2024-25

CSIR-CFTRI PERFORMANCE REPORT



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सीएसआईआर-केन्द्रीय खाद्य प्रौद्योगिक अनुसंधान संस्थान, मैसूरु - 570 020- भारत

CSIR-CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE

(A CONSTITUENT LABORATORY OF COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH)

MYSURU - 570 020, INDIA

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CONTENTS

From Director's Desk i

Achievements at a Glance iii

Achievements in Brief 1

Societal Programmes 77

Progress under R&D Projects 94

- ✦ Engineering Sciences
- ✦ Technology Development
- ✦ Translational Research
- ✦ Food Protection and Safety

CSIR Projects 131

Staff as on 31.03.2025 154

Management Council 161

Research Council 163



From Director’s Desk .....

It is a privilege to present the highlights of CSIR-CFTRI's activities and accomplishments as reflected in our recent Annual Performance Reports. The Institute continues to pursue excellence in research and development while strengthening its engagement with society. Guided by a strong commitment to advancing Food Science and Technology, our efforts remain aligned with addressing the emerging and evolving needs of the nation.

The dedicated contributions of our scientific community have ensured sustained momentum in R&D activities, with nearly 192 projects currently underway, supported through government funding, CSIR programs, and industry collaborations. During this period, the Institute successfully transferred more than 81 processes and technologies to industrial partners, reinforcing our role as a bridge between research and application. Academic output has also been noteworthy, with over 140 publications in reputed peer-reviewed journals and book chapters, along with the filing and granting of several national and international patents. After a significant gap, we have further strengthened our human resources by welcoming new scientists and technical officers, revitalizing the Institute's intellectual capital.

Among our major institutional milestones was the hosting of the CSIR Directors' Conference, along with the celebration of the CSIR-CFTRI Foundation Day. These events brought together Directors from CSIR laboratories across the country and senior leadership from CSIR Headquarters to deliberate on future strategies and the collective roadmap of CSIR. The launch of the CSIR-CFTRI Platinum Jubilee Lecture Series marked another important initiative,

providing a platform for eminent speakers to share insights, foster collaboration, and inspire our scientific community. We also take pride in establishing the Centre of Excellence for Millets, a state-of-the-art facility designed to support farmers, entrepreneurs, and industry stakeholders.

A defining achievement of the year was the approval of the **"SHRI ANNA"** mission mode project. As the Nodal Laboratory, CSIR-CFTRI is leading a consortium of eight CSIR laboratories to enhance the nutritional quality, shelf-life, and global visibility of millets. In addition, the Institute has made meaningful contributions to several national missions, including the CSIR Floriculture Mission, Seaweed Valorization, Sustainable Packaging Solutions, Bioresource Conservation and Industrial Enzymes. The recently organized Floriculture Mission industry meet enabled productive interactions between researchers, innovators, and industry stakeholders. Our social commitment was further reflected through nutrition intervention programs implemented for malnourished children in West Bengal and Karnataka.

To strengthen the innovation and startup ecosystem, CSIR-CFTRI has established a BIRAC-supported Bio-NEST incubator, complementing our existing incubation facilities. The Institute continues to play a leading role in skill development, training thousands of participants in specialized areas such as baking, food microbiology, and food processing. Several targeted programs were also conducted to empower farmers and Self-Help Groups, contributing to livelihood enhancement and capacity building.

I sincerely acknowledge the guidance and support received from CSIR Headquarters, our Research Councils, and various government agencies. I also extend my gratitude to external funding agencies, industry partners, academic collaborators, and our alumni for their continued association and encouragement. Above all, I thank every member of CSIR-CFTRI - our staff, students, and outsourced personnel - whose collective efforts as "Team CFTRI" enable us to fulfill our mandate and enrich the academic and professional life of the campus.

