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BIOSAFETY EDUCATION AND TRAINING PROGRAMMES AND COLLABORATIVE PARTNERSHIPS

Ongoing and planned biosafety education and training programmes and collaborative partnerships: A compilation of presentations from Governments and Organizations

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BioSafeTrain Project	
	[31 March 2007] [SUBMISSION: ENGLISH]

BiosafeTrain (BST) project on Capacity Building for Biosafety and Ecological Impact Assessment of Transgenic Plants in East Africa

Dr. Jenesio I. Kinyamario
School of Biological Sciences
University of Nairobi
P.O. Box 30197-00100
NAIROBI, KENYA
E-mail: jenesiok@yahoo.co.uk OR jenesiok@uonbi.ac.ke

An initial 3 year Phase I from 2005 - 2007 capacity building programme to train students M.Sc. and Ph.D. levels at local universities in East Africa.

Funded by the Government of Denmark(DANIDA).

A training programme in biosafety and ecological risk assessment of transgenic plants in East Africa.

Involves institutions in East Africa and Denmark:

University of Nairobi, Kenya
Kenya Agricultural Research Institute, Kenya
Makerere University, Uganda
University of Dar es Salaam, Tanzania
University of Copenhagen, Demark
University of Aarhus, Demark

Project Goals:

- To build regional capacity in biosafety and ecological risk assessment in East Africa,
- To enhance regional collaborations in biosafety, and
- To promote North – South collaboration in biosafety.

Project objectives:

- Develop a training laboratory in GM plant biosafety and ecological risk assessment.
- Offer M.Sc. and Ph.D. level training on agricultural and environmental impacts of GM plants in East Africa.
- Develop a research programme on key crops in East Africa (maize, cotton, rice, cassava).
- Capacity building in terms of infrastructure by upgrading current biotechnology and biosafety facilities in the three East African countries.
- Contribute to the future activities within the DANIDA Agricultural Sector Programmes in East Africa.
- Cooperate with other regional programme such as ASARECA and GMO Guidelines Projects active in East Africa.

Current Status of the Project:

- **Kenya:**
  - **2 M.Sc. students**
  - **2 Ph.D. students**
- **Uganda**
  - **2 M.Sc. students**
  - **1 Ph.D. students**
- **Tanzania**
  - **2 M.Sc. students**
  - **1 Ph.D. students**

Project activities:

Targeted short courses content

- Biosafety issues of GM plants,
- Genetics and plant breeding techniques,
- Botanical background information on key East African crops,
- Bioethics: societal, legal and regulatory aspects of biotechnology,
- Ecological impacts of transgenic crops,
- Biosafety principles and practices,
- Practical exercises and synthesis of the course.

Current status of biosafety training in East African universities under the BST Project

- Currently, courses in biosafety in the three universities in East Africa under the project are not given high priority.
- There is no particular course dealing *sensu stricto* with biosafety.
- The following are the course units that have "something" to do with biosafety.

University of Makerere

- **CRS 7214: Biopolicy, Biosafety and Bioethics**

- Review of national and international bio-policies and implications for cross border movement of germplasm. Development of bio-policy, the core principles. Bio-safety and bio-hazards: recapitulation of general principles for the laboratory and environmental bio-safety development. Sources of genetic erosion, application of population genetics to g estimate the impacts of gene-flow, immigration, and emigration on genetic drain and introduction of exotic pests and diseases. Case studies on genetically modified organisms handling and monitoring. Plant breeders rights, UPOV convention and intellectual property rights. Ethical considerations in research and development. Typologies of research and development philosophies.

CRS 7117 Biodiversity Management for Development

- Concepts in agro-biodiversity and roles in food security and environmental stability. International conventions on biodiversity. Management and conservation of agro-biodiversity at farm level in developing countries. Priority setting and decision-making for plant-genetic resources strategies. Rationalization of the options for translating national and international policies into action plans.

CRS 7209: Environment Impact Assessment

- Selection and gene flow in natural and artificial ecologies, (models for prediction studying adaptability and micro-evolutionary change. Variability and of uncertainty of crop-to wide-hybridisation. Sources of gene escape. Ecological risks of genetically modified plants (virus and insect resistance). Human health and other potential hazards. Case studies of escaped genes into non targets. Survival persistence and transfer of escaped gene. Assessment of ecological risks: the methods.

University of Dar es Salaam

1. Introduction to Biotechnology

Application of Biotechnology in medicines, agriculture and animal husbandry: plant and animal transgenic, production of genetically modified (GM) foods including understanding the human genome and gene therapy issues; food and beverages; pharmaceutical; industry and mining; environment remediation and energy production; forensic, new and emerging products; Controversy in biotechnology application and biosafety issue; Public perceptions of biotechnology and Bioethics issues

2. Biosafety, bioethics and biopolicy

Risks, benefits and impacts of biotechnology to human health, society and the environment. Genetically modified organisms (GMOs), transgenic and the environment, transgenic and human health (toxins and allergens). Fundamental ethical concerns of biotechnology. Risk assessment of transgenic organisms. International protocols on biosafety and intellectual property rights.

University of Nairobi

Undergraduate Course Units

SBT 413: Applied Microbiology and Biotechnology

- Includes topics on: The safety of genetically modified organisms (GMOs) and their products. GMOS as potential environmental hazards and management of field releases. Regulatory frameworks at national and international levels, including conventions on biotechnology. Ethical considerations on biotechnology and society. Cloning.

SBT 415: Microbiology II

- Includes topics on: DNA restriction digests, Southern and Northern blotting; and hybridization techniques; DNA sequencing, PCR techniques – RPDS and RFLPs. Biosafety and regulations for GMOS release.

MSc Course units

1. SBT 544: Population and Quantitative Genetics

- Includes topics on: Inbreeding; heterosis; heritability; cross breeding; correlated characters; breeding systems in plants advanced transmission genetics.

2. SBT 549: Recombinant DNA Technology

- Includes topics on: Clone identification: colony and plague hybridization probing, homologous and heterologous probing. PCR amplification Restriction Fragment Lengths Polymorphism (RFLP) and Random Amplification of Polymorphic DNA (RAPD). DNA sequencing. Gene cloning in research and biotechnology.

GMO ERA Project	[9 April 2007] [SUBMISSION: ENGLISH]

International Project on GMO Environmental Risk Assessment Methodologies (GMO ERA Project)

The GMO ERA Project is a pioneering initiative driven by public sector scientists to develop tools to support environmental risk assessment (ERA) of genetically modified organisms (GMOs). Our goal is to give decision makers around the globe tools and training to help them decide what information and data are most important and appropriate for an ERA that is tailored to the GM crop and agricultural system in their country. Our methods enable local scientists and decision makers to reach their own decisions, based on transparent and scientific processes.

The project has developed teaching tools for an advanced course on the methodologies for ERA of GM crops, in conjunction with our regional partners in Latin America, Southeast Asia, and East Africa. The teaching materials build on the four years of project experience in developing the methodologies.

Overview of the course modules:
Principles of Risk Assessment and Management
Non-target and Biodiversity Risk Assessment
Gene Flow and its Consequences
Resistance Risk Assessment and Management
Problem Formulation and Options Assessment (in development)
Transgene Expression and Locus Structure (in development)

For more about the course content: www.gmo-guidelines.info/public/science

Whom do the courses teach?
The course material is designed for use in an advanced course for scientists with an environmental, ecological or biological background, such as research scientists, graduate students, teachers, and regulators with a science background. The material can be adapted in intensity and length for different audiences.

