4 extra slides to be made
Boundaries (37) to be modified

The XVth Globe International General Assembly
Otsu, Japan
8th April 2000

(1)

Trade and Environment : Biotechnology, Natural Resources and Food Security

Prof. M.S. Swaminathan
UNESCO Chair in Ecotechnology
Madras, India

Trade must become a means of equity and peace and a means of promoting human security.

The Lord Plumb of Coleshill D.L.

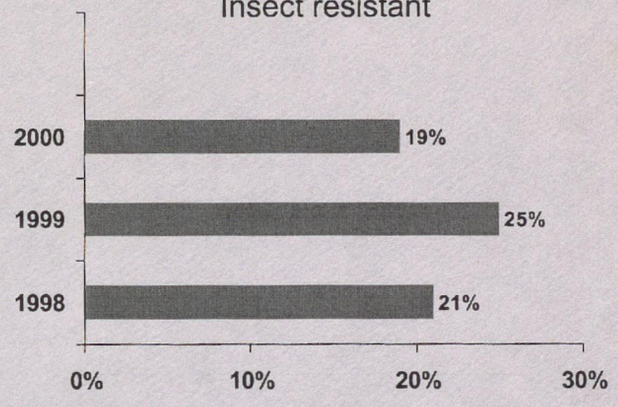
45

Last slide

Altered Crops

Corn

Insect resistant



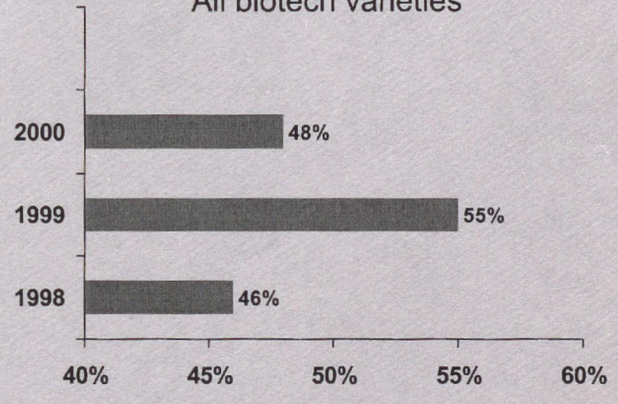
Source : USDA's National Agricultural Statistics Service

21

Altered Crops

Cotton

All biotech varieties



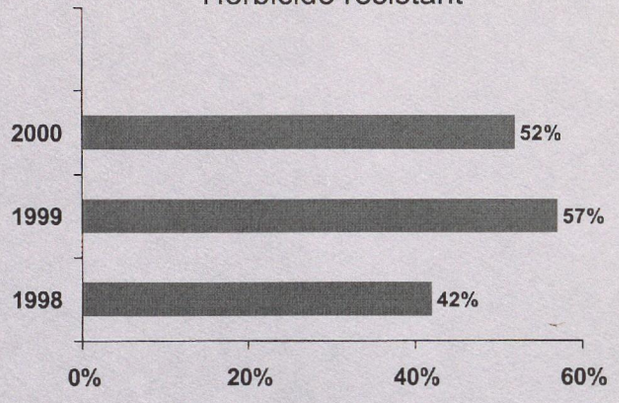
Source : USDA's National Agricultural Statistics Service

22

Altered Crops

Soyabeans

Herbicide resistant



Source : USDA's National Agricultural Statistics Service

23

The Socio-economic Context

Poverty

Chose to 900 million of the World's poor (i.e. Those who survive on less than $1 a day) live in Asia-Pacific region. Nearly one in three Asians is poor.

Asian Development Bank, 1999

2

The Socio-economic Context

Malnutrition

" About one in four new born children in developing countries – around 30 million each year – suffer retarded growth in the womb, an indication how the nutritional well-being of mothers in pregnancy remains one of the most neglected areas in world health. At present rates of progress, about one billion stunted children will grow up with impaired mental development by 2020"

UN commission on the Nutrition Challenges of the 21st century, March 2000

(3)

Ethics and Equity

Milestones

- Convention on Biological diversity
- Precautionary Principles
  - Climate Convention
  - Cartagena protocol on Biosafety
- Universal Declaration on the Human Genome and Human Rights

(13)

Ethics and Equity

Milestones

" Data from human genome mapping should be freely available to the entire world "

- President Bill Clinton and
  Prime Minister Tony Blair

Needed : Declaration on the Plant Genome and Farmers'Rights

24

Rice Genome Monsanto 25

Protocols under CBD

- Cartagena Protocol on Biosafety (adopted)
- Protocol on Agro-biodiversity based on the revised text of FAO's International Undertaking on Genetic Resources for Food Security (proposed)

18

Concept of Common Heritage in the Management of Life Support Systems

(common and differentiated responsibilities)

Atmosphere

- Climate convention
- Montreal protocol
- Emission trading

Biodiversity

- Convention on Biological diversity
- Sovereign rights of Nations over their biological resources

Ocean

- Law of the sea
- Exclusive economic zone

Land

- Convention on Desertification

7

Transgenics and Genetic Engineering

Addressing Public Concerns : Precautionary Package

Bioethics	Research agenda, eg., human cloning
Biosafety	Cartagena Protocol - 2000
Biosurveillance	eg., "Terminator" (gene protection)
Food Safety	Toxic or Allergenic effects Antibiotic resistance markers, eg. Kanamycin, ampicillin
Consumer Choice	Food Labelling