December 29, 2025

Sd/-
(Dr. Giridhar Parvatam)
Director, CSIR-CFTRI

Achievements at a Glance



Publications

Research Papers	140
Reviews	14
Book Chapters	16



Projects

Consultancy Projects	11
Sponsored Projects	27
Grant-in-Aid Projects	54
Collaborative Projects	6
Technical service Projects	26
CSIR Projects	29
Institute MLPs	39



Industrial Development

Patents Filed in India	9
Patents Granted in India	2
Technologies Transferred	81
New Technologies Developed	11



Human Resource Development

M.Sc. (Food Technology)	29
Certificate Course in Flour Milling	25
Ph.D. Awarded	34
Skill Development Programmes	1065

Achievements in Brief

1. Research Publications

1. Abhimanyu Singh, Umesh Hebbar H., Solvent? free crystallization for fractionation of virgin coconut oil: Effect of process conditions on kinetics and crystal properties, *J. Food Process Eng.*, 2024, **47(9)**, e14728

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Short Communications/ Short notes/ Editorial notes

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4. Madhurya L., Arunkumar P., Pratiksha P.G., Aswathi K.S., Urvashi S., Ezhil Vendan S., Profiling of semiochemicals of three stored product beetles by headspace solid-phase microextraction coupled with gas chromatography-mass spectrometry, *Natural Product Res.*, 2024, **38(17)**, 3063-3069

2. Patents Filed / Granted in India

Filed:

Sl. No	Title	Inventors	Filing Date	Application No.
1.	Biofumigation system for food grain storage and process for food protection therefrom	Ezil Vendan S., Vivek Babu C.S., Ravichandra Hospet, Pratiksha P.G.	20-09-2024	202411071606
2.	Synergistic biofumigant formulation for the control of stored product insect pests	Ezil Vendan S., Vivek Babu C.S., Ravichandra Hospet, Pratiksha P.G.	13-08-2024	202411061532
3.	A process for isolation of isomahanimbine from *Murraya Koenigii*	Syed Meeran Mustapha, Priya Mondal, Sachin R Chaudhari	31-07-2024	202411058258
4.	A green process for the extraction of crude glycosaminoglycans from fish waste	Nandini Chilkunda, Rohit Gowda, Tanaji Kudre, Chandra Gavva	22-07-2024	202411055907
5.	A dipping solution for enhancing vase life of cut flowers	Rajesh S Matche, Sachin R Chaudhari, Sachin P Shinde	16-08-2024	202411062425
6.	One-step process for preparation of nano-sized encapsulated spice oil and application thereof	Pooja Jagannath Rao, Poornima Priyadarshini, Arunkumar Panneerselvam, Aswathy Kovval Veedu, Leela Sairam, Sunil Ambedkar	03-01-2025	202511001015
7.	A composition for improving the shelf life of cut gerbera flower	Rajesh S Matche, Sachin R Chaudhari, Sachin P Shinde	06-08-2024	202411059523
8.	Sustainable active packaging carrier and method for preparation of the same	Rajesh S Matche, Sachin R Chaudhari, Rajat Chandel	03-10-2024	202411075607
9.	An irreversible time-temperature indicator assembly and method of preparing thereof	Rajesh S Matche, Sachin R Chaudhari, Suraj P	17-12-2024	202411100237

Granted:

Sl. No	Title	Inventors	Application No.	Filed Date	Patent No.	Date of Grant
1.	An improved process for the roasting of groundnut kernels using pulsed infrared radiation	Umesh Hebbar H., Mysore Nagaraja Rao Ramesh, Sukumar Debnath	1758DEL2007	20-08-2007	533015	15-04-2024
2.	An integrated electrospray-freeze-drying device	Chinnaswamy Anandharama krishnan, Padma Ishwarya Shankaran	201611032531	23-09-2016	542934	25-06-2024

3. Processes / Technologies transferred for commercial exploitation

The following 81 Processes/Technologies were transferred to 144 licensees.

