



**Landscaping Institutional Strategies and Interests  
For the Development and Promotion  
of Underutilized Species**

for

**The Global Facilitation Unit  
for Underutilized Species**

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## **Literature review**

### **Introduction literature review**

This literature review is the first part of a two-step study to canvas institutional strategies and interests for the development and promotion of underutilized species. In the second step, this review will serve as the backdrop against which the responses to a questionnaire on institutional strategies are analyzed. If anything, this review attempts to illustrate the diversity of approaches in existence and not to provide a comprehensive listing. The examples selected are operating at global, regional or national levels. The cases listed are the International Centre for Underutilized Crops (ICUC), the International Plant Genetic Resources Institute (IPGRI), the International Bambara Groundnut Network, The PROINPA Foundation, India, Australia, European Union and the United States of America. All of these work from their own perspective on the promotion and development of neglected or underutilized crops and have adopted different approaches.

### **International Centre for Underutilized Crops (ICUC)**

The International Centre for Underutilized Crops (ICUC) is an autonomous, non-profit scientific research and training centre established in 1988. Its establishment had been requested by an international group of 189 scientists aiming to create an entity that could specifically assist, especially in developing countries, with the promotion of use of underutilized crops for food, medicine and industrial products and environmental improvement. Its mission statement reads *“Food security, improved nutrition and economic welfare of human beings raised through sustainable and increased economic production of food and industrial raw materials. This is to be achieved by developing and utilizing the untapped biological diversity of underutilized crops”* (ICUC, 2001). Through its coordinators in Asia and Africa, the ICUC works in close collaboration with national partners to promote interest and to support sustainable technology development for products and marketing of underutilized crops.

The strategic aim of the ICUC is to develop new and underutilized tropical and temperate species in the context of sustainable production systems for the benefit of producers and consumers in developing countries. It adheres to the principle of biodiversity conservation through use. ICUC very much works through a network structure in which it provides coordination and acts as a catalyst. The networks established, with involvement of the ICUC, mostly have a regional and/or crop specific focus such as (ICUC, 2003):

Underutilized Tropical Fruits in Asia Network (UFTANET) in collaboration with the Commonwealth Science Council (CSC), the Asian Pacific Association of Agricultural Research Institutions (APAARI) and Food and Agriculture Organization of the United Nations (FAO) established in 1995

Southern and Eastern Africa Network for Underutilized Crops (SEANUC) in collaboration with FAO and the Commonwealth established in 1995

West Africa Network for Tropical Fruits (WAFNET) in collaboration with FAO established in 1998

Underutilized Traditional Vegetables for Asia and the Pacific Network (UTVAPNET) in collaboration with FAO established in 1999

Its activities can be divided in 3 main areas:

Research and development of new and underutilized crops from wild and semi-domesticated species

The research programmes focus on priority species that have been established by ICUC and its partners. However global strategic studies such as an inventory of global research on underutilized crops (Williams & Haq, 2002) are also conducted.

Professional training courses

ICUC runs training courses in collaboration with national partners including universities. The training courses include topics such as assessment of diversity, cultivation methods for tropical fruits, use of germplasm and in vitro and molecular techniques for improvement of underutilized crops.

Information services

ICUC has developed a number of information services in support of the development of underutilized species. These include a database that maintains a wide range of information on botanical, agricultural and product data for underutilized species. It also has a publications programme that has produced regional meeting proceeding and monographs on underutilized crops (Williams, 1993 & 1995). In addition it regularly publishes a newsletter.

### ***International Plant Genetic Resources Institute (IPGRI)***

The International Plant Genetic Resources Institute (IPGRI) is one of the institutes of the Consultative Group on Agricultural Research (CGIAR). Within the CGIAR, IPGRI has a specific focus on the conservation and use of plant genetic resources. Neglected and underutilized species (NUS) have to some extent been part of IPGRI's work since its inception in 1974, but was made more prominent in IPGRI's research agenda with the Medium Term Plan 1998-2000 (IPGRI, 1997). The conservation and use of underutilized species is essential for a number of reasons:

Despite the fact that NUS play an important role in agriculture in developing countries, it appears that the conservation of NUS germplasm as part of established genebank programmes has not received due attention (Padulosi, 1999).

The introduction and use of more species in agriculture has several advantageous effects. It will result in a more diverse and secure food supply, a healthier diet, it has a large potential to generate income for farmers and contributes to more balanced ecosystems. All aspects that are central to IPGRI's (IPGRI, 2002) and the CGIAR's work (Swaminathan Foundation, 1999).

IPGRI's work is especially geared towards the strengthening of stakeholders to maintain and enhance the use of NUS. Especially for the poor, NUS are seen as a very strategic resource. Much of IPGRI's work is done through genetic resources networks, in collaboration with other partners, which have a focus on a crop/species or region. Some are focussed on a single underutilized species, such as the Bambara International Network (BAMNET) or the Network on Identification, Conservation and Use of Wild Plants

in the Mediterranean Region (MEDUSA). Others are dealing with a broad range of crops, but have activities related to underutilized species such as the West Asia and North Africa Network for Plant Genetic Resources (WANANET) and The Tropical Regional Genetic Resources Network (TROPIGEN). The integration of NUS activities into existing, broader based genetic resources networks can help NUS activities to establish themselves easier. NUS activities can piggy-back on existing networks where the establishment of a dedicated NUS network would not be possible.

IPGRI pursues 3 main objectives:

The development of priority setting approaches for the development and conservation of NUS

Strengthening the conservation and use of NUS genetic resources through complementary approaches

Strengthen the work of other actors' efforts working on other aspects of NUS development such as documentation, evaluation, breeding, processing and marketing.

