Indo Swiss Collaboration in Biotechnology (ISCB)

The Indo-Swiss Collaboration in Biotechnology (ISCB) was established in 1974 as a capacity building programme supported by the Swiss Agency for Development and Cooperation (SDC). In 1999, with new orientation and themes and capacity building still playing an important role, ISCB turned into a bilateral research and development program, jointly funded and steered by SDC and the Department of Biotechnology (DBT), Ministry of Science and Technology, Government of India.

ISCB is governed by the Joint Apex Committee (JAC), which is composed of leading Indian and Swiss researchers and scientists in the fields of biotechnology and socio-economics. It is jointly managed by the Programme Management Unit (PMU, EPFL, Lausanne) and the Technology Advancement Unit (TAU, New Delhi).

The overall goal of ISCB is to contribute to food security in the Indian context through innovative life sciences and biotechnology approaches, supporting sustainable and climate-resilient agriculture. Capacity building is still a core objective, pursued through scientific exchange programmes and participation in international conferences.

In the current phase (2013-2016), research concentrates on yield improvement and on drought and pest resistance of pigeon pea, finger millet and cassava. The scientific approaches to reach these objectives are discussed and decided upon in the JAC. In the case of cassava and pigeon pea this research includes both traditional approaches as well as work with genetically modified organisms. A further network is researching on aspects of bio-fertilizer and bio-irrigation in an intercropping system of pigeon pea and finger millet.

Should an approach involving GMOs lead to the development of a product, the same will be subject to Indian biosafety regulations, allowing the GM approach only where no other viable technology option is currently feasible. Furthermore, it is the capacities and the knowledge acquired through ISCB that contribute to India's ability to make informed decisions about biotechnology.

SDC's contribution to the ISCB programme since 1999 sums up to CHF 23.4 million, of which CHF 4.8 million are provided to the current phase 2013 – 2016. These funds are used mainly for project coordination in Switzerland, salaries of Swiss researchers, scientific exchanges, network meetings and participation to scientific conferences by Indian and Swiss researchers, as well as the organization of the meetings of the JAC. The Swiss contribution is matched with an approximately equal contribution by the Indian partner DBT.

Frequently asked questions - FAQ

Why does SDC support research in the field of GMOs, when at the same time the issue is highly contentious in Switzerland?

Global food security is a priority for the SDC. The Global Programme Food Security (GPFS) and a large number of national and regional programmes are implementing this goal, focusing on smallholder farming and supporting production methods and technology that will improve the lives of poor, underprivileged rural populations.
GMO research and development do not constitute the main focus of SDC efforts. Numerous projects primarily take a conventional or increasingly agro-ecological approach to promoting

sustainable improvements in agricultural and livestock production. Subject to certain conditions in relation to ISCB (and to international agricultural research under the aegis of the Consultative Group for International Agricultural Research [CGIAR]), SDC funds also go towards the development of GMOs. However, such financial assistance is, and will remain, an exception to the rule in the SDC's portfolio. The SDC adheres to Swiss statutory standards (GMO research is of course permitted in Switzerland), contributes to public-sector research projects only, and is willing to engage in transparent dialogue with all Swiss stakeholders. It periodically reviews its position in the light of new evidence.
It goes without saying that the SDC recognises the sovereignty of every partner country in all matters related to the development and application of genetic engineering and resultant GMOs.

The SDC is acutely aware of the political implications of genetic engineering in Switzerland. However, it acknowledges that many partner countries accept genetic engineering as a viable means of developing improved plant varieties. Within the ISCB context, Switzerland also helps India to develop the capacity to make informed decisions about the risks and potential of genetic engineering in agriculture.

What role does GMO research play in the SDC's work in relation to food security?

Genetic engineering is an exceptional component of SDC's engagement in Food Security. Besides ISCB and on a multilateral level, Switzerland is a donor of the CGIAR system, which coordinates 15 research institutions worldwide with the strategic objective to (a) reduce poverty, (b) improve food and nutrition security and (c) improve natural resources and ecosystem services. Should any of these centers do any research on transgenic crops, they would be bound by national and international laws in this respect.

On what grounds does the SDC support GMO research?