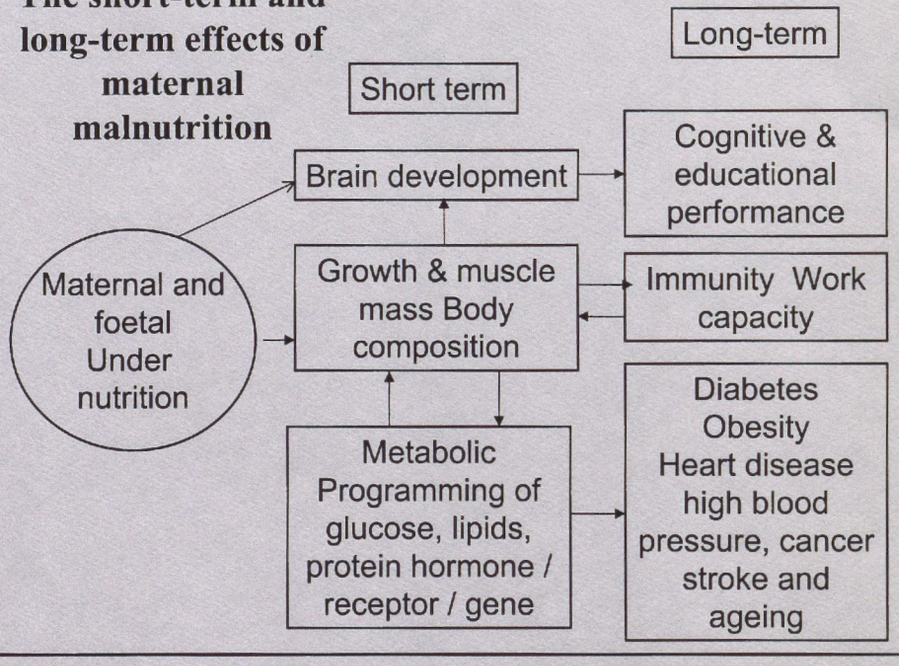
19

The Challenge of Expanding Inequity

- Inequity at birth :
  - Children with low birth weight
- Inequity in adult life :
  - Illiteracy, malnutrition, unemployment and gender bias
- Intergenerational inequity
  - Loss of biodiversity, climate change

4

The short-term and long-term effects of maternal malnutrition



5

Biosphere Services

Biological Diversity

Biological Productivity

Climate and Radiation Regulation

Decomposition and Wastes Recycling

6

Equity and Ethics : Way ahead in Global Negotiations

- **WTO - TRIPS [Article 27 (b)]** - Incorporate principles of CBD
- **WIPO** - Recognise indigenous knowledge
- **UPOV** - Evolve into Union for Breeders' and Farmers' Rights

1y

Biosphere Reserves : Seville Vision (1995)

"Rather than forming islands in a world increasingly affected by severe human impacts, biosphere reserves can become theatres for reconciling people and nature. They can bring the knowledge of the past to the needs of the future."

Methods

Individual Benefits	from varietal protection
Community Benefits	from the Community Gene Fund

20

Climate Change – Intergenerational Equity

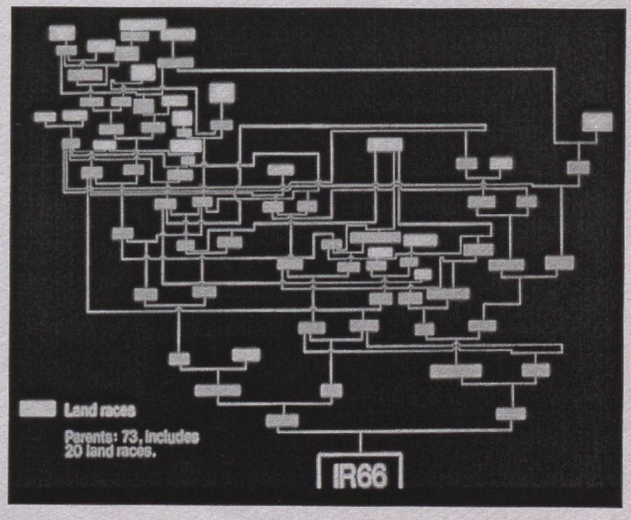
- The temperate-zone economies are rich and the tropical zone economies tend to be poor
- Global climate change represents a burden imposed on the poorer countries by the richer nations

Based on Sachs et. al (1999)