- Multigrain cereal-legume bar and puffed rice bar
- Eggless cake premix
- Tamarind candy
- Online fortification of atta (Whole wheat flour)/ maida (Refined wheat flour)
- RTS fruit juices and beverages
- Fortified mango bar
- Coffee concentrate
- Food for diabetes
- Millet and multi-millet puttu podi mix
- Process for the production of transglycosylating α- glucosidase using novel fungal strain
- Chikki / Nutra chikki
- Groundnut (peanut) butter
- Instant products from moringa leaves
- Bread production (9 varieties - Brown, Plain, Sweet, Milk, Whole Wheat, Fruit, High Fiber, Ragi, Bajra)
- Tutti fruity (papaya/carrot)
- Process for production of semolina (sooji/ rava) from millets and preparation of multimillets
- Instant upma mix from millets and multimillets semolina
- Heat resistant white sesame seeds



A process for the production of multigrain pizza base



Bifido curd



Spirulina-choco bar and spirulina-cereal bar

- Energy food new formulation
- Doly mix
- Pulse based papads
- Osmo-air dried fruits (Amla, Jackfruit, Pineapple & Mango)
- Bifido curd
- Instant gravy mixes: Dehydrated
- Shelf stable varieties of curry paste for vegetarian & non-vegetarian traditional cuisines - Chicken curry paste, Shahi paneer paste, Kitchen king
- Bottling of sugarcane juice
- Tamarind juice concentrate
- Spirulina-choco bar and spirulina-cereal bar
- Instant rava idli mix from millets and multimillets semolina
- Fermented and dehydrated ready mix for idli batter
- Fermented and dehydrated ready mix for dosa batter
- Fermented and dehydrated ready mix for idli/ dosa batter
- Virgin coconut oil
- Instant halva mix from millets and multimillets semolina
- Ready-to-use multi-grain idli and dosa batter in retail packs



Gongura leaf powder



Spray dried refined papain

- Tamarind powder
- Tamarind juice concentrate & powder
- Preparation of ready-to-eat shelf stable egg crunchy bite
- Process for the preparation of raw banana powder (unripe)
- Instant cake mix
- Ready mix: Cake
- Chicken wafers
- Chocolate rich in healthy polyphenols
- Ready mix : Jamun
- Instant rava idli mix
- Convenience flour from ragi suitable for stiff porridge
- Paan flavoured water
- Tomato products (including juice, ketchup, sauce)
- Preparation of ready-to-cook multigrain whole mix for drink/porridge
- Instant coffee cubes
- A process for the production of multigrain pizza base
- Gongura leaf powder
- Spray dried refined papain
- Ready mix : Dosa
- Marigold oleoresin
- Layered parotta (South Indian)
- Instant traditional food : Rasam
- Shelf-stable jowar flour
- Spice oil : Pepper
- Instant traditional food : Sambar
- Ready mix : Idli
- Millet based cookie
- Gluten free biscuit

- Dipping oil formulation for grapes
- Fruit jams & jellies
- Green tamarind spice mix – paste & powder
- Process know-how for probiotic carrot nectar
- Spice oleoresin: Turmeric
- Process for the production of soluble and insoluble arabinoxylan from wheat bran
- Canning of fruits & vegetables
- Ginger paste
- Garlic paste
- Pickles & chutneys
- Spirulina-choco bar and spirulina-cereal bar
- Nutra chikki with added spirulina
- Spice mix : Puliogre
- Shelf stable roti from non-wheat cereals and millet
- Instant mushroom soup mix
- Malted weaning food
- Green pepper in brine
- Ready-to-use dosa batter in retail packs
- Ready-to-use idly batter in retail packs

4. New Technologies Ready for Commercial Exploitation

Eleven new processes / technologies were developed for commercial exploitation as detailed below:

- High-performance process for anaerobic digestion of food waste for enhanced biogas production using novel pre-treatment and bioreactor design
- Process for development of gluten free bread premix (version -1) Proso millet
- Process know-how for probiotic carrot nectar
- Process for development of gluten free bread premix (version-2) Foxtail millet
- Process for Development of gluten free bread premix (version-3) Barnyard millet
- Process for development of gluten free bread premixes (three versions) 1. Proso millet 2. Foxtail millet 3. Barnyard millet
- Instant tea premix
- Ethylene scavenger
- Virgin coconut oil spread
- C-HYDRA (Hydration drink mix)
- Biofumigation technology for protection of stored pulses (1 tonne capacity) from insect pests



Process know-how
for probiotic carrot nectar



C-HYDRA
(Hydration drink mix)



