ornamental Plant Institute

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The ARC-Roodeplaat Vegetable and Ornamental Plant Institute is one of the commodity research institutes of the Agricultural Research Council of South Africa, and is located 17km north of Pretoria. There are presently three research projects on underutilized crops being undertaken at this institute. These projects concentrate on edible traditional crops, which have become naturalized in the country, as well as indigenous plants that have been used by the indigenous peoples in the past. A study carried out by the National Botanical Institute has found approximately 1700 species of edible plants in South Africa, very few of which

have been studied in any depth at all.

The first project deals with the edible leafy and seed vegetables, the second with the edible root and tuber vegetables, and the final project is the indigenous plant genebank. In the first project the leafy vegetable species being studied at this stage are the *Amaranthus* spp. and *Cleome gynandra* (Spider wisp), while the seed species under investigation are *Vigna unguiculata* (cowpea), and *V. subterranea* (bambara groundnut). Under the root and tuber project two indigenous species, *Plectranthus esculentus* (Livingstone potato) and *Solenostemon rotundifolius* (Hausa potato), are being studied. The third project concentrates on the collection and storage of promising germplasm of edible and medicinal plants in South Africa.

These research projects concentrate on evaluating promising traditional plants as possible substitutes for, or to be grown in conjunction with, present crops, particularly in areas of low agricultural potential. In all of these projects information about the plants is collected, including all possible indigenous knowledge. Botanical studies are made to gather information important to the production of these species. This is particularly important, as there is a paucity of knowledge regarding the botany of many of these species. Basic agronomic studies are then carried out to determine the best ways of producing these plants. At the same time evaluation of the nutritional values of these plant species are carried out in order to determine where they would fit in from a nutritional point of view. Information dissemination and market development is also an important part of these projects in order to make these useful plants more widely known amongst the general public.

Another underutilized crop, in South Africa at any rate, is *Manihot esculenta* (cassava), and this is being investigated under another research project. Some work on medicinal plants has recently started at the institute as well, where some 406 species of local medicinal importance are being multiplied for reintroduction to communities as possible crops. As funds become available some agronomic trials using these plants will also be undertaken. A satellite station of this institute located at Elsenburg near Stellenbosch in the Western Cape carries out research into flowers of the fynbos

biome, mainly in the Proteaceae family with an eye to the export market. Work is carried out by the flower division into the commercialization of promising indigenous flower bulbs.

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#### Introduction and evaluation of specialist crops in South Africa

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The aim of the project is to identify new crops and varieties that can be produced in marginal environments and profitably grown by both small and/or commercial farmers. Various trials of the crops canola, drypea, lentil, chickpea, sesame and pigeonpea are sown on different dates to identify, firstly, area adaptation of the crop, in this case to Potchefstroom in the North West Province, and secondly suitably sowing dates. The winter crops canola, dry pea, lentil and chickpea, are sown at narrow row spacings and the summer crops sesame and pigeonpea, at wider row spacings. Both small-scale and commercial farmers may benefit from these introductory crops. The small-scale farmer can produce crops difficult to plant and harvest mechanically and the commercial farmer from crops suitable for his crop rotation and which will fill niche markets. The winter crop chickpea was sown in September, during spring, in 1996 with promising results. Over 2 t/ha on average was achieved. Canola and lentil will not be sown during 1997 due to various reasons, not being competitive with similar crops during winter or because of bacterial disease. In future there will be more emphasis on the production of income. Results have been extended to the farmer in a farmers day with a 400 person attendance during March 1997 in Potchefstroom and in articles published in 'Farmers Weekly' and 'The Farmer' with many inquiries received thereafter. Radio talks have also been given. Because of limited funding it has not been possible as yet, to relay the results directly on farm to rural farmers. Interested farmers, seeking alternatives to their current production crops, reading these articles have indicated

interest in planting these crops or multiplying seed where not available. Over the last six months at least 12 direct requests for more information has been received for these crops, indicating at least some interest in farmers wanting to try something new. According to statistics, for every one person reacting to information there are at least another 50 to 100 that are also interested. It is extremely difficult to assess the value of research of this nature because there is no quantitative information available on the area sown under these crops or the amounts of seed traded in South Africa. It is clear however that should only one crop be "discovered" by this project it could have an advantage of millions of rands in terms of income for farmers and in terms of foreign exchange. The project has reached its fourth year and if outside funding is not found will probably not be able to function for much longer.

Ronell Keeve, Agricultural Research Council, Grain Crops Institute, P/bag X1251, Potchefstroom, 2520

### New Crop Studies In Southern Africa

The commercial development of new crops and new agricultural enterprises offer many potential benefits for South Africa in particular and Africa in general. For individual farmers, the opportunity to diversify their farming systems and to reduce their reliance on a few established crops or businesses now becomes an option. With a decline in market prices for many established crops in recent years the availability of a wider range of crops offers farmers an opportunity to select those crops which offer the best economic prospects. Within this context a highly relevant new research field in terms of crop protection and food security was subsequently identified. Ample justification for launching such a research endeavour was identified over the last year and culminated in the recent founding of the Southern African New Crop Research Association (SANCRA) by four researchers closely involved in this area and affiliated to the University of the Free State (Prof. SvdM Louw, Department of Zoology & Entomology, and WJ Swart, Department of Plant Pathology) and the Vegetable and Ornamental Plant

Institute of the ARC at Roodeplaat (Dr S. Venter and ms E. van den Heever). The main idea behind this move was to form the nucleus for a multi-disciplinary and multi-institutional Research and Development team consisting of researchers in southern Africa that are involved with promoting new or alternative crops, both indigenous and exotic, for commercial exploitation. Crop protection will initially feature very strongly in SANCRA, as will genetic crop improvement and eventually all other aspects pertaining to new crops will be accommodated. Immediately upon establishment of SANCRA, Prof. J.C. Pretorius and his research team of the Department of Agronomy & Horticulture, University of the Free State enthusiastically came forward in support of the venture. To date most of the research in this field has been on amaranth, (especially tree spinach, *Amaranthus hybridus*) which has resulted in 16 contributions to congresses and 2 publications. Other new crops such as *Cleome gynandra*, *Symphytum officinale*, *Vigna unguiculata*, *V. subterranea*, *Cajanus cajan*, *Hibiscus* spp., *Solenostemon rotundifolius*, *Pistacia vera*, *Opuntia* spp, *Hypericum perforatum*, *Carprobrotus edulis*, *Ziziphus mucronata*, and *Plectrantus esculentus* have also received varying degrees of attention.

A SANCRA mini-symposium and workshop is planned for September 1998 and all interested parties are invited to attend and participate.

More information can be obtained from Prof. W.J. Swart

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Tel: (051) 401-2383.

### The Foundation of Agricultural Development and Education, Japan. AFLORA – an On-line database on Plant Utilization in Africa

Researchers at Kyoto University have now developed an on-line database for academic purposes only, which provides access to information which has been gathered in Africa since the mid-sixties. The database consists of two sub-files on main frame computer – PLANT1 for individually collected data and PLANT2 for data from published

sources. AFLORA also welcomes new contributions and contributors are kept informed of the projects progress. From an anthropological view the uses of germplasm provides the main area of interest. Classification is in two ways: "classification of usage", e.g. medicinal, food/drink, etc. or "classification of used parts", e.g. whole plant, fruit/berry/nut, etc.

It now seems that African studies at Kyoto University, which used to be purely academic, are now moving to development programmes based on traditional farming practices. How to maintain native flora and how to preserve the culture using the native flora in a harmonious way in developing countries may be future problem.

Extracted from *PGR Communication – Asian Perspective – N<sup>o</sup>. 1 April 1996*

### Latin America

#### Underutilized crop R&D in Latin America

During the late 1970s and 1980s, there was a vigorous regional programme cum network to develop underutilized crops in Latin America: the InterScience Biological Resources Programme (PIRB - Programa Interciencia de Recursos Biologicos). The PIRB stimulated national programmes in member countries, some of which started important work in the 1980s. The network died out in the late 1980s and early 1990s due to lack of funding for the national programmes during one of Latin America's periodic economic slumps.

During the late 1980s and 1990s, various national centres and programmes dealing with genetic resources started developing sub-regional networks to exchange information and stimulate research, conservation and utilization of indigenous crop genetic resources (as well as of the major crops upon which Latin America relies). A major stimulus for the development of these networks was the UN Conference on the Environment and Development (Rio92) and the 4th FAO Technical Conference on Genetic Resources, for which Latin American countries prepared status reports, both nationally and regionally.

A second stimulus was the Interamerican Institute for Agricultural Cooperation (IICA - Instituto Interamericano para Cooperación Agrícola) which has helped build all of these networks to a greater or lesser extent. As a result of the ratification of the Convention on Biological Diversity and the elaboration of the Global Plan of Action, many of these networks are evolving from programmes focused on the conservation of genetic resources to wide-ranging programmes to utilize their indigenous genetic resources (i.e., underutilized crop R&D programmes). Different networks are at different stages in this evolutionary process, but it is hoped that they will all be major catalysts for underutilized crop R&D in the next century. The most important of the Latin American networks, and the countries involved, are listed below.

Mesoamerican Plant Genetic Resources Network (REMARFI - Red Mesoamericana de Recursos Fitogenéticos) - Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama.

Commission for the Management of Genetic Resources in the Caribbean - Cuba, Dominican Republic, Haiti, Jamaica, Porto Rico, Trinidad & Tobago (This network was originally organized by IICA).

Host institution for REMARFI & the Caribbean network: IICA, Contact: Dr. Enrique Alarcon, Address: IICA; Apartado 55; Coronado, City: San José, Country: Costa Rica, Zip code: 2200.  
Tel: 506-229-0222  
Fax: 506-229-4721  
Email: [elarcon@iica.ac.cr](mailto:elarcon@iica.ac.cr)

Genetic Resources Subprogramme (Subprograma de Recursos Genéticos) - Argentina, Bolivia, Brazil, Chile, Paraguay, Uruguay (This subprogramme is part of the Southern Cone agreement for the development and exchange of agricultural information - PROCISUR, originally organized by IICA), Host institution: IICA-PROCISUR, Contact: Dr. Roberto M. Bocchetto, Address: IICA-PROCISUR; Secretario Ejecutivo; Casilla de Correo 1271, City: Montevideo, Country: Uruguay,  
Tel: 508-292-0424  
Fax: 508-292-1318

Andean Plant Genetic Resources Network (REDARFIT - Red Andina de Recursos Fitogenéticos) - Bolivia, Colombia, Ecuador, Peru, Venezuela (This network is part of the Andean agreement for the development and exchange of agricultural information - PROCIANDINO, originally organized by IICA), Host institution: IICA-PROCIANDINO  
Contact: Dr. Nelson Rivas  
Address: IICA-PROCIANDINO; Secretario Ejecutivo; Apartado 17-03-00-201, City: Quito, Country: Ecuador  
Tel: 59-32-22-5697  
Fax: 59-32-56-3172  
Email: [prociand@iica.satnet.net](mailto:prociand@iica.satnet.net)

Tropical Regional Genetic Resources Network (TROPIGEN - Red Técnica Regional de Recursos Genéticos) - Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Surinam, Venezuela (This network is part of the Amazonian Basin agreement for the development and exchange of agricultural information - PROCITROPICOS, originally organized by IICA), Host institution: IICA-PROCITROPICOS,  
Contact: Dr. Waldo Espinoza Garrido,  
Address: IICA-PROCITROPICOS; Secretario Ejecutivo; Apartado 2995, City: Brasília, State: DF, Country: Brazil  
Tel: 55-61-323-1988  
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### **Underutilized crop R&D in Brazil**

Brazil is one of the mega-biodiversity countries and part of this diversity is indigenous crop genetic diversity. Brazil has provided cassava, rubber, pineapple, cashew, passion fruit and other less widely known crops to world agriculture. Since the end of the rubber boom, Brazilian institutions have worked on developing underutilized indigenous crops to a greater or lesser extent. Since the late 1970s, this work has intensified, as shown by the proportion of papers on underutilized fruits presented to the Brazilian Society for Fruit Culture's biannual conferences from 1972 to 1996. Similar statistics exist for other crop groups, especially vegetables, medicinal plants and industrial crops.