How will the courses be taught?
The course starts with an introduction to principles of risk assessment and management, which defines key terms and provides a risk assessment model. The three modules (non-target, gene flow and resistance) each consist of ten teaching sessions, with each session taught through a mixture of lecture, small group exercises and discussion, with each session building on the findings of the previous session. The teaching approach is based on participatory and experiential learning, involving small group activities dealing with concrete, applied scientific problems. Each course module can be taught separately or together in a series.

What skills will participants learn?
Topics covered in each course include information management, how to find, use and interpret existing information relevant to risk assessment, and how to identify and address need-to-know gaps in information. Participants are given practical guidance on how to relate endpoints of risk assessments to conservation and sustainable use of biodiversity.

Who teaches the courses?

The courses are taught by regional **Expert Teaching Teams (ETTs)**. The course is designed to prepare participants to become trainers themselves on methods of environmental risk assessment, thus expanding the pool of teachers and forming regional centers of expertise. The ETTs are now being developed in Vietnam and Brazil, with plans for expansion to other areas.

Brazil Expert Teaching Team
The Brazil ETT has applied their own expertise to adapt the teaching tools and methodologies to a Latin American audience. The ETT is already teaching a 5-day graduate level course at University of Viçosa, and is planning to expand to teach courses at other Brazilian universities this year.
The team of 27 researchers and teachers are from:

- Embrapa Institutes: Environment, Vegetables, Genetic Resources and Biotechnology, Cotton, Agrobiology, Rice and Beans, Soy, Maize and Sorghum
- BioSeg Network
- Santa Cruz State University
- Agronomic Institute of Campinas
- Federal University of Minas Gerais
- University of São Paulo
- São Paulo State University
- Federal University of Viçosa
- Federal University of Pernambuco

Problem Formulation and Options Assessment (PFOA) handbook and training:
PFOA was developed by the project and provides a framework for identifying the crucial societal need that could be satisfied by introducing a GM crop into an agricultural system, comparing the GM crop to other possible alternatives for meeting that critical societal need, and ensures that public debate informs scientific risk assessment and vice versa. It is a methodology that both strengthens the science of risk assessment while strengthening deliberative democracy in risk decision making and policy formation.

The project is developing a PFOA Handbook which will:
• Introduce and explain the substance, theory, and practice of the PFOA methodology
• Provide guidance about the integration of a PFOA into a country's environmental risk assessment (ERA) procedures for genetically modified organisms (GMO)
• Examine considerations, techniques, and resources that can assist in designing, implementing, and conducting a country-specific PFOA.

The PFOA Handbook is written for an international audience of the principal parties to be involved in the ERA of GMOs at a national level. It is designed to accommodate users in different countries having unique needs and facing distinct challenges in trying to customize the PFOA process to particular cultural, political and environmental contexts. It will be peer reviewed and used for training during 2007. The project has funding to distribute a number of free copies of the handbook on CD, and is looking for opportunities to offer training in its use.

GTZ - Colombia	[10 April 2007] [SUBMISSION: ENGLISH]

GTZ Colombia: Biosafety Awareness Raising and Education in Colombia

In the context of the German Biosafety Capacity Building Initiative for the Implementation of the Cartagena Protocol, the German Federal Ministry of Economic Cooperation and Development (BMZ) supported an initiative on awareness raising and education in biosafety matters in Colombia. The Project was conducted from 2004 to 2006. The GTZ project "Implementing the Biodiversity Convention" co-sponsored the Colombian activities with 20,000 EUR.

The project was implemented by the GTZ-supported program on environmental politics and sustainable management of natural ressources in Colombia in cooperation with the Colombian Ministry for the Environment, Housing, and Spatial Planning (Ministerio de Ambiente, Vivienda y Desarrollo Territorial, MAVDT) together with the Institute for Biotechnology of the National University of Colombia (Instituto de Biotecnología, Universidad Nacional de Colombia, IBUN) and the NGO Corporation of Democratic Entities for Development (Corporación Unidades Democráticas para el Desarrollo, CEUDES).

The aim of the project was to increase the biosafety-related knowledge of multiplicators working in educational and civil society organisations and of journalists to support their work in biosafety awareness raising in the Colombian society.

Workshops where organized in four regions of Colombia (Costa Atlántica, Eje Cafetero, Valle del Cauca, and Región Andina) to support the development of training and educationa materials. The project finally produced and disseminated materials for awareness raising and education in schools and other public fora and to train multiplicators in the four project regions.

Publications of the Project:

http://www.gtz-ambiental.org/bioseg.htm

1. Apuntes sobre Biotecnología, Bioseguridad y bioética para la Escuela
   Alfredo Flórez Gutiérrez; Gerson Maturana; Ligia Urbina Molano y Gustavo Buitrago Hurtado, 2006, Programa Ambiental de la GTZ e Instituto de biotecnología de la Universidad Nacional de Colombia (IBUN) (Book)
2. Bioseguridad y bioética en biotecnología
   Instituto de Biotecnología. Universidad Nacional, 2005, Programa Ambiental de la GTZ (Folder & CD-ROM)
3. Hablemos con la comunidad sobre Bioseguridad y Bioética en Biotecnología. Guía para Periodistas
   Rosa Angélica Nieto Rubio y Ligia Urbina Molano, 2006, Programa Ambiental de la GTZ e Instituto de biotecnología de la Universidad Nacional de Colombia (IBUN) (Book)

ICGEB	[10 April 2007] [SUBMISSION: ENGLISH]

Training Activities in GMO Biosafety at the International Centre for Genetic Engineering and Biotechnology (ICGEB)

It is widely acknowledged that there is a persistent lack, in many quarters, of understanding by decision-makers of the concepts underlying the biosafety evaluation of genetically modified organisms (GMOs) and the requirements for implementation of the Cartagena Protocol. Critically deserving of attention, in many countries, is the paucity of experienced personnel with the capability to undertake risk assessment and orchestrate risk management posed by GMOs. The ICGEB has long recognised this need, and over the years has gained invaluable experience in the development and training of human resources in biotechnology, playing a central role in capacity-building and technology transfer in GMO biosafety. Since 1991, nearly 1000 scientists from over 80 different countries have attended ICGEB's annual biosafety workshops, based primarily at our premises in Italy, as well as at accredited centres in selected member states in the developing world.

These workshops have centred on the general principles of GMO risk assessment, and more recently, on providing experience in the examination of the scientific data that are evaluated to produce an environmental risk assessment (ERA) report. The training courses have attracted an extremely diverse group of participants, including both members of the competent authorities involved in the evaluation of proposed releases of GMOs, as well as scientists active in biotechnology. Participants receive a thorough grounding in the concept of risk, and become knowledgeable in risk assessment for the deliberate release of GMOs, with regard to accepted concepts, procedures and protocols. Additionally, the participants are tutored in many basic biological mechanisms and science underlying the possible impacts of GMOs on inter alia, human health, agricultural practices, and the wider environment (see sample module descriptors in the Appendix for specific details).

At the request of individual member states and as an extension to our current activities, the ICGEB Biosafety unit has recently begun tailored support of local biosafety capacity-building initiatives, through direct commissions from the respective government ministries. A portfolio of modules is being designed and progressively implemented, with varying entry-level requirements, covering legal, scientific and technical aspects of biosafety. This permits the ministries to define the content and duration of the resultant workshop, to best target their immediate needs in developing and optimising their national, science-based biosafety regimes. As with our established annual workshops, the modules focus on elements of biosafety training and education, with approaches to identifying potential risks and, where necessary, assessing and managing potential impacts on the conservation and sustainable use of biological diversity that may be associated with the intentional introduction of new GMOs. Additional modules will be dedicated to issues arising out of intellectual property rights (IPR) and bioethics, as well as public perception and acceptance. The modular format offers the opportunity to elaborate upon specific biosafety themes, giving them as much coverage as requested, and can range from an introduction of the basic scientific elements involved to presentations and interactive sessions of current scientific approaches, developments, and procedures. Each module is designed as a self-contained workshop of 3-7 days duration, but they can also be blocked together with others to form more comprehensive training courses. The ICGEB is open to approaches from all interested stakeholders to support their efforts in building GMO biosafety capacity, and is actively seeking opportunities to organise courses for which the scope and duration will be designed to meet the specific stakeholder needs and funding opportunities.

