



GlobalHort Briefing Note

An international consortium for the promotion of innovation in horticulture for development

Tropical Fruit Research for Development Needs Fortification

"Although tropical fruits have traditionally been an important source of nutrition in developing countries where 98 percent of these fruits are produced, their importance in trade cannot be over emphasized. The current market assessment of tropical fruits estimates the value of international trade for both fresh and processed fruits at a little more than US\$4 billion in 2004, and an assessment over the past decade indicates an annual growth rate of 2.4 percent in export values. Hence, their contribution to food security, employment and income generation, and overall poverty reduction is significant." [FAO Current Situation and Medium-Term Outlook for Tropical Fruits \(2009\)](#)

1. Situation and Challenges

The Second Global Conference on Agricultural Research for Development (GCARD2) will be held in Punta del Este, Uruguay, 29 October – 1 November 2012 where discussions will take place aimed at charting a roadmap for the agricultural research for development system that can lead to greater global impact. How much will research on tropical fruits figure into this discussion? Likely very little considering some recent decisions taken by the CGIAR! The latest one is the official closing of the Tropical Fruit Program at CIAT at the end of 2012. Thus, the present challenge is to get tropical fruit research on this roadmap. Optimistic scientists had held out the hope that the [CGIAR Research Program on Agriculture for Nutrition and Health \(CRP4\)](#) would be fully supportive of tropical fruit and its diversity, given the contributions that these crops make to better nutrition, health and livelihoods. However, and despite the cover photo of a child with nutritious fruits illustrating the document proposal, fruit will not be included in the CRP4 value-chain of activities until year three of the program.



Most of Africa's edible native fruits are wild. One compilation lists over 1,000 different species from 85 botanical families and even that assessment is probably incomplete.¹ Among all those fruit-bearing plants, many of the individual specimens growing within Africa are sheltered and protected,

some are even carefully tended, but few have been selected to bring out their best qualities, let alone deliberately cultivated or maintained through generations. They remain untamed.

In addition, scavenging for fruits is exceptionally important to youngsters in the many cultures that prepare meals fewer than three times a day. Often, adults have neither time nor means to prepare supplementary snacks, so youngsters, whose small stomachs can barely hold enough to sustain their daily needs, rely on the fruits of the field, woodland, wetlands, forest, savanna, or hillside to fill the voids and carry them through. The amounts consumed may rarely have been large. But even a few small fruits that are nutritionally dense can deliver big benefits when the rest of the diet is deficient in vitamins and minerals, which is especially the case when it is overly dependent on starchy staples.

Please read the version of this document containing links at:

<http://www.globalhort.org/about-globalhort/briefing-notes/globalhort-briefing-notes-1-november-2012/>

¹ National Research Council "Introduction to Wild Fruits." *Lost Crops of Africa: Volume III: Fruits*. Washington, DC: The National Academies Press, 2008.

Why are tropical fruits important and what research needs funding? Here are some important characteristic and considerations worthy of note:

- highly diversified
- exotic, well adapted to tropical climates
- unique tastes
- high nutritional value
- multiple uses and services (food, shade, erosion, wood, medicine, biodiversity host, greening, social relationships...)
- various fruit types yet to be exploited

GlobalHort has looked at the tropical fruit research ongoing at some major organizations and has interviewed some key researchers. Unfortunately, we were unable to speak with a colleague at PROTA before this foundation ceased activities this year. PROTA had planned to release a volume on the fruits of tropical Africa. Many others could relate success stories but are experiencing ever deepening funding difficulties. The general message coming from these interviews is that funding for tropical fruits research is both scarce and highly competitive. Longer-term research is very hard to sell despite the fact that many actors of the civil society are interested in promoting indigenous fruits for domestic and regional markets. They recognize the benefits of income generation, food and nutrition security, and in the management of natural resources and biodiversity.

