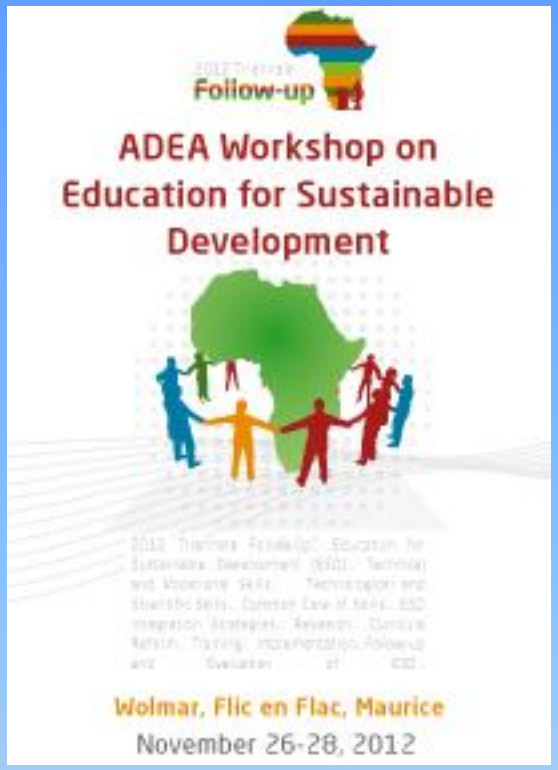
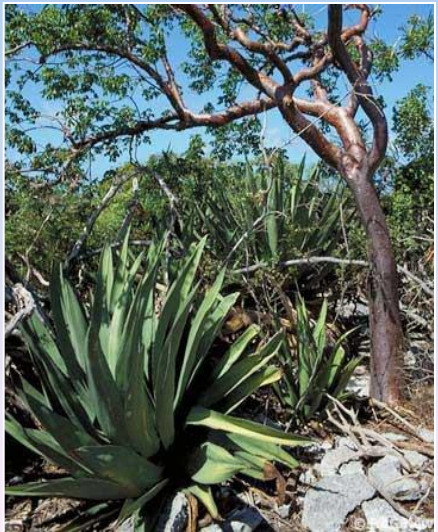


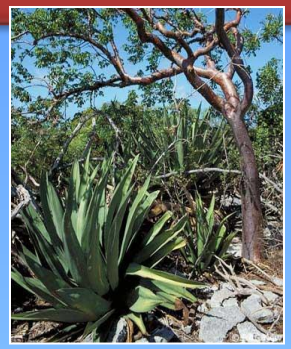
Access - Benefit Sharing in Biodiversity - Sugarcane

by

Dr Dhuneeroy Bissessur
(Phd, Cbiol, MIBiol)
Researcher and President
BIODIVERSITY ACTION GROUP
Mauritius



What is ABS?



CBD Objectives:

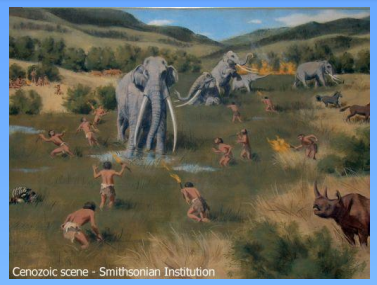
1. Conservation of Biological Diversity
2. Sustainable use of its components
3. **Access to genetic resources and fair and equitable sharing of the benefits arising out of the utilization of genetic resources (ABS)**

– Covers all types of genetic resources (wild or domesticated- animal, plant, microbial or other origin)

– In private/public land/waters

– Excluding Human Genetic Resources

What is Biodiversity?



– Biodiversity refers to the variety of life forms on Earth – plants, animals and microorganisms, as well as the genes they contain and ecosystems they form.

IUCN Photo Library © Jim Thorsell

What is a Genetic Resource?

