Minor crops and underutilized species: lessons and prospects

S. Padulosi¹, I. Hoeschle-Zeledon² and P. Bordoni²

¹ International Plant Genetic Resources Institute, IPGRI, Aleppo, Syria
² Global Facilitation Unit for Underutilized Species, IPGRI, Rome, Italy

16 September 2005, CWR Conference, Agrigento, Italy
Content

• The message
• Minor and underutilized crops
• Underutilized species & CWR
• Evolving interest and milestones
• Prospects
The Message

Poor communities around the world depend on these species for their livelihood. They are part of a strategic, culturally important, resource asset in support of nutrition, health and income generation.

Priorities

- Economics (marketing, fair trade)
- Nutrition (enhancement)
- Empowerment of communities (capacities)
- Policies (conducive environment)
- Maintenance (biodiversity and knowledge)
- Provision of seed (quality, seed system).
Content

• The message
• Minor and underutilized crops
• Underutilized species & CWR
• Evolving interest and milestones
• Prospects
Minor crops

Some official definitions exist, such as that of the American Pesticide Association (FQPA) “crops cultivated over fewer than 300,000 acres of land”. They serve specific regulatory scopes. However, many crops can be minor in terms of acreage of land but not necessarily with regard to their income generation (e.g. saffron).
Lesser used species

minor
underutilized
underexploited
neglected
NEW
promising
ALTERNATIVE

Local
secondary crops
orphan
lost
niche

Traditional
Common features of underutilized species

- **Important** in local consumption and production systems
- **Highly adapted** to agro-ecological niches and marginal areas
- **Ignored** by policy makers and excluded from R&D Agendas
- **Represented** by wild species, ecotypes, landraces
- **Cultivated** and utilized drawing on IK
- **Hardly represented** in *ex situ* gene banks
- **Characterized** by fragile or non existent seed supply systems

We believe that local varieties of commodities should not be part of Underutilized Species as they belong to that broad agricultural basket which already enjoys R&D support.
<table>
<thead>
<tr>
<th>MAJOR CROPS</th>
<th>UNDERUTILIZED CROPS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Farm Management Criteria</strong></td>
<td></td>
</tr>
<tr>
<td>High production- high risk</td>
<td>Low production- low risk</td>
</tr>
<tr>
<td>Few products</td>
<td>Many products</td>
</tr>
<tr>
<td>Homogeneous produce</td>
<td>Heterogeneous produce</td>
</tr>
<tr>
<td>Certified seed</td>
<td>Local seed</td>
</tr>
<tr>
<td><strong>Commercialization Criteria</strong></td>
<td></td>
</tr>
<tr>
<td>Satisfy modern nutritional habits</td>
<td>Satisfy local nutritional habits</td>
</tr>
<tr>
<td>Regional, national, int. markets</td>
<td>Mainly local markets</td>
</tr>
<tr>
<td>Dependency on world market prices</td>
<td>Mainly local markets</td>
</tr>
<tr>
<td>Subsidies and incentives</td>
<td>No subsidies or incentives</td>
</tr>
<tr>
<td><strong>Ecological criteria</strong></td>
<td></td>
</tr>
<tr>
<td>Highly sensitive to climate</td>
<td>Locally adapted</td>
</tr>
<tr>
<td><strong>Cultural criteria</strong></td>
<td></td>
</tr>
<tr>
<td>Internationally promoted using global standards</td>
<td>Relevant to local identities/ values and selected using local criteria</td>
</tr>
</tbody>
</table>
Rocket: agronomic and post-harvest research behind Italian booming cultivation & export. This has released the pressure on wild populations in southern regions. In many other countries, they still remain a neglected/und. crop.
Our ultimate goal is advancing well being of people: when faced with the question whether a species is or not an underutilized crop we should be asking ourselves whether our intended efforts will lift-up the status of use of the selected species and bring benefits to those very communities who have safeguarded such species over centuries. Social equity and fairness should be ultimately the guiding principles in selecting underutilized species.
Content