8

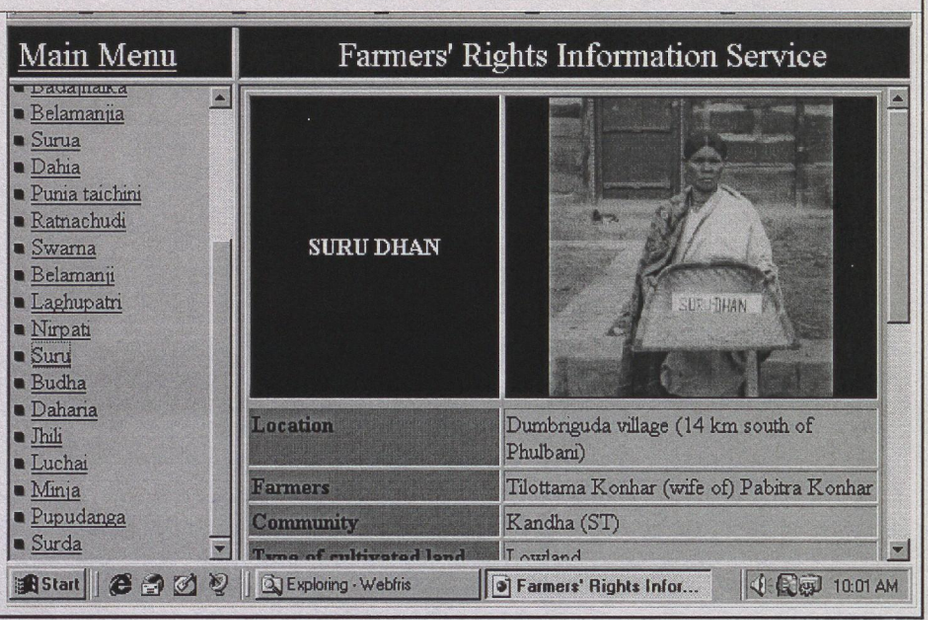
IR66

A large number of landraces are needed to develop a high-yielding variety



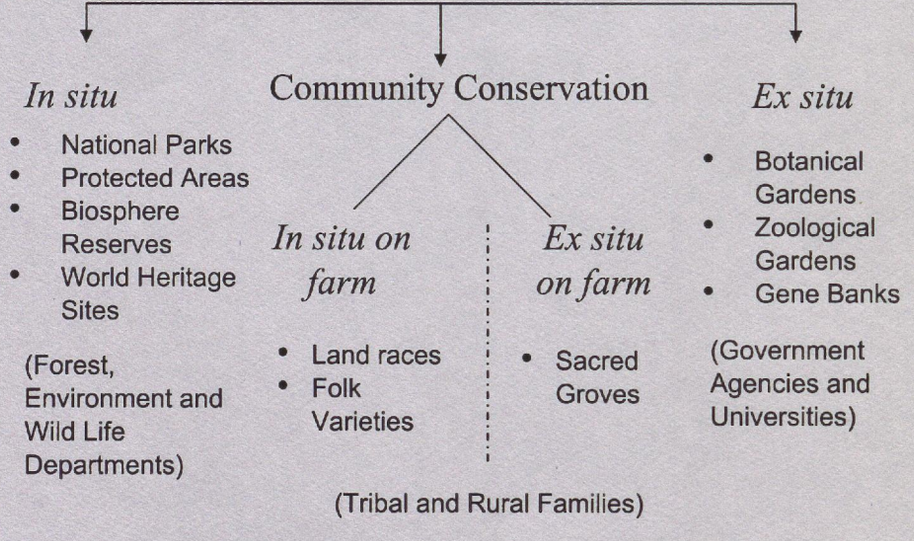
10

Women : Seed selectors and savers



11

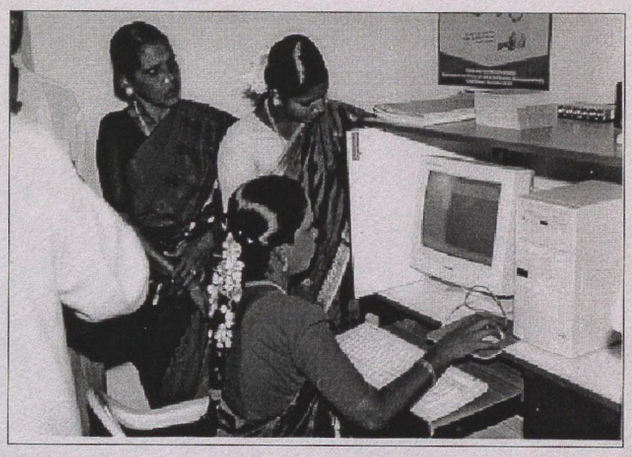
Integrated Gene Management



9

Knowledge Empowerment

Computer aided ***Virtual College*** linking scientists and women and men living in poverty



28

Pathways for Rural Prosperity

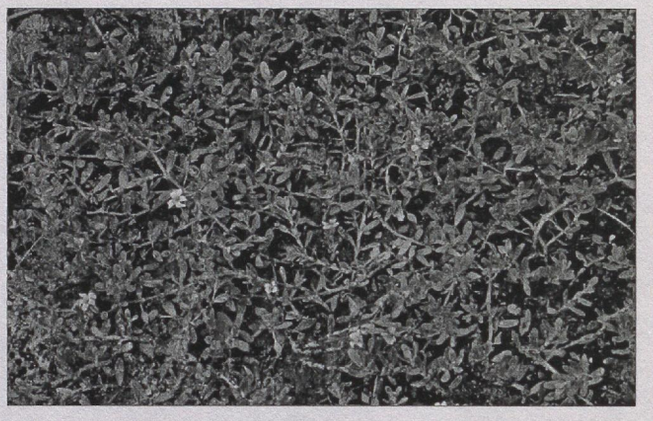
- Micro-level Planning based on GIS Mapping
- Micro-enterprises based on markets
- Micro-credit based on management by rural families

26

In nature only plants occur

Bioethics
Prior Informed Consent and Equity in benefit sharing

Medicinal Plants are the products of observation, selection and verification by local communities.