The range of priority species covered by IPGRI projects on NUS is very diverse. Traditionally for IPGRI genetic erosion and conservation needs are important criteria for species prioritization. However, many other criteria are taken into consideration, such as the interest of the species to a wide spectrum of partners (Padulosi, 1999). Also whether the work on a species will have a large scale significance such as impact on food security and nutritional value, agricultural sustainability and income generation (Padulosi *et al*, 2001).

The dissemination of information (e.g. 24 monographs on NUS), research to assess biodiversity, effective policy development based on frameworks such as FAO's Global Plan of Action (FAO, 1996) and public awareness and mobilizing partners are all essential components for IPGRI's programme to move the work on NUS forward. The strengthening of linkages between stakeholders at local, e.g. participatory research, and global levels through structures such as the Global Facilitation Unit is essential to foster synergistic approaches between stakeholders at and across all levels. Concepts such as the commodity chain approach are making inroads to obtain a more comprehensive view of a crop and its stakeholders at all levels (from R&D to consumption) as the context to analyse its constraints and potential (Frison *et al*, 2000).

***The International Bambara Groundnut Network (BAMNET): An example of an Underutilized Crop Network.***

The International Bambara Groundnut Network (BAMNET) was founded as a result of the International Bambara Groundnut Workshop, held 14-16 November 1995 in Harare, Zimbabwe. The network membership currently covers 3 continents, Africa, Europe and North America, bringing together organizations that have agreed on a common agenda based on the beliefs that (BAMNET, 2003):

Bambara groundnut has great potential for yield improvement and income generation in developing countries

Bambara groundnut has a tremendous adaptability to semi-arid or arid as well as marginal areas

Bambara groundnut products have a tremendous market potential in urban centres as well as in rural areas

The objectives of BAMNET are to increase the importance of Bambara groundnut by improving its productivity, production, marketing and consumption with the overall aim to increase food security and alleviate poverty in developing countries.

Activities of BAMNET encompass aspects such as agronomy, germplasm conservation and management, breeding, utilization, information, documentation, economics and sociology. However, at present, the activities of BAMNET will focus on:

- crop improvement and breeding
- processing and marketing
- information and communication

Meetings in 1995 and 1998 were used to set priorities for research and collaboration and monitor progress to achieve network objectives. The network serves as a platform for the development of joint activities. Members contribute mostly in kind. During the second meeting in 1998, the most urgent objectives set in 1995 had been accomplished. Country reports and a list of experts were available, a revised descriptor list for bambara groundnut published, a newsletter and mailing list in place and funding for some research projects had been obtained (Begemann *et al*, 2002). Future development will focus on the strengthening of activities of the network whereby linkage to the Global Forum on Agricultural Research (GFAR) and the European Forum for Agricultural Research for Development (EFARD) are seen to provide good opportunities. The network has shown how a very diverse group of institutions with a common agenda can work together and achieve common goals.

### ***PROINPA foundation***

The Foundation for the Promotion and Research of Andean Products (PROINPA) based in La Paz, Bolivia is a non-profit organization that generates, promotes and diffuses technological innovations to improve the food security of Bolivian rural families (PROINPA, 2003). It also works actively on improving the competitiveness of productive chains of Andean crops such as quinoa and papalisa (*Ullucus tuberosus*) and others and makes a major effort to safeguard biodiversity as an important resource base for poor people in the Andean Region.

PROINPA identifies demands from different actors of Andean crop productive chains. It generates and validates technology alternatives in areas such as production systems and sustainable agriculture, genetic resources and agro-industry. It diffuses technologies generated using participatory methods.

PROINPA works in the Altiplano, interAndean and Mesothermic valleys of Cochabamba, La Paz, Potosi, Chuquisaca, Tarija and Santa Cruz departments. PROINPA has selected impact areas representing each agro-ecology zone, where it works directly with farm families. Its works with local, national and regional organizations, but also with national and international research organizations (e.g. IPGRI, Wageningen Agricultural University).

In some areas, for example in Bolivia's agricultural research and extension system, it has assumed responsibilities previously executed by the government. It is seen, by the Bolivian government, as a model of how it wants to restructure its agricultural research and extension services. The concept is to bring together private and public actors around

jointly elaborated and co-financed research and extension programs for major agro-ecological regions.

### **India**

The Indian sub-continent has long been recognized as harboring a wealth of biodiversity. An estimated 49,000 species of higher plants are known to occur of which 30% is endemic (Gautam and Singh, 1998). Early on the Government recognized the importance of underutilized species, available in India, as a means to attain a sustainable agricultural production, improve the nutritional value of food for large sections of the population and reduce India's dependence on imports of agricultural products. In 1982, the Indian Agricultural Research System initiated an All India Coordinated Research Project on Underutilized Plants (AICRPUUP) during the VI Five Year Plan to strengthen the research on underutilized species (Bhag Mal, 1987). The project currently operates through 21 government funded centres in different agro-climatic zones in India.

The objectives of the Indian programme on Underutilized species are (Joshi *et al*, 2002):

Identify new plant resources for food, fodder and industrial use

Establish germplasm collections and characterize, conserve and enhance the material

Develop high yielding varieties for different agro-climatic zones

Develop appropriate cultivation methodologies to be integrated with new varieties

Disseminate knowledge and materials to producers

Some 20 priority species were identified for the categories food crops, fodder and energy plants and industrial plants. Over the years some varieties of grain amaranth, buckwheat, winged bean, rice bean, faba bean, guayule and jojoba have been released.

In order to be successful, new introductions had to be attractive to farmers and easily fit in existing farming systems. Income assurances, availability of appropriate markets, post-harvesting technology and facilities and sufficient research back-up are all considered important issues to facilitate introduction (Bhag Mal *et al*, 1997).