• The message
• Minor and underutilized crops
• Underutilized species & CWR
• Evolving interest and milestones
• Prospects
Underutilized species & CWR

1. Underutilized wild relatives of commodity crops
2. Wild relatives of domesticated underutilized crops
3. Underutilized wild species used as such
1. Underutilized wild relatives of commodity crops

Wild almond (*Prunus amygdalus*) in Southern Syria
Wild cowpea

(*Vigna unguiculata*: primary gene pool taxa)
2. Wild relatives of domesticated underutilized crops

Pomegranate (*Punica granatum*)

- Remnant forest of wild pomegranate in Western Kopet Dag Mts, Turkmenistan
- Cultivated varieties from Central Asia
- Cultivated varieties in San’a market, Yemen
Only existing population in the world of most primitive wild relative of pomegranate (*P. protopunica*), under threat of genetic erosion (Island of Socotra, South Yemen).
breadfruit

(Artocarpus altilis)
Wild forest of *Annona cherimola* in Pucallpa, Peru
3. Underutilized wild species used as such *Gundelia tournefortii* ("akoub") delicatessen of the Middle East

*Genetic erosion* due to massive harvests from its natural habitats in Lebanon
Content

• The message
• Minor and underutilized crops
• Underutilized species & CWR
• Evolving interest and milestones
• Prospects
Evolving interest and milestones

| 1970s | Very scarce R&D, main focus on staple crops  
|       | USA National Academy of Science document (1975) |
| 1980s | Attention mounting also as result of increased recognition of importance of CWR (IITA, CIP, ICRISAT, AVRDC..)  
|       | IPGRI’s collecting missions/studies (e.g. Vigna spp.)  
|       | ICUC established (1987)  
|       | Research Program established in India  
|       | International collaboration |
Evolving interest and milestones continued

<table>
<thead>
<tr>
<th>1990s</th>
<th>Donor funding (s.a. DFID, SDC, the Netherlands, Japan, Italy)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Projects launched at IPGRI (s.a. UMS, crop monographs)</td>
</tr>
<tr>
<td></td>
<td>Purdue Conferences on New Crops</td>
</tr>
<tr>
<td></td>
<td><strong>FAO State of World Report</strong></td>
</tr>
<tr>
<td></td>
<td>EU Projects (s.a RESGEN 95/29-96/97)</td>
</tr>
<tr>
<td></td>
<td>Chennai Meeting by CGIAR Policy Committee (1999)</td>
</tr>
<tr>
<td></td>
<td><strong>Networking (UMS, MEDUSA, CIHEAM, BAMNET, UTFANET...)</strong></td>
</tr>
</tbody>
</table>
### Evolving interest and milestones continued

<table>
<thead>
<tr>
<th><strong>2000s</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>➢ Dedicated internet web sites</td>
<td></td>
</tr>
<tr>
<td>➢ GFAR recognition (2000)</td>
<td></td>
</tr>
<tr>
<td>➢ Major Global Projects launched (s.a. IFAD-NUS-2001)</td>
<td></td>
</tr>
<tr>
<td>➢ Global Facilitation Unit for und spp. established (2002)</td>
<td></td>
</tr>
<tr>
<td>➢ Increased attention by NARS</td>
<td></td>
</tr>
<tr>
<td>➢ LEISA issue published (2004)</td>
<td></td>
</tr>
<tr>
<td>➢ CGIAR priorities (2005)</td>
<td></td>
</tr>
<tr>
<td>➢ Recognition by SBSTTA/CBD and COP7(2005)</td>
<td></td>
</tr>
<tr>
<td>➢ USAID Hort. Assessment (2005)</td>
<td></td>
</tr>
<tr>
<td>➢ Chennai Conference for policy makers (2005)</td>
<td></td>
</tr>
</tbody>
</table>
Reasons for today's increased attention