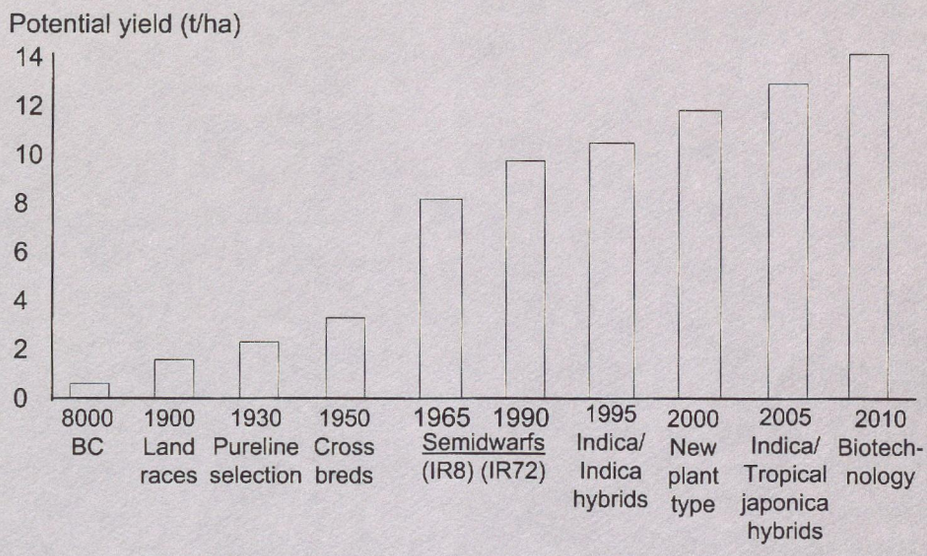
12

Food Security at the level of each individual

- Availability : Eco- and precision farming
- Access : Eco - jobs
- Absorption : Clean drinking water and environmental hygiene

27

Progress in the yield potential of rice



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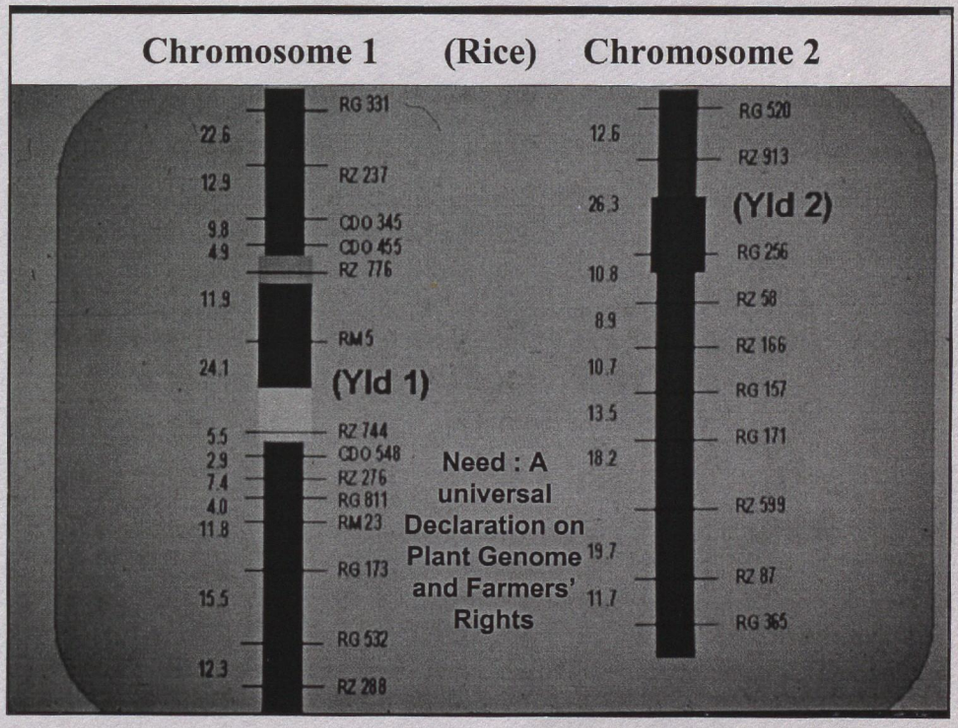
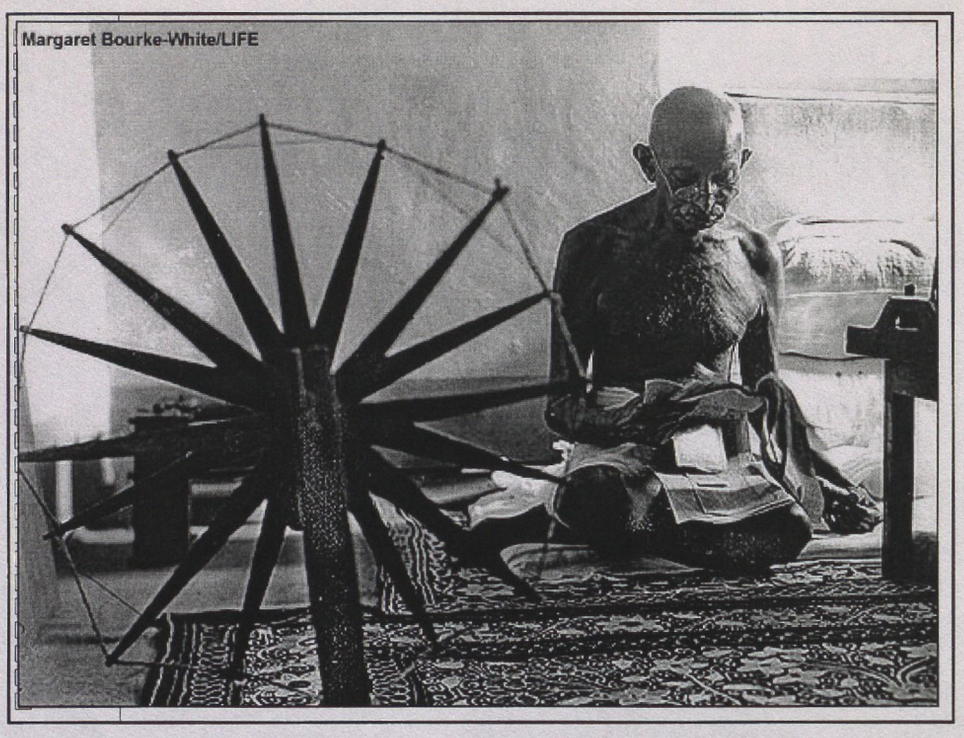




