Profile of ICAR-CTCRI
When it turns 60

ICAR-CTCRI, Thiruvananthapuram, Kerala was established in July 1963 with its Regional Centre at Bhubaneswar, Odisha, established in September 1976. CTCRI also houses the headquarters of All India Coordinated Research Project on Tuber Crops (AICRP TC) functioning since April 1968 and Indian Society for Root Crops (ISRC) established in 1972, which publishes the Journal of Root Crops.

Vision

Root and tubers for ensuring better health, wealth generation and inclusive growth.

Mission

To integrate root and tuber crops as sustainable farming system components to ensure food and nutritional security of the nation and livelihood improvement of rural population.

Mandate

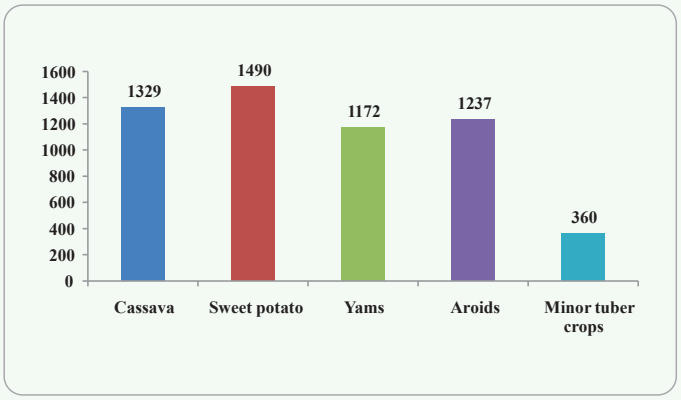
- Basic, strategic and applied research on genetic resource management, crop improvement, sustainable production and utilization of tropical tuber crops.
- Co-ordinate research and validation of technologies through AICRP on Tuber Crops.

Mandate Crops (15)

Cassava, Sweet potato, Greater yam, White yam, Lesser yam, Elephant foot yam, Taro, Tannia, Giant taro, Swamp taro, Chinese potato, Yam bean, West Indian arrowroot, Queensland arrowroot, East Indian arrowroot.

Genetic Wealth

National Active Germplasm Site for Tropical Tuber Crops at ICAR-CTCRI conserves 5588 accessions, comprising 50 species of tuber crops.



Conservation of germplasm in field gene bank at ICAR-CTCRI

Elite Varieties for Agri-Food Systems (70)

Cassava (19) : H-97, H-165, H-226, Sree Sahya, Sree Visakham, Sree Prakash, Sree Harsha, Sree Jaya, Sree Vijaya, Sree Rekha, Sree Prabha, Sree Padmanabha, Sree Athulya, Sree Apoorva, Sree Pavithra, Sree Swarna, Sree Reksha, Sree Sakthi, Sree Suvarna

Sweet potato (21) : H-41, H-42, Varsha, Sree Nandini, Sree Vardhini, Sree Rethna, Sree Bhadra, Gouri, Sankar, Sree Arun, Sree Varun, Sree Kanaka, Kalinga, Goutam, Kishan, Sourin, Bhu Sona, Bhu Kanti, Bhu Krishna, Bhu Ja, Bhu Swami

Greater yam (10) : Sree Keerthi, Sree Roopa, Sree Shilpa, Sree Karthika, Orissa Elite, Sree Neelima, Sree Swathy, Bhu Swar, Sree Nidhi, Sree Hima

White yam (5) : Sree Subhra, Sree Priya, Sree Haritha, Sree Dhanya (dwarf), Sree Swetha (dwarf)

Lesser yam (2) : Sree Latha, Sree Kala

Elephant foot yam (2) : Sree Padma, Sree Athira

Taro (10) : Sree Rashmi, Sree Pallavi, Muktakeshi, Sree Kiran, Pani Saru-1, Pani Saru-2, Bhu Kripa, Bhu Sree, Sree Hira, Sree Telia

Chinese potato (1) : Sree Dhara

Sree Reksha
(Cassava Mosaic Disease resistant variety of cassava)

Bhu Krishna
(Anthocyanin rich variety of sweet potato: 90 mg $100g^{-1}$)

Sree Neelima
(Purple-fleshed Anthocyanin rich variety of greater yam: 50 mg $100g^{-1}$)

Biofortified greater yam varieties, Sree Neelima and Da-340, dedicated to Nation by Hon'ble Prime Minister of India on 16 October 2020