Although the project itself might be considered primarily production oriented, there is a clear understanding that linkage between all layers of the production column (vertical) is essential to make new introductions succeed. Getting more stakeholders informed and interested in underutilized species will result in more involvement in the development of these species. Likewise it is necessary to stimulate international collaboration and exchange of information on research and development (horizontal linkage) through networking.

### **Australia**

In Australia the emphasis seems not so much on increasing the use of underutilized species as on the introduction of new species to Australia. New crop introductions, aimed mainly at income generation, have made major contributions to Australia's agricultural production. More than 67% of increased value of crop production between 1950-92 was derived from new crops (Chudleigh *et al*, 1994). These include cotton, lupin, mushroom,

sunflower, broccoli, soybean, melon, canola, triticale, avocado, macadamia, chickpea, mango, kiwifruit and almond (Wood *et al*, 1994)

The Rural Industries Research and Development Corporation (RIRDC) is an organization with a fairly innovative set-up because it is jointly funded from public and private sources (Wood and Fletcher, 1994). It spearheads the research and development of new crop development and is e.g. active in the initial introduction of new species. Private initiative is essential in the whole new crop development process and essential for RIRDC to support further development projects aiming at the production and commercialization of new crops. A very systematic approach has been developed with regard to the processes to encourage commercialization of new crop products by project participants in the new crop development process (Fletcher, 2002).

These include:

- Ten steps for planning (building motivation, commitment, planning)
- Community action (workshops including SWOT analysis)
- New rural industry development (setting goals and monitoring conditions)

The objective of the new crop development process is bring a group of participants that covers all aspects for the new crop development (production to consumers) together and through discussion and exchange of ideas, build motivation and commitment, analyze the market potential and set realistic goals for commercialization.

RIRDC has also produced a 2-part report (Wood *et al*, 1994) describing their new crop development experience in detail. These make valuable tools to develop strategic and operational plans for new crop development (Jolliff, 1999).

Although new crop development seems the major development thrust in Australia, there is also a thriving, mainly floricultural, export industry, based on Australia's native flora. Many indigenous Australian species are exported and cultivated abroad (Considine, 1996).

### **European Union**

In the recent past the European Union (EU) has become the dominant factor in setting global agricultural policies within Europe. Since the First EU Framework Programme (1984-'88), new crop development was included in the medium-term planning for agricultural research (Jolliff, 1999). Research was mainly stimulated to develop alternative industrial and non-food crops and renewable resources (Cappelle, 1996). This is on the one hand to reduce the costly surpluses for crops such as sugarbeets, cereals etc. and on the other hand to reduce the EU's deficits for cellulosic fibers and proteins through the development of renewable resources. The new crop development mainly refers to the introduction of completely new species or to develop new uses for existing crops. As a result of changing consumer preferences, there is a trend towards more natural and environmentally-friendly products (Rexen, 1992). The policies of the EU to support agricultural research for new crops have, over the various Framework Programmes, changed in a sense that they have become more multi-disciplinary, trans-national and involved both public and private sectors. In addition to research incentives, there are several EU regulations in place to support agricultural diversification:

2092/91 on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs

2078/92 on agricultural production methods compatible with the requirements of the protection of the environment and the maintenance of the countryside

1467/94 on the conservation, the characterization, the collection and the utilization of genetic resources in agriculture

EU regulation no 2081/92 on the "Production of geographic indications and origin denominations of agricultural and food products" offers opportunities for local products to develop niche markets by using "protected" product labels promoting produce from specific regions (Padulosi, 1999).

Public entities such as the EU and national governments see a clear role for themselves in the development of new crops for new markets while this is less the case for other sectors such as existing crops for new markets, and new crops for existing markets. The development of new crops for new markets is considered very high risk in respect to prospective return on investment. Therefore private funding is often difficult to find and public funding is required to start the development process.

The type of new crop development in the diverse countries within Europe differs greatly. While the UK, France and Germany focus mainly on alternative energy crops (biomass, biodiesel etc.), the Netherlands prefers a niche approach by focussing on vegetable oils (*Crambe abyssinica*, *Calendula officinalis*, *Limnanthus alba*), specialty fibers (*Canabis sativa*), and secondary metabolites (*Carum carvi*).

Over the years several genetic resources networks have been working on underutilized, traditional crops in Europe such as the Underutilized Mediterranean Species Project, crop specific EU funded projects under EU regulation 1467/94 and the MEDUSA project on wild plants from the Mediterranean Region (Heywood & Skouka, 1999). In 1999 The European Cooperative Programme for Crop Genetic Resources Networks (ECP/GR) established a Minor Crops Network (ECP/GR, 2003).

The EU also has a programme for joint international collaboration on research projects with developing countries (CORDIS-INCO). The programme focuses on projects that enhance the sustainable management and use of renewable natural resources in developing countries, improve the agricultural production within this framework of sustainable management of renewable resources and projects that have a distinct and positive impact on public health. Some of these projects deal with neglected or underutilized species (see <http://dbs.cordis.lu>)

### ***United States of America***

Research on newly introduced and underutilized crops has a long history in the United States of America (Joliff, 1999). If increasing crop diversity and developing new markets were initially objectives in themselves, nowadays new crops are seen as a way to make land that has been taken out of production, to reduce overproduction of major commodities, productive again. Activities focus on new uses of existing crops, such as to develop biological alternatives for petroleum based products, but also on new crop introduction (e.g. kenaf, quinoa). An important information hub on new crop development is Center for New Crops and Plant Products at the Purdue University ([www.hort.purdue.edu/newcrop](http://www.hort.purdue.edu/newcrop)). Since 1990 major New Crop Conferences have been organized every 3 year. Originally with a focus on the United States but increasingly on developments at a global level. Proceedings of these conferences are published at the Purdue University website (Janick & Simon 1990, Janick & Simon 1993, Janick 1996, Janick 1999, Janick & Whipkey, 2002).