- Genetic Material containing functional units of heredity that is of actual and potential value

- Value can be commercial (monetary) and scientific or academic (non-monetary)

Benefit Sharing

- MONETARY
- Business opportunities
- Royalties
- Access fees for permits

NON-MONETARY

- Capacity building programme
- Access to scientific info relevant to conservation and sustainable use of GR
- Collaboration and cooperation
- Sharing of information between the parties
- Technology Transfer of development facilities

Elements of ABS

- Type of Agreements :

PIC – Prior Informed Consent

MAT – Mutually Agreed Terms (Contracts)

MTA – Material Transfer Agreement

- Timing and Deadlines
- Type and Quantity of Resource
- Purpose of collection and expected results – Development and commercialization
- Location of prospecting area
- Benefit sharing

ABS - Bioprospecting

- Possible solution to sustainable genetic resource utilisation and enhanced benefit to all stakeholders.
- If operated as a business can add value to natural resources, through
  i. Providing income
  ii. benefit-sharing
  iii. Conservation of biodiversity
- Minimizes biopiracy and strengthens collaboration, co-operation and trust among all stakeholders


Thaumatococcus daniellii – Thaumatin – 100000 times sweeter than sugar

- This bioprospecting case took place before the coming into force of the United Nations Convention on Biological Divertsity (29th december 1993).
- Before, Biological diversity was considered as humanity resource not as national resource or property of each State.
- Therefore, there was no ABS agreement regarding thaumatin

Exclusive Benefits to Users

- Patents on thaumatin (No. US 4'011'206 and US 5'464'770) owned by Tate & Lyle (UK) and Xoma Corp. (USA)

- The market for sweeteners in low calorie amounted to 900 million USD per year, only in USA.

Any Benefit Sharing?

- No benefit sharing regarding bioprospecting on thaumatin mainly due to:

1) Absence of national ABS regulations
2) The lack of awareness regarding biological resources economic value by local communities
3) The poor mobilisation of benefits arising out of the utilisation of genetic resources.

Any Benefit Sharing?

- No benefits to the local communities and government.
- No contribution to poverty alleviation.
- For several years the British sugar company Tate and Lyle has marketed the product under the name Taline. As this plant does not bear fruit outside its natural habitat, the company imported fruits from its own plantations in Ghana, Ivory Coast…
- The people of Western Africa received nothing in term of benefit sharing.

Mauritian Experience
SUGARCANE

Historical Background

- Exchange / Introduction/access to genetic resources dates back to 1639 when 1st noble cane was introduced from Java
- Fertile seeds discovered in 1888
  - Improvement programme of sugarcane genetic resources initiated in 1891
  - New noble varieties produced
- End 1800/beg. 1900 – use of wild cane varieties
- 1935 – 1st Mauritian commercial sugarcane variety (M 108/30) created through interspecific hybridisation programme
- Hybrids produced, exchange of genetic material

Biodiversity of Sugar Cane saccharum complex

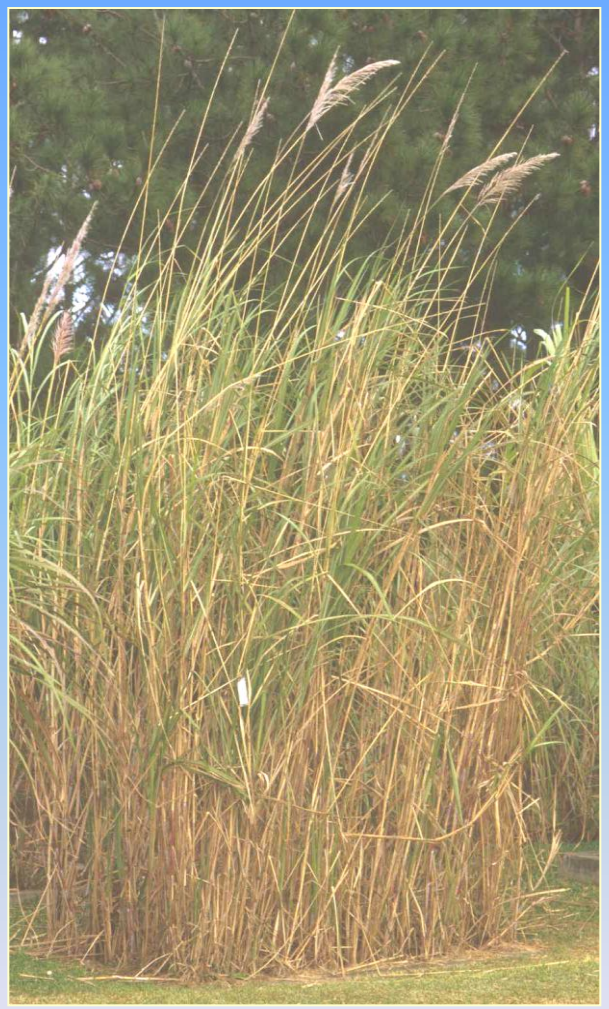
- *Saccharum*
- *Erianthus*
- *Sclerostachya*
- *Narenga*
- *Miscanthus*

Exchange of genetic material involved in the origin of sugarcane

Saccharum officinarum L.