- Alternative source of incomes
- Collapse of commodities’ prices
- Greater appreciation of biodiversity in enhancing livelihood
- Participation of Communities in setting research Agendas
- Stronger NARS, willing to invest beyond commodities crops
- Search for cultural identities in a globalized/ more “mobile” world
- Multi-ethnicity in cities and demands for traditional food
- Better understanding of “Green Revolution” limits
- Greater attention on gender sensitive research
Main message: mainstreaming of underutilized species in R&D Agenda is needed in order to fully exploit their potential.
Main messages

• The identification of constraints and success factors in marketing these species is a key aspect for their promotion;

• Capacity building at different levels (chain actors, policy makers, researchers..) is highly needed.
The conservation issue: analysis of data from the FAO 1996 State of the World Report for PGRFA

> 6,000,000 accessions
1,300 collections
78% major crops (3,400 spp.)
22% non-major crops/underut.

more than 80 % (5,350) species are represented on average by less than 10 accessions !!!

2008 FAO SWR to provide opportunity for re-assessing the situation
Over-harvests from the wild: case of “SALEP” (species belonging to *Orchis, Ophrys, Serapias* genera), Turkey.

Photo: courtesy of Prof. C. Baser, University of Eskisehir, Turkey.
Edible uses
Fresh 494
Cooked 478
Pickled 76
Spice 36

UNPRECEDENTED LOSS OF IK: THIS IS NO MORE TRANSMITTED TO YOUNGER GENERATIONS !!!!!!!
Italy: traditional soup made out of 56 wild species in Friuli Region. Only very few elderly people still know how to find the plants and prepare the dish:

HOW MANY RECIPES S.A. THIS WILL BE SOON LOST??

Photo: Prof. Paoletti, University of Padova, Italy
In situ/on farm conservation most strategic

- sheer no. of species vs. limited funds
- limited knowledge on conservation/biology of so many species
- trends in ex situ gene banks
- maintenance of associated IK
- suitable environmental niches
- legal policy issues
- greater participation of communities
Conserving and increasing the Use of Neglected and Underutilized Crop Species

This Web site intends to draw attention to those species of plants which have been neglected in a varying degree by researchers or have been underutilized economically. It is hoped that this information will contribute to: (1) identifying constraints in and indicate possible solutions to greater use of these species, (2) identifying possible untapped genetic diversity for breeding and crop improvement programmes and (3) detecting existing gaps in available conservation and use approaches.

Many web pages exist dedicated to such species and managed also directly by local communities
SYSTEM PRIORITY 1

SUSTAINING BIODIVERSITY FOR CURRENT AND FUTURE GENERATIONS

Priority 1B: Promoting conservation and characterization of underutilized plant genetic resources to increase the income of the poor

More references in the document.
Strategizing on underutilized species

Evy Tixe

Promising and Underutilized Species
Crops and Breeds

Global research on underutilized crops
An assessment of current activities and proposals for enhanced cooperation

J.T. Williams and N. Haq

IPGRI Strategy for neglected and underutilized species
(downloadable in E, S, R, C, A languages)
Underutilized species covered in many parts of the document—now being distributed at the UN Summit in NY.
Global partnership initiative launched in 2002 to raise prominence of underutilized species in international R&D Agendas.

Welcome to the web-portal for Underutilized Species

Underutilized species have a potential to ...

... enrich the wealth of agrobiodiversity
... increase incomes
... ensure food security
... improve nutrition
... occupy important ecological niches
... withstand stress conditions
... be produced with low cost
... stabilize ecosystems
... create new markets

http://www.underutilized-species.org/
WHO is working on underutilized species?