Production Technologies

- Ecoregional agrotechniques to reduce cost and maximize production.
- Protocols for the massive production and rapid multiplication of quality planting materials.
- Productive and profitable cropping systems and integrated farming system (IFS) models.
- Organic production packages for crops and cropping systems.
- Integrated nutrient management (INM) and low input technologies.
- Nutrient use efficient (NUE) genotypes of cassava.
- Sustainable soil fertility management for continuous cassava cultivation.
- Fertilizer best management practices (FBMP) by site specific nutrient management (SSNM), customized fertilizers and micronutrient formulations.
- Precision nutrient and water management and water saving techniques.

Minisett in cassava

Organic farming in tuber crops

Micronutrient formulations

SSNM in cassava

Plant Health Management

Pest Management

- Integrated pest management (IPM) for sweet potato weevil.
- IPM for mealybugs, white fly, scale insects, mites, spiraling white fly and storage pests of tuber crops.
- Bioactive molecules from cassava crop residues.

Bioformulation extraction plant

Bioactive molecules

Patent for extraction plant (Patent No. 368943)

Disease Management

- Integrated disease management (IDM) for cassava tuber rot, elephant foot yam collar rot, elephant foot yam post harvest rot, taro leaf blight and greater yam anthracnose.
- Organic management of collar rot of elephant foot yam and leaf blight of taro.
- Diagnostic tools for 10 viruses: *Indian cassava mosaic virus, Sri Lankan cassava mosaic virus, sweet potato feathery mottle virus, sweet potato leaf curl virus, dasheen mosaic virus (Elephant foot yam & taro), taro bacilliform virus, yam mild mosaic virus, yam mosaic virus and yam chlorotic necrosis virus.*
- Production of planting materials free of 4 viruses: *Cassava mosaic virus, sweet potato feathery mottle virus, dasheen mosaic virus and yam mild mosaic virus.*
- LAMP technique to diagnose 5 pathogens: *Dasheen mosaic virus, Sri Lankan cassava mosaic virus*, *Sclerotium rolfsii*, *Phytophthora colocasiae* and *Colletotrichum gloeosporioides.*
- Lateral flow technique to diagnose *Dasheen mosaic virus* and *Sweet potato leaf curl virus*.
- Biocontrol agents: Nitrogen fixing and Phosphorous & Potassium solubilizing bacteria; Two *Trichoderma asperellum* isolates viz., CTCRI-Tr9 and CTCRI-Tr15 for elephant foot yam and greater yam; Four *Trichoderma asperellum* isolates effective against all major fungal pathogens of tropical tuber crops viz., *Sclerotium rolfsii*, *Phytophthora colocasiae*, *Colletotrichum gloeosporioides* and *Fusarium* spp.; Potential endophytes against taro leaf blight and greater yam anthracnose with growth promoting characters.
- Cassava tuber-based medium was standardized for the multiplication of *Trichoderma* isolates. The multiplication procedure ensures a population $>10^{20}$ cfu g^{-1} substrate with all isolates.

Diagnostic kit (DsMV ELISA KIT) against *Dasheen mosaic virus*

Mechanization

- Cassava chipping machines, mobile starch extraction unit, industrial raspers for starch extraction, centrifugal granulator for cassava based feed, pilot plant for liquid adhesive from cassava starch and Chinese potato grader.

Motorized cassava chipping machine

Mobile starch extraction unit

Chinese potato grader

Value Added Food Products

- Fried chips and snack foods from cassava and sweet potato; Functional foods enriched with fibre and protein viz., gluten free spaghetti, pasta and noodles from fortified sweet potato and cassava flour; Vacuum fried chips from biofortified sweet potato; Nutribars; Extruded products from cassava and sweet potato; Bakery products-Protein and fiber enriched cookies from biofortified sweet potato, sweet potato muffins & cakes and gluten free cookies from taro; Food mixes and nutrijelly from sweet potato; Ready to fry products-Papads, nutri-shreds and pop-ups; Rice analogues from cassava and sweet potato based composite flour.