Several federal programmes to fund research on new or underutilized crops are in place. The USDA Sustainable Agriculture and Research Education (SARE) and National Research Initiative (NRI) programmes provide funding for projects in value-added

agriculture or other aspects of sustainable agriculture (Myers, 1999). Funding is mainly aimed at universities, non-profit organizations and government agencies, but some smaller projects can be granted to private individuals such as farmers or teams of farmers.

The Alternative Agriculture Research and Commercialization Corporation (AARC) is a wholly owned corporation of the United States Department of Agriculture (USDA). Operating under a largely private-sector board of directors it provides venture capital to companies investing in the commercialization of non food/feed products derived from agricultural materials. Armstrong reports in 1999 that AARC had \$35 million invested (Armstrong, 1999). AARC's main criteria for investing are potential return on investment, ability to create jobs in rural America and the estimated increase in use of agricultural land that previously has been taken out of production.

Up till very recently a national coordinated effort for the development of new and underutilized crops was lacking. In 1996 a study proposed the establishment of the Thomas Jefferson Initiative for Crop Diversification (Janick *et al*, 1996) to Congress. Congress approved its establishment in 1998. The Jefferson Institute's activities include education, research and market development efforts aimed at improving the long-term viability of family farms (Jefferson Institute, 2003).

### **Overall comments literature review**

The examples provided aim to illustrate the diversity in approaches taken by entities working to promote and develop new, neglected and underutilized species. On the one hand we see the approaches in Australia, the European Union and the United States of America which target mainly already established commercial farmers that have access to well developed market systems. Their approaches are geared towards income generation and diversification of agricultural production at an industrial scale. Much of their focus is on new crop introduction or new uses for existing crops. India, IPGRI, ICUC, The Bambara network and PROINPA target mainly small subsistence farmers where safeguarding the biodiversity resource base, food security, public health, environmental improvement and poverty alleviation are the main objectives. Here the promotion and development of neglected and underutilized species is a higher priority than introducing novel crops. Market systems are in general less well developed. The degree of success of the different approaches is probably more easily assessed for Australia, the European Union and the USA since their efforts are largely directed towards income generation by industrial scale farming systems. The indicator for success could be measured in monetary terms, although the environmental and social benefits of producing industrial source materials in a more sustainable and environmentally friendly way are more difficult to quantify. Measuring the success of NUS projects for subsistence farmers is very complex. The economic impact will already be difficult to measure since a substantial part of the economic activities of subsistence farming communities are not captured in official statistics. Further complication will be that many factors concerning human well-being are being targeted. These are difficult to express in exact economic figures. However if strong government involvement and support is secured, such as in the case of India, the chances of success are likely to increase substantially. Governments support is essential to create a conducive environment for the development of NUS projects. Small and local initiatives that lack a strong government backing will face a much more difficult task. Despite the differences in approach, there is a common understanding that the development and promotion of new, neglected or underutilized crops requires a very holistic approach. This is the only way to be able to fully assess the crop potential and to

bolster the efforts from all stakeholders involved from the initial stages of R&D to the final marketing of products.

## ***Analysis of questionnaire data institutional strategies and interests***

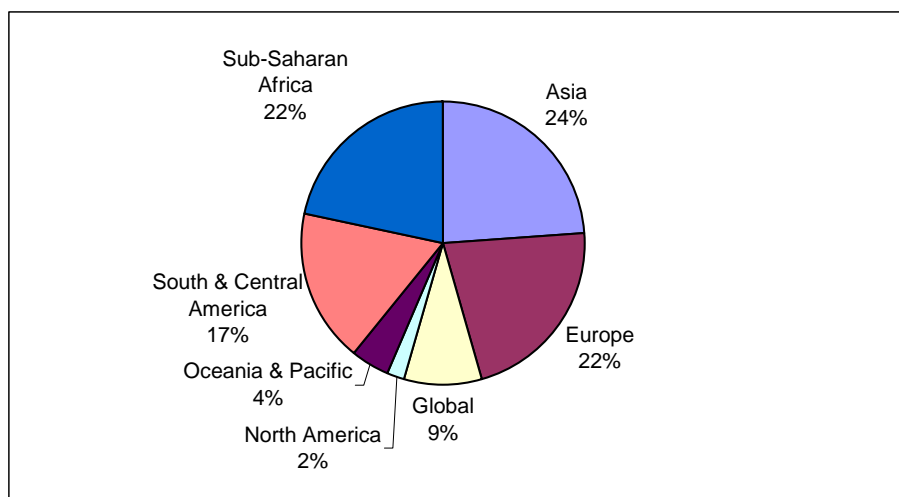
### ***Introduction analysis questionnaire***

In July 2003, an electronic questionnaire was sent out to approx. 450 potential stakeholders world-wide to solicit information on their involvement in the development and promotion of underutilized species. The sample group included organizations with very different backgrounds such as genetic resources and agricultural research, development organizations, NGO's, donors and farmers' organizations. The organizations were asked to provide contact information, indications of field of interest and who they considered key actors in the field. Also data on projects were solicited including objectives, strategies, activities, scope and partners. The current analysis uses the responses from 46 organizations including 69 of their projects. This is only a subset of the responses received. It includes only organizations providing institutional and project information for which the data was available in a standard format at the time this analysis was performed.

