Towards a Global Taro Genetic Resources Conservation Strategy

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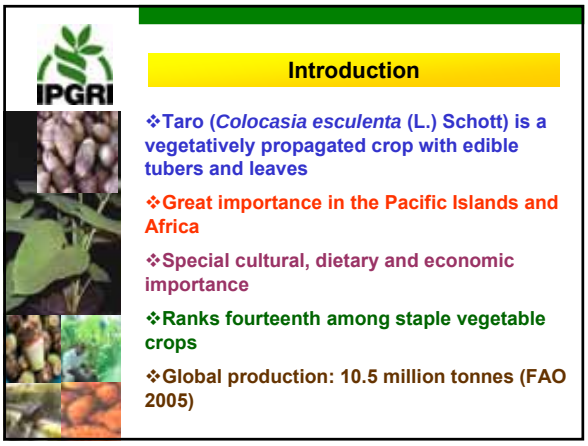
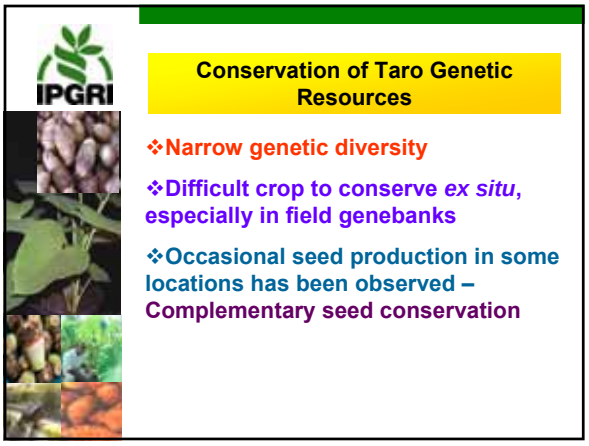
Announcement:
With effect from 1 December 2006, IPGRI will change its name to Bioversity International. The name echoes our new strategy which focuses on improving people's lives through biodiversity research.



Introduction

- Taro (*Colocasia esculenta* (L.) Schott) is a vegetatively propagated crop with edible tubers and leaves
- Great importance in the Pacific Islands and Africa
- Special cultural, dietary and economic importance
- Ranks fourteenth among staple vegetable crops
- Global production: 10.5 million tonnes (FAO 2005)



Conservation of Taro Genetic Resources

- Narrow genetic diversity
- Difficult crop to conserve *ex situ*, especially in field genebanks
- Occasional seed production in some locations has been observed – Complementary seed conservation

Recent International Meetings

- 2 major taro meetings were organized

1. Global Perspectives on Taro genetic Resources: Genetic Diversity, Adaptation and Uses 13-14th Sept 2000, Japan
2. 3rd International Taro Symposium May 2003, Fiji

Integrated Approach to Taro GR Conservation

- Identification of collections and geographic areas
- *In situ* and on-farm conservation
- **Rational Conservation Strategy**
- Conservation of nationally important accessions
- Complementary conservation of regionally important collections

Significant Collections of Taro GR

Pacific Islands

Country	1986	1994
PNG	307	521
Solomon Islands	31	2
Vanuatu	138	0
New Caledonia	?	86
Fiji	72	78
Niue	52	0
Samoa	20	17
Tonga	14	21
Cook Islands	57	0
Total	691	725

Significant Collections of Taro GR (cont.)

Southeast Asia and Oceania

Taro Network for Southeast Asia and Oceania (TANSAO)

Country	# Accessions
Philippines	172
Vietnam	350
Thailand	300
Malaysia	135
Indonesia	685
PNG	278
Vanuatu	260
Total	2180

Significant Collections of Taro GR (cont.)

Other countries

Vietnam

Germplasm Type	# Accessions
Cultivated	329
Wild	3
Feral	18
Total	350

Cuba

Germplasm Type	# Accessions
Local collection	21
Introduced	15
Selection	6
Unknown origin	3
Total	45

Africa

FAO statistics – 1,651,146 ha under "Taro (coco yam)" ≈ 90% of world's hectarage (1,841,234 ha) 2005

Problem

- Data are for Taro + Tannia
- Utilization of Tannia > Utilization of Taro

– Production statistics needs to be clarified

LIMITED INFORMATION ON TARO GENETIC RESOURCES

Significant Collections of Taro GR (cont.)

