

## Technologies at farmers' doorsteps

Among the technologies identified and patent application filed, majority are in the area of prototypes of machineries/gadgets developed for specific unit operations in post-harvest processing of coconut. Three patent applications each are in the fields of plant protection and harvesting. Since the prevailing practice in the Institute was to publish all research findings in the Annual Reports, many technologies identified for commercialization failed to qualify for filing application for patents. Further, entrepreneurs also have apprehension about the volume of business that can be generated from these technologies as contribution of coconut sector to Indian agriculture is only around 1%. Thus, it is imperative that potential of commercialization of coconut technologies lies with micro, small and medium entrepreneurs. Considering these facts, three approaches were formulated to commercialize technologies, (i) handing over the rights for commercialization to other agencies such as National Research Development Corporation (NRDC); (ii) identify entrepreneurs and sign Memorandum of Agreement (MoA) with them for commercial use of specific technology; and (iii) direct selling through the Agriculture Technology Information Centre (ATIC) of the Institute.

SUBSEQUENT to the signing of WTO agreement in 1994, followed by the amendments in Patent Rules in 2005, brought in increasing lateral thinking on creation of intellectual assets from agricultural research, commercialization of agricultural technologies from the Institute also has gained momentum. Emphasis is to encourage technological inventions in a faster pace, in tune with other developments. Accordingly, a technology commercialization and consultancy cell was formed at CPCRI during 2001-02. The Institute has so far filed 19 patent applications, of which five national patents were received till date.

### POPULARIZING TECHNOLOGIES

Providing technical know-how on payment basis began during 2002-03. In that year cost of technology know-how was fixed for 'process for making snow ball tender coconut' and 'process for making coconut chips'. The mode of transfer was through hands on training on the concerned technology: Cost fixed for the technologies at that time was to meet the training expenses. No license agreement was signed with the technology buyers at that time. The

machinery required for starting the production of coconut chips was arranged by the buyers themselves. For snow ball tender coconut, the required machine was fabricated by the Institute and sold through Agriculture Technology Information Centre (ATIC). Another prototype developed by the institute to make quality copra, an indirect type dryer, 'shell fired copra dryer' was also sold through the ATIC.

Awareness on commercialized technologies was made through farm journals, seminars and exhibitions. Response from the clientele groups to the aforesaid policy shift was mixed. Many felt it as avoidable and insisted on continuing the practice of training at free of cost; on the other hand, many entrepreneurs also came forward for purchase of the technology. For instance, 20 entrepreneurs purchased the technology know how on coconut chips and four on

snowball tender coconut in the year 2002-03 itself. However, in the subsequent years not many technology transfers in this mode were materialized. During the period 2002-2010, only four technologies were transferred on collecting respective charges. They are coconut chips; snowball tender coconut machine, shell fired copra dryer and vermicomposting of



Coconut processing machineries developed at CPCRI installed in its Agro Processing Unit



Shri Radha Mohan Singh, Hon'ble Minister for Agriculture and Farmers' Welfare, Govt. of India, exchanging MoA on the "Nanomatrix for delivery of pheromone" technology with an executive from M/s Rajasree Biosolutions, Theni, TN on the occasion of National Meet at ICAR-CPCRI, Regional Station, Kayamkulam

coconut leaves. Number of entrepreneurs/firms/Self Help Groups purchased these technologies are, respectively, 23, 9, 5 and 1.

One of the major limiting factor of technology transfer was non-availability of skilled machine fabricators to fabricate the prototypes of the institute. Soon it was realized that there is a requirement to license the design drawings to fabricating firms and many attempts were made without much success. The channel through NRDC was also not successful.

