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The Economics of Seed Genbank



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Outline



1. Introduction
2. General economics benefit
3. Cost and benefit

Introduction



- ✓ Germplasm ~ Genetic resources ~ Gene pool
 - a. Any genetic materials of species origin which have actual and potential values for human use
hidup
 - b. Life blue print
 - c. Source of genetic potential of living organism
 - d.
- ✓ Agriculture and genetic resource are critically interdependent
- ✓ Conservation and sustainable use of genetic resource is essential to meet the demand for future food security
- ✓ Genetic resource conservation:
 - a. Field genbank
 - b. Seed genbank

Introduction



- ✓ The costs of conserving genetic resource are small compared with the gains from genetic enhancement
- ✓ The economics of genetic resources can be measured through the cost and benefit
- ✓ Measuring the economics of genetic resource is problematic.
 1. Genetic resource exploration and conservation are very expensive, although dependent on the size and method use
 2. Quantifying the benefit on the use of genetic resource is particularly difficult
 3. Attaching a value to genetic resource is a complex task
 4. Attributing an appropriate part of the agronomic improvement to the use of conserved genetic resource is a daunting

The Economics of genetic resource



“I am awed by how little economics can contribute at present to the valuation of genetic resources. A natural explanation is that since most of the genetic resources of interest do not trade in markets, there are no prices. it is unlikely that price data will soon appear.”

(Gardner Brown Jr., 1991)

General economic benefit



It is dependent on the objectives

1. Maintenance and conservation of genetic and environmental resources
2. Genetic improvement
3. Eco-tourism
4. Protection of endanger species
5. Provision of education and training

General economic benefit



- ✓ direct use include the use of genetic resource to produce food, feed, fiber and energy
- ✓ help create new varieties and strain of species
- ✓ use them in the future
- ✓ extract the economic substance
- ✓ extract the gene

Cost and Benefit of In Situ Conservation



In Situ Conservation

Benefit

Genetic resources used to produce valuable product

Evolutionary processes continue

May better meet the needs of certain farmers

More efficient for some germplasm, e.g., animals, crops that reproduce vegetatively.

Cost

Costs borne by farmers

May reduce on-farm productivity

Requires land

Farmer selections may not preserve targeted diversity

Cost and Benefit of Ex Situ Conservation



Ex Situ Conservation

Benefit

Cost

Costs generally centralized

Certain types of germplasm not readily conserved

Can preserve large amounts of diverse germplasm

Regeneration can be costly, time-consuming

Germplasm can be more readily accessed by more breeders

Potential for Genetic "drift" can reduce integrity of collection

High security storage impervious to most natural disasters.

In practice, many collections are insufficiently funded, organized and documented

Field genbank



Cost:

- ✓ Direct cost
Cost directly related to the establishment of genbank and management of the activities
- ✓ Indirect cost
Cost of adverse impact caused by the establishment of the genbank
- ✓ Opportunity cost
The loss of potential benefits associated with protecting genetic resource rather than using them for economic process



Benefits:

1. Monetary
2. Non monetary (Benefit in kinds)
3. Information
4. Technology Transfer
5. Training



Monetary

1. Fees
2. Research budget
3. Royalties
4. Salary



Non-Monetary (benefit in kind)

1. Book, kit
2. Laboratory building
3. Focus research
4. Product
5. Transport fees
6. License for the manufacture and sale of commercial products
7. Integration of conservation goals into project



Technology transfer (hardware, software and knowhow)

1. Field, laboratory and office, equipment for collection and research
2. Know hoe to set up and operate equipment



Training

1. Science – collection technique, marker, propagation and breeding
2. Resource management (fieldbank conservation technique, conservation management)
3. Information management (biodiversity inventory, database)
4. Legal, administrative and management training, administration of conservation and sustainable use of biodiversity and genetic resource, benefit sharing
5. Joint research and development, collaboration in training and research program, product development and joint ventures
6. Institutional capacity building
 - a. development partnership –benefit sharing channel
 - b. Institutional development – community group, national focal point
7. Local income generation and employment

Seed Genbank



The most effective ex situ conservation strategy
(Li and Pritchard, 2009)

Benefits:

‘A gene bank should not be regarded as a plant museum where relics of the past are merely preserved or displayed. Accessions should be used, and breeders need to know what packets or bottles of seed on the shelves contain.’ (Plucknett et al., 1987).

Seed Genbank



Fixed Costs (capital costs):

1. Seed storage
2. Rooms for cleaning, sorting and packing seed
3. Drying room
4. Work room
5. Seed laboratory
6. Office
7. Power generation unit

Common facilities
requirement

Seed Genbank



Seed Storage:

1. Storage facilities
2. Refrigerator
3. Seed container
4. Temperatur control
5. Humidity control
6. Alarm and monitoring
7. Back up power system
8. Maintenance

Seed Genbank



Germinating:

1. Germination chamber
2. Vernalizer
3. Overhead (no. accessions)

New Introduction:

1. Seed health testing
2. Seed handling
3. Overhead (no. accessions)

Seed Genbank



Regeneration:

1. Screenhouse
2. Field
3. Transport
4. Seed cleaning
5. Seed drying
6. Seed container
7. Overhead (no. accessions)

Seed Genbank



Dissemination:

1. Seed health testing
2. Packing
3. Phytosanitary certification
4. Overhead (no. accessions)

General management:

1. Management staff
2. Computer
3. Miscellaneous expenses
4. Overhead (no. accessions)

Seed Genbank



Duplication:

1. Packing
2. Transport
3. Overhead (no. accessions)

45 % total ammount cost of conserving the collection:

1. Storage
2. Regeneration
3. Duplication



**Danke Schoen
Sembah nuwun**