We learned from these researchers that they have to recognize which species they can work with and how to be creative in order to best develop projects. The focus has to be on problem solving and public-private partnerships do have a role in supporting short-term applied research. We learned that advisory services are lacking for minor crops grown by poor and often uneducated farmers. There are potholes in the road that must be fixed in order for tropical fruit research to move forward and have impact.

2. Tropical Fruit Research

2.1 Tropical Fruit Research in the CGIAR

The Consultative Group for International Agricultural Research (CGIAR) is a global research partnership that unites organizations engaged in research for sustainable development. CGIAR research is dedicated to



Naranjilla (*Solanum quitoense*)

reducing rural poverty, increasing food security, improving human health and nutrition, and ensuring more sustainable management of natural resources. It is carried out by 15 centers that are members of the CGIAR Consortium in close collaboration with hundreds of partner organizations, including national and regional research institutes, civil society organizations, academia, and the private sector. Research is conducted through a portfolio of [Consortium Research Programs](#) (CRPs) that addresses today's most pressing agricultural research-for-development challenges.

Two of the original four CGIAR centers that were created in 1967 deal with tropical horticulture: [CIAT](#) (International Center for Tropical Agriculture) located in Colombia and [IITA](#) (International Institute of Tropical Agriculture) located in Nigeria. The CGIAR centers, including IITA, have concentrated their plant research efforts on wheat, rice, maize, sorghum, millet, barley, lentils, beans, cassava and potatoes. The only center that had a program covering tropical fruits was CIAT. This tropical fruits program was part of their mission "to reduce hunger and poverty, and improve human health in the topics through research aimed at increasing the eco-efficiency of agriculture."

Success Story at CIAT on Public-Private Partnerships (PPP)

"In regard to PPP we have had experience with several projects. One of them was working with naranjilla (*Solanum quitoense*) in the nursery industry. The private partner did not contribute cash but provided all the materials for us for pathology assessment. They had access to all our improved materials and technology, so if they decided to implement the technology they could be 5 years ahead in the nursery industry. They are not using the methodology for commercial purposes yet. Another example was with INIAP in Ecuador that identified naranjilla planting materials that were resistant to some nematodes and fungi. We set up a project funded by FONTAGRO where CIAT was in charge to identify a variety suitable for the processing industry and responding to environmental concerns (INIAP did not want to use 2,4-D, an artificial growth hormone). We grafted the best varieties on the resistant stalks and INIAP set up a commercial deal with this nursery: if they propagate such improved material for them and sell it to farmers, they get royalties from each plant in a fair share with the researchers. This exercise resulted in more than 500 hectares planted in a year with half being planted with these new varieties and technology. Up to this time grafting had never been used. This was a great success story."

Alonso Gonzalez, CIAT

[ICRAF](#) (World Agroforestry Centre) was established in Kenya in the mid-seventies. Its work aims toward more productive, diversified, integrated and intensified agroforestry systems that provide better livelihood and environmental benefits. ICRAF has had [The Fruits of Success](#) program, the purpose of which is to domesticate West and Central Africa's wild trees to raise income, improve health and stimulate the rural economy. The International Fund for Agricultural Development (IFAD) has supported this program along with other donors and partners, including the UK Department for International Development (DFID), Belgium Development Corporation, the United States Department of Agriculture (USDA) and the Government of Cameroon.

In 2006, IPGRI and INIBAP became a single organization and subsequently changed their operating name to [Bioversity International](#). The new name reflects an expanded vision of its role in the area of biodiversity research for development. Bioversity International is a leading agricultural research for development organization dedicated to the use and conservation of biodiversity to combat poverty and malnutrition and to enhance the sustainability of agriculture. Bioversity has recently developed a new strategy that promotes the use of

local and traditional foods within food production systems by working with smallholder farmers. It predicts that achieving greater diet diversity can be an important tool for addressing malnutrition in developing countries. Bioversity has become the champion for research and conservation funding for many fruit varieties such as Safou (*Dacryodes edulis*) in Africa or *Canarium odontophyllum* (a kind of plum) in Asia. Its [New World Fruits Database](#) has been established to advocate for

tropical fruit in the Americas. The recently published book with FAO on "[Sustainable Diets and Biodiversity](#)" will hopefully lead to more funding for tropical fruit research.

