

Technology commercialization and agri-business incubation

A new dimension in technology transfer and utilization was added with the establishment of Business Planning and Development (BPD) Units in selected ICAR institutes under the National Agricultural Innovation Project (NAIP) supported by the World Bank. Later, the BPD units were upgraded as Agri-Business Incubation Centres (ABIs) to provide multi-faceted support to promote agri-business using ICAR technologies.

THE BPD unit at ICAR-CPCRI was established in 2013 and upgraded to ABI in 2016. Subsequently, it was rechristened by prefixing the trademark of the Institute 'Kalpa'. Technology commercialization is facilitated through the Intellectual Properties and Technology Management Unit (ITMU) of the Institute.

Technology commercialization

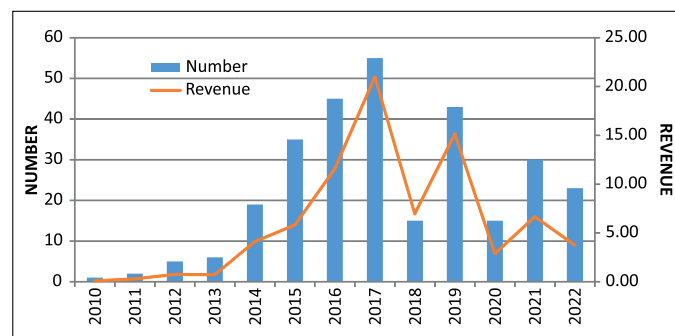
During the past 106 years of existence, ICAR-CPCRI has developed a large number of production and processing technologies for coconut, arecanut and cocoa. The establishment of ITMU cell under NAIP (2008) was a major policy shift in the arena of technology transfer as till then, all the technologies developed at the Institute were made freely available to public. The main task of ITMU, in the beginning, was to enlist technologies of commercial value, fix the licensing fee and finalization of Memorandum of Agreement for technology transfer. There are many criteria to arrive at the cost of technology including the cost involved in technology development and the number of potential buyers, returns from the technology in terms of royalty, affordability for clients and market scope. The ITMU of CPCRI has constantly kept the licensing fee affordable to micro-entrepreneurs comprising rural youth, women self-help groups and farmers. It was suggested that multiple licensing of technologies is to be followed to ensure the reach of technologies in different crop growing areas rather than restricting technology access with a higher licensing fee, especially the crop production technologies. The Institute has adopted a varying technology transfer fee for different stakeholders by offering discounts to socially weaker sections like women self-help groups under the poverty alleviation programmes, individual farmers, farmer cooperatives, and Krishi Vigyan Kendras.

Since 2010, a total of 291 Memorandum of Agreements (MoAs) have been entered into for transferring technology-know how. Revenue generated till 31 August, 2022 is ₹79.63 lakhs. Technologies licensed over the years and

revenue generated are shown in figure. Ever since the implementation of the NAIP project and subsequently the NAIF project, there is a substantial increase in technology utilization by entrepreneurs. The number of women entrepreneurs coming forward to access technologies seems to be low; only 33 licenses (11.2%) comprise of women. Nine KVKs signed MoA for technologies with CPCRI.

Among the 54 technologies commercialized, the highest utilization is in the food sector (201; 69%), ranking virgin coconut oil (VCO) technology as the number one (Table 1), followed by Kalparasa® and coconut chips. These technologies are unique and adjudged as the best by consumers. Among the different methods of VCO production, the hot-processing technology developed at ICAR-CPCRI, involving the heating of coconut milk, is most close to the indigenous preparation. VCO obtained through the fermentation process has the advantage of Vitamin E content, which is also odourless. Further, the initial investment for these technologies is very minimum (machinery cost is less than rupees 10 lakh) which makes them appealing to early entrepreneurs.

Another important segment of technologies is related to farm inputs. The users of these technologies are chiefly progressive farmers, rural youths, and farmer cooperatives.



Number of technology transfer and revenue earned (in lakh rupees) over the years

Composting technologies, entomopathogenic nematode aqua formulation, and *Trichoderma* coir pith cake formulation are finding many applications in the field. The customized fertilizer for coconut, *Kalpavardhini*, has also been received well by the farming community.

Entrepreneurs from 14 states/UTs [majority are from the four major coconut-growing states, i.e. Kerala (108), Tamil Nadu (68), Karnataka (68), and Andhra Pradesh (17)] have utilized the technologies developed at ICAR-CPCRI.