- SDC's support to agricultural research focuses on production systems in marginal areas. Genetic engineering is only one of a large set of technologies that aim at improving crops. Other methods such as participatory plant breeding, conventional or new breeding methods such as marker assisted breeding remain valuable options to address the needs of marginal smallholders.
- If research in GMO allows important advances in contributing to food security, SDC can support its application. The international agricultural research system (CGIAR) remains the principle partner for strengthening knowledge, innovation and capacity building. Any investment in genetic engineering has to form a part of an integrated and comprehensive public agricultural research and development programme that gives priority to the poor.
- SDC respects and defends developing countries' sovereignty in assessing the desirability of GM crops within the context of their own local needs and priorities. SDC enhances the ability of partner countries to take informed decisions on applying genetic engineering and using genetically modified organisms. This includes paying due attention to alternatives and the appraisal of opportunities, potential benefits and potential risks associated with the development and application of GM crops and the involvement of all important stakeholders.

Does the SDC engage with GMO critics in Switzerland?

The GPFS Division engages with GMO critics such as Bread for All (BFA) and Swissaid. Together with Swissaid, the division also organises symposia, the next one of which will take place on 15 September 2016 on the subject of environmentally friendly farming.
In 2013, the GPFS and BFA openly engaged in dialogue regarding GMO research conducted on the cassava plant by ETH Zurich. This project received funding from the Swiss Forum for International Agricultural Research (SFIAR), a body partly funded by the SDC.

ISCB has existed as an international public-sector partnership for over 40 years. http://iscb.epfl.ch/
The following background document includes information about genetically modified plant varieties that are the subject of research and development within the ISCB context:
http://iscb.epfl.ch/files/content/sites/iscb/files/shared/Documents/Brochure%20ISCB_Phase%20III_new.pdf

What specific ISCB research work does the SDC support?

For the current phase of the ISCB (2013-2016), four research networks involve Indian and Swiss research institutes:

- *BIOFI Network:* aims at improving the productivity of of two major local crops - finger millet (*Eleusine coracana*) and pigeon pea (*Cajanus cajan*) grown by small and marginal farmers in rainfed areas. The network will develop and promote a package of innovations focusing on the aspects of biofertilization and bioirrigation in a specified intercropping system of the target crops. In an interdisciplinary approach the biotechnologists will strive to optimize the package of innovative practices on-station and the socio-economic researchers will investigate the farmers' current practices and assess the adoption potential of the proposed innovations. No genetic engineering is involved.

- *The Indo-Swiss Cassava Network* aims to develop virus and whitefly resistance in cassava varieties preferred by various stakeholders in order to overcome the negative impact of the Cassava Mosaic Disease (CMD)* on cassava productivity . *CMD is caused by geminiviruses which are plant DNA viruses transmitted by whiteflies in a persistent manner. Despite the identification of sources of CMD tolerance and resistance in cassava germplasm, their introgression in farmer- and industry-preferred cultivars remains difficult and limited due to the high heterozygosity, the long selection cycle and, in some cases, the absence of rapid and robust screening methods.
  The RNA-based biotechnological approach to engineer robust resistance to plant viruses and insects is accompanied by the socio-economic investigation on the aspects relevant for the technology transfer, product development, public acceptance and adoption by end-users. An important component of this network is the capacity building between Switzerland and India. Three out of five approaches involve genetically modified organisms.

- *The Ragi Network* aims to enhance yield potential and bioavailability of essential nutrients in finger millet by identifying the genetic resources for targeted crop improvement and by developing genomic tools for molecular breeding. These findings will form the basis for the development of a focused molecular breeding program to develop nutritionally superior, high yielding and climate resilient finger millet /Ragi varieties. Socio-economic investigation will assess the Ragi production system, markets and policy and examine the adoption potential of these new technological interventions. No genetically modified organisms are involved.

- *Pigeon Pea Network* aims to develop high yielding, semi-dwarf, synchronous early maturing and moisture stress tolerant pigeon pea varieties by using the already available genome information and combining conventional and molecular breeding approaches. In addition, two independent strategies for pod borer resistance (against *H. armigera* and *M. vitrata*) in pigeon pea are envisaged. The socio-economic component of the network will analyze the traditional pea production and reasons for changes, the emerging production centres and yield gaps at the district level, the constraints faced by farmers, the traits of interest of stakeholders, and perform an ex-ante evaluation of the improved pigeon pea breeding program. One out of four research approaches involve genetically modified organisms.

Application of genetic engineering will not necessarily lead to genetically modified plant varieties for field level production. This technology may as well be applied to test non-GMO plants.
Besides transgenic chickpea events (resistant to insect pests) ISCB has been successful in developing bio-fertilizers (increasing wheat yield by up to 40%, currently in the product development stage) and bio-pesticides, of which none involve any genetic engineering.