The research work of former INIBAP on banana and plantain is still coordinated by [Bioversity International](#) and the [PROMUSA](#) network covers the dissemination of information. [CIRAD](#) is also maintaining competencies on banana research in Montpellier and in the French West Indies, considering this commodity as a world challenge. Banana is the tree hiding the ... absence of tropical fruit forest!

This year CIAT marks its 45th anniversary to celebrate "Turning our eco-efficiency vision into reality." However, a program review has resulted in the loss of the tropical fruits program. GlobalHort has interviewed Dr. Alonso Gonzalez, Program

Leader of the Tropical Fruits Program at CIAT about the program and its termination. We have also interviewed Dr. Katja Kehlenbeck, Associate Scientist, Tree Genetic Resources and Domestication, ICRAF, about some of their funding issues.



Safou (*Dacryodes edulis*)

CIAT Tropical Fruit Program Ends

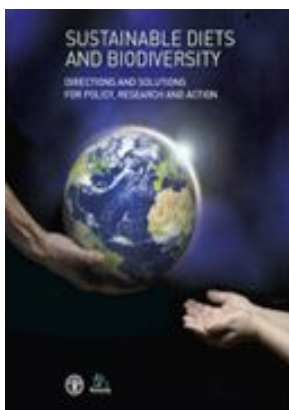
"This year, when we must close the program, we had 6 international staff (four full-time and the others part time), 14 national professional staff and many field workers and students. We had a decent capacity over these years and although it was becoming extremely difficult to raise funds, we were doing fine mainly due to the support from Colombia. The way the CRPs were restructured offered 2 or 3 possibilities to accommodate tropical fruits. Those CRPs had to do with production systems, mainly focused on banana and coconut. CIAT was not interested in the CRP4 on Agriculture for Nutrition and Health, as it seemed to deal with biofortification only and not with fruits. It was too cumbersome for CIAT to keep the fruits program viable so the program was cut."

Alonso Gonzalez, CIAT

ICRAF Experience of Funding a Tropical Fruit Project

"Our experience with this fruit project (Contribution of oilseed trees to malnutrition alleviation) is probably not a good example. It just shows how difficult fundraising is at the moment, even when using fashionable keywords such as nutrition. (...) I am afraid that I cannot tell you a 'success story' about our new fruit project. ... In my feeling, donors in general do not support high quality proposals, but accept or reject proposals rather by following political and relation-related issues. Having the right keywords in a proposal may avoid rejection in the first round, but when it comes to decisions, donors may favor people they know, independently from quality of proposals. I may be too pessimistic, but just because of my experiences during the last 4 years at ICRAF. Fortunately, however, there are exceptions!"

Katja Kehlenbeck, ICRAF





Local fruit production with mango and jackfruit at Mozzafarpur market, India (CIRAD)

2.2. Tropical Fruits Research in the International Tropical Fruits Network (TFNet)

Since 2000, the [International Tropical Fruits Network](#) (TFNet) has been an independent and self-financing global network established under the auspices of the Food and Agriculture Organization of the United Nations (FAO). It is both intergovernmental and inter-institutional in nature, with the mandate and role to promote sustainable global development of the tropical fruit industry in relation to production, consumption and trade. It is membership-based, with members acting through one lead agency on inter-country decisions. It is based in Malaysia. The TFNet is an expanding network with 145 members from 38 countries, 12 of them are country members: Bangladesh, China, Fiji, India, Indonesia, Malaysia, Nigeria, Philippines, Sudan, Syria, Vietnam, and Australia. It also has 15 associate members composed of companies and organizations and 119 ordinary members. The activities of TFNet include conducting consultancies and studies, project implementation, and organizing workshops, conferences, and seminars ([2012 Report](#)).