Virgin coconut oil spread



Ethylene scavenger

5. Details of two important technologies transferred during 2024-25

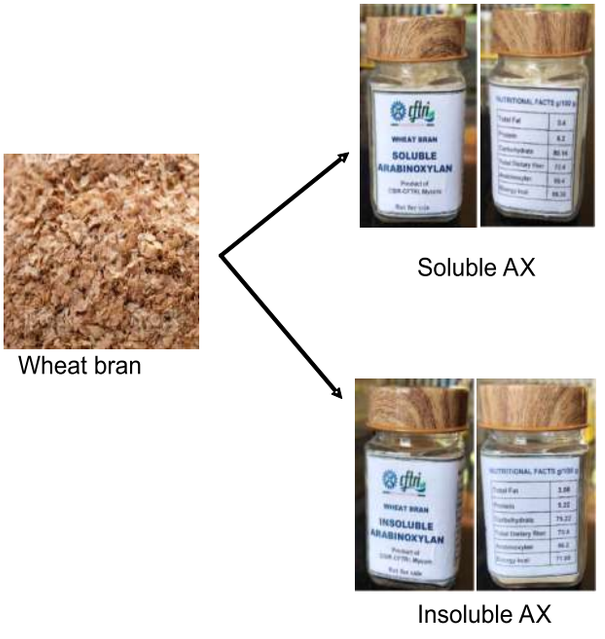
- **Process for the production of trans - glycosylating α-glucosidase using novel fungal strain**

The production of transglycosylating α-glucosidase using a novel fungal strain involves several key steps. First, the fungal strain is cultivated under controlled fermentation conditions, such as optimal temperature, pH, and nutrient levels, to maximize enzyme production. The strain secretes α-glucosidase into the growth medium, which is then harvested after a defined fermentation period. The enzyme is extracted, purified, and characterized for its transglycosylation activity, where it transfers glucose units to various acceptor molecules. This enzymatic process is important for applications in biocatalysis, including the synthesis of oligosaccharides and the modification of glycoproteins.



- **Process for the production of soluble and insoluble arabinoxylan from wheat bran**

Arabinoxylan (AX) is the major non-starch polysaccharide present in cereals. It is an important dietary fiber known for its multiple health benefits, including improved glucose response, anti-diabetic effects, immunomodulatory and anti-tumor activities, prebiotic effects, anti-obesity benefits, and cardio-protective properties. Wheat bran is a rich source of AX, containing about 22–24%. The current technology employs a unique enzyme- and chemical-based method to extract both soluble and insoluble arabinoxylan in a single process. It is a green chemistry approach and is commercially viable. This technology is the first of its kind, and no similar technology is presently available in India. AX-rich products obtained through this technology can be used as functional ingredients in a wide range of applications, including bakery products, breakfast cereals and snacks, confectionery, dairy products, meat products, infant foods, beverages, pharmaceuticals, and animal nutrition.



6. Consultancy / Sponsored / Collaborative / Technical service / Grant-in-Aid Projects

Sl. No.	Type of project	No. of projects as on 31.3.2025	No. of Projects completed during 2024-25	No. of new projectsinitiated during 2024-25
1	Consultancy Projects	11	2	8
2	Sponsored Projects	27	13	22
3	Grant-in-Aid Projects	54	23	9
4	Collaborative Projects	6	3	1
5	Technical service Projects	26	20	5
6	CSIR Projects	29	1	21
7	Institute MLPs	39	1	0

7. M.Sc. / ISMT / SDPs (nos. only)

Sl. No.	Academic Programmes	Degree / Certificate Awarded
1	M.Sc. (Food Technology)	29
2	Certificate Course in Milling	25
3	Skill Development Programmes	1065