### ***Results***

#### *The organizations, their interests and perceived key actors*

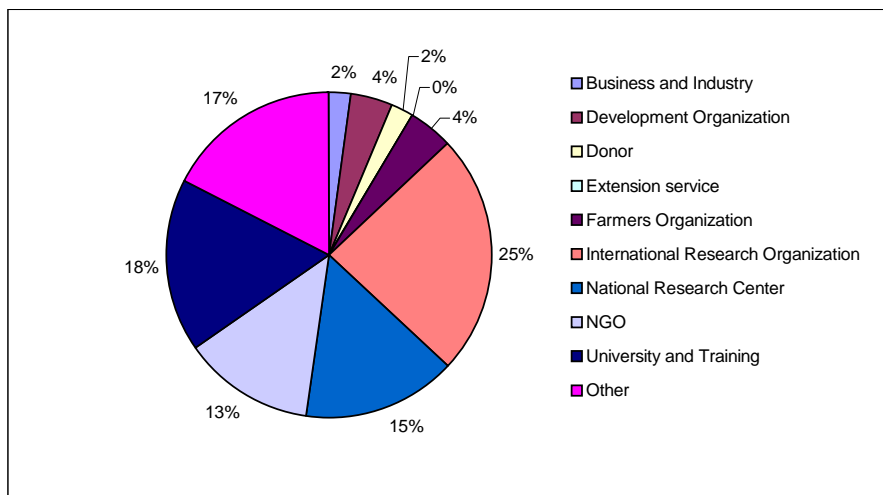
The 46 organizations included in this analysis represent a fairly good spread across regions of the world (see figure 1). The "Global" category includes institutes



**Figure 1. The analysis: Organizations by region**

such as the International Plant Genetic Resources Institute (IPGRI), UNESCO-MOST and the International Atomic Energy Agency (IAEA). Also the Bambara Groundnut Network (BAMNET) is classified as such since the network partners come from a number of regions (Africa, Europe and North America).

If we consider the type of institutions included in this analysis (figure 2), we notice that some types, such as Business & Industry, Development Organizations, Donors, Extension Services and Farmers Organizations are not extremely well represented while there is a very dominant research sector. Forty percent is either an international or national research organization and another 18% is from the University sector. The "Other" category includes private, governmental organizations and networks.



**Figure 2. The analysis: Types of institutes**

An overview of the organizational fields of interest is provided in Table 1. The top 3 interest fields are respectively genetic resources, applied research and training. This is in agreement with findings from an earlier study on research activities related to underutilized plant species (Dell’Orco, 2003). Policy and legal interests are the least frequently mentioned interest field in this group. The “Other” category includes a variety of interests including value-added processes, poverty alleviation and sustainable use.

Field of interest	Number of organizations (%)
Genetic resources	31 (67%)
Applied research	27 (59%)
Training	24 (52%)
Extension/ technology dissemination	22 (48%)
Documentation, information and public awareness	22 (48%)
Marketing	18 (39%)
Socio economics	16 (35%)
Post harvest	13 (28%)
Policy/legal	9 (20%)
Other	5 (11%)

**Table 1. Organizations: Field of interest (n=46)**

The fields of interests are not mutually exclusive. For example, an interest in genetic resources is often matched with an interest in applied research (21 organizations). On average the organizations selected 4 fields of interest, but a large variation exists between organizations. Organization such as the Southeast Asian Regional Institute for Community Education (SEARICE) and the Plant Resources of South-East Asia (PROSEA) list a single field of interest, while the CGIAR Centres IPGRI and CIP indicate very wide ranging interests (9 fields selected).

The questionnaire also solicited information on who the participating organizations consider key actors. A number of respondents indicated that all categories could be considered as such. Overall however, the National Research Organizations were mentioned most often (25 of 46), followed by International Research Organizations (18 of

46), NGO's (15 of 46) and University & Training (13 of 46) (see table 2). Business & Industry and Extension Services are least often mentioned. We have to keep in mind that some 58 % of the respondents are active in research themselves (see figure 2). This could well skew the results to some extent towards a strong emphasis on key actors from research (National, International and Universities).

If we look at the responses at a regional level we notice that in Asia and Europe, the NGO sector is mentioned as often as National Research Organizations as key actor. International Research Organizations come third. In South & Central America and Sub-Saharan Africa, the International Research Organizations and Universities follow the National Research Organizations, but are mentioned more often than the NGO's. The latter 2 regions seem to rely much more on the formal sector.

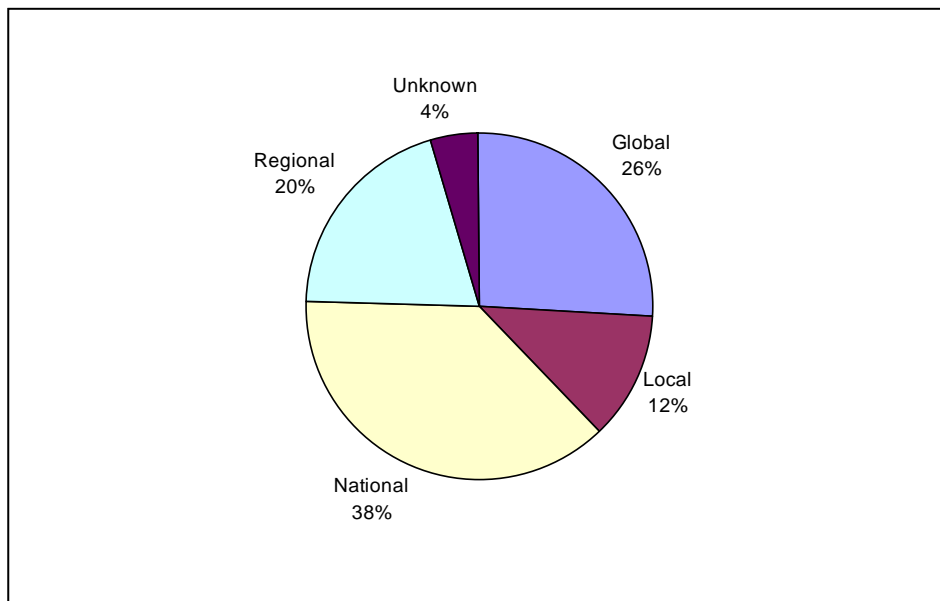
	Asia	Europe	Global	North America	South & Central America	Sub Saharan Africa	Pacific & Oceania	Total No resp.
	%	%	%	%	%	%	%	No.
Int. Research Org.	36	30	25	-	<b>62</b>	<b>40</b>	50	18
Nat. Research Org.	<b>45</b>	<b>50</b>	25	100	<b>75</b>	<b>60</b>	50	25
Univ. & Training	18	20	-	-	<b>62</b>	<b>30</b>	50	13
NGO	<b>45</b>	<b>50</b>	-	-	37	10	50	15
Farmer Org.	27	30	-	-	37	10	50	11
Extension Service	27	20	-	-	25	-	50	8
Business & Industry	18	-	-	100	37	10	-	7
Development Org.	36	30	-	-	25	10	50	11
Total no resp. per region	(n=11)	(n=10)	(n=4)	(n=1)	(n=8)	(n=10)	(n=2)	