Underpinning these capacity-building efforts, the ICGEB Biosafety Unit also actively disseminates a vast array of relevant biosafety information to the wider stakeholder community through its webpages, online databases and publications. For example, the ICGEB biosafety bibliographic database (www.icgeb.org/biosafety/bsfdata1.htm) contains more than 6,000 scientific articles (full references and abstracts), published in international, peer-

reviewed, scientific journals since 1990, dealing specifically with research that impacts on GMO biosafety issues. It is also the main source of scientific information available through the CBD's Biosafety Clearing House. Also, with the support of the Italian Ministry of the Environment (IMoE), ICGEB has developed and maintains the Risk Assessment Searching Mechanism (RASM; www.icgeb.org/biosafety/rasm.html). It provides access to existing online risk assessment documents related to official governmental decisions for the commercial release of GMOs, and which are authored by national competent authorities. To date, it contains links to nearly 700 individual documents, relating to over 150 different transgenic events from 20 plant species issued by 27 official authorities (of which more than 75 % are non-CPB parties). RASM is a searchable interlinked database, with the majority of records providing further links to online databases when relevant, for information concerning inserted nucleotide (transgene and/or regulatory) sequences and OECD unique identifiers. The ICGEB is also involved in efforts to make public and manage a web-based, public-access database of past and current projects in GMO biosafety research, to help improve communication within the scientific community, as well as between researchers and the public at large. The collaboration with the IMoE also extends to the publishing of the "Collection of Biosafety Reviews" (http://www.icgeb.org/biosafety/publications.htm), which is a compilation of commissioned scientific studies in areas of major interest for biosafety and risk assessment, and authored by internationally recognised scientists. In addition, the ICGEB Biosafety Outstation at Ca' Tron now houses the editorial office of a multidisciplinary international journal focused on GMO biosafety research, Environmental Biosafety Research (www.edpsciences.org/ebr/), which is the official journal of the International Society for Biosafety Research (www.isbr.info/), and has appeared quarterly since late 2002.

As shown here, the ICGEB is progressively putting in place a unique resource in the area of GMO biosafety, including several web-based public-access databases, and both theoretical and practical training. This ambitious overall programme can only be carried out fully with the support of other organisations. It will also only reach its greatest usefulness if it is developed to respond to the most pressing needs for training, and this must be done in close cooperation with other organisations involved in providing capacity-building. Overall, this implies developing biosafety capacity-building in the context of collaboration with a broad range of partners worldwide.

Appendix – Brief outline of sample modules available in the portfolio

1) Introduction to Biosafety in General, and the Various Approaches to its Regulation

The Cartagena Protocol on Biosafety (CPB), which came into force in 2003, was borne out of the Convention on Biological Diversity, 1992. Its role is to address "the safe transfer, handling and use of Living Modified Organisms (LMOs) that may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human health, and specifically focusing on transboundary movements". This introductory module is designed to give a general grounding in the development and approval of international policy and legal frameworks on biosafety, as well as the pertinent issues which arise with the possibility of releasing GMOs/LMOs into the environment.

Objectives - By the end of this course the participants will:

• Be conversant in GMOs/LMOs, with regard to their historical background, current techniques employed in their production, as well as present and future products
• Aware of various sides of the current GM debate, including views from biotechnology firms and the general public
• Be cognizant of the CPB and its various articles, and the extent to which some of the finer details are still being finalised
• Be able to discern the merits or limitations of the various regulatory frameworks and decision-making processes around the world, with regard to their local situation
• Know the extent to which their current national legislation ties in with International legislation, and its governance of GM activity
• Acquainted with the impact of intellectual property rights (IPR) in GM product research, development and trade

2) Risk Assessment and Management

The CPB empowers governments to decide whether or not to accept imports of GMOs on the basis of risk assessments. These assessments aim to identify and evaluate the potential adverse effects that a GMO may have on the conservation and sustainable use of biodiversity in the receiving environments. They are to be undertaken in a scientific manner using recognised risk assessment techniques.

Objectives - By the end of this course the participants will:

• Have been instructed in the concept of risk, be able to consider the effects and related probability of a negative event, and be aware of the limits of predictive models • Be knowledgeable in risk assessment for the environmental release of GMOs, with regard to accepted basis, procedures and protocols, and know how to manage them
• Be able to discuss the relevancy of “substantial equivalence” in biosafety regulations, especially when confronted with future “second generation” GM products (eg nutriceuticals, abiotic-stress tolerant GM crops)
• Be aware of post-market monitoring obligations, including identifying & communicating unapproved GMO releases to affected parties
• Determine potential changes in dietary intake and any long-term nutritional impact, and know how these should be managed
• Have sufficient background information to help address the question of regulating “Pharma crops”
• Be aware of the various methods to involve the consideration of their national socioeconomic concerns during the regulatory process

3) Possible Risks Related to the Unconfined Release of GMOs

The ability to carry out an environmental risk assessment related to the commercial release of GMOs requires knowledge and expertise from a wide range of scientific disciplines, including but not limited to, molecular biology, plant breeding, genetics, plant pathology, agronomy, weed science, and ecology. The main categories of concern that have arisen and that are being addressed include: a) risks to animal and human health, b) risks to the environment, c) risks to agriculture, d) “management” concerns, eg. legislation and regulation approaches, ethical issues, traceability and commodity segregation, public perception, and socio-economical concerns.

Objectives - By the end of this course the participants will be aware of the biological mechanisms and science underlying:

• Allergy and toxicity screening of transgene products, plant metabolites and whole GM plant; the influence of processing on the properties of food or feed • Perceived risks concerned with the presence of antibiotic resistance selectable markers • The evolution of herbicide resistance, pathogen resistance, resistance/tolerance of target organisms, and be aware of possible necessary changes in crop management practices
• Horizontal and vertical gene flow, the possible persistency of transgene (or product) in the environment, susceptibility of non-target organisms, routes to impact upon tri-trophic interactions, identifying effects on biodiversity, impacts on soil fertility, uptake of foreign gene to micro-organisms, generation of new live viruses by recombination in planta or within the insect vector

4) Plant Transformation and Resultant Ramifications for Biosafety Risk Assessment

Many of the transformation events that are now commercially available were produced and approved under earlier versions of biosafety regulation. Based upon recent scientific findings, it is now possible to reduce their impact by making informed choices and incorporating them at the earliest stages of product development.

Objectives - By the end of this course the participants will be able to address concerns with:

• The choice of both the plant variety for improvement and the transgene to be incorporated (socio-economic considerations)
• Transgene insert design, including the choice of selectable marker
• Modifications affecting the product amino acid sequence
• Strategies for limiting the impact of gene flow: linkage of transgene with domestication alleles, the presence of 'containment' sequences (e.g. Genetic Use Restriction Technology [GURT])
• The choice of transformation method used (gene gun, direct DNA uptake, Agrobacterium sp.) and anticipate resultant differences in insert profiles
• The inheritance and stability of expression of the insert due to its chromosome position, as well as preferential locations in the host genome

5) How GM Products are Managed in the Marketplace

Governments have an obligation to respond to concerns raised by the public. If approved for entry into the marketplace, there may be a system in place to allow the public their right to choose whether or not to use GM products, based upon the evaluation of impartial credible information. This involves visible regulation, identifying public concerns, the ability to trace and segregate products, and a public education programme.