8. List of Consultancy Projects during 2024-25

Sl. No.	Title of the project	PI	Start Date	End Date
1	Technical advisory consultancy for wheat flour fortification to eradicate malnutrition	Dr. Suresh D Sakhare	19-10-2022	31-12-2025
2	Technical support for conducting programs on wheat flour fortification for different stakeholders	Dr. Suresh D Sakhare	19-10-2022	31-12-2025
3	Development of simple process improvements for level 2 microfeeder for wheat flour fortification	Dr. Suresh D Sakhare	19-10-2022	31-12-2025
4	Wheat flour fortification: Technology transfer and training to reduce malnutrition	Dr. Suresh D Sakhare	19-10-2022	31-12-2025
5	Establishment of Tamarind processing Centre at Chittoor District, Kurubalakota	Dr. Madhava Naidu M / Dr. B B Borse	01-06-2022	31-12-2026
6	Consultancy assistance in research-based advisory for evaluation of herbal formulation for water and wastewater applications	Dr. Sandeep N Mudliar	21-05-2024	20-05-2025

Sl. No.	Title of the project	PI	Start Date	End Date
7	Online training program on Wheat flour milling: Technology & operations	Dr. Suresh D Sakhare	05-07-2024	04-07-2025
8	Online training program on Wheat flour milling: Technology & operations	Dr. Inamdar AA	25-07-2024	24-06-2026
9	Expert advisory on assessment of microbiological contamination risk in beverage water sources and treatment systems	Dr. Praveena Bhatt Mudliar	16-10-2024	15-05-2025
10	Technical advisory for extraction of curcuminoids from turmeric oleoresin	Dr. Pushpa S Murthy	09-01-2025	08-07-2025
11	Wheat milling operations training program for Buhler (India) Pvt. Ltd.	Dr. Suresh D Sakhare	17-03-2025	16-06-2025

9. List of Sponsored Projects during 2024-25

Sl. No.	Title of the project	PI	Start Date	End Date
1	Ready-to-Reconstitute (RTR) Gulab Jamun with syrup	Dr. Babylatha R	20-06-2023	31-07-2025
2	Process for the extending shelf life of “Fried Maddur vada”	Dr. Babylatha R	12-10-2023	31-03-2025
3	Method of extraction of soluble and insoluble arabinoxylan from defatted rice bran	Dr. Sachin M Eligar	03-07-2023	31-08-2025
4	Development of Wine and potable beverage from Mahua	Mr. Punil Kumar HN	01-09-2023	31-08-2025
5	Process for production of acid protease and phytase using submerged fermentation	Dr. MVRK Sarma	21-12-2023	31-01-2026
6	Quantification of Vitamin A and D in oils and performance check of laboratories	Dr. Usharani D	25-03-2024	24-05-2025
7	Scale-up studies of low molecular Weight Chitosan (LMWC)	Dr. Harish Prashanth KV	17-04-2024	16-11-2025
8	Blending/infusion of the spice, flavor and herb in instant coffee cubes	Dr. Pushpa S Murthy	18-04-2024	31-07-2025
9	Development of millet based buns	Dr. P. Prabhasankar	28-05-2024	27-02-2025
10	Training program on Value addition on cashew processing	Dr. Babylatha R	11-06-2024	10-09-2024