Functional pasta from cassava

Gluten free pasta

Low glycaemic spaghetti

Industrial Products/Processes

- High quality cassava flour; Quick cooking dehydrated cassava tubers and elephant foot yam corms; Sago from reconstituted cassava based dry starch; Functional sago from wet and reconstituted cassava dry starch; Food grade modified starches of cassava as thickening agent, gelling agent, binding agent; RS4 (Modified starch) and RS5 (Starch-lipid complex) type resistant starches of cassava and sweet potato; Cassava starch based nanocomposite films for food wrapping application; Cassava starch-Konjac Glucomannan blend for liquid coating of fruits and vegetables; Encapsulated sweet potato and purple yam anthocyanins, anthocyanin capsules with nutrient supplement; Wax coating technology for fresh cassava tubers.

Sweet potato anthocyanin capsules

- Cassava starch factory effluent treatment plant; Cassava bioethanol production technology; Cassava starch based biodegradable plastics; Biodegradable films from cassava starch; Cassava starch based adhesives; Cassava stem based thermoplastic starch sheets and particle boards; Cassava starch based eco-friendly disposable articles; Modified cassava starch for textile, paper and adhesive industries; Non-food grade modified starches-Crosslinked starch, oxidized starch, starch phosphate; Semisynthetic superabsorbent polymer (SAP) based on cassava starch; Lab scale process for urea coated with cassava starch-graft-copolymer; Process for cassava starch-graft copolymers in textile sizing, flocculant; Production technology for biochar.

Super absorbent polymer

Cassava starch phosphate

Cassava stem based particle board

Reaching the Unreached

- Farmer participatory technology development and transfer.
- Entrepreneurship development programmes.
- Sustainable livelihood assessment of tuber crops growers.
- Rainbow diet campaign and upscaling technologies for food and nutritional security.
- Documentation and validation of farmers innovations/ITKs.
- Gender mainstreaming in tuber crops.

Method demonstration

Frontline demonstration

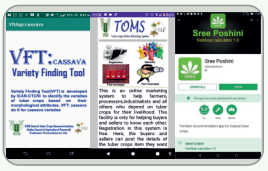
Mera Gaon Mera Gaurav

EDP programme for farmers

ICT Tools

- IoT device: Electronic Crop (e-Crop), an AI enabled IoT device that simulates crop growth in response to weather and soil parameters and generates agro-advisory that is sent to the farmer's mobile by SMS.
- Crop growth simulation models: EFYSIM- an elephant foot yam growth model, SPOTCOMS-sweet potato growth model; SIMCAS-a cassava growth model; MADHURAM-the world's first sweet potato growth model.
- Decision Support Systems: Sree Visakham cassava expert system; Tuber crops online marketing system, OUSHADHAM for disease and pest diagnostic system for tuber crops, Cassava protector, Tuber Information Cafe, CASSNUM 1.1 for nutrient management of cassava.
- Mobile Apps: Krishi Krithya for e-Crop based smart farming; Variety Finding Tool (VFT) cassava and VFT taro; TuberGuru App for information of tropical tuber crops; Sree Poshini.
- Database/Information system: TUBERTECH on the CTCRI technologies; TUBERHELP on information system of tuber crops.

E crop



Mobile Apps

Statistical Tools

- Database: Germplasm of tuber crops; EST database of cassava and SSR identification tool; SNPs and miRNAs in cassava and elephant foot yam.
- R Programmes: A web based interactive tool for tuber crops statistics using R and Shiny; An interactive web-based gene network development tool; RIntGeneNet to facilitate the construction of gene regulatory networks; R packages for box plot, cluster and principal component analysis, Soil Quality Index (SQI) by integrating ANOVA and computation of SQI.
- Statistical methodologies: Mapping QTL analysis of non-normal traits using MCMC technique and linkage map construction under polyploidy. Bayesian method of QTL mapping was applied for mapping of SSR markers for cassava mosaic disease.
- Machine learning tool: Plant-*Phytophthora* protein-protein interaction using protein features from sequences and integrated into an interactive web application.
- Bioinformatics: Comparative and functional genomics analysis of starch biosynthesis and carotenoid biosynthesis pathways in cassava; Whole genome sequence analysis in cassava; Next Generation sequencing data (RNA seq) analysis for tuber colour in sweet potato.

Developmental Programmes

SCSP Programme: Institute technologies viz., improved varieties, nutrient use efficient varieties, site specific nutrient management, integrated nutrient management, organic management, pest and disease management, postharvest processing and value addition were used for the empowerment of more than 3000 farmers and other stakeholders in Kerala, Tamil Nadu and Andhra Pradesh.