During the mid to late 1980s, Brazil had a national underutilized crop

programme (Programa de Cultivos Pioneiros) organized and financed by a consortium of government agencies (National Research Council - CNPq, Agency for Studies and Projects - FINEP, Brazilian Enterprise for Agricultural Research - Embrapa) and the Brazilian Society for the Advancement of Science (SBPC). This programme chose 20 priority crops and invited national institutions to prepare peer-reviewed R&D proposals to interest producers and agro-industry entrepreneurs in taking them to market. Although the programme was discontinued during one of Brazil's periodic economic crises (1990-91), several of the priority crops now have expanding markets in the country and a few are being exported on a small scale. Three of the major successes are annatto or urucum (*Bixa orellana*, Bixaceae) - red food colouring, peach palm or pupunha (*Bactris gasipaes*, Palmae) - heart-of-palm, and cupuassu (*Theobroma grandiflorum*, Sterculiaceae) - fruit pulp and cacao-like seed with a less saturated fatty acid profile.

Brazil's National Research Center for Genetic Resources and Biotechnology (CENARGEN/Embrapa) has continued to stimulate underutilized crop R&D nation-wide via support for germplasm collections and associated research. Embrapa's Programme 2 "Conservation and Use of Genetic Resources" is designed to conserve and utilize exotic and indigenous plants, animals and microorganisms to enhance agricultural sustainability. There are currently 62 projects and 167 germplasm collections with 235,000 accessions in 50 locations. Unfortunately, financing for these and other aspects of these R&D efforts is partial at best and the lack of strong interaction with end-users, both producers and agro-industrial entrepreneurs, and the market has kept the programmes from developing strong social support, which would attract more financing.

CENARGEN was also instrumental in creating an Amazonian network to conserve and use indigenous genetic resources (GENAMAZ - Rede para Conservação e Uso dos Recursos Genéticos Amazônicos), in association with the Amazonian Development Agency (SUDAM - Superintendência

do Desenvolvimento da Amazônia). This network is designed to consolidate, amplify or create regional competence for generating information on indigenous species, conserve and utilize their genetic resources, and contribute to the sustainable development of Amazonia. Twenty Amazonian institutions are currently integrated into this network, the first priorities of which are medicinal plants, agricultural and industrial microorganisms, fruits, timbers, and fishes.

Because of Brazil's strong interest in finding new market alternatives, both for internal use and for export, and its interest in conserving its enormous biodiversity. There is a growing awareness in the federal government's 2nd echelon that the efficient utilization of this biodiversity to benefit society will require a new national programme on underutilized crops. The most recent step in this direction was the creation, in November 1997, of the Brazilian Programme on Molecular Ecology for the Sustainable Use of Amazonian Biodiversity (PROBEM - Programa Brasileiro de Ecologia Molecular para o Uso Sustentável da Biodiversidade da Amazônia) by the Ministry of the Environment's Amazonia Office and CNPq. PROBEM will coordinate bioprospecting in Amazonia, train regional scientists in modern techniques to identify pharmaceutical and industrial chemicals, and develop the information required to patent these for licensing to third parties. This programme has many aspects of a modern underutilized species programme and we expect that Brazil will develop a complete national programme before the turn of the millennium.

Information provided by:

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### Asia

#### Tusukuba Medicinal Plant Research Institution – A Gate of Medicinal Plant Germplasm Exchange

Following the decrease in Western medicines following the First World War it was the government of Japan who decided to promote the production of necessary pharmaceuticals based on locally available materials. A temporary unit was built in Tokyo in 1914 and a local farm designated for cultivation of various plants. The operation expanded in 1956 and an experimental station for medicinal plants was established at Kasukabe. Branch stations were also established throughout the country. In 1980 the Kasukabe station moved to Tusukuba and became recognized as the Tusukuba Medicinal Plant Research Institution. Two laboratories are now in operation one for cultivation and the other for breeding and plant physiology.

Management of genetic resources is a major role of the institute and a sizable part of the activities are directed towards technology of germplasm conservation. To date germplasm exchange has been with 432 institutions in 67 countries. Plant breeding and training of local staff and visitors is also an important component of work at the institution.

It is thought that the most important medicinal species originating from Japan is *Lithospermum erthrorhizon*, traditionally used as dye, it now offers a major component of some kinds of dermatological medicine. *Glycyrrhiza spp.*, a group of plants widely used in Oriental medicine, *Geranium thunbergii* a well known herb for Japanese traditional medicine, and other traditional pharmaceutical plants are now targets of research.

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Extracted from *PGR Communication – Asian Perspective – N°2 January 1996*

#### Industrialization of 'Plau-Noi' (*Croton spp.*) in Thailand.

Since the 1970's, Sankyo, a major pharmaceutical company producing agro-chemicals (including medicines) decided to use plant extracts from *Croton sublyratus* Kurz. to produce plaunotol. This important medical agent [(E,Z,E)-7-hydroxymethyl-3,11,15-trimethyl-2,6,10,14-hexadecateraeen-1-ol)] is an anti-peptic ulcer agent found exclusively in *Croton sublyratus* Kurz. (known at 'Plau-Noi', although other *Croton spp.*, including *C. joufra*, and *C. herri* are also known as Plau-Noi, neither produce the active compound. The active ingredient was discovered after it was observed that the plants 'Plau-Noi' had been used locally for antihelminthic, dermatotherapeutic and other medical purposes.

Clones with high plaunotol were selected and propagated through rooted cuttings. To increase production, they were later multiplied with meristem culture and micro-grafting. After noting that other species of *Croton* were faster growing and more tolerant to root rot than *C. sublyratus*, micro-grafting onto *C. oblongilolius* Roxb. and multiplication by meristem culture was successfully attempted. Although the root stock species did not produce plaunotol, the survival rate was improved, as was the time to harvest - from 5-7 years to 2-3 years - and the yield improved 2-3 fold.

This success story, rooted in traditional knowledge of indigenous plants species has resulted in an industry which has now been successful for over two decades and employs up to a thousand local people. For his leading role in the research Dr Eisuke Matsunaga was awarded a prize from the Tropical Agriculture Research Association of Japan in 1996.

Extracted from *PGR Communication – Asian Perspective – N°2 January 1996*

#### Prioritizing Minor Crops for Future use: Indian Experience

The Asian-Pacific region possesses a rich diversity of several plant species, which though presently underutilized, have a good potential for food production or for other industrial uses,

suiting local adaptation or introduction in similar ecological conditions in other parts of the world. This rich genetic estate, extant in diverse ecosystems, nurtured by ingenious indigenous communities, provides ample opportunities for further development of agriculture in the region at a comparative advantage in terms of sustainability and diversification of farming systems.

India has more than 160 indigenous cultivated plant species and the National Agricultural Research programme of the Indian Council of Agricultural Research (ICAR) is encouraging co-ordinated research on different underutilized plants.

The National Bureau of Plant Genetic Resources (NBPGR), New Delhi, is one of the ICAR institutes and provides a leading role in all PGR activities of the country. One of its regional stations at Shimla has been identified specifically for pseudocereals; the globally prioritized underutilized crops. Amongst these are *Amaranthus* spp., which are showing the highest promise, and India houses a collection of over 3,000 accessions. Buckwheat (*Fagopyum esculentum* L.) is another crop of high potential as it is adapted to a range of elevations. China has the largest collection of this species with over 1,500 accessions, followed by Japan (+600) and India (+500). However, in Chenopods (*Chenopodium* spp.), the third most prominent pseudocereal, germplasm is still lacking.

NBPGR's Shillong centre has built up substantial local variability in perilla (*Perilla frutescens*) and Job's tears (*Coix lacryma jobi*) for characterization, evaluation and further testing. Job's tears is a distant relative of maize and is cultivated as an additional carbohydrate source in hilly tracts in N.E. India. Soft-shelled types are used for human consumption and hard-shelled for livestock. Specific interest in this crop is due to the high calcium content.

In total, 6,700 accessions exist for the priority underutilized crops covered and the All-India Co-ordinated Research Project (AICRP) has so far developed, identified and released twelve improved varieties and other technologies in seven such crops. These minor crops are linked with sustainable farming systems

in socially remote areas and marginal lands. Therefore, improvements would not only help to increase food production but would eventually help in raising the overall economic status of the indigenous community.

*Extracted from APAARI Newsletter, Vol. 5(2):18-19. December 1996*

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## Networks

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### Africa

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#### Southern and Eastern Africa Network on Underutilized Crops (SEANUC)

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In August 1995 the ICUC, in collaboration with the Food and Agriculture Organization of the United Nations (FAO) and the Commonwealth Science Council (CSC), organized a Regional Meeting on Genetic Resources & Utilization of Underutilized Crops in Southern and Eastern Africa. The meeting agreed:

- To establish a regional co-operative network for conservation and sustainable utilization of PGR of priority species; collaboration to improve the production in traditional farming systems; the increased use of indigenous underutilized crops for food and nutrition.
- The network would operate under the aegis of FAO with ICUC and CSC as the implementing agencies.
- That a consensus strategy for research and development should be drawn up and the network should provide programmes for the promotion of indigenous underutilized crops.
- A list of priority underutilized crops of social, economic and nutritional importance in the region was formulated.

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#### The African Ethnobotany Network (AEN)

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The African Ethnobotany Network (AEN) was officially launched at a workshop held in February 1997 at the

15th AETFAT (Association of the Taxonomic Study of the Tropical Flora of Africa) conference in Harare, Zimbabwe. This network has been formed by the *People and Plants* Initiative - started in July 1992 by WWF, UNESCO and the Royal Botanic Gardens, Kew to promote the sustainable use and equitable use of plant resources through providing support to ethnobotanists from developing countries. Primarily concerned with natural ecosystem conservation, the *P&P* initiative believes that sustainable conservation requires the supply of benefits to local people from conserved areas. The newly formed network aims to assist with this aim by improving contact and information between colleagues sharing similar interests; by raising awareness about ethical issues such as Intellectual Property Rights; and, by informing about approaches used to protect local knowledge, community land rights and access to biological resources, thereby raising awareness among local people, researchers and policy makers.

Further information about the activities supported by the *People and Plants* Initiative can be found in **People and Plants Working Papers** and the bilingual (English - French) **Bulletin of the African Ethnobotany Network** will shortly be available. For further information please contact: People & Plants Initiative, Division of Ecological Sciences, UNESCO, 7 Place de Fontenoy, 75732 Paris, Cedex 07 SP, France.

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Email: [r.hoeft@unesco.org](mailto:r.hoeft@unesco.org).

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### Asia

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#### Underutilized Tropical Fruits in Asia Network (UTFANET)

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Asia is the centre of diversity of many tropical fruits. Most of these are underutilized but they provide food, nutrition and income for rural people. There is an increasing recognition among governments of the region that underutilized tropical fruits have a great potential not only to provide nutritional requirements but also to generate valuable rural employment and foreign exchange. The Commonwealth Science

Council (CSC) and the ICUC organized a regional meeting on the utilization of "Underutilized Tropical Fruits and Nuts" in Dhaka, Bangladesh in 1993. The meeting recommended a network be established to promote underutilized crops of the region. In 1994 ICUC, in collaboration with IPGRI, identified priority species in the region and in 1995 UTFANET started to operate with financial support provided by DFID, CSC, FAO and ICUC. The specific objectives of the network are:

- To develop an effective network which facilitates collaborative partnership among countries in the region in order to conserve biodiversity and to make more efficient use of expertise, technologies and genetic resources
- To assemble, collate and distribute relevant information on selected tropical fruit species for dissemination to scientists, the agricultural community and policy makers.
- To help national governments develop policies for promoting the use of promising fruits.
- To improve the propagation, production and management practices of tropical fruits
- To reduce losses and enhance quality through new and/or improved post production technologies
- To facilitate rural development through efficient farming systems research, extension and improved technologies
- To strengthen the capabilities of national and local institutions, with a particular focus on appropriate training

To date, eight countries have signed a Memorandum of Understanding (MOA): Bangladesh, India, Indonesia, Nepal, Philippines, Sri Lanka, Thailand and Vietnam. The Ministries of Agriculture for Malaysia and Manmar are currently in the final stages of processing the MOA for signature.