Sl. No.	Title of the project	PI	Start Date	End Date
11	Microbial profiling of herbal fermented products	Dr. Praveena Bhatt Mudliar	18-06-2024	11-02-2025
12	Development of raisin jam with spice	Dr. Vanitha T	25-07-2024	24-06-2025
13	Development of biodegradable plates from the wastes of the spices industry	Dr. Inamdar A. A.	25-07-2024	24-09-2025
14	Development of infusion based carbonated / non-carbonated detox drink	Dr. Vanitha T	01-08-2024	31-07-2025
15	Shelf-life study for can wine (two) samples	Sri. Rajeshwar S Matche	04-12-2024	03-10-2025
16	Millet flour characterization and product making properties for tata consumer products	Dr. Suresh D Sakhare	18-09-2024	17-09-2025
17	Process for making ready-to-use idli/ dosa batter with extended shelf life	Dr. Babylatha R	19-11-2024	18-09-2025
18	Heat penetration studies for six products (Pindi Chana, Rajma Masala, Palak Paneer, Paneer Malai, Paneer Butter masala & Dal Makhani (300g each) and heat distribution studies	Sri. Prabagaran P	09-12-2024	08-12-2025
19	Shelf-life study for carbonated can wine sample	Sri. Rajeshwar S Matche	11-12-2024	10-10-2025
20	Shelf-life study for can wine sample	Sri. Rajeshwar S Matche	19-12-2024	18-10-2025
21	Moisture Sorption Isotherm (MSI) and prediction of shelf life of Boost 22, Boost Bar & Boost Chocolate using computer simulation methods	Sri. Rajeshwar S Matche	07-02-2025	06-02-2026
22	Moisture Sorption Isotherm (MSI) and stability studies for soda – VAS	Sri. Rajeshwar S Matche	07-02-2025	06-02-2026
23	A study on and improvement of the protein quality, physico-chemical characterization, and nutrition, texture and flavour profiling of the vegetarian protein slice	Dr. Jyothi Lakshmi A	07-01-2025	06-10-2025
24	Process for making value-added flavoured cashew products	Dr. Babylatha R	24-01-2025	25-03-2027
25	Exploratory studies on packaged coconut water	Dr. Chetana R	07-02-2025	06-07-2025
26	Process for extending the shelf-life of heat desiccated products “Peda/Palada”	Dr. Babylatha R	05-03-2025	04-07-2027
27	Development and validation of an accurate HPLC method for quantification of sorbic acid in cake	Dr. Prasanna Vasu	05-03-2025	04-09-2025

10. Ongoing in-house MLPs 2024-25

Project No.	Title of the Project	PI & Dept.	Date Start	Date End
Thrust area: Targeted nutrition - Nutritional interventions for elderly and geriatric foods				
1. MLP0311(WP1)	Formulation and development of a nutrient dense ready-to-use food product using egg white protein hydrolysate for elderly populations	Dr. Suresh PV MMS	30-09-2024	31-03-2026
2. MLP0311(WP2)	γ-Aminobutyric acid (GABA) - enriched rice for geriatric populations	Dr. Meera MS GST	30-09-2024	31-03-2026
3. MLP0311(WP3)	Formulation of a ready-to-eat nutri- snack suitable for elderly population	Dr. Usha Dharmaraj, GST	30-09.2024	31-03-2026
4. MLP0311(WP4)	Development of millet-based fermented product for management of neurological disorders	Dr. Vinod Kumar N TFAN	30-09-2024	31-03-2026
Thrust area: Targeted nutrition - Sports nutrition and foods for fitness				
5. MLP0312(WP1)	Structured lipid-based nutritional supplements for targeted sports and athletic performance	Dr. Vijayaraj P DOB	30-09-2024	31-03-2026
6. MLP0312(WP2)	Gummy/jelly confection for sports personnel	Dr. Vijayalakshmi S TTBD	30-09-2024	31-03-2026
Thrust area: Targeted nutrition - Food to food fortification to combat micronutrient deficiency				
7. MLP0313(WP1)	Biofortified wheatgrass as a sustainable source for Fe and Zn nutrition	Dr. Sreedhar RV PCBT	30-09-2024	31-03-2026
8. MLP0313(WP2)	Development of Spirulina and edible mushrooms based vitamins and dietary fibre rich functional Food products	Dr. B.V. Thirumalesh PCBT	30-09-2024	31-03-2026
9. MLP0313(WP3)	Fortification of coffee and jaggery with Iron and folic acid and their modulatory effect on biological activity	Dr. Pushpa S. Murthy PPSFT	30-09-2024	31-03-2026

