Use and Exchange of Crop Genetic Resources, Promoting Regional Cooperation and Benefit sharing and legislations

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Over view

- Introduction to Sri Lanka & PGR sector
- Poverty & Food security
- Genetic diversity, wild relatives and potential use in food production
- Wild relatives for food production
- Bio diversity for adaptation to climate changes
- Use of PGR for food and agriculture
- Constraints to utilization of genetic diversity

Cont ‘d.
● National Program me and Legislations
● Benefits sharing, access to PGR and farmer rights
● Management of genetic resources
● PGR and alleviating poverty
● Contribution of rice germplasm in other countries
● Contribution of vegetable germplasm
● Contribution of fruits crops, plantation crops, export agricultural crops
● Implications
SRI LANKA

- Free independent sovereign nation (Island in the Indian Ocean)
- Population – 21 million
- 30% work force in agriculture sector
- Gradual decrease in the rural sector & increase in urban sector
- Country receive rains from two monsoons
  - North East monsoon
  - South West monsoon
- Annual precipitation follows a bimodal pattern

Cont ‘d.
• The country is divided into 3 major Agro ecological Zones:
  - Dry zone
  - Intermediate zone
  - Wet Zone

• Further sub-divided into 46 agro ecological zones based on climatic and micro and macro environment factors.

• Dry zone receives annual rainfall < 1500 mm
• Intermediate zone receives 1500-2000 mm
• Wet zone receives > 2500 mm

Cont’d.
• Land allocation

• 0.8 million ha of Wet zone & Intermediate zone, covers Tea, Rubber and Coconut

✓ 75,000 ha for spices and beverages

✓ 27% land use for paddy (0.75 million ha)

Cont ‘d.
Land allocation.....

✓ 24% for plantation crops
   Tea is grown 220,000 ha above mean sea level of 600m
   Rubber 2000,000ha 150-600m,
   Coconut 200,000ha

✓ 44% sparsely used
✓ For other food components 0.25 million ha
Poverty and Food security

- Literacy rate 92%
- But lack of education cause poverty
- Human development index 0.771 based on,
  - life expectancy at birth
  - Level of education
  - GDP per capita 2135.66 us $
- 40% lives in poverty
Private sector contribution on PGR

• After economic reform came to affect – 1977/1978
• Mainly supply exotic varieties
• Invested on environmental control agriculture
• Big onion seed production
Genetic Diversity

• No country is Self sufficient in plant genetic resources

• Case of grassy stunt disease in rice
  - *O. sativa* is not resistant
  - *O. nivara* resistant line from India
  - no longer exist *O. nivara*

• Very high endemism exist in Sri Lanka

• Sri Lanka has identified as a country which has very high bio diversity (bio diversity hot spot)
Diversity of Rice

• Number of accessions 4666
• They include wild relatives ≈ 3%
  land races 44%
  Improved  21%
  Unknown 32%
• Five wild relatives show very high diversity
  \textit{O. nivara}
  \textit{O. rattipogon}
  \textit{O. rhizomatic}
  \textit{O. granulata}
• They are in danger in extinction due to loss of habitats
• Found resistant gene for BPH & rice blast
• 50% accessions conserved in gene bank have been characterized
Diversity of other Cereals

- No of accessions in the gene bank 1693
- 1% wild relatives
- 70% land races
- 29% advance cultivars & breeding lines
- Danger of extinction of finger millet and confined to marginal lands
Diversity of Legumes

• Legumes play important role as protein supplement
• Number of accessions conserved 2113
• Substantial genetic diversity exists but only 30% have characterized
Diversity of Root and Tuber crops

- Exit secondary diversity
- Nine accessions conserved
Diversity of Vegetables

- Number of accessions conserved 4210
Under Utilized Crops

- 60 varieties have been identified
- 400 accessions found in home gardens
- Predominantly they are fruit crops grown in the wild and home gardens
- Mainly conserved *in situ*.
Wild relatives of Crop plants

• They maintain ecosystem health

• 300 crop wild relatives found in Sri Lanka

• Over 1200 GPS location have been recorded for wild rice, wild Vigna, Wild banana, Wild Cinnamon

• 30 cereals, 31 vegetables, 7 oil crops, 94 fruit crops, 40 fiber crops, 16 root & tuber crops, 19 spices & condiments exist in Sri Lanka
Biodiversity for adapting to climatic change

• Three major zones Dry zone, Intermediate zone, Wet zone

• Programme has been undertaken by PGRC to develop community based approach

• Most of traditional crops have already lost and replanting using available accessions to re-establish sustainable agro eco systems
Constraints to utilize genetic diversity

- Productivity of crop is affected due to biotic and abiotic stresses
- Lacking of genes
- Introgression help to broaden genetic pools
- Low crossability and limited recombination hinder and obstruct the introgression process
- Technologies such as embryo rescue method available elsewhere could be answered
- But such facilities are limited here in Sri Lanka
- Only available in institutions such as IRRI
Contribution of Rice germplasm

• Sri Lanka provides 25 rice varieties in other countries
• Used in Asian, African, and Latin countries ex; BG 90-2
National programme & affective use of genetic materials

• Ministry & DOA execute collaborative programme
• Many other non governmental & government organizations also have programmes
• Some farmers also have maintain mainly traditional varieties of high nutritive values
• There is no central body to cover all PGR activity and issues
• PGRC established in 1988 to cover OFC mainly dhm. sri lanka
Laws enacted to PGR and environment

- Flora and Fauna ordinance 1993
- Forest ordinance 1995
- Environment Impacts assessment introduced 1984 through cabinet decisions
- Sri Lankan Constitution - hold ownership of genetic materials
- National Heritage Wilderness Area Act 1988 protect WR
Laws enacted to PGR and environment....

- Plant protection Act – 1999
- Phytosanitary regulation and soil conservation Act 1951
- Convention of Biological Diversity 1994
- International Treaty 2014
Implications

• Crop identifications
• Cooperation among countries
• Capacity building on sustainable management of PGR
• Implementation of relevant parts of conservation & treaties
• Mechanism to use the existing PGR
• Prioritization of highly impacted species for conservation and utilization

Cont’d.
Implications...

• Regional collaboration on improvement of germplasm

• Evaluation of collected germplasm for improved productivity

• Development of bio-prospective protocols

• Development of molecular base identification of important genes

• Education and training
THANK YOU!