The first steering committee was held in December 1995 and it was agreed that due to financial constraints attention would be given to only two to three of the priority species and Jackfruit, Pummelo and Mangosteen would be the subjects of highly focused research. DFID, UK has provided two, three-year

Ph.D. studentships for Bangladesh and Nepal to work on "Genetic diversity and development of propagation systems for Jackfruit and Pummelo".

The first UTFANET training course on "Propagation and Production of Tropical Fruits" was conducted in Thailand in July 1995 in collaboration with the Horticultural Research Institute, Government of Thailand. CSC, APAARI and ICUC funded the course.

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### Network on Promotion of Hybrid Research in Vegetables

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India is the second largest producer of vegetables after China with an estimated annual production of 72 million tonnes from 6.2 million hectares. However, the estimated country requirement is expected to rise to 90 million tonnes by the turn of the century and up 225 million tonnes by 2020 AD. Development of F<sub>1</sub> hybrids with tremendous future potential for production and improved processing, have ushered in a revolution in vegetable production.

In order to provide healthy competition amongst public and private sector institutions in the country, the Indian Council for Agricultural Research (ICAR) has formally launched a special project on *Promotion of Hybrid Research in Vegetable Crops* on 15 November 1995. The project has been steered with the triple purpose of increasing productivity of major vegetable crops, incorporating biotic stress resistance in hybrids and strengthening facilities for production of hybrids seed. 15 research centres of the All India Co-ordinated Vegetable Improvement Project have been selected for developing hybrids in 9 vegetable crops – tomato, brinjal, capsicum, chillies, onion, okra, cucumber, bittergourd and cabbage.

*Extracted from an article by Dr D.P. Singh, p5, ICAR NEWS Vol. 2. No. 2 April-June 1996.*

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### PROSEA (Plant Resources of South-East Asia)

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PROSEA is a foundation under Indonesian Law, a non-profit organization with an international charter, domiciled in Bogor. It has an international programme focusing on the

documentation of information on plant resources of South-East Asia. It consists of a Network Office in Bogor (Indonesia) coordinating six Country Offices in South-East Asia, and a Publication Office in Wageningen (the Netherlands).

#### Activities

The establishment and operation of databases;  
the publication of books and CD-ROMs;  
the publication and dissemination of derived materials in local languages;

#### Databank

PROSEA has been developing an information storage and retrieval system called PROSEA Databank that consists of six databases, including -: a checklist of more than 6200 plant species, references to literature and organizations.

#### Publications

The main publication of the PROSEA programme is an illustrated multi-volume Handbook. The hard-bound edition (HBE) and medium-price paperback edition (MPE) is distributed by Backhuys Publishers in the Netherlands for industrialized countries and the low-price paperback edition (LPE) is distributed by the Network Office of South-East Asia and PROSEA offices for the developing countries of Asia and the Pacific.

For more information details on all publications, please contact:

Network Office: c/o Research and Development Centre for Biology  
Jl. H. Juanda 22, P.O. Box 234, Bogor 16122, Indonesia.  
Email: [junus@indo.net.id](mailto:junus@indo.net.id)

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### Europe

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#### Henry Doubleday Research Association (HDRA)

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HDRA is Britain's Premier organic gardening organization. We offer practical organic gardening advice and carry out scientific research into horticultural techniques that do not rely on chemicals. The research does not involve animal experimentation. We also run attractive organic display gardens, in Great Britain, open to the public at Ryton in the Midlands, and at Yalding, near Maidstone in Kent. Our Information and Education Department

runs courses on a wide range of organic and related subjects as well as promoting organic gardening, farming and food. Other areas of our work include running a consultancy service on waste management, research projects, Third World agriculture and garden design. We also aim to spread the organic message far and wide through TV, radio, books, leaflets, newspaper and magazine articles and now the World Wide Web. For more information please contact:

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Internet: <http://www.hdra.org.uk/>

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### BuroTrop

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BuroTrop is an international non-profit association, (involved with tropical perennial oil crops particularly coconut and oil palm) whose activities are established and followed-up by its Board of Directors where donor and producer countries from Africa, Asia, Latin America and the Pacific are represented. Representatives from international aid agencies, research institutions and private companies also attend in an observer capacity. Among BuroTrop publications is 'Bulletin BuroTrop' published three times a year. For more information please write to:

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### Plunkett Foundation

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Established in 1919 by Sir Horace Plunkett, the Foundation today focuses on supporting user-controlled enterprises and the Plunkett Approach involves:

- finding pragmatic solutions based on international experience
- constructing innovative approaches from established best practice
- involving and empowering the people directly involved
- mobilizing locally-controlled resources

Over 100 international study programmes have been run by the Plunkett Foundation in the last five years covering a range of topics, including strategies for successful farmer controlled businesses in a free market; business management in a market economy; food supply, distribution and retailing in a free market economy; organization of agricultural production and marketing; agri-tourism and regional development; administration, budgeting and financial procedures; and an overview of financial controls for non-financial managers. For further information please contact:

Davina Rippon  
Study Programme Manager  
Plunkett Foundation  
Hanborough Business Park  
Long Hanborough  
Oxford, OX8 8LH, UK

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### MEDUSA Network

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A network on the 'Identification, Conservation and Use of Wild Plants in the Mediterranean Region' called MEDUSA, was formally established during the workshop on 'Identification of wild food and non-food plants of the Mediterranean Region' held on 28-29 June, 1996 at the Mediterranean Agronomic Institute of Chania (MAICh). This network is currently (1996-1997) financially supported by the Directorate General I of the European Union, CIHEAM, and MAICh. The eventual aim of the network is to propose methods for the economic and social development of rural areas of the Mediterranean Region, using ecologically-based management systems that will ensure the sustainable use and conservation of plant resources of the area. These plant resources are of actual or potential importance to agriculture, various industries and human health, and consequently will improve the quality of life. The particular goal of the Network is the exploration of possibilities for the sustainable utilization of such resources as alternative crops for the diversification of agricultural production and improved product quality. An international, cooperative network dealing with the conservation of minor Mediterranean plants used by man.

The second MEDUSA workshop was

held Port El Kantaoui, Tunisia on May 1<sup>st</sup>-3<sup>rd</sup>, 1997. It was attended by representatives from 11 Mediterranean countries and by representatives of various organizations such as FAO, IUCN, ICUC and ICMAP. A number of scientific presentations were made and Country Reports on the wild plant resources and Governmental and Non-Governmental Organizations involved in any aspects of their study, cultivation, sustainable use, conservation of plant genetic resources used or for potential use in agriculture, and habitat restoration, were presented. The proceedings are in preparation. The third MEDUSA Regional Workshop will be held in Coimbra, Portugal, on 27-28 April.

The proceedings of the first meeting (Chania 1996) are available together with the first issue of the Medusa newsletter. For requests please address to the Medusa Secretariat:

Dr. Melpo Skoula

Email: [melpo@zorbas.maich.gr](mailto:melpo@zorbas.maich.gr)

or in Italy to D. Pignone

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### MESFIN - Mediterranean Selected Fruits Inter-Country Network

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#### Conclusions of the technical meeting on globalization of the work on tropical and subtropical fruit genetic resource conservation and utilization

##### Introduction

An international technical meeting organized by MESFIN (Mediterranean Selected Fruits Inter-country Network) was held in Madeira, Portugal, from 5-8 August 1997 with the participation of scientists from 13 countries (Brazil, France, Greece, Israel, Malaysia, Portugal Spain, Tanzania, Tunisia, Turkey, UK, USA, Vietnam). The meeting was also attended by representatives of FAO, as well as representatives from international institutions and centres (IPGRI, ICUC). The meeting was opened by the His Excellency, the President of the Government of Madeira and the Regional Secretary for Agriculture and the closing session was chaired by the Regional Secretary for Agriculture in the presence of the President of the Instituto Nacional de Investigacion y

Tecnología Agraria y Alimentaria of Spain. The proposal to establish a global network on tropical fruit genetic resources conservation and utilization was recognized and agreed during the first meeting of MESFIN on tropical and subtropical fruit genetic resources, held in Tenerife, Spain, in October, 1995.

### *The Network*

The meeting led to the following recommendations:

- To establish a global network under the aegis of FAO to facilitate inter-country and inter-regional scientific collaboration on tropical and subtropical fruit (TSTF) genetic resource conservation, evaluation and utilization. The global network on tropical and Subtropical Fruit Germplasm Conservation and Utilization was given the Spanish acronym REMUFRUT (Red Mundial de Frutales Tropicales). The network should function on a voluntary basis involving the participation of interested national institutions as well as regional and inter-regional networks dealing with TSTF genetic resource conservation and utilization.
- That the global network could also play a role in harmonizing ongoing networking initiatives in different regions.
- That the regional networking initiatives dealing with TSTF genetic resources in Asia and the Pacific, the wider Mediterranean, region, Africa and the Americas, could constitute the initial regional components of the global network.
- That efforts should be made to expand the participation in the global network to include interested countries /institutions and other existing relevant networks. More specifically for Africa there is a need to expand networking activities on TSTF genetic resources to West African countries.
- Participants invited international institutions and centres - IPGRI, ICUC, CIHEAM, and others to provide technical and financial support to specific tasks to be carried out within the framework of the network.
- That FAO should explore the possibility to assist in strengthening the capacity of existing regional networks to participate actively as partner groups in the global network.

The major goal of the network is to link different initiatives in different parts of the world dealing with TSTF - including underutilized fruits - genetic resource exploration, conservation and utilization.

Dr. Victor Galan from the Instituto Canario de Investigaciones Agrarias (I.C.I.A.) was designated as General Co-ordinator and I.N.I.A. of Spain is the co-ordinating institution. The role and functions of the General Co-ordinator were defined as follows:

- Guarantee exchange of information among members.
- Guarantee regular publication of a newsletter.
- Promote co-ordinating board meetings as well as specific meetings on species or subjects:
- Guarantee that the database will be accessible for world benefit.
- Facilitate exchange of PGR.
- Promote efforts to obtain funding assistance from donors and financing agencies for strengthening network activities.

The mandate will be reviewed every three years. The role and functions of the Co-ordinating Board were defined as follows:

- Facilitate communication among different regions.
- To help the General co-ordinator in promoting activities both at the regional or species level.
- Facilitate adaptation of the working arrangements of the network to meet member requirements.
- Co-operate to identify and obtain funding assistance from donors and financing agencies for strengthening network activities.

The co-ordinating board will include representatives of the different regional and inter-regional networks participating in the global network as well as interested countries/institutions not involved in regional networks. It is expected that the first meeting of the Co-ordinating Board will be in one year's time. The specific tasks to be addressed by the network are the following:

### *Identification of genetic variability.*

- Identify primary and secondary centres of diversity for selected TSTF.
- Facilitate co-operative efforts in genetic resource exploration.
- Facilitate co-operation between PGR

research work at the basic level and at field level.

- Organize and develop documentation (e.g. catalogues)

### *Evaluation and characterization.*

- Facilitate co-operative studies on characterization of TSTF through biotechnological or traditional means.
- Revise criteria for existing descriptors, specifically to include utilization criteria, as well as developing new ones.

### *Conservation.*

- To facilitate co-operative studies on appropriate and efficient strategies on selected tropical and subtropical fruits and their wild relatives.

### *Documentation and information.*

- Facilitate the exchange of information among regional networks.
- Disseminate information on collections, accessions conservation technologies, catalogues, utilization and plant genetic erosion concerning TSTF.
- Facilitate development of a global database on TSTFGR.

### *Germplasm exchange.*

- Help member networks and institutions on exchange of TSTF germplasm in full respect of all international agreements.

### *Utilization.*

- Encourage regional collaboration to facilitate co-operative studies in TSTF genetic improvement.
- Encourage the development of appropriate production technologies.

### *Transfer of technology.*

- Identify the needs for technology dissemination in TSTF and promote the establishment of appropriate mechanisms to address them.

### *Public awareness.*

- Promote efforts to increase public and institutional awareness about the importance of work on TSTF genetic resources.