High sucrose
Large diameter

Saccharum spontaneum L.



High vigour
High fibre

Erianthus (Sect. *Ripidium*)

High vigour
Drought tolerant

Support Providing Institutions

- Research institution (SA, SRS, MSIRI) – 1893, 1930, 1953
- Mauritius Sugar syndicate (MSS) - 1919
- Miller/Planters Arbitration and Control Board (CB) 1939
- Cooperative Banks (1913) & Societies
- Sugar Insurance Fund Board previously cyclone and drought insurance board
- Sugar Industry Labour welfare Fund (SILWF)
- College of Agriculture 1925 - UOM
- Bulk Sugar Terminal
- Mechanical Pool
- Farmers Service Centre (FSC)

Access to Sugarcane Genetic Resource

Exchange Policy- countries with cane breeding stations

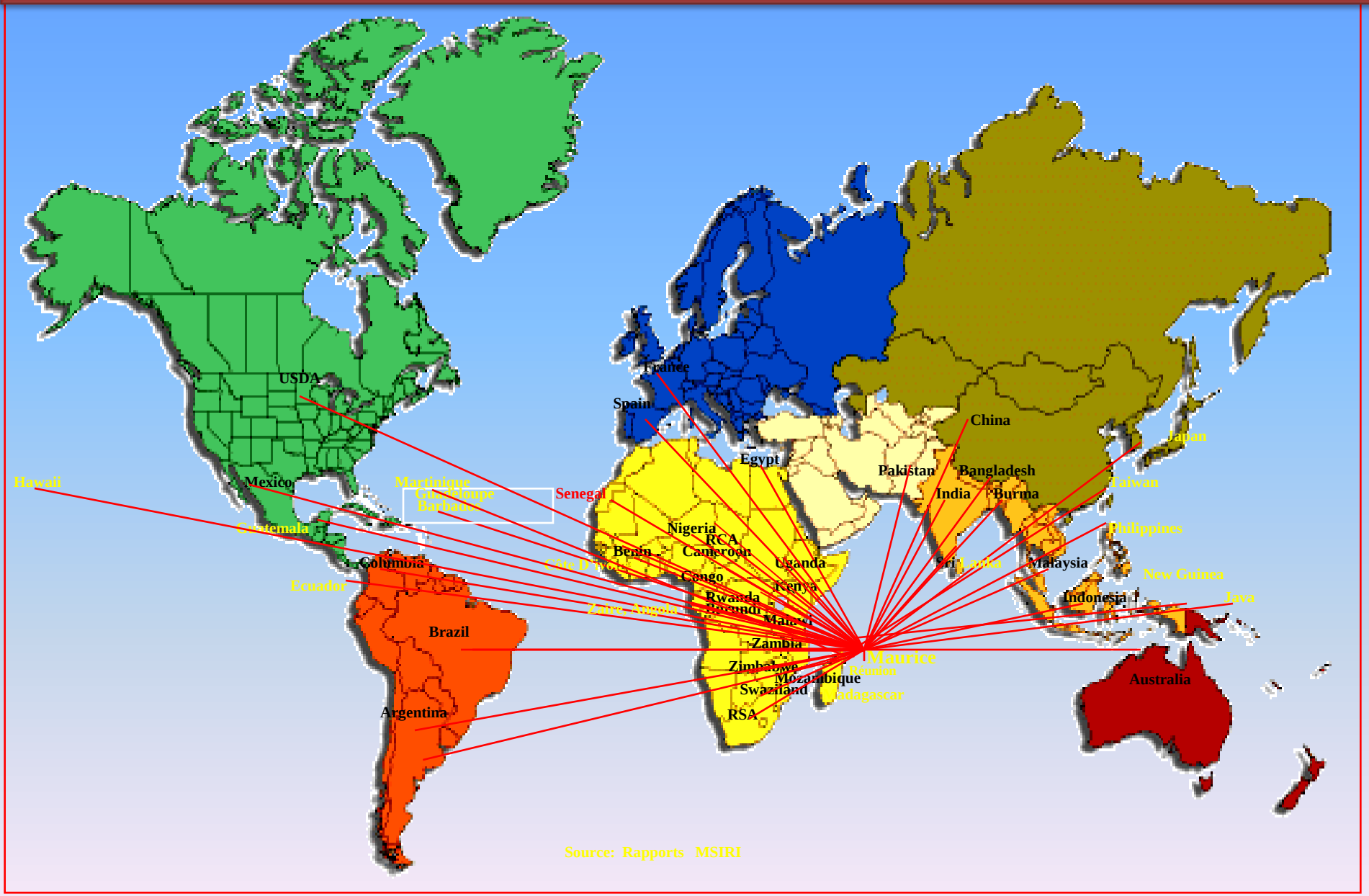
- Free access to world collection
- Reciprocal exchange among countries with a variety development programme
- Exchange protocol
- Commercial exploitation