Objectives - By the end of this course the participants will be familiar with:

• GMO detection (sampling strategies, detection methods, validation)
• The requirements for commodity segregation and GM traceability
• Labelling regulation
• Public perception and acceptance issues

6) The National Biosafety Clearing House

A National Biosafety Clearing-House (BCH) facilitates transparency, accountability, and the sharing of information. In addition to enabling governments to inform others about their final decisions regarding the import of GMOs/LMOs, the BCH should contain information on national laws, regulations, and guidelines for implementing the Cartagena Protocol. Also included should be information required under the Advanced Informed Agreement (AIA) procedure, summaries of risk assessments and environmental reviews, bilateral and multilateral agreements, plus other scientific, legal, environmental and technical information.

Objectives - By the end of this course the participants will:

• Have a clear understanding of the function of a BCH, what information/documents should be made available and how to present it all in a clear and accessible manner
• Know how to incorporate and enhance participation with the general public, including making the following information available in simple, clear language: background to LMOs and biosafety obligations, main national laws and regulations, LMO experimental & commercial release information & documents (public accessibility to decision-making process), information communicated between the national BCH and the CBD-BCH
• The efforts required in website maintenance, and any non-electronic dissemination of information
• How to use the BCH most efficiently

India	[11 April 2007] [SUBMISSION: ENGLISH]

Training Programmes on Biosafety Issues and Capacity building in LMO detection: Challenges and Perspectives

Modern biotechnological techniques have enabled the introduction and expression of novel genes into plants. As a result plants can now be engineered to produce significantly higher yields, better quality with resistance against insects, pests and tolerance to herbicides. Despite the potential benefits of transgenic crops, there are concerns regarding the possible environmental risks if the transgenes escape and get established in natural or agricultural ecosystems. Concerns over the ecological impact of transgenic crops largely depend upon whether a crop has wild relatives and the ability to cross pollinate them. If crops hybridize with wild relatives and gene introgression occurs, wild populations could incorporate transgenes that change their behaviour and they could present a serious threat as weeds or competitors in natural communities.

Therefore, the complete potential of biotechnology can only be realized, in a pragmatic way. At each step, foolproof testing and scientific data have to be provided. Also, proper regulatory and policy mechanisms have to be put into place. To reap the benefits of biotechnology, there is an urgent need for scientists, researchers, policy makers, NGOs and private sector to come together on a common forum to discuss such pertinent issues.

As per Cartagena Biosafety Protocol the definition of biosafety is to minimize the potential risk to human health and environment from the handling and transfer of Living Modified Organisms (LMOs) produced through modern biotechnology. Recognising the potential risks of LMOs, the Convention on Biological Diversity (CBD) addressed this issue of biosafety in Articles 8(g), 19.3 and 19.4. An Open-ended Ad-hoc Working Group under the aegis of CBD negotiated the protocol. The Cartagena protocol was adopted during an extraordinary meeting of the Conference of Parties to the CBD in January 2000 and has been implemented on 11th September 2003. India is one of the signatory to this protocol.

India is on the threshold of commercialization of several GM crops more than a dozen GM crops are in different stages of limited and large-scale trials. Among these some crops have centre of diversity or origin in India such as brinjal and other are food crops such as cabbage, brinjal, caulifower, okra, chickpea etc. So it is high time to address issues related to their environmental biosafety and food safety in proper perspective before they are deregulated and grown in field and go in food chain.

National Bureau of Plant Genetic Resources (NBPGR) New Delhi under aegis of Indian Council of Agricultural Research (ICAR), New Delhi, has emerged as a centre of excellence in terms of human resource development in the area of biosafety issues related to transgenics and testing of transgenics using molecular techniques. The training programmes are the part of the institutional endeavor aimed primarily at developing a core group of experts at the national level in this area to tackle various emerging issues related to biosafety concerns and evaluation of transgenics.

NBPGR is regularly organizing the orientation courses on biosafety issues since 2000, for the researchers engaged in development of transgenics in different Research Institutes, State Agricultural Universities, Central Universities, State Government Departments, NGOs and International Organizations etc with the aim to create a critical mass well-versed with diverse aspects of biosafety issues and regulatory mechanism associated with undertaking research in this area.

Till date seven orientation courses on “Biosafety Considerations for Evaluation of Transgenic Crops” have been organised at NBPGR, New Delhi funded by Department of Biotechnology, Ministry of Science and Technology, Govt. of India.

5th to 13th December 2006	7 th to 14th November 2005
22nd November to 1st December, 2004	10th to 18th November, 2003
20th to 28th November, 2002	2nd to 9th November, 2001
17th to 26th July, 2000	

NBPGR has also been identified as one of the four partner institutes under Global Environment Facility (GEF) and World Bank funded capacity building project for the implementation of Cartagena Protocol on Biosafety by Ministry of Environment and Forests Govt. of India.

Three hands on training programmes were organized under the project:

- Cartagena Protocol: Decisions to Diagnostics from 23rd to 30th November 2006
- Biosafety concerns of transgenics and detection of LMOs from16th to 20th January 2006
- Biosafety concerns of transgenics and detection of LMOs from14th to 21st March 2005

More than 200 participants from ICAR Institutes, State Agricultural Universities, Central Universities, State Government Departments, NGOs and International Organizations etc. attended these courses. More than 40 speakers/panelists comprising eminent Bio-technologists, Seed technologists, Ecologists, Plant breeders, policy makers, and representatives of private sectors, NGOs etc. shared their viewpoints with the participants.

Different aspects of genetic engineering, provisions of International Biosafety Protocol, seed quality law enforcement, impact of GURT technologies, quarantine strategies, regulatory mechanism for import of transgenics and for undertaking limited field trials, impact of transgenics on environment and human health and case study of *Bt* cotton (from lab to fields) were dealt with, in detail.

The faculty of NBPGR has also delivered lectures in different workshops, training programmes, interfaces, National and International seminars and symposia organized by Ministry of Environment and Forests Govt. of India, Department of Biotechnology, Ministry of Science and Technology, Govt. of India and Ministry of Agriculture, Govt. of India for students of and faculty of Universities and schools and to the farmers and general public.

So far the expertise developed at NBPGR in the field of biosafety and LMO detection has enabled it to impart awareness at the national level to a considerable extent. It is high time now that India takes on a leading role in so far as the strengthening of awareness and development of appropriate strategies in this critical area.

Bogor Agricultural University, Indonesia	[11 April 2007] [SUBMISSION: ENGLISH]

BIOSAFETY EDUCATION, TRAINING AND RESEARCH PROGRAMS
DEPARTEMENT OF PLANT PROTECTION
BOGOR AGRICULTURAL UNIVERSITY

Bogor Agricultural University is the oldest and biggest agriculture education institute in the country. As one of the leading institution in agriculture, biotechnology and biosafety has always been our major concern. As a country who has ratified the Cartagena Protocol, our government has been advocating for biosafety training and research across the country. Policies related to Biosafety in Indonesia is still in its infancy. Although government regulations are in place, it still requires further enhancement for proper safety to be put into priority. There is no doubt that Indonesia needs to collaborate and foster regional or international cooperation in biosafety, especially in matters of policies, regulatory systems, biosafety research and education.