For further information please contact:

Dr. Victor Galan, MESFIN, Instituto Canario de Investigaciones Agrarias, Apartado 60 - 38200, La Laguna, Tenerife, Islas Canarias (España).

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### ACTIN (Alternative Crops Technology Interaction Network)

The first major conference of ACTIN, the industry-led Alternative Crops Technology Interaction Network was declared a great success, attracting more than 100 delegates. Representatives from industry, universities and research institutes in the UK and Europe attended the event with the common interest of developing renewable yet competitively-priced raw materials for industry in the oils, fibres, starches and speciality chemicals sectors. An internet-based database linking suppliers and potential users of alternative or non-food crop products and technology was launched at the event, held at the MAFF Central Science Laboratory, York, UK in September.

ACTIN's mission is to stimulate the uptake of alternative, i.e., non-food crop products and technology by industry, and information from the database is designed to encourage future research collaborations. Through careful planning and the application of innovative technological solutions Pira International have created a highly sophisticated database for ACTIN users. They can now rely upon a powerful, 'person-centred' search tool to find a contact directly involved in their area of interest. This exciting initiative provides information on UK-based organizations, but it is planned to extend coverage to incorporate Europe, USA and the rest of the world.

Access to the database will be through membership of ACTIN2020, the ACTIN Special Interest Group. Members of the group will be able to obtain information via the ACTIN enquiry desk [Tel +44 (0)1372 802054] or via the World Wide Web.

The conference was entitled Gateway to Renewable Industrial Feedstocks and opened by MAFF Parliamentary Secretary Elliot Morley. Delegates were told that crop products such as wheat and potato starch, rapeseed oil and flax fibre had massive potential in industry with applications as diverse as paint production, the manufacture of lubricants and the production of interior door panels for the automotive industry. The event was a resounding success in bringing together all those interested in the supply and use of alternative crop products. Key messages were that the industry must

move on from being providers of raw materials to providers of solutions to people's needs and that the ACTIN initiative will help turn well meant words into real world actions. The database will facilitate this important transition, creating a new synergy between and within industry, Government and academia.

Dr B Nigel Oliver  
ACTIN Research Coordinator  
Email: [oliverbn@easynet.co.uk](mailto:oliverbn@easynet.co.uk)

ACTIN Web site: <http://www.actin.co.uk>  
for news of latest developments, to submit a database entry (free), or for membership of ACTIN2020.

### Rocket Network

In 1994 the Rocket Network, an international cooperative group, was established with the aim to promote the conservation and utilization of some underutilized Mediterranean species belonging to the genera *Eruca* and *Diplotaxis*. The project is developed within the frame of the "Underutilized Mediterranean Species" project of IPGRI.

Presently at the Instituto del Germoplasma we are: conserving and starting the distribution of the *Eruca* collection, collecting new samples from Southern Italy, multiplying samples under genetic insulation, and conducting studies on the reproductive system in *Eruca*.

Proceedings of two previous meetings (Lisbon 1994 and Padua 1996) of the network are available on request. The next meeting is scheduled for spring 1998, and the definitive programme will be made available on the internet page below..

For further details contact:

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Internet: <http://www.ba.cnr.it/~germdp02/rocket.html>

### The NF-2000 Network

The NF-2000 Network provides information about Non-Food Agro-Industrial research and Development activities in Europe, from European Commission (EC) programmes and other sources. The subject matter covers raw materials (sugar, vegetable oil, starch, fibre, wood, etc) and technology for the manufacture of a wide range of end products including fuels, polymers, composites, paper, pharmaceuticals, bulk and fine chemicals. It also covers some aspects of energy crops and decentralized electricity generation.

NF-2000 continues and extends the activities of the NF-AIRID Network and is funded by the EC, so the information is free of charge!

The Network is coordinated by CPL Scientific Limited, UK. Further information can be obtained from:

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Fax: +44 1635 529322  
Email: [nf-2000@cplsci.demon.co.uk](mailto:nf-2000@cplsci.demon.co.uk)  
URLs: <http://www.cplscientific.co.uk>  
<http://www.nf-2000.org>

### SEPASAL - Survey of Economic Plants for Arid and Semi-Arid Lands

Developed and maintained at the Royal Botanic Gardens, Kew, SEPASAL is a database of useful plants of tropical and subtropical drylands. It deals with "wild" and semi-cultivated species and excludes major crops. Set up in 1981 with funding from OXFAM, the database has recently been extensively upgraded thanks to funding from the Clothworkers' Foundation.

There are presently approximately 6200 species on the database. The types of data stored include scientific and local names, distribution, environmental preferences and cultivation and harvesting details. Plant uses are recorded in detail. Each major type of use (e.g. food, medicines, materials, environmental services) is further subdivided into specific use categories linked to the part of the plant that is used.

This allows us to provide information to answer specific requests.

There are two ways that SEPASAL might be of use to you. Perhaps you have a species in mind for which you would like further information. Or, you may be trying to discover if there are plants that would suit your local environment and that would provide you with products, such as edible fruits or fuelwood, or services such as soil binding or shade for vegetables.

Contact us, letting us know where you heard about SEPASAL, and we will search the database for you. Please be as specific as possible regarding the type(s) of plants you are interested in, e.g. tree/shrub/herb, for what type of environment, which uses you require, etc. The service is mostly free - we charge for enquiries from commerce and consultants; in return we like feedback from users about the value (or otherwise!) of the service and your ideas to improve its usefulness.

**SEPASAL**  
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### IPALAC - The International Programme for Arid Land Crops

The international programme for Arid Land Crops (IPALAC) was launched in Israel in 1994 with the aim of promoting the use of plant species which are adapted to semi-arid lands for combating desertification. IPALAC acts as a catalyst for maximizing the potential of plant biodiversity for rural development in the world's drylands. This is achieved mainly by the transfer or domestication of plant species which include multi-purpose trees or shrubs, legumes, fruits and nuts, plants with industrial and medicinal uses and species which are adapted to salt and drought tolerance.

Although the IPALAC concept is applicable to any country interested in developing its arid lands, its main focus is in trying to help resource-poor countries, particularly in Africa. IPALAC consists

of a few scientists and an administrator, most of its work is conducted in collaboration with scientists from organizations who are also interested in the domestication and transfer of arid land crops

Although IPALAC is based in Israel, much of its work is conducted in-country, for instance in Mali, Burkina Faso and Senegal in West Africa, where research is currently being undertaken to improve agricultural productivity in the arid and semi-arid regions. An IPALAC centre has also been established at the Central Arid Zone Research institute (CAZRI) in Rajasthan, India. The climatic conditions of long dry seasons and monsoon rains which exist at CAZRI are very similar to those of the Sahel. Crops and farming systems, show high potential for adaptation in West Africa. As a result, a training course for African agronomists and extension workers will be held at CAZRI in September of this year.

For some years *Ziziphus mauritiana*, a tree suitable for hedging which also provides a nutritious fruit, has been selected and improved at the IPALAC Centre at CAZRI; it is now being introduced into West Africa for use in hedging to keep out livestock from water catchment areas known as diguettes.

This IPALAC approach, which has been established by identifying arid land problems and improving them through the use of plants, has also been applied in determining the potential role of the date palm (*Phoenix dactylifera*) in the Sahel. The tree is an important source of food and a basis of the economy in countries north of the Sahara but it is virtually unknown further south. A workshop on 'Date Palms for the Sahel' was recently held in Niamey, Niger where a comprehensive seven-nation programme on date production was drafted and will be implemented in the coming months.

International Programme for Arid Land Crops  
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### Other Network addresses

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Agricultural Library, Rm 304, 10301  
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### Crops News

#### Africa

#### The Sheanut tree (*Vitellaria paradoxa* C. F. Gaertn)

The Sheanut tree (Family: Sapotaceae, *Vitellaria paradoxa* C. F. Gaertn., syns. *Butryospermum paradoxum*) is indigenous to the semi-arid zone of sub-Saharan West Africa. Commonly seen at high densities on inter-cropped small farms, it is one of the most highly valued tree species providing numerous non-wood forest products. The most notable product, the oil or Shea butter (French: beurre de Karité), is harvested and extracted from dried kernels by women of this region for whom it is an important subsistence commodity and cash crop. The trees themselves also protect against environmental degradation prevalent in this area. On the world market Shea butter is valued for use in cosmetic or pharmaceutical products (moisturizing creams, sun lotions, etc.) and as an edible vegetable oil.

Due to the importance of its non-wood products, *Vitellaria* was included on the list of tree species constituting African forest genetic resource priorities for *in situ* conservation at the fourth session of the FAO Panel of experts on Forest Genetic Resources in 1977. Since 1984, recommended action has included botanical and genealogical exploration and in 1988 an appeal for provenance trials to be implemented was voiced by the panel's sixth session. ICUC researchers have collaborated with Sheanut producing countries since the early 1990s, with the aim of improving knowledge on genetic diversity and developing propagation techniques. In collaboration with the Cocoa Research Institute of Ghana, significant progress has been made in understanding the species diversity in Ghana and breakthroughs have been made with propagation techniques using both vegetative and *in vitro* methods.

P. Lovett & N Haq, ICUC, UK

*There will be a workshop on Karité, Vitellaria paradoxa 15-17 April, Rome. Sponsored by IPALAC in co-operation with IDRC (Canada) and FAO*

### Evaluating the Potential for Bambara Groundnut as a Food Crop in Semi-Arid Africa.

Bambara groundnut (*Vigna subterranea* L. Verdc) produces a nutritious food and is cultivated in many drought-prone regions of Africa. Although bambara groundnut is an important crop for some countries in Africa, yields are very low, typically 300-800 kg ha<sup>-1</sup>. There is a strong suggestion in the literature that the crop is endowed with several agronomic advantages, including; high nutritional value, resistance to pests and diseases, genetic variability, drought tolerance and adaptation to marginal conditions. Perhaps more significant than any other feature is the popularity of the crop as a food by growers and consumers across a wide range of African countries. Such attributes make the crop ideally suited to production in subsistence agriculture in marginal areas of tropical Africa, however, there is a lack of basic understanding of the biology of the crop, which is fundamental to the effective exploitation of its agronomic attributes.

A programme of research on bambara

groundnut was initiated in 1992 with field experiments in Botswana, Tanzania and Sierra Leone linked with controlled environment studies and modelling at the Universities of Nottingham and Wageningen. This multi-disciplinary research programme has investigated the growth and development of bambara groundnut landraces obtained from the three African partner countries. Bambara groundnut has been studied from a broad spectrum of disciplines, including physiology, breeding, agronomy, entomology and modelling. The specific objectives of the EU programme were to:

1. Produce a validated model of bambara groundnut for predicting the total biomass and pod yield of different genotypes in contrasting soils and atmospheric environments.
2. Identify suitable agro-ecological regions and seasons for the cultivation of bambara groundnut in Tanzania, Botswana and Sierra Leone.
3. Identify the physiological attributes associated with the ability to produce yields under semi-arid conditions.
4. Recommend suitable management practices to stabilize yields of bambara groundnut under rainfed conditions.
5. Outline a methodology for applying a similar approach to rapidly assess the potential of other underutilized species in tropical environments.

The challenge for bambara groundnut research is to improve yield stability, enhance yield potential through breeding and move towards realizing this potential through improved agronomic practices. The process will be strongly assisted by a more comprehensive understanding of the biology of the bambara groundnut plant than is presently available. Scientific interest in the crop has been stimulated by various international meetings, some through the EU programme, and the formation of an International Bambara Groundnut Network in November 1995. The purpose of the network is to promote exchange of information and germplasm, outline research priorities and attempt to secure funding for proposed projects.

Scientists interested in learning more about the EU programme should contact Dr Azam-Ali or Dr Collinson at the University of Nottingham's Sutton Bonington Campus.