Access to Sugarcane Genetic Resource

Exchange Policy- Other Institutions

- Selling contract including expertise
- Royalties in USD *x* t sugar produced if cultivated > 100ha
- Variety not to be shared to any other user
- The number of the variety should not be changed
- No genetic transformation without prior consent of the owner of the genetic material

Mauritian Varieties Exported to other Countries



Source: Rapports MSIRI

Uses of Sugar Cane Genetic Resource

- Productivity – high sugar & cane yields
- Adaptation to biotic and abiotic stresses
- Ratooning ability
- Suitability to Harvest dates & Mechanised harvest
- High Fibre/biomass
- By-products – bagasse, molasses, scums, electricity, ethanol

Impact on Environment

- No negative impact on Environment – efficient utilisation of fertilisers and herbicides
- Erosion and soil degradation not a major problem
- Salinisation is practically innexistant although sugarcane has been cultivated for more than three and a half centuries
- Sugarcane has a good ground coverage and prevents erosion
- No pesticides used – biological control
- Pollution from mills are reduced with the appropriate treatment plants installed

Benefit Sharing

- Every ton of sugarcane milled produces 125 kg of sugar, 300 kg of cane tops, 50 KWh of electricity and 7 litres of ethanol capable of replacing 6 litres of petrol

- Mauritius produces about 5,000,000 tons of sugar cane per year and the commercial importance of this renewable biomass and its by-products in generating additional income in terms of benefit sharing cannot be ignored.

Benefit Sharing

- Different kinds of benefit sharing were in operation during the various periods in the history of sugar cane cultivation leading to many controversies, as the Farmers were not satisfied with the shares allocated to them

- The sugar cane Farmers faced many difficulties to obtain their shares of benefits accruing from their sugar cane crop.

Benefit Sharing

- During the period 1680 to 1710, Farmers received 12 shillings for a leaguer of juice pressed in the company's mill

- In the 1880's some were paid in cash whereas others were given part of the sugar produced that is a share of 2 to 3 kg of sugar per ton of cane provided

- Later the canes were sold at MUR 8 per ton paid in cash per week to the Farmers whereas the owners of the sugar mills acquired all the sugar produced

Benefit Sharing

- At the beginning of the 20th century, the canes of the planters were sold to the sugar mills either at 65 to 70 kg of sugar per ton of cane payable at the end of the crop season – at about 8 to 10.50 MUR per ton of cane delivered

- The Farmers obtained an improved share of benefits only after the creation of the Mauritius Sugar Syndicate in 1919

Benefit Sharing

- The whole population benefit from a subsidised domestic price of sugar
- The government has also been sharing the benefits of the proceeds from sugar through a sugar export tax. In 1986, government obtained 13 percent of its revenues from this tax
- Sugarcane Farmers and sugar industry employees were given free shares and became shareholders of the Sugar Investment Trust (SIT), in 1994

Benefit Sharing

Evolution of Farmers' Share of Sugar, Molasses and Scum

Year	Sugar (%)	Molasses (%)	Scum (%)
1939 - 1963	66	66	66
1964 – 1972	68	68	68
1973 – 1975	71	71	100
1976 – 1984	74	74	100
1985 - 1987	74	100	100
1988 – 1999	76	100	100
2000 to-date	78	100	100