The decision to set up an African branch of the International Tropical Fruits Network (TFNet; see www.itfn.org) was formalized during a workshop on “Enhancing participation in the value chain and establishing markets for tropical fruits smallholders in Africa” in April 2011 in Lagos, Nigeria. Nineteen senior agricultural officers from eleven countries attended the workshop to discuss improving market access for tropical fruits and to establish an African branch of TFNet (Afri TFNet). In its first [report](#) Afri-TFNet expressed the need for government research institutions to continuously formulate and introduce

appropriate technologies for application by smallholders in order to increase their production capacity and to enhance product quality. Tropical fruit production should be supported by intensive and integrative research programs covering production systems, propagation methods, cultivar breeding, plant growth regulator application, pest management, postharvest handling, food technology and production economics. Since the 2011 workshop however, Afri TFNet has not been visible, even during the All Africa Horticulture Congress 2012 in South Africa well attended by Ghana and Nigeria representatives. The recent international symposium held in China (see below) confirmed that overall cultural information is lacking for most indigenous tropical fruit species.

This summer the [5th International Symposium on Tropical and Subtropical Fruits](#) (ISTSF) was held in Guangzhou, China. The Chair of the ISHS Section on Tropical and Subtropical Fruits, Dr. Kumar Sisir Mitra, in his presentation stated: “The potential for development of tropical and subtropical fruits depends on continuous improvement of technology for production and postharvest management. Global partnerships are imperative to integrate scientific and technological innovations.” GlobalHort recently interviewed Dr. Mitra who is on the Board of Trustees of TFNet and horticulture professor at Bidhan Chandra Krishi Viswavidyalaya University, West Bengal, India.

Success Stories at TFNet on Donors

“Governments, both Central and State, as donors for tropical fruit research, have proven quite generous in India. There are many projects on tropical fruits in different universities and institutes. Different corporations have also shown interest in funding tropical fruits research. There are many success stories I can report here. In the early 2000’s the central government-funded program called National Agriculture Improvement Project (NAIP) has provided competitive grants for specific research topics. Together with university colleagues, I have conducted research on guava, mango, litchi etc. From this research we can now advise growers about off-season production of guava, rejuvenation of old and unproductive orchards of mango, and control of fruit cracking in litchi. These technologies have been well accepted by the growers in my State and they are now earning more profit than before. Similarly, I know that technology for off-season production of longan in Thailand, off-season production of mangosteen in Indonesia or off-season production of mango in the Philippines, was developed by researchers and is regularly used by the growers.”

Dr. Sisir Kumar Mitra, TFNet

2.3 Tropical Fruits Research by the USAID-supported Horticultural Collaborative Research Program (Hort CRSP)

Since its inception in 2010 the [Hort CRSP](#) has funded 46 projects in more than 30 countries, spanning the value chain of fruits and vegetables. It supports horticultural research that builds local institutional capacity while addressing issues of poverty, health, nutrition and gender. Of the thirty current projects there are two addressing tropical fruit:

i. [Strengthening farmer groups to increase fruit and vegetable production](#): Uganda. Kate Scow of UC Davis leads "Promoting fruit and vegetable production to improve nutrition in Nkokonjeru, Uganda" (~\$150,000)

ii. [Improving outreach methods to small-scale fruit and vegetable farmers](#): Bolivia, Chile, Ecuador, Guatemala, Honduras, Peru. Jeffrey LeJeune of The Ohio State University leads "Improving extension methods for horticultural outreach among small-stakeholder farmers in Latin American countries" (~\$75,000)

In addition to the projects listed above, the Hort CRSP also pairs graduate students with organizations in developing countries each year for [Trellis Fund projects](#). This year there are fourteen projects of which two deal with tropical fruit:

- Promoting organic mango and orange fruit farming in Uganda,
- Improving banana maintenance, soil management and intercropping education among female smallholder farmers in Rwanda.

The Hort CRSP program has proven to be very successful and it is hoped that the funding will continue for many years to come.

