INDO-SWISS COLLABORATION IN BIOTECHNOLOGY (ISCB)

http://iscb.epfl.ch
ISCB programme is implemented based on an agreement between SDC and DBT and the costs of the programme are shared between these two agencies. ISCB’s governing body, the Joint Apex Committee (JAC), defines the strategic orientation of ISCB, approves projects, and steers programme activities. The Programme Management Unit (PMU) is located at the EPF Lausanne, where it is attached to the Cooperation & Development Center unit. The PMU is responsible for efficient and effective coordination and implementation of the individual projects, the management of financial and other resources and highlights present and future needs of the programme. International scientific experts review project proposals and act as advisors. The ISCB programme supports joint projects with at least one Swiss – and one Indian project partner to create synergies across institutes and national borders. Agreements among the project partners and the programme management unit regulate rights, responsibilities and accountabilities of the project partners such as scientific objectives, funds [sanctioned by DBT and SDC] or intellectual property.

Background

The Indo-Swiss Collaboration in Biotechnology (ISCB) is a well established bilateral research and development programme, jointly funded and steered by SDC (Swiss Agency for Development and Cooperation, Federal Department of Foreign Affairs, Government of Switzerland) and DBT (Department of Biotechnology, Ministry of Science and Technology, Government of India). The ISCB programme was initiated in 1974. In the first 25 years of the programme, a wide range of projects in biotechnology (e.g. human health or microbial processes) were supported. After an external evaluation in 1999, the ‘new ISCB programme’ was commissioned.

Focus

This new ISCB programme focuses on innovative (bio)technologies in agriculture and environment with an impact on poverty reduction, food security and adaptation to climate change. ISCB is supporting several joint research and development projects to improve pulse, wheat and cassava varieties as well as in the areas of biofertilizer, biopesticide, biosensor and bioremediation. These areas are central for the overall development of the rural and urban population in India.

Mandate

- Develop climate resilient products and processes which have an impact on poverty reduction and food security. The key strategy, the value-chain concept, has been followed to move research activities to product development.
- Build capacities of Indian institutes and to promote R&D partnerships between Swiss and Indian institutes and private companies with strong economic, social, and ecological relevance.

Current phase

The new ISCB programme is in its third phase (2007-2012). For this phase, about 4 million Swiss Francs and 4.8 million Swiss Francs have been provided from DBT and SDC, respectively. The programme includes about sixty scientific staff from about twenty Swiss and Indian research institutes. The focus of the third programme phase is particularly to steer projects towards product development. In addition, South-North-South collaboration became a new focus.

In 2010, the Technology Advancement Unit (TAU) was set up in India. Transfer of knowledge from ‘research to application’ in the specific sectors of agriculture and environment is a challenging task. The overall objective of the TAU is to create a conducive environment for technology transfer and product development as well as to concretely support the individual project partners on their way towards product development. As a first step, the TAU will focus on supporting projects of the ISCB exclusively. Over the medium and long term, the TAU is envisaged to be nurtured as an autonomous organisation by the DBT in order to provide broader services beyond the ISCB projects.
**Objective**

Improve the resistance of chickpea and cassava to biotic (insects, virus) and abiotic (drought) factors by genetic transformation of the target plants. In the current phase the focus of two projects (BI, AAU) is to steer projects towards product development. Licensing agreements were signed with private and public partners. Cooperation with and transfer of technology to private and public partners is enabled in parallel, which allows efficient product development towards the end-user.

**Projects**

- **UB and MKU**: Genetic diversity and RNAi-based control of cassava mosaic geminivirus in India
- **BI**: Evaluation of ASAL expressing chickpea transgenic plants for the inheritance of aphid resistance
- **UAS**: Introgression breeding for the development of genetically modified chickpeas (Cicer arietinum L.) for protection against pod borer (Helicoverpa armigera) and aphid (Aphis craccivora)
- **AAU (ICRISAT-K, ICRISAT H)**: Genetic transformation of chickpeas (Cicer arietinum L.) using a chimeric Bt-Cry2Aa gene to confer protection against pod borer (Helicoverpa armigera)
- **ICRISAT-K**: Characterization and evaluation of transgenic events of chickpea containing the DREB1A transcription factor for tolerance to drought stress under contained greenhouse and field conditions

**Project Partners**

- **Prof T Hohn** (Coordinator), University of Basel (UB), Institute of Botany, Basel, Switzerland
- **Prof S Das**, Bose Institute (BI), Plant Molecular and Cellular Genetics, Kolkata, India
- **Prof PU Krishnaraj**, University of Agricultural Sciences (UAS), Institute of Agricultural Biotechnology, Dharwad, India
- **Prof BK Sarmah**, Assam Agricultural University (AAU), Department of Agricultural Biotechnology, Jorhat, India
- **Dr KK Sharma**, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT-K), Genetic Transformation Laboratory, Patancheru, India
- **Dr HC Sharma**, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT-H), Genetic Transformation Laboratory, Patancheru, India
- **Prof K Veluthambi**, Madurai Kamaraj University (MKU), School of Biotechnology, Madurai, India

**CONTROL OF STRESS FACTORS IN CHICKPEA AND CASSAVA**
**Objective**

Improve the quality and yield of crops by making use of the beneficial effects of plant-growth promoting bacteria and mycorrhizal fungi (biofertilizer) on the nutrient and water uptake efficiency and stress tolerance of plants. In the current phase the focus is on development of mass production and formulation technologies and the transfer to private partners for commercialization. In 2012, the collaboration with private sector was initiated.