### Improvement of indigenous underutilized vegetables and pulses (*Tylosema esculentum*, *Amaranthus* spp., *Chenopodium album* and *Cleome gynandra*) in South Africa

There are many indigenous vegetables and pulses in South Africa which are sources of nutritionally rich protein and vegetable oil. The rural small-scale farming communities of the eastern Cape and other parts of South Africa grow a variety of underutilized vegetables and pulses that are low-cost and rich sources of nutrients. The group of indigenous vegetables commonly called "Imifino" in Xhosa, found in different veld and ecological zones, include *Amaranthus* spp., *Chenopodium album*, *Bidens pilosa*, *Urtica urens*, *Solanum retroflexus*, *Centrella coriacea*, *Sonchus asper*, *Rhaphanus raphanistrum*, *Cleome gynandra*, *Portulaca oleracea*, *Bauhinia petersiana*, *Vigna subterranea*, *Macrotyloma geocarpum* and *Taraxacum officinale*. This group of vegetables are also adaptable to low input or management conditions and are utilized by most rural communities in South Africa. However, these species are facing rapid destruction due to erosion of traditional farming practices.

A survey in the former Transkei in 1984 showed over 30 different indigenous vegetable species were found to be used by the rural people. Among them *Tylosema esculentum*, *Amaranthus* spp., *Chenopodium album* and *Cleome gynandra* have been identified as important but have had little or no development or commercial exploitation. *Tylosema esculentum* can be used as seed which contains 30-39% protein and 30-36% oil. The meal after extraction has up to 52% protein and can be used as animal feed. The leaves of *Amaranthus* spp. contain high concentrations of vitamins and minerals. *Chenopodium album*, grown on the Indian continent as grain for food is mostly used as vegetables in South Africa, and the leaves of *Cleome gynandra* contain high levels of vitamins and minerals.

Preliminary investigation indicate that many of the indigenous vegetable and pulses could be processed for commercial markets. However, these species have low yields and no research

has been conducted on the genetic diversity, nutritional values, development of appropriate agrotechniques for better yield/quality and income.

Therefore, the current study aims to: survey and collect germplasm of *Tylosema esculentum*, *Amaranthus spp.*, *Chenopodium album* and *Cleome gynandra* used in traditional farming systems; collect information on uses and farming practices of indigenous vegetables and pulses; assess nutritional and genetic differences within each species and the factors which may enhance these characters; and, develop appropriate agrotechniques to improve these species for yield and quality for sustainable use in the traditional farming systems.

Moremong, M. Poswall & N. Haq, University of Fort Hare, South Africa & ICUC, UK

### **Cold tolerance and precocity genes bring new hopes for economic oil palm expansion in high altitude African rainfed areas.**

Oil palm has become the principal edible oil source for many countries, resolving internal demand and creating export surplus. To date, many African countries have not been able to take advantage of this as they lacked the climatic conditions for an economical production. Precocity and cold tolerance in oil palm have been developed during the past 20 years by FAO and ASD de Costa Rica with germplasm from Cameroon and Tanzania crossed with DAMI Deli. Initial tests showed that the material begins good production in 38 months at 1,000 masl in Western Ethiopia with a well distributed rainfall of 1,800 mm. Previously, oil palm would not grow or produce satisfactorily at these elevations due to low temperatures. This creates an opportunity for many African countries which are net importers of edible oils as well as improving nutrition through vitamin A intake. Technology transfer began in Ethiopia and continues in Cameroon (the Village Women's Organization, Bamenda), Malawi and Zambia. It is particularly satisfying to see the genetic base selected, improved and returned to benefit source countries.

Peter Griffee, AGP, FAO.

## **Asia**

### **Dragon Fruit of Vietnam**

A juicy, sweet-and-sour fruit occurring in the southern part of Vietnam has been overlooked for inclusion in the Prosea volume 2 'Edible fruits and nuts'. It is the fruit of a plant called dragon fruit or green dragon in English, oeil de dragon in French and in Vietnam it is known as 'thanh long' or 'garu'. Its scientific name is *Hylocereus undatus* (Haw. Britt. & Rose (synonym *Cereus triangularis* auct. non Haw., *C. undatus* Haw.) belonging to the Cactaceae. Originating from Central America it is cultivated in Vietnam and in Indonesia (Java). The fruit is eaten fresh or prepared into fruit juice and also sometimes as a vegetable. The anthocyanin of the fruit is used as a dye and the fruit also has medicinal properties.

Although mainly exported from Nicaragua, the export value from Vietnam was 300 tonnes in 1990 with a value of US\$450,000 (1kg = US\$1.50) mainly to Singapore, Hong Kong and Taiwan. In Vietnam the average yield of dragon fruit ranges from 20-25 tonnes per ha per year and a crop may produce fruits for up to 15 years.

*Extracted from an article by Dzuoung Duc Huyen & N. Wulijarni-Soetjipto in Prosea Newsletter N° 18, April 1997.*  
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### **Pummelo (*Citrus grandis* L. Osbeck)**

Pummelo or shaddock is one of the economically important citrus fruit species of humid tropical and sub-tropical regions of South, South-East and East Asia. It is regarded as one of the ancestral species of the presently cultivated true citrus fruit crops. Juicy pulp vesicles from the citrus fruit, rich in vitamin C, are either eaten raw or used for juice extraction. Albedo of pummelo is considered as a suitable raw material for commercial pectin production. In some of the south -Asian countries the aromatic flowers are used for perfume extraction and other plant parts are used for medicinal purposes. However, in the western world pummelo is mainly used for citrus

breeding due to its monoembryonic nature of seed.

Most of the pummelos are self-incompatible and unlike other citrus species it does not produce any nucellar seedlings. Due to these reasons pummelos as a group, exhibit a greater range of genetic variability as compared to other citrus species. Some of the Asian countries namely Thailand, China and Japan have already initiated research to exploit the local pummelo gene pool for the varietal improvement. However, in most of the pummelo growing areas of South Asia quality and quantity of production is very low as farmers are still using inferior varieties from seed propagated planting materials. Therefore, since 1995 an ICUC research project, aiming to identify superior clones and improve propagation techniques, has been carried out in collaboration with the Nepal Agriculture Research Council (NARC). Results of this study have shown high levels of diversity in qualitative and quantitative characters. It is also been shown that the crop can be propagated very successfully by means of cutting, layering, grafting and by *in vitro* methods.

K. P. Paudyal & N. Haq, ICUC, UK

### **The Jackfruit (*Artocarpus heterophyllus* Lam.)**

The Jackfruit tree (*Artocarpus heterophyllus* Lam. Syn. *A. integrifolia* L.f.) belongs to the family Moraceae. This family comprises of 55 genera and 900-1000 species of mostly tropical herbs, shrub, and trees and sometimes vines. The genus *Artocarpus* contains eight species which bear edible fruits. These are *A. altilis* Fosberg, *A. chaplasha* Roxb., *A. heterophyllus* Lam., *A. integer* Merr., *A. nitidus* Trecul, *A. odoratissimum* Blanco, *A. rigidus* Blume and *A. sericarpus* Jarrett. The jackfruit tree is a multipurpose tree and all parts of the plant are equally important. Weighing up to 50kg each, the ripe jackfruit contains yellow pulp rich in carotene, vitamins and minerals. Other parts of the fruit contain pectins which have high value for the preparation of jelly. The seeds are rich in carbohydrates and also contains minor amounts of minerals and vitamins. The unripe fruit is also a high quality vegetable in tropical Asia. The

tree has highly valued timber; the branches are used for fuelwood and the leaves are used for cattle-feed. More recently the medicinal value of different plant parts (leaf, root, and seed) of jackfruit trees has been reported.

Considering the short storage life as well as exotic taste and flavour, a number of products have been developed from raw, tender jackfruit as well as from the ripe fruits and the seeds can be stored for use throughout the year.

The Jackfruit tree, although indigenous to India, is now widely grown in most Asian tropical countries - Bangladesh, Burma, Sri-Lanka, Malaysia, Indonesia, and the Philippines. Jackfruit is also found throughout other tropical areas such as Africa, Australia, West Indies, South Florida, Brazil and the Caribbean regions. In Tropical Asia the plant is mainly grown in the homestead farms and sometimes in the form of orchards. Due to the importance of the Jackfruit, it has been declared as the "National fruit" of Bangladesh. Jackfruit has been recommended as a number one priority fruit crop for commercialization in Asia and the responsibility was given to Bangladesh for its research and developments. However, little information is available on the genetic diversity of the plant and the information regarding its propagation is limited. Researchers at ICUC have made significant progress on characterizing the genetic diversity of the plant and in standardizing *in-vitro* as well as vegetative propagation methods in collaboration with the Bangladesh Agricultural Research Institute (BARI), Joydebpur, Gazipur, Bangladesh.

A.K. Azad & N. Haq, ICUC, UK

### **Lupins (*Lupinus* spp.)**

Lupins are important prehistoric leguminous crop plants and belong to the tribe Genisteae of the family Leguminosae. The centre of origin of this plant is referred to as being in the Mediterranean and Andean Civilizations. There are over 300 species of the genus *Lupinus*, a few of them are cultivated but the majority are wild. They are distributed both in the Old World - largely the Mediterranean and African regions - and in the New World (Americas).

In the present day world of cheap

protein, the genus is attaining importance because of high protein and oil content in seeds. Lupin protein is well balanced in amino acid composition and can be compared with that of soybean protein. Moreover, being a legume, *Rhizobium*, present in the root nodules of the plant, fixes atmospheric nitrogen and helps improve the fertility of degraded soils. Until the end of the last century lupin was widely used for human and animal consumption, and a limited amount is still eaten in the Mediterranean.

One undeniable fact about this plant is that its seeds contain some toxic compounds (alkaloids) which make the seeds bitter in taste. However, plant breeders have been successful in developing some sweet varieties of *Lupinus albus* and *L. mutabilis* L which contain a very low percentage of alkaloids. Among the four major domesticated species, *L. mutabilis* contains high protein (40%) and oil (18%) content; is resistant to drought and frost; and lacks pod cracking and dropping. Despite these desirable characters, it has disadvantages, namely late, irregular blooming and ripening. This crop could be cultivated both in temperate and sub-tropical regions if some of the major agronomic problems are solved.

Because of this, a research programme has been initiated at the University of Southampton to improve the crop. Research aimed at developing varieties of *Lupinus mutabilis* L., which have desirable characteristics such as early blooming and a determinate type of growth habit, is currently in progress. It is hoped this will be achieved through gene transfer of selected traits from other species by wide hybridization techniques, including the use of embryo rescue systems and through agrobacterium media.

Azad H. Shah & N. Haq, ICUC, UK

### **Seabuckthorn (*Hippophae rhamnoides* L.)**

Once used in 19<sup>th</sup> century Russia for making wines, jams and other types of food the potential of the Seabuckthorn (*Hippophae rhamnoides* L.) (family: Elaeagnaceae) is again being realized. The berries, usually yellow in colour, are rich in sugars, organic acids, amino acids,

carotene, flavone and the vitamins B, C, E, K, and P. The vitamin C content is often 5-100 times that of most fruit and vegetables whilst the pulp and seeds have a high content of oil. It is a widely distributed species occurring throughout the temperate zones of Europe and Asia at altitudes of 60-2,500m. It can endure temperatures of -60°C to 40°C and survive in a wide range of soil types and climatic zones. Due to its nitrogen fixing properties the plant is commonly interplanted with potatoes on the Loess plateau in China and a six-year-old plant can fix up to 45kg nitrogen per hectare.

From an ecological point of view the plant Seabuckthorn can also be important for shelter belts in stabilizing river banks and mountain sides and has been used to great advantage in China to control water run off erosion. It has been estimated that the now dense bushes along the Changtu river prevent the loss of between 3-5 million tons of soil per annum. Seabuckthorn also provides excellent firewood with a calorific value of more than 4,000 Kcal/kg. In summary Seabuckthorn is proving to be a new crop of enormous potential, playing an important role now and in the future for the mountain farmers of Asia and Europe.

Extracted from *INSAN Newsletter*, Vol. 5. N° 1 Autumn/Winter 1991.

### **Palmyrah fibre separator developed**

Palmyrah fibre is used to manufacture vacuum road cleaners, high quality brushes, acoustic boards, household brooms, cushions, etc. Almost 95% of the fibre produced in India was exported. The Krishi Vigyan Kendra under the administrative control of the Central Tobacco Research Institute, Rajahmundry, has developed a Palmyrah fibre separator. To extract manually a beating process was used which resulted in workers suffering from arthritis and chest pains. The new machine reduces the drudgery involved to 10% of the manual method as well as increasing production and income five fold. This meets the objectives of designing such a machine by improving health and income of rural people.