(Source: Mauritius Chamber of Agriculture, 2008)

Impact on Poverty Alleviation

- Sugarcane industry is indeed the main contributor to development and poverty alleviation in Mauritius
- Not only commercial but also social aspect, protects environment, consolidates food security
- Mauritians got access to education and posts at the highest level – creating lawyers, doctors, pharmacists, engineers, as well as other professionals
- Development of infrastructures, roads, buildings, schools, colleges, universities
- Tourism; construction of hotels, embelishment of environments etc
- Free Education, Health, Transport for students, senior citizens etc

Conclusion

- Access to sugarcane genetic resources and Benefit Sharing both monetary and non-monetary, has been successfully implemented in the sugarcane sector in Mauritius
- Several appropriate institutions have been created at different times with a transparent framework to facilitate access to sugar cane genetic resources and ensure benefit sharing as well as to give support to and facilitate the work of both millers and farmers
- Benefit sharing both monetary and non-monetary has contributed significantly in poverty alleviation and creation of a welfare state.

The Way Forward

- Create an ABS National Competent Authority - One-stop, fast-track, easy to enforce, preferably exclusive and always CONFIDENTIAL. Control, monitor, facilitate, ensure smooth running of the Bioprospecting cases. Under the highest decision making power e.g PMO ?
- Tracking of genetic resources exploited by other users - negotiate payment of royalties
- ABS Education awareness campaign - (CEPA) Communicate, Educate and Public awareness - (through ADEA)

ACCESS TO GENETIC RESOURCES AND BEBENEFIT SHARING

Thank You

Site: www.biodiv.be/civoire

SELECTED BIOPROSPECTING CASES

- The Mauritius Oceanography Institute in collaboration with the Centre National de Recherches Scientifique (CNRS) of Paris, France and the University of Amsterdam has embarked on a bioprospection project to screen marine organisms and possible patenting of drugs
- Extracts from one of the specimens of sponges collected in the Mauritian waters has been found to have active components against cancer (Strategic plan 2007-2010, Mauritius Oceanography Institute)

Constraints

- Ignorance of ABS concept by decision makers, stakeholders and the public at large
- Absence of political will
- Analphabetism of populations
- Lack of trust

Identification as Sweetener

- Researchers at the University of Ifè were the first to identify its potential as a sweetener. Http://www.ictsd.org/pubs/ictsd_series/iprs/dakar/Dakar_chapter8.pdf
- Extraction of a substance entirely (100%) natural from Thaumatococcus daniellii : thaumatin
- The gene has been cloned and used as a sweetener
- Thaumatin is composed essentially of two proteins: thaumatin I and thaumatin II which is comprised of 207 amino acids.

- Known in France under the name of SUTIN, pure thaumatin has 2000 to 3000 times the power of sugar (sucrose). Http://www.amcan ingredients.com/pages/scien_fr01.htm
- Thaumatin is 100000 times sweeter than sugar cane. Http://www.fao.org/DOCREP/004/V1430F/V143 0F05.htm # ch4

PROTOCOLE DE NAGOYA

- **Un traité complémentaire à la convention de de la CDB concernant l'accès aux ressources génétiques et le partage juste et équitable des avantages découlant de leur utilisation (APA)**

- **Un régime international pour que les bénéfices lies a l'exploitation des ressources génétiques d'un pays tiers (plantes, micro-organismes, animaux) par un autre état, un organisme de recherche ou une entreprise (pharmacie, agroalimentaire, cosmétique) soient partagés avec les pays d'origines, via un accord commercial, l'accès aux résultats de la recherche ou un transfert de technologies.**

PROTOCOLE DE NAGOYA

- **Il fournit un cadre juridique transparent pour la mise en oeuvre effective de L'APA.**
- **Un outil contre la bio piraterie**
- **Adopté le 29 Octobre 2010 au Japon**
- **Entrera en vigueur 90 jours après le dépôt du 50ème instrument de ratification**

Objectif

- **Le partage juste et équitable des avantages découlant de l'utilisation des ressources génétiques, contribuant ainsi à la conservation et à l'utilisation durable de la biodiversité**