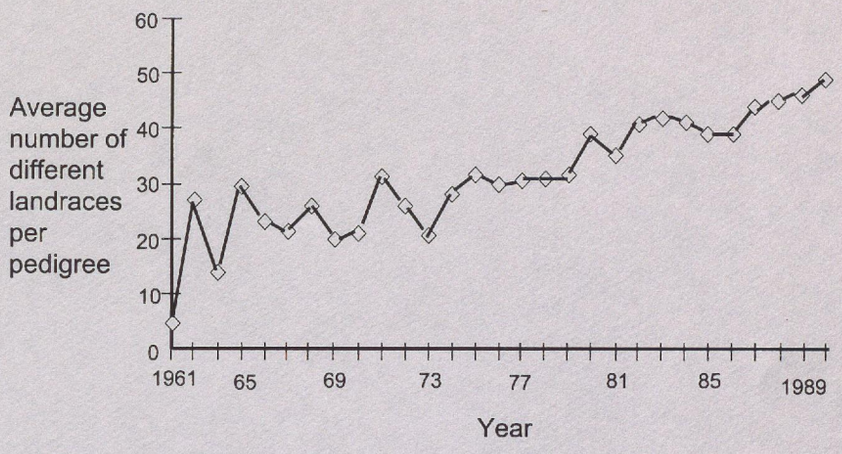
43

Transgenic system

Potential Stress tolerant genes (BADH, SOD, Catalase, Gyloxylase) have been transferred from Mangroves to Brassica and Tobacco

31

Numbers of Landraces Contained in Pedigrees of Wheats Released in Developing Countries



Source : CIMMYT Pedigree Management System and Global Wheat Impacts Survey

Integrated Gene Management

Enhancement and Sustainable use

- Location specific selection and seed multiplication

  (mostly carried out by women)

- Participatory Plant Breeding

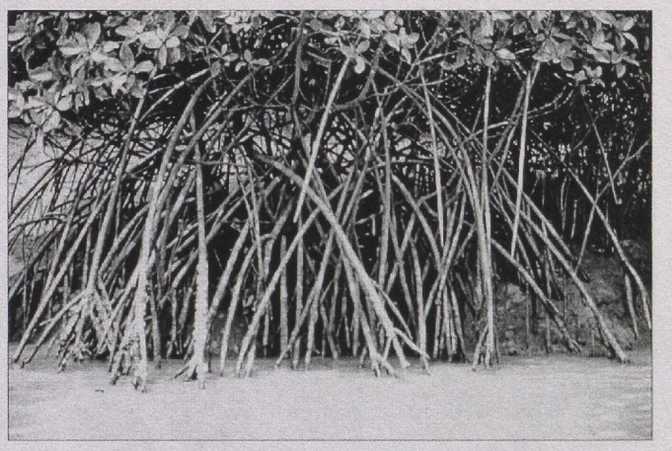
  (Farm family – Plant breeder Collaboration)

- Pre-breeding

  (Generation of novel genetic combinations for use by grass root plant breeders)

