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An Epicenter of Innovations and Technology on Secondary Agriculture and value added products: CIAB

The Center of Innovative and Applied Bioprocessing (CIAB) is an autonomous institute of the Department of Biotechnology (DBT), Govt. of India primarily involved in secondary agriculture and value added product development from different bio resources. With the concept of doubling income of farmers, value addition of agricultural products and using agricultural waste and byproducts has become more relevant. Plant based bioactive compounds have got huge market potential and can transform income sources of rural people who are exclusively involved in agricultural practices.

Furthermore, institute have successfully developed and transferred various technologies to different companies. Other efforts include scaling up and commercialization of technologies. During last few years, scientists have transfer two efficient technologies i) D-psicose-a nearly zero calorie sugar produced from the biomass and ii) a liquid whey beverage product named CIAB-NAVITA to the industries. Other technologies transferred by the institute are:

1. Processes for development of tomato based Swaad-e-Seasoning, Tomaco spice-mix and TomZesty Fizz.
2. Iron fortified or iron enriched turmeric as a value added product for dietary micronutrient supplement for improving iron nutrition and for alleviating or lessening malnutrition like iron deficiency anaemia malnutrition and for such other healthful uses and process of its preparation.
3. Bioprocessing of fruit processing wastes for Dallulose synthesis, employing a thermo-stable and recyclable nanobiocatalyst.
4. Bioprocessing of table sugar or cane molasses for production of prebiotic glucooligosaccharides, employing *Leuconostoc mesenteroides* or dextransucrase enzyme.

Besides, three more technologies will be transferred to industry under a non-disclosure agreement. List of important patented technologies developed are enlisted in table 1.

Table 1: list of developed technologies based on agricultural products and agricultural waste

Technologies developed at institute	Patent file number
A process for production of levulinic acid from agriresidue wastes in a single-pot reactor setup. This compound is recognized as a high value platform molecule. Indian	201711010199
A Process of fragrance improvement of citronella essential oil by its enrichment with rose oxide and a process of production of rose oxide and uses thereof	201611009275
A process for fragrance improvement of citronella essential oil by its enrichment with rose oxide using hypervalent iodine reagents and uses thereof	201611024112
An improved process for production of food grade 6-O-ascorbyl esters by chemical esterification of L-ascorbic acid with various fatty acids and their simple purification	201811000397
A process for production of xylose, levulinic acid and lignin from spent aromatic biomass	201911013540
An improved process for isolation of 1,5-dihydroxy3,8-dimethoxyxanthone from Swertia paniculata	201811028298
A green strategy for the development of debittered dietary fibre rich edible powder from kinnow juice industry waste Indian	201911017743
Novel process for the production of off odour/off flavour free protein hydrolysate from maize gluten meal and uses thereof.	201811048486
A method for catalytic biosynthesis of turanose, the next generation functional sugar, utilizing sucrose biomass.	201911007403
A method for catalytic production of prebiotic fructooligosacchrides and levan from sucrose containing feedstocks.	201811000595
A bioprocess for transformation of banana pseudo-stem into a functional juice containing non-digestible and prebiotic oligosaccharides, and nearly calorie free functional sugar, Dallulose	201711009819
A method for bioprocessing of raw and byproducts from dairy and sugarcane industries for production of functional biomolecule, 4galactosyl-kojibiose and kojibiose.	201711006155
A two-step process for the production of silicaremoved cellulose from rice straw	201911018935
A one-pot process for the selective removal of silica from rice straw	201911021881
Xylanase and magnetic-xylanase-CLEA based process for xylooligosaccharides (XOS) production from physically treated agro¬biomass and uses thereof.	201711020622
Utilization of tomato and tomato processing by-products for the development of fiber, minerals and antioxidant rich novel bakery products.	201711042760
A special beverage based on tomato fruit juice, coconut water and other additives.	201711028768
Integrated as well as module(s) selective process for production of whey proteins, bacterial cellulose, calcium citrate and Dtagatose from liquid whey.	201711024828
A simple method for extracellular production of high purity C-phycocyanin from Spirulina platensis.	201811050007
An up scaled process for the production of rice straw derived nanocellulose (cellulose nanofibers) with improved delignification and better crystallinity index.	201811048498
Processes to synthesize lignin coated metal (silver and gold) nanocomplexes and further development of nanotherapeutic and nanodiagnostic agents.	201711047253
Processes to develop lignin based metal oxide nanocomposites for UV protective,	201811048498

antimicrobial and photocatalytic applications.	
Simple, one-pot methods developed for preparing light activatable polypyrrolic compounds and their nanoformulations.	201811044076
A process to synthesize lignin nanocarriers in facile, green and high yielding manner. Indian	201911011852
A novel D-allulose 3-epimerse biocatalyst system for biosynthesis of nearly zero calorie functional sugar, D-allulose Indian.	201811023113

The R & D of the institutes has made possible value addition of agricultural residues and waste, valorization of crop wastes, development of nutritionals, nutraceuticals, upgradation of value primary processing bioproducts, biosynthesis of industrial enzymes etc.

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