Extracted from an article by Dr K. Nagarajan, in *ICAR News* Vol. 3 N° 3, July-September 1997.

### Europe

#### **Buckwheat (*Fagopyrum esculentum* Moench.)**

The buckwheat (*Fagopyrum esculentum* Moench., Polygonaceae) is a pseudocereal cultivated on a limited scale in temperate countries but it has the potential for more profitable widescale cultivation. Buckwheat grain is high in protein and commonly used as a staple food crop in many Asian countries e.g. India, Nepal, China, North Korea, Russian, Japan. The various species of buckwheat, including the common or sweet buckwheat (*F. esculentum*) and the tartary or bitter buckwheat (*F. tartaricum* Gaertn.), are capable of growing in a wide range conditions from cool temperate to tropical climates (at higher altitudes) and on various types of soil.

The plant has many uses, being a source of honey, medicines, animal feed and as green manure for subsistence farmers but the most important feature of the plant is its grain which is grinded into flour to make bread, noodles, cereals and porridges. Other parts of the plant are also useful e.g., the tender shoots are used as leafy vegetables while the flowers and green leaves are used for the extraction of rutin. Rutin has been reported to give protection to people exposed to harmful effects of radiation on high mountain areas and from X-rays. It has also been used with success as a prophylactic against gangrene resulting from frost bite. More recently, this crop has received attention for its potential in the UK and observations have been made by ICUC researchers on the growth habit and yield of Buckwheat varieties.

Thanh-Thuy Lac & N. Haq, ICUC, UK

#### **Blue Honeysuckle, a fruit for even the Far North**

Sweet blue honeysuckle, a new berry plant, has currently gained wide popularity with gardeners in the Russian north, in the zone of risky horticulture. Practically in any amateur's or farmer's garden, from three to 15 plants may be found. Large nurseries are eagerly growing the blue honeysuckle bushes and sell them to the population.

Commercial plantations of the crop, each covering from 10 to 25 hectares [25 to 62 acres], are concentrated mostly in western Siberia. The major advantage of blue honeysuckle that facilitated its rapid spread over Russia is its extra-early ripening. The taste and colour of berries remind one of highbush blueberry. Blue honeysuckle ripens 10 to 14 days earlier than strawberry. Ripening occurs when the orchards produce very few vitamin-containing products, therefore blue honeysuckle makes a good addition to the people's diet, as its berries contain 6-8% sugars, 2-3% acids, 40-170 milligrams of vitamin C per 100 grams, and from 1,200 up to 1,800 biologically active polyphenols per 100 grams. Berries can be consumed fresh or frozen. They are used for producing jam, juice, fruit and berry infant food mixtures, [and] beverages, as well as for obtaining natural food pigment or dark red colour, which is used in caramel and marmalade production. By 1995, over 50 blue honeysuckle varieties had been registered in Russia. All of them were developed from *Lonicera caerulea*. Currently, Dr. Plekhanova is implementing a programme of blue honeysuckle breeding in Russia. For more details, please contact Prof. Maria N. Plekhanova at this address: N.I. Vavilov Institute of Plant Industry, 42, B. Morskaya Str., 190000, St. Petersburg, RUSSIA.

*Extracted from a posting by Bob Batson on 'LISTSERVE' (30/1/1998)*

The original article by Dr. Maria N. Plekhanova appeared as "Blue Honeysuckle: A New Berry From Russia" in Pomona 29(1), Winter 1996, 46-48.

### Recent Meetings

#### **FISSC - First International Sweet Sorghum Conference.**

Beijing, China. Sept. 1997.

*Summary (P.J. Griffie)*

Sweet sorghum (Ss) has a long history of relatively minor breeder enhancement which accelerated during the most recent energy crisis with a correlated decline shortly afterwards. Interest is reviving as exemplified by

the First European Seminar on Sorghum for Energy and Industry (Toulouse, April 1996) and the recent FISSC attended by 90 Delegates from 14 Countries. Ss is a high energy C4 pathway plant which exhibits the 'staygreen' effect and is an F4 (Food, Feed, Fuel, Fibre) multi-use plant depending on breeding strategy. It has a short cycle, high biomass yield and is drought and saline tolerant. Its Water Use Efficiency (WUE) is 3 times that of sugarcane and Radiation Use Efficiency (RUE) double that of soybean. The Chinese Peoples Republic (CPR) has a breeding programme based on 350 germplasm lines which has Feed and Fuel as principal objectives from the Yangtze to Yellow Rivers and Inner Mongolia respectively. The Feed is for cattle silage to release feed grains for food areas and the Fuel is for alcohol as the CPR predicts exhaustion of petroleum reserves by 2016. Farmers' yields have reached 100 MT of green biomass per hectare, driven by the (inherent) CPR Farmers' Field School pilot demonstration approach. FAO co-sponsored the FISSC from the Crop and Grassland Service's (AGPC) regular programme by funding the Proceedings and first Compendium of Ss abstracts. The objective of the FISSC, to promote academic exchange towards global recognition of the crop potential and to enhance technical collaboration, was achieved. This will be advanced through the FAO Web Site in collaboration with the Sustainable Development Department (SDRN).

- The Common Fund for Commodities (CFC) funded the International Sugar Organization (ISO) supervised project in Harare is establishing Ss's potential in this region, the Regional Office for Asia and Pacific (RAP) was well represented through Australia, Japan, Indonesia and India; the latter offering to host the 2nd ISSC in 1999. The Regional Office for Near East (RNE) interest is high (Egypt and Iran) both Countries having an Ss programme. European interest is keen (utilization technology and project support); represented by Belgium, France, Germany, Hungary, Italy and the United Kingdom.
- It is recommended that FAO, Plant Production and Protection Division (AGP) continues to promote Ss

development, through AGPC's diversification mandate; particularly in more hostile edaphoclimatic agro-ecozones where crop choice is limited or restricted through input cost (irrigation).

- Constraints (surmountable) include certain processing aspects related to end use and initial slow plant growth. The germplasm range is quite adequate.

FAO, the Institute of Botany, Chinese Academy of Sciences and the Federal Agricultural Research Centre of Germany helped fund and co-sponsor the Conference which was held at Beijing Botanic Gardens (BBG). The National Economical and Cultural Development Corporation together with the Winter and Summer Company also provided support. The Beijing Milk Production Company kindly provided the Field Day Lunch.

For further information with regard the Proceedings and Abstracts please contact:

Prof. Li Dajue,  
Email: [lidj@ns.ibcas.ac.cn](mailto:lidj@ns.ibcas.ac.cn)

### WOCMAP II – A Success in Argentina

Under the mandate of <sup>1</sup>IUBS, and in collaboration with <sup>2</sup>ISHS and <sup>3</sup>SAIPA, <sup>4</sup>ICMAP organized the Second World Congress on Medicinal and Aromatic Plants for Human Welfare from 10 to 15 November - the 1997 theme was 'Challenges for the 21st. Century'. The host city of Mendoza was a perfect setting for the Congress and in line with ICMAP's philosophy of regionalizing the venues. The previous and first Congress was held in 1992 in Maastricht, attracting about 400 participants. The escalating importance of the theme, an <sup>5</sup>OTC expanding market of 14 billion dollars, resulted in WOCMAP II attracting over 1200 participants from 52 countries - more than double the expected attendance. The Congress was notably multidisciplinary and it was encouraging to see the increased attention being given to the cultivation and propagation of Medicinal and Aromatic Plants (MAPs) based on "Good Agricultural Practices". However, from the biodiversity and

conservation presentations, it became increasingly clear that much more attention needed to be focused on MAPs as natural resources and that co-ordinated development of national, regional and global policies and strategies for their conservation and sustainable use is vital to protect and utilize the diversity. Much material is wild-harvested, often with little or no control, and few genetic resource collections have been made. These issues, along with benefit sharing and the need to conserve traditional knowledge, were addressed in Congress resolutions.

The complex question of phytopharmaceutical standards (consumer protection benefits versus market supply constraints) was hotly debated, again resulting in a resolution to develop and clarify procedures and monographs. In his Plenary Lecture, Professor H. Wagner suggested that many phytomedicines will not survive the year 2000 unless quality control is improved and therapy regularised.

FAO, UNIDO and IPGRI presented related aspects of their work in a joint session. Mr. Griffiee, of FAO's Plant Production and Protection Division, demonstrated the 'Crop Questionnaire' developed with the assistance of Mr. Per Diemer. This was a test version for referees to input data to FAO's 'Crop Information System' and a significant number of plant scientists agreed to run tests on Medicinal and Aromatic plant descriptions. This will lead to production monographs.

The four volumes of the conference proceedings will be published in *Acta Horticulturae* :

- Biological resources, Sustainable use, Conservation, Phytomedicines;
- Ethnobotany, Pharmacognosy, Pharmacology, Toxicology, Biotechnology;
- Agricultural production, Post-harvest techniques, Industrial processing;
- Standards and regulations, Quality control, Supply and marketing, Economics.

Enquiries should be addressed to Dr Arnaldo Bandoni, SAIPA, Buenos Aires, Argentina.  
Email: [postmast@saipa.org.ar](mailto:postmast@saipa.org.ar)

FAO was pleased to support the

participation of Prof. Vernon Heywood, President of ICMAP and the Congress President, through the Partnership Retiree Programme. During the Congress, Professor Heywood received an honorary degree from the Juan Agustín Maza University, Mendoza, in recognition of his services to the conservation of plant biodiversity.

Information should soon be available at: <http://www.ffyb.uba.ar/congresos/wocmap/congress.htm>

- <sup>1</sup>International Union of Biological Sciences
- <sup>2</sup>International Society for Horticultural Science
- <sup>3</sup>Sociedad Argentina para la Investigación de Productos Aromáticos
- <sup>4</sup>International Council for Medicinal and Aromatic Plants
- <sup>5</sup>Over The Counter

### Regional Planning Workshop on Rehabilitation of Traditional and Neglected Crops In Africa

A planning workshop was recently held in Pretoria, South Africa, 24-28 November 1997, being the first regional activity under component 3 of the AFRA III-18 project on "Development of Improved Crop Varieties". It was jointly organized by the International Atomic Energy Agency (IAEA) and ARC-Roodeplaat Vegetable and Ornamental Plant Institute. The Objective of this workshop was to plan the activities in each of the participating countries. The five-year programme with special emphasis on component 3 and the programme of the Plant Breeding and Genetics section of the Joint FAO/IAEA Division was presented to the Chief Investigators from 7 member countries (Cameroon, Democratic Republic of Congo, Egypt, Ethiopia, Ghana, Madagascar, South Africa) to the local participants and to the director of the International Centre for Underutilized Crops (ICUC). A lecture was presented by Dr Nazmul Haq, ICUC, on potential African traditional crops for improvement and on evaluation and improvement of *Plectranthus* and *Solenostemon* by Mr James Alleman. Principal investigators presented their country reports and work plans under the project, which were discussed and revised-taking recommendations by experts and participants into consideration. The involvement of ICUC in the project implementation was discussed with its representative.

### Results achieved:

It was agreed that a multi-disciplinary approach (agronomists, breeders, pathologists, nutritionists, economists) should be followed to improve and promote the selected neglected crops, including farmers evaluation, and to use mutation techniques in combination with biotechnology for domestication and improvement of neglected crops. Information should be exchanged and links should be established with the National Agricultural Research Centre including National and Regional Plant Genetic Resources Centres (PGRC). Considering the limited manpower and resources in certain countries it is recommended to focus on only one or two neglected crops. Work plans for the development of improved germplasm of traditional and neglected crops were revised: cocoyam (Cameroon), noug (Ethiopia), African spinach and Zulu round potato (South Africa), Jack bean (Democratic Republic of Congo), Bambara groundnut (Madagascar), lupins (Egypt) and African yam bean (Ghana). Identification of training requirements, expert services, equipment needs and sources of funding are required for the breeding programme.