TSP Programme: Technological interventions for improving livelihood security of the tribal people in Odisha, Jharkhand and Chhattisgarh.

NEH Programme: NEH programme is implemented in Manipur, Meghalaya, Nagaland, Tripura and Arunachal Pradesh to enhance the food, nutritional security and livelihood improvement of the tribal people. Village incubation centre was created at Riha village, Ukhrul district of Manipur in 2016.

Demonstration

Seed village on cassava

Village incubation centre

Demonstration

Technology Commercialization

- Total commercializable technologies: 33
- IPR protection and commercialization of technologies: 5
- Commercialization of technologies without IPR: 28
- Technology licensing: 24
- Contract manufacturing: 9
- Contract research: 5
- Total number of licenses granted including contract research: 82
- Consultancy services: 2

Agribusiness Incubation Centre (ABI)

- Provides technology, skill upgradation and incubation for sustainable entrepreneurship using technological advancements in tropical tuber crops in the areas of production of quality planting materials, eco-friendly farming, smart farming and nutrition & health.
- Imparts training and capacity building to prospective entrepreneurs in agribusiness ecosystem.
- Participants: Agripreneurs, Entrepreneurs, Students, Startups, FPCs, SHGs, MSME and large companies.

Commercialization of technologies through ITMU

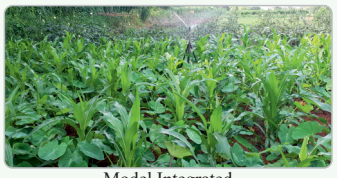
Agribusiness Incubation

Economics and Impact Assessment

- Price forecasting of tuber crops, value chain assessment of tuber crops, market intelligence for tuber crops, techno-economic feasibility reports are done besides impact assessment of tuber crops technologies.

Facilities and Infrastructure

- Experimental farm
- Laboratory: The Institute has state-of-the art laboratories for DNA sequencing, molecular study, transgenics, gene editing, tissue culture, bioinformatics, soil fertility and plant nutrition, soil physics, geoinformatics, plant pathology, virus diagnostics, agricultural entomology & nematology, biomolecules from crop residues, food processing, value addition and starch biochemistry.
- Library
- Techno-Incubation Centre
- Museum
- Agricultural Knowledge Management Unit
- Intellectual Property and Technology Management Unit
- AgriBusiness Incubation Centre
- Dairy Unit
- Residential complex and guest houses



Model Integrated organic farming system

Library

AAS laboratory

Museum

Dairy unit

Techno-incubation centre

Awards

- Sardar Patel Outstanding Institution Award of ICAR (2005).
- 14th Rank among 93 ICAR Institutes (2022).
- Chaudhary Devi Lal Outstanding All India Coordinated Research Project (AICRP) Award (2007).
- Best Annual Report Award of ICAR (1997-98 & 2017-2018).
- Outstanding Grading by QRT 2014-2019 for ICAR-CTCRI and AICRP TC (2020).
- ICAR Team Research Awards (1985, 1994, 1998 & 2014).
- ICAR Award for Outstanding Interdisciplinary Team Research in Agricultural and Allied Sciences for Biennium 2011-12 (2012).
- Best Centre Award for All India Network Programme on Organic Farming (2020).
- Jawaharlal Nehru Award (1975, 1995, 1998, 2000 & 2003).

CTCRI in Media

- National and regional newspapers, radio and televisions.

Facebook Twitter Instagram

Whatsapp You Tube

Reach Us

Headquarters: Thiruvananthapuram (Establishment: 1963)

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Phone: (91) (471) 2598551 to 2598554
E-mail: director.ctcri@icar.gov.in; Website: https://www.ctcri.org
Thampanoor central railway station: 10 km
Kochuveli railway station: 7 km
Domestic airport (Terminal 1): 10 km
International airport (Terminal 2): 7 km

Regional Station: Bhubaneswar (Establishment: 1976)

Latitude: N 20° 14.154' ; Longitude: E 85° 47.3837'; 45m MSL
Dumduma P.O, Bhubaneswar 751019, Odisha, India.
Phone: (91) (674) 2470528
E-mail: rcctcri@yahoo.co.in; Website: https://www.ctcri.org
Bhubaneswar railway station: 11 km; International airport: 10 km

May 2023

Technical Folder

Profile of ICAR-CTCRI
When it turns 60

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