29

The Gene Revolution :Transition from Mendelian to Molecular Breeding

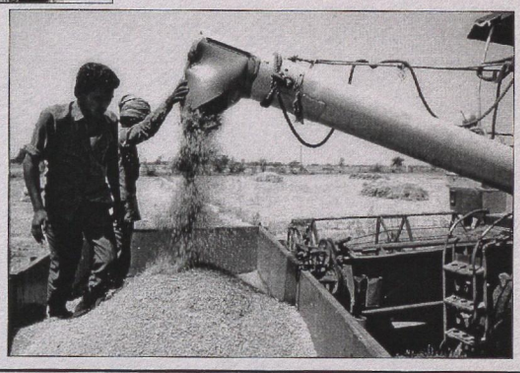


30

Crop Diversification and Value Addition

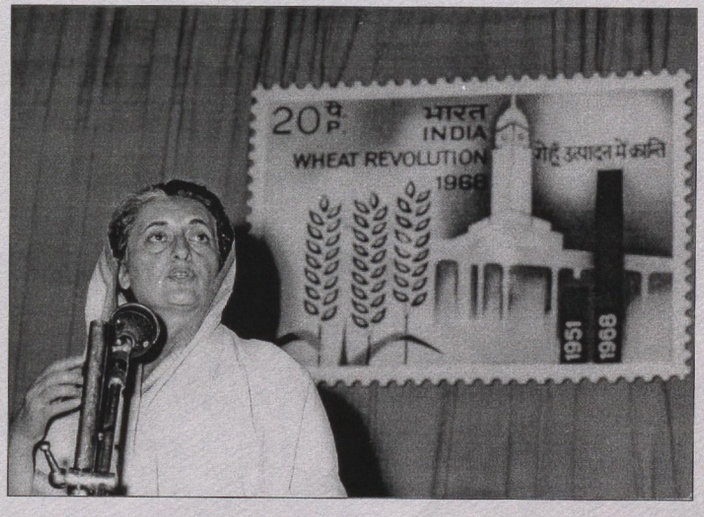
32

The Wheat Revolution



33

1968 – The beginning of green revolution

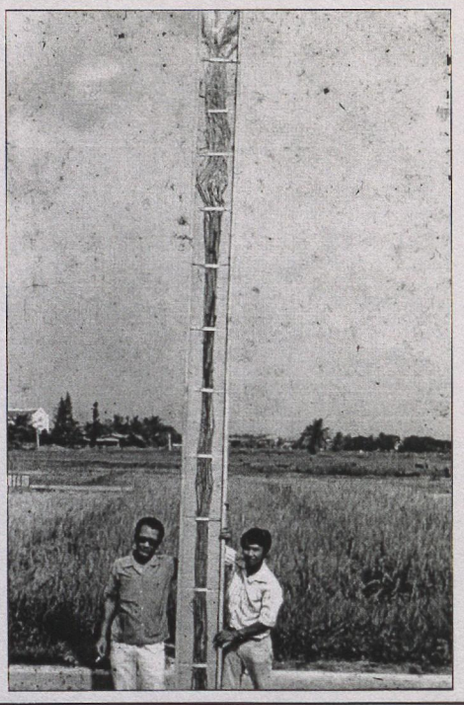


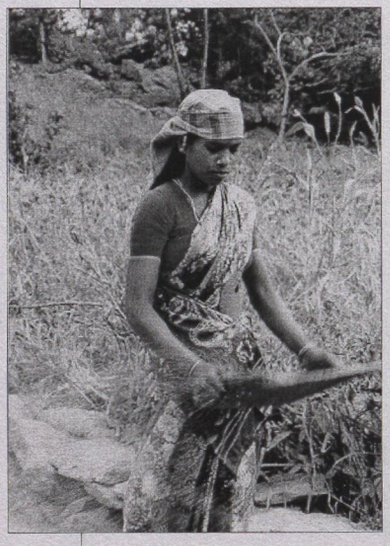
34

Deep water rice

Nature provides for everyone's need but not for everyone's greed

– M K Gandhi





Production by masses

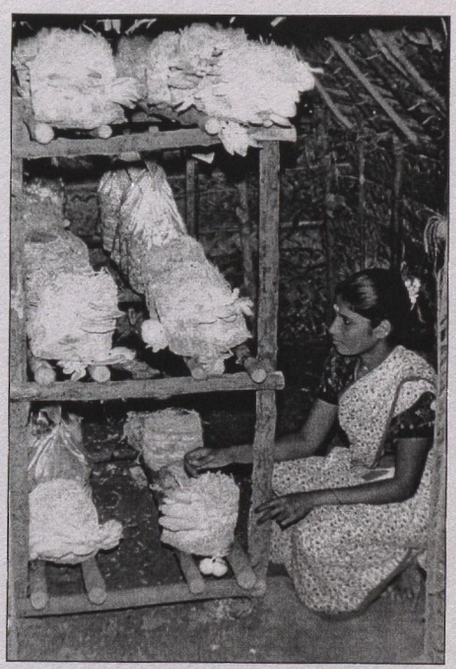
Jobs for all

Multiple
Micro-enterprises for
livelihood security

35

Jobs for all

Multiple
micro- enterprises
for livelihood security



36

BIOVILLAGES

Goals

~~Rural Poverty~~

~~Resource Degradation~~

Conservation of natural Resources

Eradication of Poverty

37

Global Population Growth

First Billion	:	Millions of Years
Second Billion	:	123 years
Third Billion	:	33 years
Fourth Billion	:	14 years
Fifth Billion	:	13 years
Sixth Billion	:	11 years