Thrust area: Targeted nutrition - Innovative processing technologies for meat-based products and meat analogs				
10. MLP0314(WP1)	Studies on the development of fish and chicken meat-based complimentary baby/toddler food products	Dr. Tanaji G. Kudre MMS	30-09-2024	31-03-2026
11. MLP0314(WP2)	Development of plant based 3D printed meat analogs	Dr. Pradeep Singh Negi FVT	30-09-2024	31-03-2026
12. MLP0314(WP3)	Process standardization for extraction of bioactive compounds present in muscle foods using suitable green technologies	Dr. Indira Dey Paul MMS	30-09-2024	31-03-2026
Thrust area: Food cooked in iron and iron-alloy cooking pots and its implications for Iron bioavailability and iron deficiency anemia condition				
13. MLP0315(WP1)	Cooking of food in iron utensils as a strategy for enhancing the bioaccessibility of iron for overcoming anemia	Dr. Jyothilakshmi A TFAN	30-09-2024	31-03-2026
Thrust area: Cultured ghee and health benefits				
14. MLP0316(WP1)	Preparation of cultured ghee and evaluation of its health benefits vs non-cultured ghee (commercial ghee)	Dr. Ramaprasad TR DOB	30-09-2024	31-03-2026
Thrust area: Cultured ghee and health benefits				
15. MLP0317(WP1)	Quantification of ethylene oxide and its metabolite in oil seeds and spices	Dr. Giridhar P FSAQCL	30-09-2024	31-03-2026
16. MLP0317(WP2)	Development of multi-optional sustainable sterilization processes for spices as an alternative to ethylene oxide and their risk assessment	Dr. Sukumar Debnath FE	30-09-2024	31-03-2026
Thrust area: Natural ingredients for flavours and shelf life extension				
17. MLP0318(WP1)	Spice extractives and flavorants for the value addition of 'Chayote', the underutilized vegetable having the nutritive potential	Dr. Shivakumar L PPSFT	30-09-2024	31-03-2026

Project No.	Title of the Project	PI & Dept.	Date Start	Date End
18. MLP0318(WP2)	Value addition to the seeds from date fruits to enhance flavour and nutraceutical value for various food applications.	Dr. Anil Kumar K PPSFT	30-09-2024	31-03-2026
19. MLP0318(WP3	Reforming *Garcinia cambogia* fruit processing methods	Dr. Naveen J PPSFT	30-09-2024	31-03-2026
20. MLP0318(WP4)	Enhancing shelf life and quality of peanut butter using curcumin and turmeric oil	Dr. Sachin R. Chaudhari PPSFT	30-09-2024	31-03-2026
21. MLP0318(WP5)	Semi-synthetic derivatives of principal constituent of cinnamon for the production of citric acid – A value added approach for enhanced food preservation	Dr. Suhas R PPSFT	30-09-2024	31-03-2026
22. MLP0318(WP6)	Coffee flavour concentrate from spent coffee grounds	Dr. Nanishankar V H PPSFT	30-09-2024	31-03-2026
Thrust area: Shelf life extension of fresh fruits and vegetables				
23. MLP0319(WP1)	Sustainable post-harvest treatments and technologies for shelf-life extension of grapes, mangoes, and drumsticks for internal and export trade	Dr. Revathy Baskaran FVT	30-09-2024	31-03-2026
24. MLP0319(WP2)	Formulations from biowaste for shelf life extension of selected fruits and vegetables	Dr. Vanitha T FVT	30-09-2024	31-03-2026
25. MLP0319(WP3)	Study of acceptability of deep fried snack foods with salt substitutes (potassium chloride, calcium chloride)	Dr. Prabhakara Rao P.G. RC-Hyd	30-09-2024	31-03-2026
26. MLP0319(WP4)	Utilization of green pea pod powder and banana peel powder in the development of dietary fibre-rich extruded and bakery products.	Dr. Sridhar Rachakonda RC-Hyd	30-09-2024	31-03-2026