**Table 2. Perceived Key actors by region (% of respondents per region)**

Together the 46 institutions mentioned 13 international and 11 national key actors by name. The key actors most often mentioned were the International Plant Genetic Resources Institute (4x) and the International Centre for Underutilized Crops (3x). Both are International Research Organizations with well-known and comprehensive programs on neglected and underutilized species that have activities in various parts of the world.

*The projects: their objectives, strategies and activities*

The 46 respondents submitted data on 69 projects. These data contain indications on objectives, strategies and activities, where the project is executed, its scope and status. Figure 3 shows the breakdown in projects with a local, national, regional and global focus.



**Figure 3. Overall geographical focus of projects**

Table 3 provides the projects and their geographical focus per region. In most regions, with the exception of Asia, the proportion of projects with a (sub)-national focus is about equal to the proportion of projects with an international focus. Within Asia the proportion of projects with an international focus is much smaller than the projects with a (sub)-national focus. Projects with a global geographical focus can be executed in several regions (Global) or they can be executed in a specific region. E.g. a component of a project with a global geographical focus can be executed in a specific region (e.g. an global project on nutritious neglected species with a component on nutritious millets in Asia).

Region	Geo focus	No of projects	Region	Geo focus	No of projects
Asia	Global	1	South & Central America	Global	1
	Local	4		Local	2
	National	6		National	6
	Regional	1		Regional	5
		<b>12</b>			<b>14</b>
Europe	National	6	Sub Saharan Africa	Global	5
	Regional	5		Local	2
	Unknown	2		National	5
		<b>13</b>		Regional	2
Global	Global	9		Unknown	1
		<b>9</b>			<b>15</b>
North America	Global	1			
		<b>1</b>			
Pacific & Oceania	Global	1			
	National	3			
	Regional	1			
		<b>5</b>			

**Table 3. Projects and their geographical focus per region**

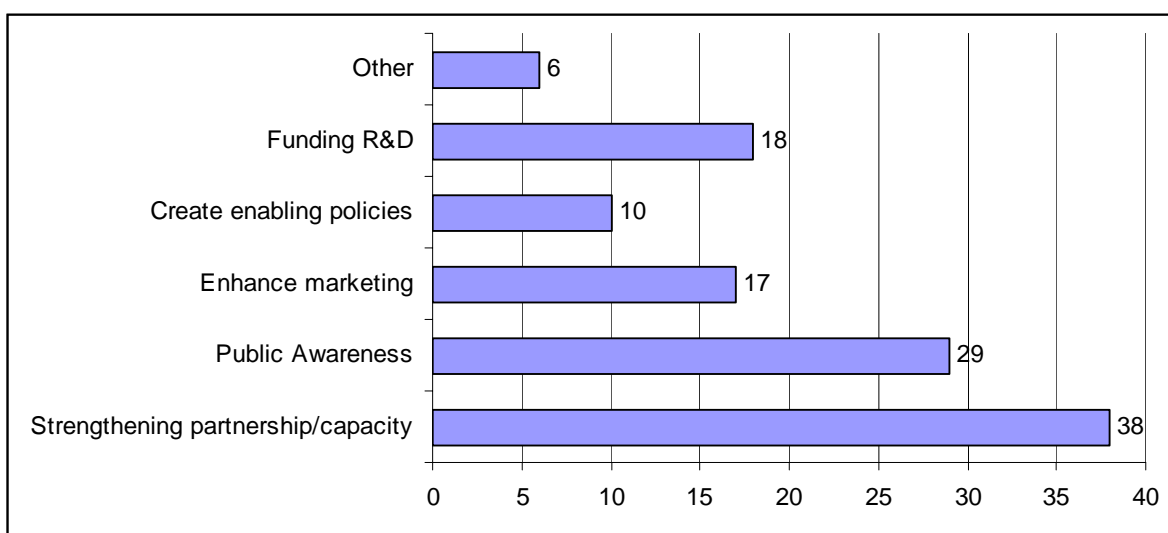
Likewise a project executed in a specific region can be of global significance (e.g. a germplasm collection)

*Objectives, strategies and activities*

Table 4 provides an overview of project objectives per region. Biodiversity conservation, income generation and food security were the most common project objectives overall. The top position of biodiversity conservation is matched by the institutional interest in genetic resources in the previous section (see table 1). For projects executed in Asia and Europe, cultural diversity seems a more prominent project objective than in any of the other regions. In South & Central America and Sub-Saharan Africa income generation and food security gain importance as project objectives. While in South & Central America nutrition seems fairly underrepresented as an objective.