38

A tribal woman in Orissa harvesting seeds of wild rice on time to prevent shattering

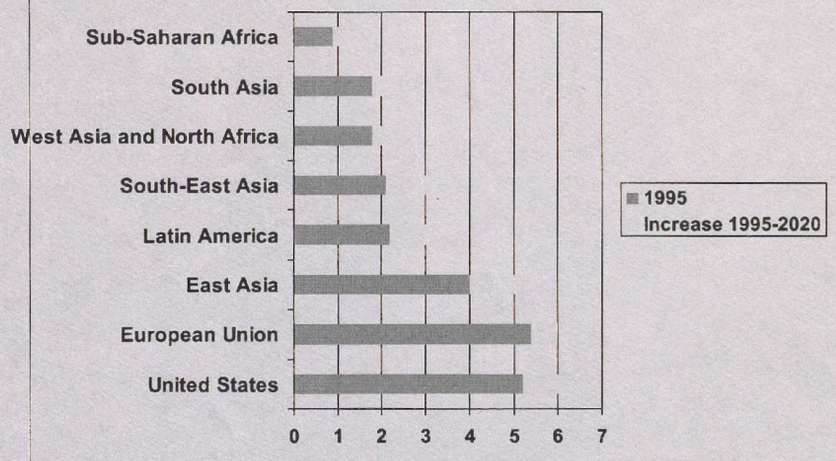
17

Meeting the Challenges of Ageing : Role of Traditional Knowledge

Country	Plant	Property
India	*Trichopus zeylanicus*	Helps to remove fatigue
India	*Baccopa monnieri*	Helps to improve memory
Tropical Africa	*Prunus africana*	Treatment for benign prostatic hyperplasis

16

No cornucopia
Cereal yields, tonnes per hectare



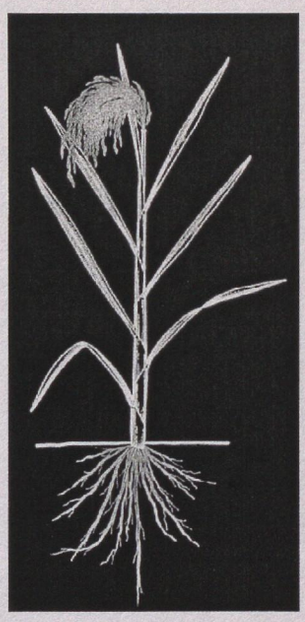
Source : International Food Policy Research Institute

Major Global Increases in Area of Transgenic Crops, 1999

- 4.8 million ha. HT Soybean in USA
- 2.1 million ha. HT Soybean in Argentina
- 2.2 million ha. Transgenic Maize in USA
- 1.0 million ha. HT Canola in Canada
- 1.0 million ha. Transgenic cotton in USA

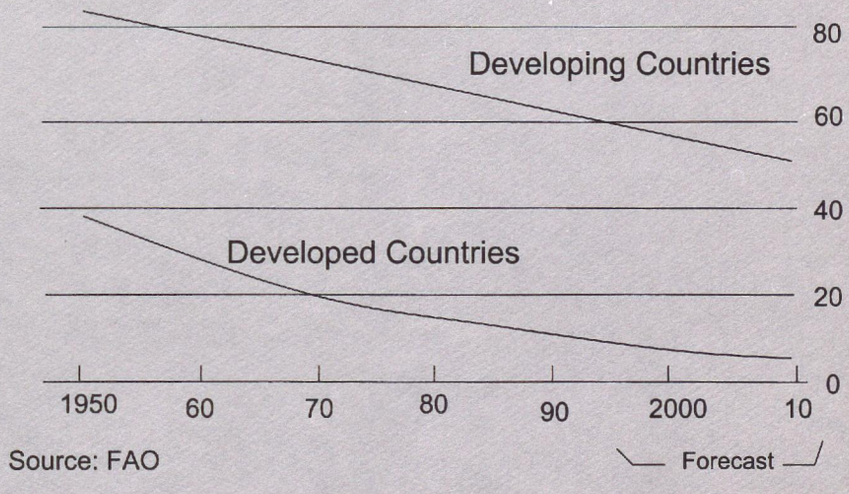
Source : Clive James (1999)

Uni-culm rice plant



Wilting

Agricultural employment, % of total employment



Source: FAO

39

Conclusions and Recommendation

- Trade policies should strengthen and not erode the livelihood security of the poor.
- WHO should enable the establishment of a World Trade Agreement Contract Facilitation Service.

Contd . . .

(40)

Conclusions and Recommendation

- TRIPS of WTO should incorporate the ethics and equity provisions of the convention on Biological Diversity. If would be useful to establish an Inter - Academy Environment and Food Security for offering independent and credible scientific advice on controversial issues.
- To work towards the creation of a level playing field for products emerging from decentralized and small scale production (i.e., production by masses), there is need for a Global Facility for Equitable Trade on the model of the Global Environment Facility.

Contd . . .