What are the criteria for licensing technologies / products that come out of ISCB? In other words: Can the private sector use and possibly misuse the results of this publicly funded project?

Some research work under the ISCB programme leads to the development of concrete technologies or products. In such a case, the technology / product developing institution(s) under the ISCB programme as the *licensor,* can transfer the usage rights of biological materials and underlying know-how for product development to a *licensing partner(s).* This is done through the signing of a non-exclusive licensing agreement for the Indian territory with a predefined field-of-use. The *licensing partners* (which are Indian and can be from the public or private sector) are chosen in coordination with the Indian Department of Biotechnology (DBT) based on their experience and capabilities (including stewardship), their research priorities and their experience in partnering with public institutions, amongst others.

What specific progress has been made with regard to food security as a result of the SDC's support?

Launched in 1999, the New ISCB Programme (ISCB as a project was implemented in 1974, the New ISCB Programme with new orientations and themes commenced in 1999) has been successful in developing several innovative next-generation technologies.

Some of the key results and their applications include:

a. Development of prototypes of bio-fertilizers with potential to increase wheat yield by 40 per cent under marginal conditions and the recent transfer of the technology to the private sector for further development and commercialization;
b. Development (for the first time) of transgenic chickpea events which are resistant to insect pests and transfer of the technology (know-how and events) to public and private organizations (Indian) on a 'non-exclusive license' basis for further product development and commercialization;
c. Development of promising biopesticides against insect pests at pilot scale;
d. Substantial progress in application of markers in wheat breeding programmes has proved to be a most decisive factor in varietal development in India as well as globally.

Academically: Besides transferring tangible results to the product stage, the ISCB programme has succeeded in generating more than 450 scientific publications and articles, most of which in reputed international journals. ISCB has promoted significant scientific exchanges, networks and platforms.

In the Indian perspective: The Secretary to the Government of India in the Department of Biotechnology is on record quoting that ISCB is the best and most innovative bilateral scientific programme of the Indian Government, which now functions as a beacon and a partnership model for such cooperation with other countries. He also mentioned that the 'ISCB brand', over the last few years, has come to symbolize cooperation, quality, effectiveness and efficiency.

Will the SDC continue to provide support beyond 2016?

It has been planned for some time to end this project and, by extension, the SDC's involvement in this type of research. To this end, there will be a concluding phase to consolidate the scientific work that has been carried out.

Are smallholder farmers' needs taken into consideration?

The phase that began in 2013 incorporated inputs from farmers helping to select plant varieties and research areas. The selection process started with an analysis of documented information on

the needs of Indian farmers, i.e. smallholder families and poor farmers in marginal, peripheral regions. The selection was narrowed down again to exclude plant varieties and research areas that were already being invested in by major institutions or sponsors. Multi-stakeholder workshops were held to discuss the resultant shortlist. These were attended by two farmers in addition to 20 representatives of farmers' organisations and organisations that liaise with farmers.
Farmers are also involved in on-farm trials as part of the biofertilisation project – the most advanced of the four research networks.

Indian Department of Biotechnology on…

… GM and Biosafety in India:
There is no moratorium for GM crops in India (except for one particular gene in eggplant). The regulatory system is in place, more than a dozen field trials for GM crops have been conducted in the last two years and more approvals have been given recently. Currently two field trials in eggplant and cotton have commenced. Confined field trials on chick pea were performed last year at two locations, and a second round of trials has been approved by the regulator. GE male sterile system in mustard is in the final stage and risk assessment and management documents prepared by the regulator will soon be placed in the public domain for stakeholders' inputs.

… its own contribution
The Indo-Swiss Collaboration in Biotechnology is a mutually agreed upon bilateral research and product development programme with financial contributions from the two partner countries. It is not a development aid programme. The Swiss funding is only used in the basic research phase mainly for capacity building and trainings in molecular labs. With the exception of Cassava, all genetic transformation methods were developed in the Indian labs. All GM research beyond the initial (basic) research phase is financed by the DBT, in other words: Swiss funds are not directly used in GM research. Non GM research and technologies, such as biofertilizers, biopesticides, bioremediation and marker assisted breeding of crops are also part of the programme as alternatives to the GM approach. As a policy, following India specific biosafety regulations, the GM approach is only employed where no other viable technology option is currently feasible.

SDC – Global Programme Food Security, 31 August 2016