Rest of the world

700,000 ha over the last decade

Country	# Accessions
India	400
China	242
Bangladesh	150
Japan	120
Hawaii	140
Cameroon	70
USA	60
Total	1182

Conservation Methods for the Taro GR

Formulating a complementary conservation strategy

- *What are the storage features of the seeds of the species?*
- *Are in vitro protocols available?*
- *Is short, medium or long term storage required?*
- *What is known about the breeding system of the species?*
- *Where is the germplasm located? Is it accessible?*
- *Are there issues related to accessing the germplasm?*
- *What is the capacity and resources of the genebank?*
- *How can security be improved?*
- *How will the germplasm be utilised?*

Source: Modified from Maxted *et al.*, 1997

Conservation Methods for the Taro GR – *Ex situ* conservation

1) Seed Storage

-Has received little attention, because taro is vegetatively propagated, however seeds can be produced

-Preliminary studies show that Taro has orthodox seed storage characteristics

-Potential for conservation of taro genes as opposed to particular gene combinations

2) Field genebanks

-Most common conservation method

-At present, almost all taro germplasm are maintained in field genebanks

Conservation Methods for the Taro GR – *Ex situ* conservation (cont.)

3) *In vitro* methods

-*Advantage of security, ease of distribution and the ability to conserve pathogen-tested and cleaned materials*

4) Slow growth method

-*Provides a medium term storage option*

5) Cryopreservation

-*Recovery rates between 80 to 100% have been reported for taro after vitrification*

Conservation Methods for the Taro GR – *In situ* conservation

1) Biosphere reserves/protected areas

-*Wild taro been reported in Australia, PNG, the Solomon Islands, Vanuatu & SEA*

Not been studied thoroughly

-*Breeders avoid wild taros because of negative traits*

-*However wild genotypes are important future source of genes*

2) On Farm conservation

-*An important consideration in an overall complementary strategy*

-*Potential in the Pacific where diversity of landraces is high*

3) Home gardens

-*Taro one of the most dominant plants found in home gardens in PNG, Fiji and Tonga.*

- *Could provide immediate nutritional, economical and social benefits*

Use of Taro Genetic Resources

1) Used in breeding programmes for taro blight resistance in Samoa and PNG – hybridization between 2 main genepools identified by biochemical and molecular markers
2) Commercial taros have been improved for characters as resistance to leaf blights and aphids, increasing vigour and yield and taste
3) Triploid selections have been released and diploid hybrids are being evaluated.
4) Artificial production of triploids

How can different conservation methods be combined to complement each other to conserve and utilize taro genetic diversity effectively and efficiently?

Integrated Approach to Taro Conservation

Determine which subset of the overall diversity in the genepool can be conserved by which method

Classify materials within existing collections according to different criteria

Criteria for Integrated Approach

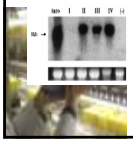
CLASSIFICATION

Type of material
- Local landraces or farmers' varieties
- Breeding lines
- Foreign introductions

Genetic Diversity
- Core collection based on genetic diversity information

Use
- Frequently-used
- Less-frequently used
- Hardly-ever-used

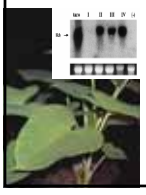
Type of use
- Subsistence
- Commercial
- "Good" parents in crossing and breeding programmes
- Multiple use (Leaves, corms, petioles
- High nutritional value



1st group –elite germplasm and those containing traits of importance

2nd group – containing interesting or potentially useful traits for which improvement is desirable or has future importance

3rd group – comprise diverse accessions for which there is no identifiable use at present



Good passport, characterization and evaluation data

Major future needs for developing global conservation strategy for taro:

1. Rationalization of collections
2. Information on taro diversity in Africa
3. Identification of critically important collections
4. Complementary/integrated conservation strategy in place

Bioversity International

Improving lives through biodiversity research

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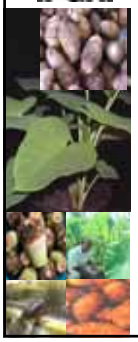

THANK YOU!