Table 1. Number of MoAs signed for technology know-how in different segments

Segment	Technologies	No. of licensees
Food	Virgin Coconut Oil (VCO)	58
	Coconuts chips	44
	Byproducts (carbonated water, vinegar)	23
	Kalparasa [®] and coconut sugar	54
	Tender nut products (Frozen coconut delicacy, carbonated water, trimmed tender coconut)	18
	Others (Foam mat dried milk powder, Chocolate, Cocoa nibs)	4
Machinery	VCO/Coconut chips machinery; Trimmed tender coconut; Snowball tender coconut; Punch and Cutter	18
Nursery related	Coconut varieties	12
	Tissue/organ culture protocols	5
Farm inputs	Kalpa Gold and Kalpa soil care (composting technologies)	18
	Bio-agents/bio-formulations	30
	Nanomatrix for pheromone delivery	3
	Kalpa Vardhini/Poshak	4

Intellectual property management

The ITMU is also vested with the management of IP assets of the Institute, mainly patents, copyrights, and varieties. Decision with regard to patenting a technology is considered in the Institute Research Committee meeting and patent filing is done through ITMU. Eleven national patents (Table 2) were granted to the Institute till 31 August, 2022. The Institute has registered four trademarks. Eight coconut varieties are registered with PPV and FRA.

Technology awareness programmes

Towards creating awareness and providing information on proven technologies with business potential to entrepreneurs, the Institute conducts an average of 16 programmes every year in different places. Another channel for technology popularisation is through exhibitions. In the pre-Covid-19 era, the Institute participated in 25 to 30 exhibitions a year, which not only helped showcase the technologies but also assisted in marketing the products of the incubatees using ICAR-CPCRI technologies. These activities are also helpful in popularising technology information in local languages by utilization of mass media. Different kinds of extension literature were prepared and distributed to visitors in the exhibitions and technology awareness camps.

Kalpa agri-business incubator

To promote technology-based business models to entrepreneurs, the Indian Council of Agricultural Research established a network of Agribusiness incubation (ABI) centres. The ABI established at ICAR-CPCRI (i.e. Kalpa ABI) is focussed on technology incubation for coconut, arecanut and cocoa-based business initiatives. Specific objectives of Kalpa ABI are:

- To promote business entrepreneurship in the plantation sector by creating an agribusiness ecosystem;
- To facilitate the commercialization of technologies

Table 2. Patents granted to the Institute

Invention	Patent No.	Name of Inventor
Coconut/ Arecanut palm climbing device	268548	A C Mathew, M V Krishnan
Design and development of coconut de-shelling machine	233742	T Vidhan Singh
Tender coconut punch and cutter	233744	T Vidhan Singh, K G Narayana Swamy, M V Krishnan
Manually operated coconut kernel slicing machine	358062	A C Mathew, Madhavan K
Coconut chips slicing machine	285418	A C Mathew, Madhavan K
Coconut testa removing machine	278013	A C Mathew, Madhavan K
Development of a telescopic sprayer	246751	T Vidhan Singh
Design and development of shell-fired copra dryer	269186	T Vidhan Singh
Simple device to collect fresh and hygienic neera (inflorescence sap) from coconut tree	382339	K B Hebbar
Composition, device or a trap and methods thereof (Improved nano-based formulations for the prolonged shelf life of biopesticides)	354729	M Eswaramoorthy, K Subaharan, B V V S Pavan Kumar
Coco sap chiller	373309	Augustine Joseph, K B Hebbar

developed by ICAR-CPCRI and other agencies in the sector;

- To handhold start-up ventures with ICAR-CPCRI technologies;
- To network with different agencies for market promotion of coconut products.

Number of incubatees admitted and graduated from 2017 to 2022 is shown in Table 3.

Table 3. Number of incubatees admitted and graduated from Kalpa ABI

Item	2017-18	2018-19	2019-20	2020-21	2021-22
Incubatee admitted	13	14	12	8	10
Incubatee graduated	10	11	10	6	9
Startups initiated business	8	9	7	8	9
EDP organized	3	7	9	6	5

Two types of incubation are provided by the Kalpa agri-business incubator: In-house and virtual.