Department of Plant Protection, Faculty of Agriculture, Bogor Agricultural University has routinely conducted training courses in pest and disease management for people across the country. Every year, 2-5 training courses are routinely conducted, which lasted for a whole 6 or 10 days, depending on the subject. In 1997, we started to form international collaboration for the trainings we conducted. When the issue of biosafety came forward, we actively reached out for international cooperation to further enhanced our capacity in biosafety and biosafety training. Our first collaboration was in 1998 with the Ministry of Environment, whereby a team of our researchers were involved in the Risk Analysis of the Bt cotton of Monsanto. In 2006, The Department of Plant Protection-Bogor Agricultural University (IPB) in collaboration with Genøk-University of Tromsoe, Norway and TWN, Malaysia held the first holistic biosafety regional training course located in Bogor on 24-29 January 2006. This training course has been a great learning process for both the participants and organizers. It combined laboratory works and discussion and lectures over a variety of subjects, from the science, economic, social and political context. The course has shown to be an uplifting experiences for many participants, and it has encouraged and inspired them with ideas for further actions after this training course:

1. To held annual or biennial regional training course on biotechnology and biosafety in Asia region, in order to distribute the holistic foundation and information to as much potential individual as possible who work in this issue or related to them.

2. Establishment of a network whereby people can share the latest issue on biotechnology and biosafety, especially in Asia region. (A yahoo group list has already been set up)

The Training Course was initially set up for South East Asia, but upon its initiation, the organizers has received applications from as far as Russia, Africa, China, India. In the end, it was decided to enlarge the countries that can participate. Altogether, the training course was attended by 37 participants (Cambodia, China, India, Indonesia, Laos, Malaysia, Nepal, Philippines, Thailand and Vietnam). The participants represent different stakeholders: Government, NGOs, Scientist, Students, and Lecturer.

As mentioned above, the training discussed a broad range of issues in a holistic manner, covering scientific and technical aspects, environment and health, socio-economy, ethical issues, public participation, regulatory mechanisms and international developments in the science and regulatory framework. There were 14 resource persons came from Genøk, TWN and IPB. A combination of methodologies applied in the training, lecture and discussion, group discussion to analyze case studies, laboratory demonstrations and practice.

In July of 2006, the Department of Plant Protection started linking with Michigan State University through one of our USAID funded project. One of the staff of the Department of Plant Protection attended a-6 day Environmental Biosafety Short Course (EBSC), organized by Michigan State University in collaboration with USAID Program for Biosafety Systems (PBS). The course was held on July 30 - August 4 2006 located in Michigan State University, USA.

Other activities which has been done by the Department of Plant Protection, with regard to biosafety training and education:

1. Conduct several round table discussions with regard to the safety, policies and public participaton on biosafety. The main goal of such discussions are increasing the awareness of different target groups.
2. Conduct a study, funded through World Resource Institution on public participation of biosafety regulation and policies.

Indonesia has 220 million people with a large population depending on the agriculture sector. As such, biosafety will always be a major concern for the country. Due to this, the Department of Plant Protection has a mission to improve the quality of human resources in this field. Bogor Agriculture University shall always play a leading role in building public understanding of biosafety through:

- Involvement in various research aspects, especially those related to environmental safety risk analysis (including risk assessment, risk management, and risk communication) of transgenic crops.
- Involvement in capacity building activities, especially for building public understanding toward biosafety,
- Involvement in establishment of biosafety policies

Japanese University Network	[10 April 2007] [SUBMISSION: ENGLISH]

University of Tsukuba and Japanese university network on biosafety education

Prof. Dr. Kazuo N. Watanabe
Chair, International Program, Gene Research Center & Graduate School of Life and Environmental Sciences, University of Tsukuba, 1-1-1 Tennoudai, Tsukuba, Ibaraki, 305-8572, Japan
nabechan@gene.tsukuba.ac.jp, KNWSpudman@aol.com
Fax: +81-29-853-7723, phone: +81-29-853-4663
http://www.gene.tsukuba.ac.jp/
http://www.sbs.life.tsukuba.ac.jp/Watanabe/Watanabe.html

Gene Research Center at University of Tsukuba(GRC-UT) is the principal center for plant biotechnology & biosafety research and associated education under Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan. University of Tsukuba is the chair university among fifty national universities on biosafety education and networking of biosafety capacity building for various stakeholders including overseas activities.

GRC-UT has More than twenty years of experience in biosafety training courses at various contexts emphasizing risk managements and institutional development on LMOs as well as transgenic research. This also had included foreign participants, mainly from Asian nations, formerly supported by UNESCO in the past. Certificates were issued to foreign participants, we have also the ordinary graduate degree programs stated in the below. Overseas on-site training programs and degree programs involving various biosafety components have been coordinated by bilateral arrangements such with Tunisia, Myanmar and Pakistan. As for the types of training programs we have: i) In-house annual training programs including international participants, ii) Several sessions of a half-day module either on basics or governance on biotechnology for domestic needs, iii) One-week basic course for beginners off-campus with partner universities in Japan, iv) Several workshops for domestic educators with partner universities, v) Intensive workshops for secondary school students by university network, vi) Specific intensive programs for foreign researchers with extramural funding(one week up to six months, including basic course and specific modules).

As for the Degree-oriented and postdoctoral programs involving biosafety, we have: a) two graduate school divisions emphasizing biosafety research and implementation for MSc and Ph.D., b) joint degree programs with national research institutions such as NIAS biosafety unit, c) JSPS-COE Foreign researcher fellowships, d) Joint PD and predoctoral program with IAS-UNU, and e) Sandwich-degree programs for Ph.D. (Ronpaku).

Program for Biosafety Systems, IFPRI	[11 APRIL 2007] [SUBMISSION: ENGLISH]

THE PROGRAM FOR BIOSAFETY SYSTEMS (PBS)

John Komen, Mark Rosegrant & Reynaldo V. Ebora,
Program for Biosafety Systems (PBS)
URL: http://www.ifpri.org/themes/pbs/pbs.htm

The Program for Biosafety Systems (PBS) contributes to the implementation of the Cartagena Protocol by supporting partner countries as they develop the policy and legal framework, administrative procedures, technically qualified personnel and outreach mechanisms integral to their national biosafety systems. PBS work emphasizes sound science-based decision making and research, while also addressing socioeconomic considerations. PBS works with partner countries in Africa (Ghana, Mali, Nigeria, Kenya, Uganda, Malawi, Mozambique, South Africa) and Asia (Philippines, Indonesia) to develop and implement a program of activities tailored to biosafety needs identified by local collaborators. In addition, PBS works with regional policy-making bodies on subjects of common interest, such as GM commodity trade and the development of regional technical guidelines.

Project activities

Biosafety training and education activities are an integral part of the PBS plan of work. The full scope of activities includes the following:

Policy and regulatory development through stakeholder participation: The PBS policy component analyzes the implications of different country and regional regulatory approaches for genetically modified organisms and develops new decision models to assist regulatory agencies. Choices regarding biosafety policies and objectives are evaluated for their implications for agricultural growth, trade, and food security.

Technical training in environmental and food risk assessment: PBS maintains an active program of training and outreach activities. The overall aim of such activities is to ensure that the people involved in biosafety decision-making are competent and confident to assess planned releases of GMOs and GM food products using the best available science.

Strategic planning for communications and outreach: Clear and consistent communications about biotechnology and biosafety are key to the success of biosafety capacity development in partner countries. Improving the understanding of biotechnology and biosafety in a wide array of audiences is essential to achieving this goal.

Grants for scientific research on environmental risk issues: The focus of the Biotechnology-Biodiversity Interface (BBI) grant program, managed by PBS, is on the need to better understand the interaction between genetically engineered crops, agriculture, and the environment. Environmental risks and benefits, and their applicability to the agricultural realities of different ecological regions, must be assessed on a case-by-case basis. Through BBI, competitive grants fund biosafety research aimed at addressing the effects of agricultural biotechnology, particularly genetically engineered crops, on natural biodiversity as it occurs in developing countries.