### Actions proposed:

#### To the Agency:

- Request that FAO/IPGRI send Technical Guidelines for the Safe Movement of Germplasm to the project co-ordinators.
- Initiate collaboration with ICUC on domestication and improvement of neglected crops such as Sheanut tree in Africa.
- Ensure prompt issuance of tickets for meeting participants.
- Give UNDP clear instructions with regard to payment and air travel.
- Instruct UNDP offices/travel agencies to consider the requirements for transit visas when arranging flights and also informing participants of these requirements

#### To the counterparts (Principal Investigators):

- Multi-disciplinary approach (agronomists, breeders, pathologists, nutritionists, economists) should be followed for project implementation.
- Use of induce mutation techniques with large M<sub>2</sub> populations (15,000 to 30,000 plants) in combination

with biotechnology for the domestication and improvement of neglected crops.

- Exchange information and links with National Agricultural Research Centres including National and Regional Plant Genetic Resources Centres (PGRC).
- Submit requests for procurement of chemicals and equipment to the Agency as early as possible and supply detailed information (supplier and catalogue number).
- Justify and specify the need for equipment and chemicals. Consumables, chemicals, isolation bags, seed technology equipment and other small equipment items can be requested.
- Prepare annual progress reports for the project co-ordinator.
- Receive information on neglected crops (available in the region) related to the project from ICUC/FAO.

#### To the counterparts (Project Co-ordinators and National Co-ordinators)

- Support and ensure effective implementation of the research programme. All communication related to the project should be disseminated to the Principal Investigator.
- Ensure that the equipment provided by IAEA for the implementation of project-related activities is placed at the Institute of the Principal Investigator.
- Ensure that the mutant germplasm and accessions – developed in programmes of participating countries – are available to the Principal Investigator of Component 3.
- Monitor the implementation of the work plan in close collaboration with the National Working Group.
- Provide administrative support to the Principal Investigator to undertake the compilation of national data on available germplasm of neglected crops.
- Support Principal Investigators in organization of national workshops and field days for farmers participating in evaluation of germplasm and promotion of neglected crops.

#### To the Project Scientific Consultant

- Involvement in monitoring and

evaluation of the project and distribution of scientific recent advances to Project Co-ordinators.

#### To ICUC:

- Facilitate links with other networks
- Include participants on ICUC mailing lists and disseminate information to AFRA countries.
- Facilitate jointly with the Agency the domestication and improvement of neglected crops such as the Sheanut tree in Africa.

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### 2<sup>nd</sup> International Symposium on Tuberous Legumes

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For a brief description, publications and the contributions for the proceedings of the 2<sup>nd</sup> International Symposium on Tuberous Legumes (5-8 August 1996, Celaya, Mexico) and related information please look up:

<http://www.botge.kvl.dk/projects/symp.htm>

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### Plant genetic resources in the African savannah

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The Institut d'Economie Rurale (Mali), Bureau des Ressources Génétiques (France) and SOLAGRAL (France) held an international meeting on the management of plant genetic resources in the African savannah in Bamako, Mali, 24-28 February 1997. For details please contact:

Bureau des Ressources Génétiques  
57 rue Cuvier, 75231 Paris cedex 05,  
France.

Tel: +33-1-44088310

Fax: +33-1-45357015

Email: [begic@jouy.inra.fr](mailto:begic@jouy.inra.fr)

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### International Conference on Medicinal Plants Conservation, Utilization, Trade & Cultural Traditions,

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Held at Bangalore, India, 16-20 February 1998. Please contact the following for further details:

ANMAP Secretariat, FAO Regional Office for Asia and the Pacific  
Maliwan Mansion, Phra Atit Road  
Bangkok 10200, Thailand

Tel: (66-2) 281-7844

Fax: (66-2) 280-0445

## **Forthcoming events**

### **MEDUSA Regional Workshop**

The Third MEDUSA Regional Workshop, will be held in Coimbra, Portugal, on 27–28 April, immediately following the 1st International Meeting on Aromatic and Medicinal Plants of the Mediterranean which is being held on 23–26 April in Ansiao, near Coimbra. The theme of the Workshop will be: 'From information to practice: case studies'.

For any further information please contact: Melpo Skoula, Executive Secretary of the MEDUSA Network, Mediterranean Agronomic Institute of Chania, PO Box 85, 73100 Chania, Greece

Tel.: +30 821 81151

Fax: +30 821 81154

Email: [melpo@zorbas.maich.gr](mailto:melpo@zorbas.maich.gr)

### **ASOMPS IX**

The Ninth Asian Symposium on Medicinal Plants, Spices and Other Natural Products (ASOMPS IX) is one of a series of important international symposia on natural products research. The last was held in June 1994 in Melaka, Malaysia.

ASOMPS IX will be held in Hanoi, Vietnam on 24-28 September 1998.

Topics will include:

- Chemistry of medicinal plants, spices and other natural products
- Biological studies of natural products
- Ethnobotany and biodiversity
- Biochemistry and biotechnology of natural products
- Product development and commercialization of natural products

An open forum on "Ethnobotany and Community Rights" will be held at the end of the conference. Please contact:

The Secretariat ASOMPS IX  
Institute of Natural Products Chemistry  
National Centre for Natural Science and Technology, Nghiado, Tuliem, Hanoi Vietnam

Tel: (84-4) 836 0830

Fax: (84-4) 834 5390 / 853 1615

### **Fourth National New Crops Symposium - New Crops & New Uses: Biodiversity & Agricultural Sustainability**

November 8–11, 1998 at Hyatt Regency at Civic Center, Phoenix, Arizona

Session topics:

- World Biodiversity Update
- Strategic Problems of New Crops and New Uses (Politics of Biodiversity, Economics, Commercialization and Marketing)
- Biodiversity and Industry Issues (Ornamentals, Medicinal, Food, Consumer Marketing, Industrial uses)
- New Crops for Agricultural Problem Areas (Replacing Tobacco, Illegal drugs, Declining crops)
- New Crops and New Uses Review (Cereals, Oilseeds, Industrial, Fibers, Vegetables, Forages, Ornamentals, Herbs and Medicinal)

Please contact the following for more information (refer to "1998 Conference"):

[conference@aaic.org](mailto:conference@aaic.org) or  
David Dierig, (602) 379-4356,  
[ddierig@uswcl.ars.ag.gov](mailto:ddierig@uswcl.ars.ag.gov)  
Dennis Ray, (520) 621-7612,  
[dtray@ccit.arizona.edu](mailto:dtray@ccit.arizona.edu)  
Jules Janick, (317) 494-1329,  
[jjanick@hort.purdue.edu](mailto:jjanick@hort.purdue.edu)  
Kenneth Foster (520) 621-7900,  
[kfoster@ag.arizona.edu](mailto:kfoster@ag.arizona.edu)

### **Plant-Based Approaches for Combating Desertification**

Beer Sheva, Israel November 2 - 5, 1998

The wise use of plant germplasm that is either native or adaptable to the climatic and edaphic conditions of semi-arid/arid lands is one approach that can help reduce the spread of desertification and contribute to sustainable development in dry regions. IPALAC is an initiative designed to serve as a catalyst for the introduction, adaptation, domestication and/or improvement of plants, or systems based on plants for utilization in the development process. Scientists/researchers, development workers/agencies, or others who have used plants in income generating or

environmental projects in semi-arid regions are encouraged to share their experience during the conference.

The IPALAC 1998 Calendar of Events also includes: a course on Propagation of Woody Species in Kenya in February 1998; a course in French on Date Palm Cultivation in Israel in June 1998; a workshop on *Zizyphus mauritiana* in Zimbabwe in June 1998; a course on Rainfed Farming Systems in Semi Arid Regions in Rajasthan, India, in September 1998; and, a symposium: "Silk - An Economic Opportunity for Semi-Arid Africa" in Dakar, Senegal, in October 1998.

For further information: please contact:

International Programme for Arid Land Crops, Ben-Gurion University of the Negev, PO Box 653

Beer Sheva, Israel 84105

Tel: 972 7 646 1905/1972

Fax: 972 7 647 2984

Email: [ipalac@bgumail.bgu.ac.il](mailto:ipalac@bgumail.bgu.ac.il)

### **9<sup>th</sup> International Lupin Conference**

Will be held at Klink (Müritz), Germany, 20-25 June 1999. The conference will cover:

- On-farm production and utilization
- Utilization
- Plant protection
- Plant breeding
- Economy
- Lupins in ecological agriculture

For details please contact:

German Lupin Association,  
Gesellschaft zur Förderung  
Der Lupine (G.F.L.) e.V.

Im Rheinfeld 1-13

D-76437 Rastatt, Germany.

### **Amaranth Institute meeting 1998**

Amaranth Institute Friday, Aug. 7 - Saturday, Aug. 8, 1998, Sidney, Nebraska. Topics will include: marketing, production, breeding, food, and industrial uses of amaranth

To register, submit paper topic, or for more information, contact: Jane Sooby, High Plains Ag Lab, 3257 Rd. 109, Sidney, Nebraska 69162 USA

Tel: 308-254-3918

Fax: 308-254-2402

Email: [phrc031@unlvm.unl.edu](mailto:phrc031@unlvm.unl.edu)

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### **An International Forum On Ginseng**

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The First European Ginseng Congress, will be held from December 6-11, 1998 at Philipps-Universität in Marburg, Germany. Contributions to all aspects of agriculture, agribusiness, biology, biochemistry, medicine, or pharmacy will be welcome. Therefore, all ginseng scientists and researchers are welcome as well as growers and marketers of Korean and North American Ginseng.

For further details and the registration form please contact Hans Christian Weber, Email: [weberh@mail.uni-marburg.de](mailto:weberh@mail.uni-marburg.de), or the web page ([http://staff-www.uni-marburg.de/~b\\_morpho/tagung.html](http://staff-www.uni-marburg.de/~b_morpho/tagung.html))

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### **The Society for Economic Botany, Annual meeting 1998**

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Will be held at The University of Aarhus, Denmark, July 13-17, 1998. Please contact:

SEB Treasurer John Rashford, Dept. of Sociology and Anthropology, College of Charleston, Charleston, SC 29424, USA. Email: [Rashfordj@cofc.edu](mailto:Rashfordj@cofc.edu)

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### **The International Bamboo Congress and International Bamboo Workshop**

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Will be held in San José, Costa Rica November 2-6, 1998.

For more information

Email: [pbambu@sol.racsa.co.cr](mailto:pbambu@sol.racsa.co.cr) or check the web page - <http://www.funbambu.or.cr>

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### **ACOTANC 98 - The Australasian Conference on Tree and Nut crops**

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Will be held at Nelson, New Zealand April 24-26, 1998. For further information please contact:

John Gray, Secretary  
Nelson Branch  
NZ Tree Crops Association  
72 88 Valley Rd. Wakefield  
Nelson 7181 New Zealand  
Tel: 64 3 541 8653  
Fax: 64 3 541 9653  
URL: <http://www.AOI.com.au/acotanc>

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### **New Rural Industries 1998 'Advancing innovation'**

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First National Conference, Perth, Western Australia, 18-21 October 1998 at Belvoir Homestead. For further information please contact:  
The Organizers, Promaco Conventions Pty Ltd, CAN 008784 585  
PO Box 890, Canning Bridge Western Australia 6153  
Tel: (+61) (08) 9364 8311  
Fax: (+61) (08) 9316 1453  
Email: [promaco@promaco.com.au](mailto:promaco@promaco.com.au)  
Web: [www.promaco.com.au](http://www.promaco.com.au)

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### **Publications of Interest**

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#### **ICUC Publications**

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Anon (1997) **Annotated Bibliography of Jackfruit, Pummelo and Mangosteen**. ICUC, Colorline Printers, Dhaka. 68p.

Anthony K. Haq N. Cilliers B. (eds.) (1995) **Genetic Resources and Utilization of Underutilized Crops in Southern and Eastern Africa. Proceedings of Symposium held at the Institute for Tropical and Subtropical Crops Nelspruit, South Africa, August 1995**. FAO, ICUC & CSC. Dynamic Ad CC, Nelspruit. 175p.  
ISBN: 0-9529572-05

Anthony K., Haq N. (eds.) (1997) **Underutilized Tropical Fruits in Asia Network (UTFANET)**. 60 p.