GFU Survey (2005)
700 people contacted/ 209 answered
209 Experts of 169 Institutions dealing with 185 Projects

- 37 Americas
- 37 Asia-Pacific-Oceania
- 76 Europe
- 45 Sub-Saharan Africa
- 14 Central/West Asia
Field of expertise of respondents

<table>
<thead>
<tr>
<th>Objective of Projects / experts dealing with applied research</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodiversity</td>
<td>38</td>
</tr>
<tr>
<td>Cultural Diversity</td>
<td>18</td>
</tr>
<tr>
<td>Food Security</td>
<td>28</td>
</tr>
<tr>
<td>Income Generation</td>
<td>27</td>
</tr>
<tr>
<td>Nutrition</td>
<td>22</td>
</tr>
</tbody>
</table>

Whose main objectives are

58 projects are on Applied Research

Whose main activities are

<table>
<thead>
<tr>
<th>Activities</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing</td>
<td>49</td>
</tr>
<tr>
<td>Plant Genetic Resources</td>
<td>90</td>
</tr>
<tr>
<td>Policy / Legal</td>
<td>22</td>
</tr>
<tr>
<td>Post Harvest / Processing</td>
<td>40</td>
</tr>
<tr>
<td>Public Awareness / Gathering &amp; Sharing Information</td>
<td>57</td>
</tr>
<tr>
<td>Socio-economics</td>
<td>39</td>
</tr>
</tbody>
</table>

Institution Type

<table>
<thead>
<tr>
<th>Institutions types</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutions types</td>
</tr>
<tr>
<td>International Research Organization</td>
</tr>
<tr>
<td>National Research Center</td>
</tr>
<tr>
<td>University and Training</td>
</tr>
<tr>
<td>NGO</td>
</tr>
<tr>
<td>Farmer's Organization</td>
</tr>
<tr>
<td>Business and Industry</td>
</tr>
<tr>
<td>Donor</td>
</tr>
<tr>
<td>Extension Service</td>
</tr>
<tr>
<td>Development Organization</td>
</tr>
</tbody>
</table>
The EU Novel Foods Regulation – its impact on trade in biodiversity products from developing countries

The challenge
A lot of the world’s food is derived from just a few crops. Rice, maize and root crops supply roughly three-quarters of the world’s food energy. In terms of the range of edible and non-edible plants, there are just 20 species that dominate agriculture and 40 species that dominate wild plant use. In particular, in the agricultural systems of developing countries, these plants have been mass-produced for efficiency, but usually in their native range. In contrast, the prospects for commercialising "neglected" and "undervalued" species beyond national or regional borders have improved. Developing countries are known for their immense traditional and indigenous crops, which are in turn increasing demand for them, particularly in developed countries. Therefore, official development assistance agencies support the efforts of developing countries to promote trade and investment in agricultural products, with the aim of contributing to sustainable development and biodiversity conservation. Several organisations, such as FAO, GTZ through its localisation of agro-food trade, and the UNCTAD, link developing countries with emerging international markets for exotic foods.

Unfortunately, potential traders in foods that are exotic in developed countries but traditional in their regions of origin, face considerable challenges in accessing the European market. The EU Novel Food Regulation (NFR), adapted to local needs, is one effort to harmonise consumer protection in the EU to create food-specific concerns, in an attempt to marketing such exotic foods.

What is “Novel Food”?
The NFR regulates the placing of novel foods in EU member states to protect public health by ensuring food safety. It calls for anyone wishing to place a novel food product on the EU market to first establish whether the food is novel and then to present evidence that it is safe. Novel foods are those new food ingredients that have not been used for human consumption in a significant degree and in the Community before 15 May 1997. Novel foods are not permitted to be used in the food industry until they have been proven safe. Researchers who believe a new food ingredient is safe for human consumption must present evidence that it is safe for human consumption in a significant degree and in the Community before 15 May 1997. Novel foods are therefore not subject to rigorous safety testing. Applicants may seek to register their new foods in the Community before 15 May 1997. Novel foods are not permitted to be used in the food industry until they have been proven safe.

Regulation (EC) No 258/97, which defines a novel food, states that "a novel food is any food ingredient or product that is not already used for human consumption in the Community before 15 May 1997." Novel foods are therefore not subject to rigorous safety testing. Applicants may seek to register their new foods in the Community before 15 May 1997. Novel foods are not permitted to be used in the food industry until they have been proven safe.