	Nutrition	Food security	Biodiv.	Income generation	Cultural diversity	Other
Asia	5	5	12	8	6	3
Europe	8	5	11	3	5	2
Global	1	2	1	2	0	2
North America	0	0	1	0	0	0
Pacific & Oceania	0	1	1	0	0	0
South & Central America	1	6	9	10	2	4
Sub-Saharan Africa	6	9	7	10	2	3
<b>Total per objective</b>	<b>21</b>	<b>28</b>	<b>42</b>	<b>33</b>	<b>15</b>	<b>14</b>

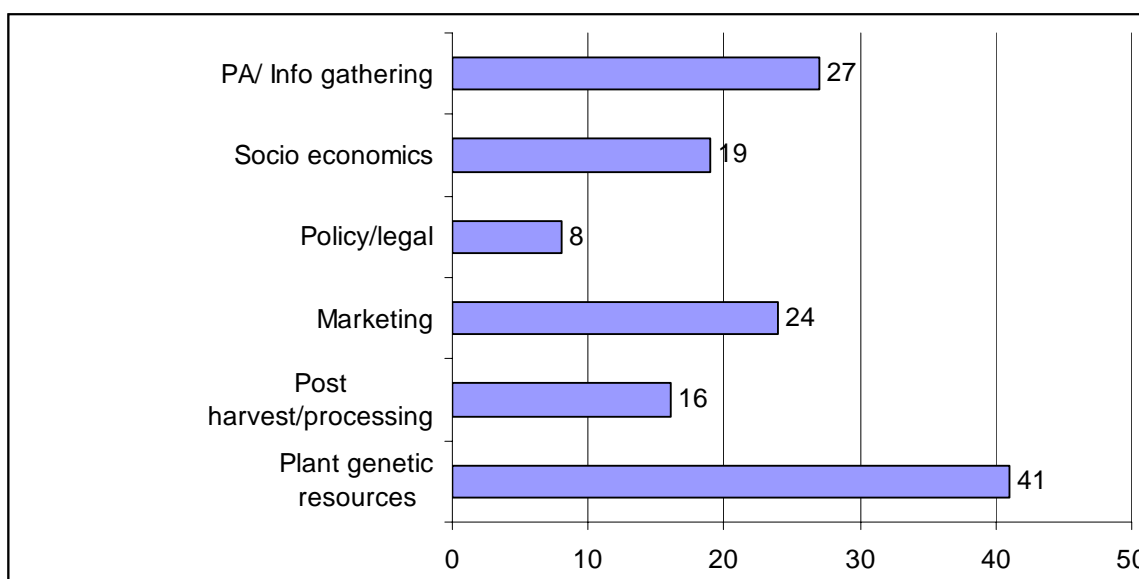
**Table 4. Project objectives per region.**



**Figure 4. Frequency distribution of project strategies applied**

Considering the strategies applied in projects we see that “Strengthening partnerships” and “Public Awareness” are the 2 most frequently used strategies, followed by “Funding R&D” and “Enhance Marketing”. Further analysis to evaluate linkage between objectives and specific strategies could not be performed on the current data set.

When looking at the project activities we notice that “Plant Genetic Resources” is most often mentioned followed by “Public Awareness/ Information Gathering” (fig. 5). Policy and legal activities are least often mentioned. As already seen under the objectives, biodiversity related work is a well established component in many NUS related projects.



**Figure 5. Frequency distribution of project activities**

Public awareness and information gathering are important activities to raise awareness, mobilize resources and build an information resource on which future action can be based. Policy and legal activities are least often mentioned as were the enabling policy objectives in figure 4.

#### *Discussion analysis*

The analysis is based on a relatively small sample of 46 organizations and 69 projects. As such it can hardly claim to provide a comprehensive overview. Nonetheless some trends can be indicated.

From the sample taken, it seems that work on NUS is very much research driven. Research organizations at the national and international level, including universities, make up a very large part of organizations active in this field (58% in this analysis). NGO's seem to have established a clear presence also. However organizations representing Extension Services and Business & Industry, which are essential to introduce crops into the production systems and push them on the market, seem very much under-represented. Asked about perceived key actors in the field, the responses depict a similar situation. National Research Organizations come out on top as part of a dominant research sector. One would expect that work on NUS requires a strong research effort to set the development of these species on a solid footing. However there is the risk that an over-representation of research organizations in the field as a whole will lead to an over emphasis on research issues. A recent workshop in Germany on “Enhancing the Role of Underutilized Plant Species for Poverty Alleviation” also noted the

dominance of the research sector in this field and stressed the importance of participation by non-research stakeholders (Guendel *et al*, 2003). Other key activities further on down in the crop development cycle, related to production and marketing, might suffer neglect as a result. All this occurs despite the fact that there is a common understanding that a close collaboration between all stakeholders involved in the development and promotion of NUS, from R&D to marketing, improves the chances of a successful development.

The data on the 69 projects showed a mix of (sub-)national and international projects. In most regions these are found in about equal quantities, with the exception of Asia where the (sub-)national projects are much more numerous than international ones. Unfortunately the data does not support any further indications as to why this is the case.

Overall the most popular NUS related project objectives deal with biodiversity, income generation and food security. Regional differences occur however. For projects executed in Asia and Europe cultural diversity as an objective seems more prominent. In South & Central America and Sub-Saharan Africa income generation and food security are the top project objectives. If we relate this to Table 2, which presents perceived key actors per region, we find that in Sub-Saharan Africa and South & Central America, where food security is a top project objective, the most frequently mentioned key actors are from the formal research sector (National and International Research Organizations and Universities). These types of organizations are indeed most likely candidates to work on food security issues. In Asia and Europe, NGO's are frequently mentioned as key actors. These organizations would well be geared towards projects with a cultural diversity objective. The choice of partners seems very much related to the specific objectives that are to be achieved.