Assistance with regulatory documentation for proposed field testing: For the benefits of agricultural biotechnology to reach farmers and consumers in developing countries, specific agricultural products must be developed, tested, and deployed. Each step along this process must be carried out following good biosafety practices and in conformity with national biosafety regulations. This component of PBS aims to help public sector R&D institutions to incorporate biosafety into their product development efforts and to comply with

regulatory requirements. It also aims to help regulatory agencies to carry out their roles effectively in the review, approval, and inspection processes.

Main achievements

Selected PBS achievements include:

Contributing to (regional) policy making: A number of African governments are in the process of drafting, or revising overall guiding policies on biotechnology and biosafety, usually backed by laws or decrees stipulating the specific procedures for GM applications and products. PBS supports national policy development where needed, notably in countries who are in the process of defining their national biosafety systems, e.g., in Malawi, Ghana and Uganda. In Malawi, PBS has supported a process of grassroots consultations in key agricultural zones, providing inputs into a draft policy on biotechnology and biosafety developed by a multi-stakeholder Biotechnology Policy Taskforce. The final policy document will be submitted to Cabinet in early March 2007. In the meantime, work has started to revise the Biosafety Act (2002) to better define regulatory roles and responsibilities among relevant government agencies.

Regional policy research projects in collaboration with ECAPAPA[1], ACTS[2] and FANRPAN [3] aim to inform the policy process in sub-Saharan Africa. For example, the Regional Approach to Biotechnology and Biosafety Policy in Eastern and Southern Africa (RABESA) initiative, supported by the COMESA Secretariat, in its first phase analyzed the likely trade implications of planting GM crops for selected countries in East and Southern Africa. Based on the outcomes of the study (available at: http://www.acts.or.ke/pubs/monographs/index.html), the COMESA Secretariat drafted a set of guidelines on regional trade flows of GM commodities, which will be elaborated in a follow-up phase of the initiative.

In addition, detailed legal analysis and review has been done on (drafts of) laws and regulations, and recommendations made to ensure such documents establish workable, understandable and transparent regulatory systems that are consistent with international obligations. In Eastern Africa, this work has been review through regional policy seminars organized by the East African Community (EAC).

Establishing the BBI competitive grants program: Scientific data are essential for assessing environmental risks and benefits of transgenic organisms, particularly in centers of diversity. Impacts will differ from one ecological region to another and should be evaluated on a case-by-case basis, in and by developing countries. The focus of the Biotechnology Biodiversity Interface (BBI) grants mechanism, managed by PBS since 2003, is on the need to better understand the interaction among transgenic crops and animals, agriculture, and biodiversity. To date, 11 project proposals have been awarded, with scientific leadership by developing-country research institutes. PBS regional coordinators and advisory groups are instrumental in identifying BBI priorities, launching calls for proposals and supporting potential grantees. Findings from the BBI projects are being reviewed through regional technical review meetings and international conferences.

Integrated Confinement System for GM plants: Confined field trials (CFTs) play a critical role in the evaluation and development of new technologies intended to improve agricultural productivity. General guidelines for assessing and deciding on CFTs have been adopted in most partner countries. However, their implementation must be carefully managed in order to assure that the experimental material remains confined, so that no effect on the environment and human or animal health is allowed. Aware of the need for a comprehensive and encompassing approach —comprising the development of detailed guidelines, tailored training and technical assistance— in the critical area of biosafety for confined field trials, PBS and partners in developing countries have developed an ‘Integrated Confinement System’ applicable to confined field trials as well as contained

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1 ECAPAPA: Eastern and Central Africa Programme for Agricultural Policy Analysis

2 ACTS: African Centre for Technology Studies

3 FANRPAN: Food, Agriculture and Natural Resources Policy Analysis Network

glasshouse experiments. The system has been developed through collaborative work in East Africa, and has the following elements: (a) CFT Guideline; (b) Containment Manual; (c) Confinement Manual; (d) Regulatory Procedures; (e) Trial Managers Handbook; and, (f) Inspectors' Handbook. These materials are now available in English and French at:
http://www.danforthcenter.org/International/4_Program%20for%20Biosafety%20Systems.htm

Towards an integrated approach to biosafety training and education

4. PBS training and education events were initially organized directly in response to needs and challenges expressed by partners in Asia and Africa. This was a valid approach in order to establish a strong training component, an extensive network of "PBS alumni", and to develop and test training materials and methods in close collaboration with national partner organizations. For example, in fiscal year 2005, 21 distinct PBS training events in Africa involved 493 participants from 13 countries in sub-Saharan Africa.

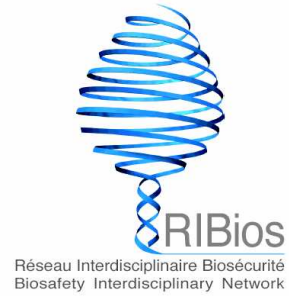
This approach ensures the relevance of PBS-supported activities, but does not necessarily lead to immediate impact towards achieving PBS outcomes and milestones. PBS agreed in 2005 on a set of common principles to be followed in the design, implementation and evaluation of training and education activities. They were derived from a review of past events in partner countries, drawing lessons from successful approaches. These key principles emphasize the need to have an agreed plan for training and follow-up in place well before the training event itself; build on local collaboration and expertise; target the right audience; and, secure peer review and participant evaluation of training materials and methods.

As a result, PBS continues to move toward targeted training interventions supporting a clearly defined goal, with less emphasis on introductory, generic biosafety training activities (however recognizing these are still needed for most partner countries). As a result, recent training events focused on, for example, reviewing and managing actual field trial applications; developing national GM food safety regulations in line with international (Codex) standards; developing training curriculum and materials by African universities. These activities will be complemented by a PBS "train the trainers" initiative, aimed at institutionalizing biosafety training/education in partner-country institutes, the first of which will take place during the Summer of 2007.

A ***case from the Philippines*** serves to illustrate the points above, and how policy development went hand in hand with technical training. Over the last several years, through the PBS SEAsia office, Michigan State University (MSU) is collaborating with the Philippines Bureau of Plant Industry (BPI) in providing technical assistance and training to build insect and weed resistance management policies for GM maize varieties that are commercially available in the country. In the Summer of 2005, the Chief of the Crop Protection Division of BPI did a two-month internship at MSU focusing on insect-resistance management for Bt maize. As a follow-up to the internship, in September 2005, a team from MSU visited the Philippines to meet the BPI insect resistance management team. BPI expressed the need to develop and implement a basic course in resistance management for biotech crops targeting crop protection officers of the different regions in the Philippines. The training program was jointly developed by MSU, PBS SEAsia and BPI specifically to address the need for training and technical assistance as a part of BPI's post-commercialization strategy for Bt and Roundup-Ready maize. A 3-day program was held in March 2007 at the University of the Philippines Los Baños, and over 35 participants from the 12 regions took part in the program. Course topics included:

- History & current policies for plant biotechnology in the Philippines
- Scientific and social issues of using biotech crops
- General insect and weed biology and ecology
- Specific insect and weed pests of Philippine maize production
- Basics of *Bacillus thuringiensis* insecticide & glyphosate herbicide
- Benefits and limitations of Bt and glyphosate pesticides
- Formation of pest resistance to pesticides
- Insect resistance management (IRM) requirements for Bt maize
- Glyphosate stewardship

Biosafety Interdisciplinary Network (RIBios)	[10 April 2007] [SUBMISSION: ENGLISH]



Partners
Science Faculty, University of Geneva
Law Faculty, University of Geneva
Science & Society Interface, University of Lausanne
Federal Office for the Environment (FOEN)
Agroscope Changins-Wädenswil - agronomical research station
University of Bamako, Mali
International Institute for Environment and Development, London
UNEP-GEF, Biosafety Unit
Secretariat of the Convention on Biodiversity

BIOSAFETY INTERDISCIPLINARY NETWORK (RIBIOS)

RIBios is an interdisciplinary team specialising in biosafety issues related to plant biotechnologies (food and agriculture). Since April 2002, this network of scientists has concentrated primarily on training, mediation and research. It is based at the *Graduate Institute of Development Studies* (IUED), which is linked to the *University of Geneva*.

