The ICAR - Sugarcane Breeding Institute, Coimbatore (SBI) is the premier and is one of the oldest agricultural research institutes under the Indian Council of Agricultural Research. Established in 1912, the institute had been largely responsible for meeting the sugarcane varietal requirements of the country for the past ten decades with the dual mandate of developing improved sugarcane varieties and also supporting the sugarcane breeding programmes of over 23 Sugarcane Research Stations in the country.

**Mandate**

- Breeding of superior sugarcane varieties/genotypes having high sugar productivity as well as sustainability and to assist state sugarcane breeding programmes.
- Basic and strategic research on crop improvement, production and protection aspects of sugarcane
- Collection, maintenance, evaluation, documentation and conservation of genetic resources of sugarcane / *Saccharum* species
- Dissemination of technologies and capacity building

**Infrastructure**

The Institute at present has one Regional Centre at Karnal (Haryana) and two Research Centers at Kannur and Agali in Kerala. The Regional Centre at Karnal, established in 1932, caters to the requirement of evaluating breeding stocks and evolving superior commercial varieties for the subtropics. Recently developed varieties from the center viz., Co 0118, Co 0238, Co 0239 and Co 05011 are fast spreading and performing better in the region. In 1956, the world germplasm collection was introduced for maintenance at Taliparamba in Kerala State. This was subsequently shifted to Kannur (Kerala) in the year 1962. The world’s largest collection of sugarcane germplasm comprising 3368 clones are being maintained at Sugarcane Breeding Institute Research Center, Kannur. The Agali center established in 1995 acts as a National Off Season Nursery Facility for the mandated crops and serves as National Distant Hybridization Facility to widen the genetic base of sugarcane varieties being evolved in addition to augmenting the resources of the National Hybridisation Garden.

The facilities for DUS testing of sugarcane varieties were established at Coimbatore, Karnal and Agali by Protection of Plant Varieties and Farmer’s Rights Authority.

**Organisational Structure**

The organizational set up of this Institute includes three major Divisions viz. Crop Improvement, Crop Production and Crop Protection besides Extension and Statistics & Economics Sections. The National Hybridization Garden (NHG) operated by the SBI is an unique facility which is solely responsible for the development of location/region specific sugarcane varieties in the country. The institute activities are supported by Agricultural Knowledge Management Unit (AKMU), library, Prioritization, Monitoring and Evaluation cell (PME), farm and estate sections.
The institute created history when the first batch of inter-specific hybrids of sugarcane between the cultivated species (Saccharum officinarum) and the wild species (S. spontaneum) were evolved for the first time in 1912 and the first commercial hybrid 'Co 205' was released in 1918 for cultivation in the subtropical India. About 3126 'Co' canes have been developed at the institute and out of which 169 of them are popular varieties in India and abroad. The landmark varieties developed at the Institute were Co 205, Co 213, Co 312, Co 313, Co 419, Co 421, Co 453, Co 527, Co 740, Co 997, Co 1148, Co 1158, Co 62175, Co 6304, Co 6415, Co 6806, Co 7219, Co 7717, Co 6907, Co 7805, Co 8021, Co 86032, Co 89003 and Co 0238. Many of the early 'Co' varieties like Co 270, Co 281, Co 290, Co 312, Co 331, Co 419, Co 421 and Co 475 were cultivated in about 28 foreign countries including USA, Australia, West Indies and Mauritius. Even today Co varieties are popular in many Asian and African countries.

Wonder cane of the millennium Co 86032, the most popular variety is grown over one million hectares in the tropical region. Currently, along with Co 86032 other Co varieties occupying 80-90 % in Gujarat, Tamil Nadu and Karnataka, 64% in Maharashtra and Punjab, 50% in Haryana, >35% in UP, 20-25% in Bihar, Andhra Pradesh and Odisha, which is a unique distinction for an ICAR Institution in varietal contribution. At present, the varieties developed by ICAR - SBI and the state research stations with SBI support occupy more than 99% of the cane area in the country.

Recently released variety Co 0238 revolutionized sugar industry in the sub-tropical region particularly in the largest sugarcane producing state Uttar Pradesh. Average sugar recovery in the UP state was 9.18 % during 2012-13 which was increased to 10.62 % during 2015-16.

While continuing to develop new varieties suitable to the changing
needs through conventional breeding, new biotechnological approaches are being suitably integrated in developing varieties having high sugar content for longer crushing period, higher cane yield, resistance to major diseases and pests and wider adaptability. Tissue culture technology has been effectively used in the generation of somaclonal variation. Micro-propagation techniques have been developed at this Institute to produce healthy seed material at a rapid pace. ICAR- SBI is an accredited center for virus indexing and genetic fidelity testing of sugarcane tissue culture plants. Virus indexing service is being offered to tissue culture production labs and this service is being utilised by the labs in different states to produce healthy planting materials.

Crop production technologies like wide row planting, bud chip settlings, intercropping, integrated nutrient supply system, varieties tolerant to saline and alkaline soils, organic sugarcane cultivation, drought management, control of flowering, micronutrient deficiency management, etc were standardized at this institute are adopted by farmers and contributing substantially to the improvement in sugarcane production. Composting technologies perfected in this institute using Trichoderma viride or Pleurotus reduces the composting time of pressmud. Precision farming is a new area of research where in technologies for precision management of natural resources is being developed. Yellow leaf disease affected fields were monitored through remote sensing technique. Preservation techniques for converting fresh juice to powder for efficient storage and transport are being standardised.