In-house incubation

Over a period of time, facilities for the production of following coconut value-added products were created in the ABI centre: virgin coconut oil, desiccated coconut, coconut chips, coconut sugar, 'bean to bar' chocolate, and coconut milk. In the augmented incubation space, facilities for frozen coconut delicacy, Kalpa krunch and activated carbon are made available. The period of incubation is usually six months to one year. The majority of entrepreneurs are interested to use these facilities for learning and skill acquisition.

Virtual incubation

Technology backstopping and co-developing new technologies are the major service requirement of incubatees. Some of the technologies like tissue culture require continuous education for the staff at every stage of product development. Another group of incubatees are interested in product/service development for which the

domain expert is tapped from the Institute. For instance, General Aeronautics, Bengaluru, a start-up registered with IISC, Bengaluru attempted application development for the detection of pest and disease incidence using Unmanned Aerial Vehicle (UAV). Another laboratory has joined hands with ICAR-CPCRI for developing certain sensor-based applications. The Institute also supports resource-poor entrepreneurs by developing non-exclusive products/protocols at an affordable rate. For instance, a young entrepreneurial graduate who approached for developing a protocol for frozen coconut gratings or a street vendor who approached for the technology for coconut water jelly were supported by Kalpa ABI.

Promotion of entrepreneurship

Besides the structured and formal entrepreneurship Development Program (EDP) based on commercialized technologies, the Kalpa ABI conducts several programmes for motivating entrepreneurs, market promotion, and investment mobilization in collaboration with different agencies. Some of the regular programmes conducted by Kalpa ABI in this regard are mentioned below.

Rural India Business Conclave: It is a flagship programme initiated jointly by Kalpa ABI and Kerala Startup Mission. The first edition was conducted during 27 February to 3 March, 2020 and the second edition during 9-13 June, 2022. This programme was conceived from the inspiring words of Mahatma Gandhi that 'India lives in its villages', and the vision of inclusive growth put forward by the Hon'ble Prime Minister Shri. Narendra Modi. To materialize this, the rural population should have seamless access to finance, innovative business models and technologies. RIBC is conducted with this perspective and aim of transferring rural areas to more developed and favourable ones for livelihood and entrepreneurship. It has multiple events and many partners. The prime event is the 'Rural-AgriTech Hackathon' which is conducted for 30 hours with selected 20 teams out of nearly 100 entries received. Other events of the conclave include Founder's and Expert talks, panel discussions, start-up pitches, Investors' meet, workshops, and exhibitions focussing on 'Science, Invention, Technology and Innovation' (SITI).



Facilities for in-house incubation: Inside the processing centre; the coconut vegan delicacy unit and activated carbon plant



Rural-AgriTech Hackathon winners (RIBC 2.0)



Technology awareness workshop conducted as part of RIBC 2.0

Kalpa green chat: This programme was initiated in 2019 in collaboration with Kerala Startup Mission. Eminent speakers in the field of investment, policy-making bodies, technocrats, and founders of start-ups are invited to present their insights in this programme. At present this programme is conducted in online mode.

Dream Big Kalpa – Industry Institute Interface: Towards branding ‘Kalpa’ in the coconut industry, this programme is being organized every year since 2015. It allows entrepreneurs and other stakeholders to learn about new technologies directly from the Scientists/Inventors. The interaction between the participants and scientists was observed to be mutually beneficial as entrepreneurs were able to understand technology from a correct perspective and scientists could identify research gaps in the industry.

Way forward

Agri-Business Incubation, with a decade of existence, has proved to be effective for identifying potential entrepreneurs and hand-holding them to success. Many technologies of commercial importance could reach

entrepreneurs through ABI which otherwise would have remained in the lab for years. For instance, it took over a decade for commercializing the technology for coconut chips (2002 to 2012) while new technologies are being accessed without much time lag from their release. The scope for technology incubation is tremendous and with one exclusive ABI for coconut, there is a limitation to reaching out to the entrepreneurs spread across several parts of India. Though it may not be possible to start more ABIs for coconut under Government systems, private participation can be promoted. Many agencies are now coming forward to bridge this gap and a mode of operation and linkage with Kalpa ABI has to be defined for capturing this opportunity.

For further interaction, please write to:

Dr Muralidharan K (Principal Scientist and AHD, Division of Social Sciences), ICAR-Central Plantation Crops Research Institute, Kasaragod, Kerala 671 124. *Corresponding author email: muralidharan.k@icar.gov.in