RIBios aims at filling urgent biosafety training gaps in Francophone Africa and in Switzerland through an interdisciplinary approach, and at ensuring public awareness and effective participation of relevant stakeholders in the decision-making processes related to GMOs. To this end, the network addresses human resources development, public participation and capacity building on biosafety in developing countries. Thus, the expected outputs of RIBios' work include the training of decision makers, practitioners, researchers and NGOs on biosafety-related issues in Switzerland as well as in francophone African countries, engendering greater participation of the public in technology assessments with regards to GMOs, and finally, the creation of a network of experts on biosafety.

RIBios milestones

A research programme funded by the *Geneva International Academic Network* and entitled "Environment and sustainable development: the issues at stake with biosafety". This programme generated original academic **research and implementation guidelines related to the precautionary principle**.

A capacity building project funded by the *Swiss Development Cooperation Agency*, targeting the implementation of the Cartagena Protocol. It allowed two **workshops in Laos and in Kenya** and a new biosafety **academic training course at the University of Geneva** to be organised. Since 2004, this graduate course is organized every two years and counts for 15 *European Credit Transfer System* credits.

The creation, with the University of Bamako, of the "**Biosafety Interdisciplinary Training Course for Francophone Africa" in Mali**, which targets researchers, lecturers, officials from non-governmental organizations and farmers' associations, as well as decision-makers. This graduate course provides a certificate from the University of Bamako and is organized annually.

A **participatory technology assessment** (an adaptation of a citizen jury) **on genetically modified crops** was organized in southern **Mali** (Sikasso) in 2006, bringing together local cotton growers and worldwide experts.

Detailed information regarding these activities can be found on the RIBios website.

Planned Activities

1. Contribute to the « African Initiative to Promote Graduate Training in Biosafety ». In collaboration with the Secretariat of the Convention on Biodiversity, plan and implement a regional and subregional strategy to enhance and coordinate the training related to biosafety and agrobiodiversity management in Africa.

- With the University of Bamako, to administer the second edition of the "Biosafety Interdisciplinary Training Course for West Africa" (CIBAF). This course will benefit, again, 20 professionals from Francophone Africa and will be organized in Autumn 2007.
- With the University of Bamako, to administer the third edition of the "Biosafety Interdisciplinary Training Course for West Africa" as a Masters degree covering both biosafety and agrobiodiversity management. This Master degree will be granted by the University of Bamako in 2008-2009 (not funded yet).
- To coordinate existing and future academic training in Francophone Africa, in collaboration with the *Université d'Alger* and with the *Université Libre du Bénin*.
- To organise specialized short-term training sessions targeting specific needs. This will potentially be carried out in collaboration with the *Université Cheick Anta Diopp* (Senegal) and *Université d'Abidjan* (Ivory Coast). These short-term training sessions, aimed first at complementing the CIBAF programme, could later evolve into modules or units of a long-term graduate inter-university curriculum (not funded yet).

2. Implement public participation activities for technology assessment and natural resources management in Francophone Africa.

- Provide follow-up and "feedback" related to the participatory technology assessment organised in Sikasso/Mali in January 2006, so as to maintain the public participation drive that has been created and to foster its regional and national appropriation, e.g. replications of the process in other parts of Mali (not funded yet).
- Set-up of a second participatory technology assessment on the interactions between cotton production, natural resources management and the potential introduction of transgenic cotton in the region (in collaboration with Malian partners and surrounding countries such as Burkina Faso).

3. Enhance biosafety training offered in Switzerland and Europe through a collaborative effort with the « European Network in Biosafety Teaching and Capacity Building » (to be set up).

- Set-up a bioethics - both human and non-human - conference round in Geneva in Autumn 2007.
- Organise the third edition of the "Certificate of Ongoing Training in Biosafety" (CFCB), a postgraduate interdisciplinary training organized every two years at the University of Geneva. For its 2008 edition, the course will mainly be taught in English and will be proposed as an e-learning training curriculum.

4. Further develop academic research on new approaches to uncertainty and ignorance management in relati environmental issues.

- Continue academic research on the precautionary principle, science and society dialogue and participatory approaches related to new technologies and natural resources management.
- Take part in the "participatory research and collaborative management of innovation" programme funded by the "International Fund for Agricultural Development (IFAD)".
- Participate in the new research programmes and training curricula related to environmental issues and negotiation of the *IHEID*, a new academic institute to be set up in Geneva in 2008 that will specialise in international and development studies.

Serbia and West Balkans	[22 March 2007] [SUBMISSION: ENGLISH]

Biosafety Education and Training Programmes and Possibility for Collaborative Partnerships with Serbia and West Balkans

BRIEF REPORT

Republic of Serbia is a part of West Balkans (together with Albania, Croatia, Bosnia and Hertzegovina, Macedonia and Montenegro) and also a part of Central and Eastern Europe (CEE) region. Agriculture and food production are among national priorities in Serbia (farmland comprises 70% of the total surface area). Importance of agriculture and therefore profound interest in biosafety stands for all West Balkan countries.

At present, no academically-accredited courses that are related specifically to biosafety exist in West Balkans, as well as in CEE, according to BCH CP (as of March 2007). However, there are several capacity building projects and short term training programs as well as potential for cooperation in biosafety education and training that are not fully reflected on BCH CP.

CAPACITY BUILDING PROJECTS AND SHORT TERM TRAINING PROGRAMS

UNEP GEF Biosafety Projects

All West Balkan countries were involved in *Development of National Biosafety Framework* UNEP GEF projects.
No Implementation or Pilot UNEP GEF biosafety projects were realized in West Balkan countries yet.
All West Balkan countries are eligible for UNEP GEF BCH project and are now at various phases of joining or implementing that project (for example, Albania already held two BCH workshops).

UNEP GEF Development project in Serbia and Montenegro

Three workshops were held under this project: “General provisions of Cartagena Protocol and review of the survey for Serbia and Montenegro” (Belgrade, November 2005), “Public participation and awareness, decision making process in biosafety” (Belgrade, December 2005) and “Risk assessment and risk management, role of inspection within biosafety” (Novi Becej, May 2006). Workshops were organized with participation of local experts (dr Jelka Crnobrnja Isailović, dr Dragana Vasić, dr Aleksej Tarasjev, Vanja Kojić, Darko Lojen, mr Jasminka Ranđelović, Ivana Milošević, Jovanka Marić) and experts from Austria and Romania (dr Maria Michaela Antofie, dr Michael Eckerstorfer and dr Andreas Heissenberger).
It is expected that Endorsement letter for Serbian BCH project will be signed very soon and that country will enter MoU negotiation phase.