If we look at project strategies it seems that Strengthening Partnerships/Capacity and Public Awareness both are frequently applied. In the context of NUS this makes sense. Often in the absence of any structured development, production and marketing effort for specific neglected or underutilized species, individual stakeholders have to be united, organized and capacitated to increase their joint impact above critical levels. This is necessary to move the NUS development process forward. Public awareness will generate interest and commitment from additional people and resources to further boost the effort.

It is worth noting that apparently creating enabling policies and policy/legal activities score low in both project strategies and activities. It is well known that enabling policies are extremely important to provide a conducive environment to support the development of NUS. The development is often a very challenging process and various obstacles need to be overcome. Clear and supportive policies can lower some of these obstacles and increase the chances of success. For example a clear government policy on research support for NUS can help to soften the perceived high risk image that overshadows many new crop developments and make it a more attractive proposal for potential investors. The data analyzed in this report suggests that possibly the aspect of policy development is either under-valued or under-exploited. It is clear that in this area some sensitive issues may need to be tackled and there might be a reluctance to introduce changes, but it is equally clear that without full policy support development and progress in the whole field will be seriously hampered. This is in stark contrast to aspects of biodiversity. It is a very visible and well-established component in many NUS programmes. There is a common understanding that genetic resources are an important resource base for NUS development. The principle of "conservation through use" is applied in many projects.

The structure in which the data resulting from this questionnaire were collected imposed some limitations on the type of relationships that could be analyzed. A more detailed analysis of, for example, objectives and related strategies or strategies and related activities might have been interesting. However because each data record contained multiple objectives against multiple strategies, the direct relationship between individual objectives and related strategies could no longer be established. The same approach was used for some other data items such as Key actors and their fields of interest, strategies and activities etc. If it is considered useful to evaluate this kind of relationships, it is suggested that the data-structure be modified to facilitate such an analysis.

### ***Conclusions analysis***

The analysis of the data yielded clear indications as to whom are **perceived** key actors involved in the promotion and development of neglected and underutilized species. National Research Organizations are seen by many as the mayor key actor in collaboration with International Research Organizations, Universities and NGO's. However the fact that not many organizations were mentioned by name could suggest that in practice the National Research Organizations play a less prominent role. Of the International Research Organizations IPGRI and ICUC are most often mentioned by name, be it at relatively low frequencies. Both seem to be fairly well known in the field without exactly dominating the scene.

Overall, research seems very well represented in the field, while other sectors such as Extension Services and Business & Industry are under-represented. Such an unbalanced representation of stakeholder interests could easily have negative effects on the development cycle of NUS and should be closely monitored.

Another area that is highlighted for attention is related to the development of enabling policies. The data reviewed seems to indicate a relative lack of interest for this activity. Considering the importance of these policies to create an environment in which the development of NUS is greatly facilitated, strong support in this area is essential.

Based on the limited data available, it is difficult to indicate areas where overlap occurs. The activities are geographically spread and in quite some cases very isolated. Overlap would be very difficult to pinpoint in the first place and likewise any measures to counter overlap would be very difficult to implement. Many of the projects indicate that special efforts are made to strengthen the linkages between all stakeholders involved. Integration not only occurs at a peer level, e.g. genetic resources networks, but also vertically across the entire production column. As these linkages continue to intensify, more information on past, present and future activities will become available and identification of overlap easier to detect and remedy.

### ***Overall conclusions***

This survey was conducted as a two step process. The first part consisted of a literature review of different approaches used for the promotion and development of new, neglected or underutilized species. This to obtain an insight in approaches applied world-wide. The second part consisted of an analysis of institutional interests and projects. This was a somewhat more detailed level in which the institute's objectives, strategies and activities were reviewed. From the literature review and the institutional survey it was clear that the objectives for involvement in NUS activities were different per geographical region. In Africa and South & Central America food security and income generation were

major objectives, while for the highly industrialized countries in the European Union, United States of America or Australia income generation and agricultural diversification were more important. Asian countries seemed to take an in-between position in which the wide range of objectives was targeted without a clear emphasis on a particular objective. The highly industrialized countries seem to focus on the introduction of new crops, development of new uses for existing crops or development of environmentally friendly crop alternatives for raw industrial products. The developing countries aim at making a more optimal use of existing crops, either neglected or underutilized, and less at introducing completely new crops.

Although the nature of these programmes might be different, there seems to be broad agreement on general approaches to programmes to develop new, neglected or underutilized species. Strengthening partnerships, capacity building and a large information component, that includes public awareness and information gathering, are very common strategies to push the programme forward. Most programmes have a strong biodiversity component in common while policy and legal activity areas are not very well developed. Most programmes have a very strong research sector, where national research organizations are perceived to play a major role, but lack a substantial participation by the production and marketing sectors. This despite the fact that there is a broad understanding that active participation of all stakeholders is essential to make achieve success.

The fact that similarities exist, means that there could be opportunities to share principles and methodologies between developed and developing country programmes. The more similar the settings of the NUS programmes are, the more one would expect that sharing would be possible. Developed countries probably have more in common with each other. Likewise developing countries would probably have more in common with each other. Networking between similar programmes could definitely strengthen the individual programmes. This does not mean that opportunities for collaboration between developed and developing countries in this field do not exist. The International Bambara Groundnut Network clearly shows how a joint agenda can be developed between developing and developed countries and successfully implemented.

The literature review indicates that there is no clear standard approach. Developing and developed countries alike need to design their individual programmes making the most optimal use of local resources and opportunities.

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