3. Education, Training and Extension

Alonso Gonzalez, CIAT: "The Director of the fruit department at [INIAP](#) (Instituto Nacional Autónomo de Investigaciones Agropecuarias) told me recently that the government of Ecuador is planning to reorganize and (is) asking INIAP to focus only on research and forget about extension and assistance to farmers. He says that this is going to be very difficult. In Colombia the trend is the reverse. There is a body called [Fondo Nacional de Fomento Hortofruticola](#), which is basically a levy system. For every sale of produce 1% goes into a fund (...). The management of this fund is focusing a lot on extension, making sure that the farmers will have access to what is known. Computers are lacking but radio shows and magazines are used to disseminate information. Connectivity and the use of mobile



Training session on mango orchard IPM in Senegal, FAO

phones are increasing. Some crops are well informed but not minor fruit species that are mainly cropped by poor farmers who are generally not well educated."

Kumar Sisir Mitra, TFNet: "In my State (West Bengal, India), each district has two or three horticultural officers responsible for implementing different Government programs with growers such as the National Horticulture Mission, the National Food Security Mission, Micro-Irrigation program, Micro-Mode program, or Agri-Export Zone program (we have in our State an Agri-Export Zone for mango, litchi and pineapple). In these entire programs farmers are being trained regularly about improved practices for cultivation and postharvest management. The State agricultural universities have their own Directorate of Extension and the main activity of the Directorate is to transfer the generated technologies in the university through lab-to-land program or through KVK (Krishi Vijyan Kendra or Agriculture Science Centre) to the growers."

4. Public-Private Partnership (PPP)

Kumar Sisir Mitra, TFNet: "Over the years we have developed many good varieties and hybrids of tropical fruits, each State has developed the production protocol and postharvest management technologies. Indeed, many of the research results have been percolated to the growers and West Bengal has increased our production and productivity. However, extension of technologies needs further improvement as many growers are still using the traditional varieties and technologies. In the last ten years the Government has developed many infrastructures but still it is very negligible compared with what is required. The marketing channel is very poor in most of the States that caused 20-30% wastage of fruits and value addition/processing at the growers site is still very poor. I wish the private sector would come forward in the near future to have PPP mode for development of postharvest management and processing support to minimize the huge loss of perishable tropical fruits."

5. Conclusion

Tropical fruit researchers around the globe need and deserve secure funding to maintain and improve their programs. The GCARD roadmap must recognize and support these efforts that have great relevancy to the health and wellbeing of smallholder farmers. Donors must be found to strengthen the crop diversification approach to improving health and livelihoods. This should be a prominent avenue on the agriculture for development roadmap. The aim of GlobalHort is “to create wealth and improve human health and wellbeing in the world’s poorest countries through increased production, consumption, processing and marketing of fruits and vegetables and other horticultural crops.” GlobalHort will continue to lobby GFAR, CGIAR and other leaders of the GCARD process to secure a brighter future for tropical fruits research.

Not so much technology but much more coordination and co-operation

“The challenges of the future, will be to achieve greater relevance of research to real, whole industry problems; this requires a new approach. A framework of 'system' thinking to facilitate identification of constraints, in order of priority, and then to assist with the integration of traditional research results into the whole system would help ensure that the right questions are asked, and answered. If we are able to harness the synergy of integrated, multi-disciplinary teams to answer the identified questions, the success rate of research would increase substantially. Such teamwork depends on a strong spirit of co-operation and goodwill. The research challenge of the future might be to more effectively facilitate the development of truly co-operative and integrated, multi-disciplinary teamwork to broaden the approach while maintaining the disciplinary skills of individuals, and to involve industry in the process.”

Altaf Qadir, Scientific Officer, Horticulture Research Institute, Pakistan Agricultural Research Council. [Status of production and handling of tropical fruits in the WANA \(West Asia North Africa\) Region](#)

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- Coaching funded research projects addressing key constraints to achieving the GlobalHort mission
- Building the indigenous human capacity required to support smallholders investing in horticultural enterprise

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