Anthony K., Haq N., de Groot P. (1992) **Underutilized Tropical Fruits in Asia**. ICUC/CSC, London.

Anthony K., Meadley J., Röbbelen G. (1993) **New Crops for Temperate Regions**. Chapman & Hall, London. 280p.

de Groot P., Haq N., (eds.) (1995) **Promotion of Traditional and Underutilized Crops**. Report of a workshop held in Valletta, Malta, June 1992. Series No. CSC(95)AGR23 Technical Paper 311. ICUC/CSC, London. 173p.

Potulski N. (1995) **Alternative Crops for Drug Growing Areas in Asia**. ICUC. 175p.

Potulski N. (1995) **Alternative Crops for Drug Growing Areas in Latin America**. ICUC. 155p.

Quah S.C., Kiew R., Bujang I., Kusnan M., Haq N., de Groot P. (eds.) (1996) **Underutilized Tropical Plant Genetic Resources, Conservation And Utilization**. Universiti Pertanian Malaysia Press, Kuala Lumpur. 353p.

Smartt J, Haq N, (eds.) (1997) **Domestication, Production and Utilization of New Crops**. ICUC, Colorline Printers, Dhaka. 298p.

Wickens G.E., Haq N., Day P. (1989) **New Crops for Food and Industry**. Chapman & Hall, London. 444p.

Williams J.T. (1993) **Pulses and Vegetables**. Chapman & Hall, London. 264p.

Williams J.T. (1996) **Cereals and Pseudocereals**. Chapman & Hall, London. 280p.

(In press) **Underutilized Crops of Pakistan**.

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#### **General Publications**

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Anon (1997) **Evaluating the Potential for Bambara Groundnut as a Food Crop in Semi-Arid Africa. An Approach for Assessing the Yield Potential and Ecological Requirements of an Underutilized Crop**. European Union Life Sciences and Technologies for developing Countries STD-3. Final Project Report Project Number TS3\*CT920121. 74 p.

Azam-Ali S.N. (ed.) (1997) **Proceedings of the International Bambara Groundnut Symposium**. University of Nottingham, UK 23-25 July.

Batlle, I., Tous J. (1997) **Carob tree. *Ceratonia siliqua* L. Promoting the conservation and use of underutilized and neglected crops. 17**. Institute of Plant Genetics and Crop Plant Research, Gatersleben / International Plant Genetic Resources, Rome, Italy. 92p.

Brown M.J. (1997) **Durio – A Bibliographic Review** [Arora R.K., Ramanatha Rao V., Roa A.N. (eds.)] IPGRI Office for South Asia, New Delhi. (ISBN 92-9043-318-3) 188p.

Chomchalow N., Gowda C.L.L., Laosuwan P. (1993) **Proceedings of the FAO/UNDP Project RAS/89/040 Workshop on Underexploited and Potential Food Legumes in Asia.** FAO/RAPA Publication 1993/7, Bangkok. 150p.

Dept. of Agric, Ministry of Industry and Primary Resources, Brunei Darussalam (1992) **Medicinal Plants of Brunei Darussalam Part One.** Government Printing Dept. Brunei Darussalam. 219p.

Edmonds, J.M., Chweya J.A. (1997) **Black nightshades. *Solanum nigrum* L. and related species. Promoting the conservation and use of underutilized and neglected crops. 15.** Institute of Plant Genetics and Crop Plant Research, Gatersleben/International Plant Genetic Resources, Rome, Italy. 113p.

Faridah H.I., van der Maesen L.J.G. (eds.) (1997) **Plant Resources of South East Asia No. 11 Auxiliary Plants.** Backhuys Publishers, Leiden, The Netherlands. 389 p.

Flach M. (1997) **Sago palm. *Metroxylon sagu* Rottb. Promoting the conservation and use of underutilized and neglected crops. 13.** Institute of Plant Genetics and Crop Plant Research, Gatersleben / International Plant Genetic Resources, Rome, Italy. 76p.

Heller J., Begemann F., Mushonga J. (eds.) (1997) **Bambara groundnut. *Vigna subterranea* (L.) Verdc. Promoting the conservation and use of underutilized and neglected crops. 9. Proceedings of the workshop on Conservation and improvement of Bambara Groundnut (*Vigna subterranea* (L.) Verdc.), 14-16 November 1995, Harare, Zimbabwe.** Institute of Plant Genetics and Crop Plant Research, Gatersleben / Department of Research & Specialist Services, Harare/International Plant Genetic Resources, Rome, Italy. 166p.

Johnson D.V. (1997) **Non-wood forest products: tropical palms.** Non-Wood Forest Products 10, NWFP Division, Forestry Dept., FAO and RAP Publication 1997/10, Bangkok. 166p.

Kumar S., Singh J., Shah N.C., Ranjan V. (eds.) (1997) **Indian and aromatic plants facing genetic erosion.** Central Institute of Medicinal and Aromatic Plants, Lucknow 226 001, India.

Mal B. (1994) **Underutilized Grain Legumes and Pseudocereals – Their Potentials in Asia.** FAO/RAPA Publication: 1994/14, Bangkok. 162p.

National Research Council (1996) **The Lost Crops of Africa Vol. 1. Grains.** National Academy Press, Washington D.C. 383p. ISBN: 0-309-04990-3

Newton J. (ed.) (1995) **Planta Europa – Proceedings of the first European conference on the conservation of wild plants, Hyeres, France.** Museum of Natural History, Cromwell road, London, SW7 5BD, UK. 273p.

Padulosi s. (ed.) (1997) **Oregano. Promoting the conservation and use of underutilized and neglected crops. 14. Proceedings of the IPGRI International Workshop on Oregano, 8-12 May 1996, CIHEAM, Valenzano (Bari), Italy.** Institute of Plant Genetics and Crop Plant Research, Gatersleben/International Plant Genetic Resources, Rome, Italy. 176p.

Schippers, R. Budd L. (eds.) (1997) **Workshop on African Indigenous Vegetables held Limbe, Cameroon, January 13-18, 1997 – Workshop Papers.** IPGRI and NRI. 155p.

Singh R.P. (1996) **Monograph on promising pest control plant species of Asia and the Pacific.** FAO (RAP) Bangkok, Thailand. 94p.

Smith N.O., Maclean I., Miller F.A., Carruthers S.P., (1997) **Crops for Industry and Energy in Europe.** The University of Reading. Brussels. 72p. ISBN: 92-827-9415-6

## **Newsletters & Journals of Interest**

**ARAARI Newsletter** – Produced by FAO regional office for Asia and the Pacific and the Asia-Pacific Association of Agricultural Research Institute (APAARI). Please contact:

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**Australian New Crops Newsletter** - Published six monthly this newsletter gives a wide view of research on underutilized crops particularly in Australia. Many of the articles can also be accessed on the world wide web. For further details please contact:

The Editor, Dr Rob Fletcher  
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**D+C (Development and Cooperation)** is published bimonthly by Deutsche Stiftung für internationale Entwicklung (DSE), for further details please contact:

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**Indigenous Knowledge and Development Monitor** – a publication which promotes the exchange of information on indigenous knowledge as it relates to sustainable development. The monitor is produced by the Centre for International Research and Advisory Networks (CIRAN/Nuffic) in cooperation with the indigenous knowledge resource centres. Please contact:

CIRAN/Nuffic,  
PO Box 29777  
2502 LT The Hague  
The Netherlands  
Tel +31 70 4260324  
Fax: +31 70 4260329/4260399  
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**LEISA** newsletter is published quarterly by the Centre for Research and Information on Low-External-Input and Sustainable Agriculture. For further information please contact

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URL: <http://www.bib.wau.nl/ileia>

**LUPTEC** – A bimonthly newsletter of the South African Lupin Network (SA LUPNET). Please contact:

The Editor – Dr JAM van der Mey

LNR – IGG / ARC – GCI

Private Mail Bag X1251

Potchefstroom 2520

**MPTS NEWS** – A bi-annual newsletter for the Multipurpose Tree Species Network – Sri Lanka. Please contact: MPTS Secretariat

Faculty of Agriculture

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Tel: 94 08 388569 / 388375

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**NANMAP** – A bimonthly newsletter of the Asian Network on Medicinal and Aromatic Plants (ANMAP). Please contact:

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Phra Atit Road,

Bangkok 10200, Thailand

Tel: (66-2) 281-7844

Fax: (66-2) 280-0445

**ODI – The Overseas Development Institute** provides numerous publications which may be of interest to those working on underutilized crops. Two networks of interest can be contacted using the following address:

Agricultural Research and Extension Network:

Email: [agren@odi.org.uk](mailto:agren@odi.org.uk)

Rural Development Forestry Network.

Email: [forestry@odi.org.uk](mailto:forestry@odi.org.uk)

Overseas Development Institute  
Portland House, Stag Place  
London SW1E 5DP, UK

Tel: +44 (0) 171 393 1600

Fax: +44 (0) 171 393 1699

**Tropical Agricultural Research and Extension** – A new journal. Please contact:

Editor-in-Chief: Prof. R. Pathirana

Editorial Office,

Faculty of Agriculture,

University of Kamburupitiya

Sri Lanka

Tel: 94 41 92200

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### Underutilized Crops and the Internet

There are a growing number of sites for those working on underutilized crops, assuming you have access to an internet linked computer. The following is a summary of some sites that may be of interest. This is not an exhaustive list, but many bigger sites have useful links to related pages. Some sites also have interactive databases, such as the Center for New Crops & Plant Products, NewCROP databasa. Also offered at this site is information on how to join the Discussion list for New Crops – an email based bulletin board.

**Alternative Crops Technology Interaction Network (ACTIN):**  
<http://www.actin.co.uk/>

**Alternative Farming Systems Information Center:**  
<http://www.nal.usda.gov/afsic/>

**Canada's Office of Urban Agriculture:**  
<http://www.cityfarmer.org/>

**Center for New Crops & Plant Products:**  
<http://www.hort.purdue.edu/newcrop/>

**Centre for International Research and Advisory Networks (CIRAN/Nuffic):**  
<http://www.nufficcs.nl/ciran/>

**Centre for Low-External-Input and Sustainable Agriculture (ILEIA):**  
<http://www.bib.wau.nl/ileia/>

**DIVERSITAS:**  
<http://www.lmcp.jussieu.fr/icsu/DIVERSITAS/>

**Henry Doubleday Research Association (HDRA):**  
<http://www.hdra.org.uk/>

**Information Centre for Low-External-Input and Sustainable Agriculture (ILEIA):**

<http://www.bib.wau.nl/ileia/>

**NF-2000 Network:** <http://www.nf-2000.org/>

**Plant Resources of South-East Asia (PROSEA):**  
<http://gopher.bib.wau.nl/prosea/home.html>

**Rocket Genetic Resources Network:**  
<http://www.ba.cnr.it/~germdp02/rocket.html>

**Survey Of Economic Plants For Arid And Semi-Arid Lands (SEPASAL):**  
<http://www.rbgekew.org.uk/ceb/sepasal.html>

**The "MEDUSA" Network:**  
<http://www.maich.gr/mednet.htm>

**The Australian New Crops Home Page:**  
<http://www.uq.edu.au/~gagkrego/index.htm>

**The Bamboo Foundation:**  
<http://www.funbambu.or.cr/>

**The Cucurbit Network:**  
<http://probe.nalusda.gov:8000/otherdocs/cgc/tcn/>

**The Food and Agricultural Organization of the United Nations (FAO):** <http://www.fao.org/>

**The Henry Doubleday Research Association (HDRA):**  
<http://www.hdra.org.uk/>

**The International Centre for Research In Agroforestry (ICRAF):**  
<http://www.cgiar.org/icraf/>

**The International Institute for Environment and Development (IIED):** <http://www.iied.org/>

**The International Plant Genetic Resources Institute (IPGRI):**  
<http://www.cgiar.org/ipgri/>

**The Overseas Development Institute (ODI):** <http://www.oneworld.org/odi/>

## Some Useful Addresses

It is hoped that a directory of scientists; organizations; and private and public enterprises with interests in underutilized crops, will be published in forthcoming issues as a regular feature. The following have expressed an interest in, or are already involved with, research on underutilized crops. Please feel free to offer any contributions or corrections for the next newsletter.

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