GFU/GTZ: sensitization of issue regarding access to EU market of novel food (NOTE: novel in the EU but traditional in their countries of origin!)
Areas: 4 Regions - Asia (India, Nepal); WANA (Egypt, Yemen); Latin America (Bolivia, Peru, Ecuador) and West Africa.

Species: MAP (Egypt, Yemen), nutritious millets (India, Nepal), Andean grains (Bolivia, Ecuador, Peru), fonio (West Africa).

Framework: rescuing and maintenance of resource base/IK, selection and cultivation improvement, post harvest, processing / add values, marketing, empowerment of local actors/ woman, policies and Public awareness.
Community based processing units in poor rural India: doubling incomes from millets products.

- Germination/multiplication methodologies
- Participatory evaluation of local and introduced material
- Participatory breeding/ on farm demonstration trials
- Ecological friendly/ organic agric. techniques
- Facilitate micro-credit and other income generation activities
- Development of low cost processing technologies
- Add value: blend traditional + innovative processing technologies
- Establish local community processing units
- Introduce products to local municipalities-school meals
EMPOWERMENT: Self Help Group members attending course on millet production/marketing at UAS, Bangalore, India
WORKING FOR AND WITH THE COMMUNITIES

Promotion of nutrition qualities of underutilized species through cultural / local cuisine diversity...
These species are biological assets that rural poor are currently using and managing.

Traditional knowledge is a good starting point for improving their use and enhancing their values.

Focusing on them empower communities and recognizes their expertise and leadership.

They are important in local cultures: they are characterized by many uses and meanings. They convey a message that define people, places and events.

(Eyzaguirre 2003)
Necessary mechanism to address their complexity of the issue
Networking should involve all actors of the production-to-use chain
Need to empower local stakeholders in making them active players
Synergies are needed among various Ministries/Agencies
Participation of the private sector is needed
Participation in priority setting (selection of species and activities) should be always highly participatory. Our framework need to be in harmony with needs of communities who will be the ultimate beneficiary of our efforts.
ELEMENTS FOR AN INTERNATIONAL INITIATIVE ON BIODIVERSITY FOR FOOD AND NUTRITION

[...] promote activities that contribute to improving food security and human nutrition through enhanced sustainable use of biodiversity including, inter alia:

(i) Conservation and sustainable use of crop and livestock genetic diversity, including wild relatives of domesticated animals and plants;

(ii) Conservation and sustainable use of neglected and underutilized species;
Content

• The message
• Minor and underutilized crops
• Underutilized species & CWR
• Evolving interest and milestones
• Prospects
Survey feedback on most promising species (in parenthesis underutilized species no.):

- Fruit crops 106 (51)
- Vegetable crops 69 (16)
- Herbs and spices 23 (7)
- Ornamentals 28 (5)
Sub-Sahara

- “despite diverse biophysical constraints s.s drought and low soil fertility, region ripe for expanded cultivation of its underutilized and indigenous crops (s.a. leafy vegetables (Cleome gynandra, Solanum ethiopicum, S. macrocarpon), (Hybiscus sabdariffa), fruits (Ziziphus mauritania, Moringa oleifera), medicinal plants and vegetables”.

Latin America and Caribbean

- “underutilized LAC fruit trees represent opportunities to generate new markets”

- “among the activities recommended is the compilation of regional knowledge of species cultivation and traditional usage at a regional and national level”.
Prospects

- Attention bound to increase
- Greater international support (GFU, ICUC, CGIAR, etc)
- Capacity building to receive increased attention
- State of World Report to update on conservation
- In situ/on farm to play more strategic role

Challenges

- Changing negative image
- Policies (FAO Treaty) expansion of list of spp in Annex I
- Stronger involvement of private sector
- Trade off- between marketing and maintaining diversity
- Bio-prospecting and benefit sharing
- Inter-sectorial cooperation (among various Ministries)
thank you