Integrated pest and disease management packages in sugarcane have been developed. Studies are being conducted to screen sugarcane progenies/germplasm for pest and disease tolerance, identifying resistance sources, molecular basis of disease resistance, developing bio agents to control sugarcane pests and diseases, molecular diagnostics of sugarcane pathogens and techniques for rapid screening for disease resistance/tolerance. Controlled condition testing (CCT) was developed to rapidly screen sugarcane clones for red rot resistance. Grain inoculation technique has been developed to assess field tolerance in sugarcane red rot. Through the newly developed sett treatment device, efficient delivery of fungicides is achieved to manage red rot and smut.

**Crop Diversification**

ICAR - SBI has developed and evaluated energy canes. Type 1 and Type 2 energy canes are now available which can be used as dual purpose canes/ or as feed stock of sugar industry. Apart from energy potential and high biomass, these energy canes have tolerance to abiotic stresses and come up under resource poor areas. SBI has developed a novel technology for juice powder preparation, which can be stored and reconstituted.
Technology transfer

Promising technologies of ICAR-SBI namely, Soil moisture indicator, Sett treatment device and Settling transplanter were transferred to private entrepreneurs for large-scale production. Sett treatment device and Settling transplanter were developed in collaboration with ICAR-CIAE, Regional Station, Coimbatore.

Soil Moisture Indicator

Capacity Development and Education

Capacity development programmes on varietal improvement, crop production and protection technologies, extension methodologies, value added products, biotechnology etc., are undertaken by the Institute for scientific personnel, sugarcane extension workers, sugar factory personnel and sugarcane farmers. A strong institute-industry-farmer linkages have been established for effective technology delivery system and capacity development of sugarcane farm leaders. ICAR - SBI is one of major Institutions providing Post Graduate training in Biological Sciences under the Bharathiar University, Coimbatore, Bharathidhasan Univeristy, Trichy and Anna University Chennai. This institute in collaboration with Tamil Nadu Agricultural University is offering M.Sc. programme in Sugarcane Technology in Open and Distance Learning (ODL) Education mode.

Awards

The Institute was awarded with the Sardar Patel Outstanding ICAR Institution Award 2013 (Larger Institutes). The award was presented by the Hon’ble Prime Minister of India on 29th July 2014.

Institute received Runner Award of Mahindra Samriddhi India Agri Awards 2014 on 25.02.2014 at New Delhi.

ICAR-SBI was conferred with "Cashless ICAR Institute Award" on February 14, 2017. Dr. Bakshi Ram, Director, received the Cashless ICAR Institute Award from Shri Radha Mohan Singh, Union Minister of Agriculture and Farmers Welfare.

Contents by
Dr. G. Hemaprabha, Dr. C. Palaniswami, Dr. R. Viswanathan, Dr. Neeraj Kulshreshtha, Dr. K. Chandran, Dr. R. Karuppally and Dr. P. Murali

Published by
Dr. Bakshi Ram, Director, ICAR-SBI, Coimbatore.
Milestones

1912 ICAR-SBI was established as a Sugarcane Research Station under the Department of Agriculture, Madras Presidency funded by the then British Government to bred varieties for sub-tropical region. Dr. C.A. Barber was appointed as the first Head of Station & Government Sugarcane Expert.

1918 First inter-specific commercial sugarcane variety Co 205 was released

1926 Work on tropical cane breeding initiated

1927 Co canes spread to foreign countries- Co 205 to Cuba and Florida (U.S.A)

1928 Release of Co 312 which dominated as the most popular variety in the sub-tropical India for the next three decades

1932 The Karnal Center was established with the funds sanctioned by the Imperial Council of Agricultural Research. Mr. G.V. James was the first In-Charge of the station and he succeeded in germinating the sugarcane fluff at Karnal. The first batch of seedlings were planted

1933 First wonder cane of tropical India Co 419 was released

1946 Launching of Spontaneous Expedition Scheme (SES)

1949 Second wonder cane of India Co 740 was released

1956 Establishment of a world collection of germplasm duplicating the original collection at Canal Point, U.S.A with US aid. Ninth ISSCT Conference was held for the first time in India at New Delhi

1962 Golden Jubilee year. The Cannanore (Kannur) Research Center was established to house the world collection of sugarcane germplasm

1963 First PL 480 project taken up for producing Indo-American clones with built-in resistance to diseases, adverse environments utilizing S. spontaneum. Radio isotope laboratory was set up

1969 Institute became part of the Indian Council of Agricultural Research (ICAR)

1971 All India Coordinated Research Project on Sugarcane of ICAR was launched ICAR - SBI as one of the main center

1974 National Hybridization Garden (NHG) on sugarcane was established

1976 Aerated steam unit was inaugurated

1977 Tissue culture laboratory was established. Division of Breeding, Genetics, Cytogenetics and Physiology reorganised

1983 Carried out testing of pre-zonal varieties at five zonal centres

1987 Platinum Jubilee celebrated

1999 Agali center was established

2000 Co 86032- the wonder cane of new millennium was released

2008 Accreditation from DBT for genetic fidelity testing and virus indexing

2009 Wonder variety Co 0238 of subtropical India was released

2011 The Centenary Celebrations were launched by Dr. S. Ayyappan, Secretary (DARE) DG & (ICAR) on the occasion of 99th Foundation Day of the Institute.

2012 International Symposium on New Paradigms in Sugarcane Research was held on October 15-18, 2012 in connection with the Centenary Celebrations 2012. On December 18, 2012-Valedictory Function of the Centenary Celebrations was held at Coimbatore

2014 Received Sardar Patel Outstanding ICAR Institution Award 2013 (Larger Institutes). The award was presented by the Hon’ble Prime Minister of India on 29th July 2014

2014 Received runner award of Mahindra Samriddhi India Agri Awards 2014

2017 Cashless ICAR Institute Award Confirmed on 14th February, 2017

2017 International Symposium on “Sugarcane Research Since Co 205: 100 Years and Beyond - September 18-21, 2017