### Food Processing

Large number of food products can be made from coconut. Processing protocols for novel coconut products were commercialized from the Institute: These are coconut chips; Virgin Coconut Oil (VCO)-hot processed or through fermentation; kalparasa-unfermented coconut inflorescent sap, and coconut sugar and carbonated coconut water. The cost of technology know how varied between ₹15,000 (coconut chips) to ₹45,000 (VCO). On signing MoA, hands on training as well as design drawings of required machinery will be provided

to the buyer. Another product ready for commercialization is the 'coco crunch', an extrudate using partially fat-

removed coconut kernel (on extraction of coconut milk) which was developed in collaboration with Central Institute for Fisheries Technology, Kochi. The technology transfer fee for this product is ₹60,000.

In biotechnology, embryo rescue protocol in coconut, arecanut tissue culture for mass multiplication, cryo-preservation of coconut pollen have been successfully transferred to different entrepreneurs.

The Institute is pioneer in the use of biocontrol agents for management of pests and diseases of coconut. Technology know how on mass multiplication of three bio-agents, viz. *Goniozus nephantidis*-the parasitoid of coconut black headed caterpillar (*Opisina arenosella*), *Metarhizium anisopliae*-the green muscardin fungi for the

control of rhinoceros beetle and a *Rhizobacterium*-a biofertilizer. Technology for vermicomposting of coconut leaves using an indigenous earthworm *Eudrilus* spp. evolved at the Institute has been adopted by a large

### Technology Transfer

The dual mode of technology transfer (on free of cost and on charge basis) continued till 2011. But on implementation of the National Agricultural Innovation Project (NAIP), sub-project on 'Intellectual property management and transfer/commercialization of agricultural technology scheme' (2010-17) was a turning point and standard operation procedure for IP protection and technology pricing and licensing was evolved. As envisaged in the Project, the Institute Technology Management Unit (ITMU) was constituted to prioritize the IP related issues concerned with the Institute. The first task of ITMU was identification of technologies having commercial applications and fixing the price for technology transfer. Cost incurred for the development of technology, expected number of buyers of the technology over the years, expected income for the entrepreneur from the technology etc. are the factors considered while fixing the cost. Terms and conditions for technology transfer were also framed and accordingly Memorandum of Agreement (MoA) to be signed while transferring the technology was prepared. This information is available in the Institute web site ([www.cpcri.gov.in](http://www.cpcri.gov.in)).



number of coconut farmers across the country. Besides CPCRI, many agencies are also providing information on this technology that can be adopted by individual farmers as a component of integrated nutrient management in their coconut gardens. Interestingly six entrepreneurs came forward for commercial production of coconut leaf vermicompost and signed MoA with the Institute. Cost of these technologies was around ₹5,000.

### Production of Planting Material

The biggest asset of the Institute is the large number of germplasm of its mandate crops, viz., coconut, arecanut and cocoa, it holds. The Institute

has released a number of high yielding varieties/hybrids from its germplasm collection. A major complaint of the farming community is non-availability of quality planting material of these varieties/hybrids. Considering future need of rejuvenation of old and senile plantations in the conventionally coconut cultivated regions, scope for business ventures in this area is enormous. Private entrepreneurs can utilize the germplasm conserved in the Institute on

signing appropriate MoAs. For instance, if one wants to use the germplasm for evolving new varieties/hybrids, he can get the required planting material from the institute after undertaking the Material Transfer Agreement (MTA). Some of the biotechnology protocols developed at the Institute could also be used for production of quality planting material. That include cryopreservation of coconut pollen, coconut zygotic embryo culture and plumule culture for production of homogeneous population, molecular marker for hybrid authentication etc. Protocol for arecanut tissue culture is also commercialized. These technologies are relatively high-priced from ₹40,000 to ₹2,50,000.