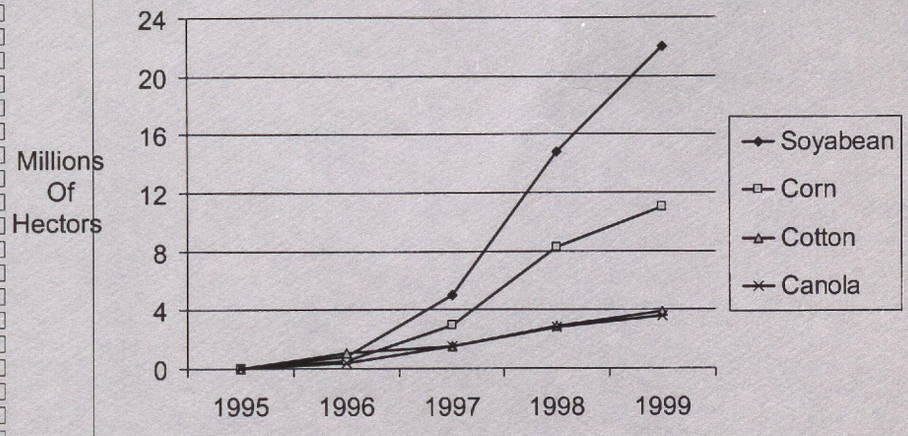
(41)

Conclusions and Recommendation

- For enlisting technology as an ally in the movement for social and gender equity under conditions of a rapid expansion of proprietary science, there is need for Global and Regional Cooperative Research Networks on the model of the Rockefeller Foundation sponsored Rice Biotechnology Network

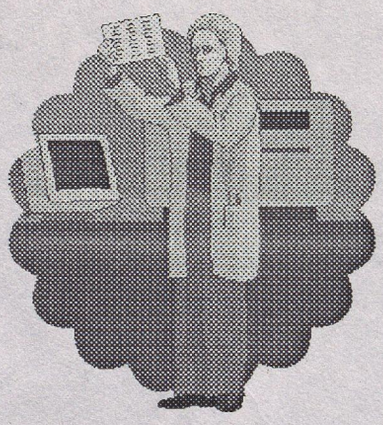
42

Global Area Transgenic Crops 1995 – 1999: By Crop



Source : Clive James, 1999

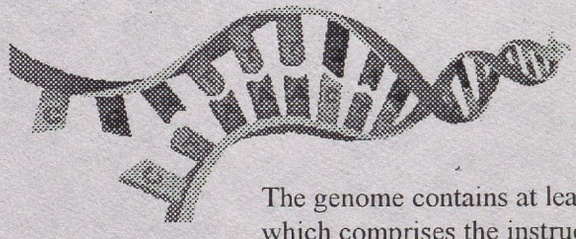
The Rice Genome Sequencing Project:
How science can improve food production



COMPANY researchers work out the exact order of the roughly half billion chemical "letters" that make up the rice genome. This knowledge is the key to understanding how rice production can be increased, or how more nutritious varieties can be grown.

Rice is consumed by an estimated 3 billion persons each day around the world.

The Rice Genome Sequencing Project:
~~How science can improve food production~~



The genome contains at least 40,000 genes which comprises the instruction book of the rice plant.

Monsanto has built a "working draft" of the rice genome and will ~~make~~ share this information with the world research community.

.. Ministry of Agriculture, Forestry and Fisheries, Japan &. Tokyo. 4 April, 2000

The International Rice Genome Sequencing Project

Mass Production Technology

Technology

capital

Advantages of scale
Competitive efficiency
Jobless economic growth

Production by Masses

Decentralized

Labour intensive
~~Handicaps on~~
~~Lack of~~ Competitive capacity

Job: led economic growth.

(3)

Ethics and Equity

Milestones

- Convention on Biological Diversity
- Precautionary Principles
  - Climate convention
  - Cartagena Protocol on Biosafety
- Universal Declaration on the Human Genome and Human Rights

(4)

Milestones

- " Data from human genom mapping should be freely available to the entire world "

  — President Bill Clinton and Prime Minister Tony Blair

- Needed: Declaration on the Plant Genome and Farmers' Rights.

4. To work towards the creation of a level playing field for products emerging from decentralised and small scale production (cf., production by masses), there is need for a Global Facility for Equitable Trade on the model of the Global Environment Facility

5. For enlisting technology as an ally in the movement for social and gender equity ~~, there~~ is need under conditions of a rapid expansion of proprietary science, there is need for Global and Regional Cooperative Research Networks on the model of the Rockefeller Foundation sponsored Rice Biotechnology Network

Conclusions and Recommendations

1. Trade policies should strengthen and not erode the livelihood security of the poor.

2. WTO should enable the establishment of a World Trade Agreement Contract Facilitation Service

3. TRIPS of WTO should incorporate the ethics and equity provisions of the Convention on Biological Diversity. It would be useful to establish an Inter-Academy Panel on Biotechnology, Environment and Food Security for offering independent and credible scientific advice on controversial issues

children will grow up with impaired mental development by 2020 !!"

UN - Commission on the Nutrition challenge of the 21st century, March 2000.

Roman Farmer Vaaro.

Integrated ~~Natural Resources~~ Management.

Conservation Continuum.

—

Ethics + Equity Protocol in Agro-biodiversity

Enhancing the Competitive efficiency of Production by Masses

- Infrastructure investment
- Production on contract
- Organisation and Management.

  eg.. Cooperatives