**Projects**

- **TERI**: Development of technology for in vitro mass production of selected arbuscular mycorrhizal fungi (AMF) and field validation and demonstration of finished product on wheat in India
- **FiBL**: Short- and mid-term effects of biofertilizers on wheat yield and quality in different environments
- **UB-B**: Application and transfer to India of molecular tools for monitoring of Plant Growth Promoting Rhizobacteria (PGPR) bioinoculants, particularly Pseudomonas spp., in wheat crops in tropical soils
- **UB-W**: Managing AMF for sustainable agriculture: Molecular tools for strain-specific tracing and quantification of AMF applied as bio-fertilizers.

**Project Partners**

- Dr A Adholeya [Coordinator India], The Energy and Resource Institute (TERI), New Delhi, India
- Dr P Mäder [Coordinator Swiss], Research Institute of Organic Agriculture (FiBL), Soil Sciences Division, Frick, Switzerland
- Prof T Boller, University of Basel (UB-B), Institute of Botany, Basel, Switzerland
- Prof V Bisaria, Indian Institute of Technology Delhi (IITD), Department of Biochemical Engineering and Biotechnology, New Delhi, India
- Dr A Sharma, GB Pant University of Agriculture and Technology (GBPUAT), Department of Biological Sciences, Pantnagar, India
- Prof A Wiemken, University of Basel (UB-W), Institute of Botany, Basel, Switzerland
Objective
Develop a set of immunobioreactor based disposable biosensor devices/kits for the rapid detection of selected pesticides with a high degree of sensitivity, rapidity and potential for wide field application.

The specific objective of the current phase is to establish a private-public-partnership to make a decisive step towards a valuable product for the farmers and other applicants.

Project
- Simultaneous optical detection of multiple pesticides from water sample on a microfluidic platform

Project Partners SBIRI
- Dr CR Suri, Institute of Microbial Technology (IMTECH), Chandigarh, India [public partner]
- Dr MS Thakur, Central Food Technological Research Institute (CFTRI), Mysore, India [public partner]
- Bigtec, Bangalore, India [private partner]

BIOREMEDIATION
IN SITU DEGRADATION OF PESTICIDES

Objective
Develop a bioremediation technology to treat pesticide contaminated Indian soils by using specific inoculation of previously enriched pesticide degrading bacteria (bioaugmentation). The overall objective of the current project phase is to improve and refine the bioremediation technology for HCH (hexachlorocyclohexane) contaminated soil in order to be able to offer site-adapted concepts depending on the kind of soil and the type of contamination.

Joint project
- Environmental risk and bioremediation of hexachlorocyclohexane isomers

Project Partners
- Prof Ch Holliger [Coordinator], Swiss Federal Institute of Technology Lausanne (EPFL), Laboratory for Environmental Biotechnology, Lausanne, Switzerland
- Dr HP Kohler, Swiss Federal Institute of Aquatic Science and Technology (EAWAG), Environmental Microbiology, Dübendorf, Switzerland
- Prof R Lal, University of Delhi (UD), Department of Zoology, Delhi, India
- Dr T Poiger, Agroscope Changins Wädenswil Research Station (ACW), Environmental Protection and Consumer Safety, Wädenswil, Switzerland
- Dr V Raina, Kalinga Institute of Industrial Technology (KIIT), School of Biotechnology, Bhubaneswar, India

BIOSENSOR
DETECTION OF PESTICIDES
BIOPESTICIDE

BIOLUMINESCENCE

BIOCONTROL OF POD BORER

Objective
Develop and test efficient and cost-effective biological methods to control the pod borer (Helicoverpa armigera) in pulses based on the introduction of specific entomopathogenic fungi, which are natural enemies of the pest insects. In the current programme phase, the project is supported to establish the conditions to be financed in the frame of SBIRI. The Small Business Innovation Research Initiative (SBIRI) is a funding scheme introduced by DBT created to boost public-private-partnership efforts in India. A SBIRI project was approved and launched in 2011. The project will be further monitored and supported by ISCB.

Project
- Transferring mycoinsecticide technology to the private sector and launching a SBIRI project.

Project Partners
- Dr MV Deshpande, Biochemical Sciences Division, National Chemical Laboratory (NCL), Pune, India (public partner)
- HiTech Bioscience India Ltd. (HTBS), Pune, India (private partner)

UNESCO Chair
In 2007, CODEV was recognized as a UNESCO Chair in Technologies for Development. The Chair organizes its activities around 4 priority areas:
- Technologies for the sustainable development of habitat and cities
- ICTs for the environment
- Science and technology for disaster risk reduction
- Technologies for sustainable energy production

About us
Comprising a team of 20 people, CODEV’s mission is to promote and coordinate scientific cooperation activities within EPFL.
EPFL thereby aims to contribute to the most pressing world challenges by encouraging scientific partnerships, research and education that will help adapt technological innovations to developing countries.

Activities
- Research
- Management of research programs
- Education
- Expertise & Advice
- Communication & Events

With more than 350 laboratories and research groups and 13 complete study programs, EPFL (Swiss Federal Institute of Technology Lausanne) is one of Europe’s most innovative and productive technology institutes. Its main campus brings together over 11,000 people – students, researchers and staff. The school’s structure facilitates transdisciplinary research and encourages partnerships with other institutions in both fundamental research and engineering applications.

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