Table 1. Patents filed by CPCRI, Kasaragod

| Patent filed                                                                                     | Year of filing |
|--------------------------------------------------------------------------------------------------|----------------|
| Process for making snowball tender coconut                                                       | 2001-02        |
| Making sweet coconut chips                                                                       | "              |
| Design of an electronic tensiometer and auto-irrigation system                                   | "              |
| Solar cum electrical dryer with agricultural waste as third source of energy                     | 2004-05        |
| Design and development of shell fired copra dryer**                                              | "              |
| Design and development of coconut deshelling machine***                                          | 2006-07        |
| Development of a manually operated tender coconut punch and cutter*                              | "              |
| Development of telescopic sprayer*                                                               | "              |
| Development of manually operated coconut splitting device                                        | "              |
| Ferro cement sub surface dam                                                                     | "              |
| Surge irrigator                                                                                  | "              |
| Portable snowball tendernut machine                                                              | 2007-08        |
| Automatic pumping system for skimming wells                                                      | "              |
| Manually operated coconut kernel slicing machine*                                                | 2009-10        |
| Coconut/arecanut palm climbing device**                                                          | "              |
| Aprocess for the production of coir pith cake formulation of <i>Trichoderma</i>                  | 2011-12        |
| A simple device to collect fresh and hygienic neera (inflorescence sap) from coconut tree        | 2013-14        |
| A composition, device or a trap and methods there of (for enhancing effectiveness of pheromones) | "              |
| Coco Sap Chiller <sup>1</sup>                                                                    | 2014-15        |

\*National patent granted in 2008; \*\*Patent granted in 2009;

\*\*\*Patent granted in the year 2014 Jointly filed with a farmer

### Machinery and Gadgets

Contribution of institute in the field of postharvest handling of coconut received appreciation from many quarters. The Institute possesses the IP (design drawing) of machinery for most of the unit post harvest operations in coconut processing; few of them are also granted national patents as mentioned earlier. These machineries were developed chiefly for the processing of coconut for chips and VCO that include coconut shell remover, testa remover, slicer, pulveriser, milk extractor, double jacketed vessel with auto stirrer and indirect heating facility using two source fuel LPG or coconut shells) etc. Some of these machineries are also have applications with processing other products such as coconut milk, desiccated coconut etc. Entrepreneurs

### Technology Utilization

Among technologies commercialized by institute, largest number of MoAs signed in the area of coconut value-addition. Coco-sap chiller, a novel device for collecting unfermented coconut inflorescence sap and preserving its flavour and aroma without the use of preservatives ('Kalparasa') has found many buyers especially the Coconut Producing Companies (CPCs) formed by the coconut farmers. The efforts of the Institute in coordination with other agencies to bring changes in Excise Act also helped to expand business with 'kalparasa'. Technological know-how on VCO and coconut chips was also purchased by many entrepreneurs.

can purchase the right for manufacturing these machineries on signing MoA. The cost of technology varied between ₹5,000 to ₹15,000.

### Industrial Farm Inputs

Some of the farm inputs are required in large quantity such as fertilizers and plant protection material. Know-how for such a technology was recently developed by the Institute in collaboration with Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore. It was a nano-matrix for enhancing the effectiveness and extended period of use of pheromone for management of red palm weevil and rhinoceros beetle, two important pests of coconut and date palm. The technology was licensed to M/s Rajshree Biosolutions, Tamil Nadu and the MoA was handed over by Sri Radha Mohan Singh, Honorable Union Minister for Agriculture and Farmers Welfare in the *Kisan Mela* held at CPCRI Regional Station,

Kayamkulam. The non-exclusive right of technology is priced at ₹3,00,000.

Over the years, a number of entrepreneurs approaching for buying Institute technologies have been increased. This is mainly due to various awareness programmes conducted by the Institute especially under the 'Business Planning and Development Unit' implemented during 2012-14. The Government's incentives for start-up ventures are also motivating many entrepreneurs to enter into agribusiness sector. The Agri-business Incubation Center of institute provides technical and logistic support to new business ventures in coconut sector.

For further interaction, please write to:

Drs K Muralidharan, A C Mathew and H Muralikrishna (Scientists), Central Plantation Crops Research Institute, Kasaragod 671 124, Kerala.

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