USDA FAS biosafety training workshops for Serbia

Various workshops and training activities were realized for Serbian participants in cooperation with United States Department of Agriculture (USDA)\ Foreign Agricultural Service (FAS). They included:

Workshops and training activities in Serbia
Biotechnology: Process, Issues and Future seminar(Belgrade and Novi Sad, April 2003)

Biotechnology roundtables (Belgrade and Novi Sad, June 2004)
Seminar on Management of GMO Field Trials and Role and Administration of Internal Biosafety Committees (Vrujci Spa and Belgrade, February 2005)
Biosafety Workshop on Risk Assessment and Monitoring of Field Trials (Palić Lake, May 2005)
Workshop on biosafety Enforcement and Compliance (Novi Sad, July 2006)

Various US biosafety experts participated in those activities (dr Hector Quemada, dr Robert Frederick, dr David Heron, dr Subhash Gupta, dr Richard Hellmich, dr StevenBurke, dr Scott Angle) as well as experts from Serbia (dr Goran Bekavac, dr Aleksej Tarasjev, dr Oliver Stojković, Ružica Tripić)

Workshops and training activities held in USA exclusively for participants from Serbia and Montenegro
Compliance and Reinforcement of Biosafety Regulations seminar (East Lansing, MI, August 2005)
Biothechnology Study Tour – Inspection Service Training (Ames, IA, June 2006)

MATRA Project

Under the auspices of Netherlands government MATRA project, regional workshop *Implementation of biosafety regulations* was held in Serbia on Palic Lake (May 2002). Participants were from Albania, Bulgaria, Macedonia, Slovakia, Turkey and Serbia and Montenegro. Lecturers included dr Julian Kinderlerer, dr Piet vand der Meer, dr Hans Bergmans and dr Dragana Vasić.

Other training activities

Biosafety was also one of the topics on *Modern Concepts In The Fields Of Environmental Protection* training for journalists organized by Regional Environmental Centre (REC) and Media centre in Belgrade in May 2004, as well as on symposium *Bioethics in Science and Medicine* organized by Serbian UNESCO Bioethics Committee and Serbian Academy of Arts and Sciences (October, 2006)

Participants from Serbia also attended and participated in various training programs held by *International Centre for Genetic Engineering and Biotechnology* (ICGEB) in Trieste, *Norwegian Institute of Gene Ecology* (GenØk) in Tromso, *Biosafety - An International Short Course in Environmental Aspects of Agricultural Biotechnology* in East Lansing, Michigan and participated in FAO biosafety workshops and Norman E. Borlaug International Agricultural Science and Technology Fellows Program. Denmark biotechnology company ARESA organized, in cooperation with Ministry of Environment, three day seminar on GMO (Copenhagen, September 2005) for West Balkan Countries (Bosnia and Hertzegovina, Croatia and Serbia).

CAPACITIES FOR ACADEMICALLY-ACCREDITED BIOSAFETY EDUCATION AND TRAINING PROGRAMS

No academically-accredited courses that are related specifically to biosafety exist in West Balkans countries. In Serbia those issues are briefly covered, for example, in curricula in biotechnology, evolution and genetics, mostly at PhD studies level. To fully evaluate present situation detailed survey of existing and planned curriculums (education system in all West Balkan countries goes through large transition phase) is needed.

Institutions in the West Balkans that are relavant for Biosafety education and training programs include (this list is by no means exhaustive):
In Serbia
Institute for Biological Research “Siniša Stanković”, Faculty of Biology, Institute for Molecular Genetics and Genetic engineering, (University of Belgrade) Maize Institute “Zemun polje”, Institute for Field and Vegetable Crops (Novi Sad), Faculty of agriculture (Novi Sad University), and several research centres and laboratories (Cacak, Becej, Novi Sad)

In Albania
Faculty of Natural Sciences (University of Tirana), Institute of Biological Research (Academy of Sciences) Institute of Public Health, Institute of Food Research,
In Bosnia and Hercegovina
Agricultural Institute (Banja Luka)
In Croatia
Faculties of Food Technology and Biotechnology, Science, Agriculture, Political Science (University of Zagreb), Institute "Ruder Boškovic", Institute of Social Sciences "Ivo Pilar", Agricultural College
In Macedonia
Faculties of Agricultural Sciences and Food, Pharmacy, Forestry, Natural Science, Medicine, Veterinary Institute, Institute for Sociological Political and Juridical Research (Cyril and Methodius University, Skopje)

POSSIBILITIES FOR WEST BALKAN COUNTRIES COOPERATION IN DEVELOPMENT OF BIOSAFETY EDUCATION AND TRAINING PROGRAMMES

Serbia and other West Balkan countries possess significant expertise in various fields relavant to biosafety. However, education and training in biosafety is at present very scarce and mostly related to training in biotechnology. More emphasis should be put on collaboration in education and training programs that link biosafety to other biodiversity, environmental and health issues (eg. biological, social, legal, and medical aspects) and those programs in biotechnology that are specifically related to biosafety. Programs should be tailored to specific needs of Serbia and other West Balkan countries, particularly in fields that are connected to risk assessment and public participation issues.

Therefore, there is both a need and a potential for cooperation in biosafety education and training at various levels
Within each West Balkan country: In- country cooperation and coordination between different departments and institutions. Multidisciplinary courses are still hard to organize within existing education systems. On the other hand, those systems are now undergoing major transition and that fact provide additional opportunity for incorporation of biosafety programs.
Between West Balkan countries: Based on similar needs and building on existing personal contacts in scientific research and biosafety issues.
On CEE, North - South and South -South levels: Cooperation could include exchange of expertise and information, joint courses, invited lectures, study trips and various other activities. It should also build on existing contacts between scientists in relevant fields.

All those issues should be further discussed on regional and subregional meetings as well in various institutional and personal contacts.

Brief Report prepared by Aleksej Tarasjev
tarasjev@ibiss.bg.ac.yu, tarasjev@yandex.ru

University of Dar es Salaam, Tanzania	[11 April 2007] [SUBMISSION: ENGLISH]

Biosafety Capacity Building – University of Dar e salaam, Tanzania

There are two biosafety related projects at the University of Dar es Salaam; both are but coordinated by the Department of Molecular Biology and Biotechnology with expert input from departments such as Botany and Chemistry. Both projects are regional i.e. East African

1. safetrain:

This is the most activity with regards capacity building as there are students involved.

Scope: Conduct activities regionally and nationally to assist develop capacity for countries in the East African region to make autonomous decisions regarding the use of biotechnology. This includes all elements of researching, generating and testing genetically engineered organisms.

Strategy: To maximise local involvement; all activities are in E Africa, students are enrolled at local universities, with locally selected projects. The input is as deemed appropriate and not linked to donor demands.

Capacity building activities: Improve existing infrastructural capacity by upgrading current biosafety and biotechnology facilities; offer M.Sc. and Ph.D.-fellowships on agricultural and environmental impacts of GM plants, through joint African-Danish supervision; develop a training platform structure, a Biosafety Training Laboratory for the region; develop a Diploma in Biosafety, as part of the continuing education initiatives; develop a research agenda adapted to local conditions on relevant biosafety topics; test, revise and adapt suggested standard procedures for GM plant biosafety. Conduct short courses for students and interested parties on specific Biosafety issues.

Achievements (for Dar): MSc (2) and PhD (1) enrolled at UDSM; MSc candidates to graduate in 2007/ 2008. Biosafety level 2 Training laboratory to be established; data analysis course to be conducted in July 2008.

2. gram for Biosafety Systems (PBS) in East Africa:

Scope: Conduct activities regionally and nationally to assist participating countries and the East African region as a whole to progress towards attaining efficient and functional biosafety systems.

Strategy: Assist countries to achieve regulatory and technical capacity to conduct confined field trials of transgenic crops. This effort is augmented by support towards risk assessment, risk management and risk communication.

Capacity building activities: Policy development with specific policy related studies on economic implications of GMOs to the region and on legal issues; training in food and biosafety assessment; development of a Regional Strategic Plan; sourcing for funding, two BBI grants.

Achievements (for Dar): A national biosafety framework has been developed (the country study and draft regulations are out UNEP/GEF 2004). Field trials in approval process (cotton). Training GM identification for regulators (FAO, 2007). Development of GM testing facility at TPRI (on-going). Curriculum development for Biosafety and Risk Assessment.