Project No.	Title of the Project	PI & Dept.	Date Start	Date End
27. MLP0319(WP5)	Development and formulation of healthy instant RTS beverage and instant beverage mix from ash gourd (*Benincasa hispida*) and bottle gourd (*Lagenaria siceraria* (Mol.) Standl.) and effect of packaging materials on storage quality	Mr. Srinivasulu Korra RC-Hyd	30-09-2024	31-03-2026
28. MLP0319(WP6)	Utilization of betel leaf powder and extracts in Foods	Mrs. G. Sulochanamma, RC-Hyd	30-09-2024	31-03-2026
29. MLP0319(WP7)	Value added products from dragon fruits (*Hylocereus monacanthu*)	Mr. Madhusudhan Rao D, RC-Hyd	30-09-2024	31-03-2026
30. MLP0319(WP8)	Minimization of post-harvest losses and extension of shelf-life of selected fruits and vegetables grown in Northern parts of India	Dr. Khushbu Sharma, RC-Luck	30-09-2024	31-03-2026
Thrust area: Design and development of food processing gadgets/machineries for home and small scale operations				
31. MLP0320(WP1)	Design and development of coconut cutting and grating gadget	Dr. Dinesha B L FE	30-09-2024	31-03-2026
32. MLP0320(WP2)	Design and development of a conceptual prototype model for tamarind fruit (*Tamarindus indica*) deseeding machine and optimization of processparameters	Mr. Ramesh G, FE	30-09-2024	31-03-2026
33. MLP0320(WP3)	Gadget / machinery for deseeding and cutting of citrus fruits, apples and similar kind of fruits	Mr. Shesha Narayana K, FE	30-09-2024	31-03-2026
34. MLP0320(WP4)	Design and development of smart roaster	Mr. Shivakumara M, FE	30-09-2024	31-03-2026
35. MLP0320(WP5)	Design and development of filling and forming type dumpling-making machine prototype	Dr. Shyam Ramkrishna Garud, FE	30-09-2024	31-03-2026

Project No.	Title of the Project	PI & Dept.	Date Start	Date End
36. MLP0320(WP6)	Supporting farmers community through circular economy by conversion of food waste and agro waste/excess stock Tomato-Onion-Potato (TOP) to ethanol and other value added products (Bio-CNG)	Mr. Punil Kumar HN, FE	30-09-2024	31-03-2026
37. MLP0320(WP7)	Design and development of grain storage system with pushing force mechanism for the prevention of insect infestation in stored food products	Dr. Ezil Vendan S FPIC	30-09-2024	31-03-2026
Thrust area: Traditional rice varieties – Nutritional and nutraceutical profiling				
38. MLP0321(WP1)	Nutritional profile of selected traditional rice varieties of Karnataka	Dr. Doddabhimappa R. Gangapur, GST	30-09-2024	31-03-2026
39. MLP0321(WP2)	Development of black rice-based anthocyanin-rich prototype products: Profiling of sensory and nutritional attributes	Mrs. Crassina Kasar FMBCT	30-09-2024	31-03-2026

11. Ongoing Grant-in-Aid Projects 2024-25

Sl. No.	Project No.	Project Title	Project Leader	Funding Agency	Start Date	End Date
1	GAP0557	Establishment of Centre of Excellence for millet processing and research	Dr. Meera MS	RKVY, GoK	29-08-2019	31-03-2025
2	GAP0558	Farm based S&T interventions for socio economic development in the aspirational district of Nabarangpur, Odisha	Mr. Nagendar A	RKVY	11-09-2019	31-03-2025
3	GAP0570	Development of fermentation technology for the preparation of ready-to-use multigrain Idli and Dosa batters with extended shelf-life	Ms. Rohini Karnat S	DST (WOS-B)	02-12-2019	02-06-2024

Sl. No.	Project No.	Project Title	Project Leader	Funding Agency	Start Date	End Date
4	GAP0589	Functional characterization of the regulatory genes involved in pungency in Capsicum sp.	Dr. Giridhar P	DBT	03-12-2020	02-08-2024
5	GAP0594	Medium chain triglycerides (MCTs) enriched oil and its functionality	Dr. Suresh Kumar G	CDB	27-01-2021	26-06-2024
6	GAP0595	Infrastructure for millet processing and incubation centre	Dr. Meera MS	RKVY	09-12-2020	31-03-2025
7	GAP0596	Evaluaton of guar gum beta-manno-oligosaccharides based standardized symbiotic mixture for its ability to improve bone health in mice through gut microbiota mediated immunomodulatory mechanisms	Dr. Kunal Sharan	SERB	18-02-2021	17-06-2024
8	GAP0597	Evaluating the role of galactomanno-oligosaccharides as potential therapy for inflammatory bowel disease using omics based approaches	Dr. Mukesh Kapoor	ICMR	01-02-2021	31-05-2024
9	GAP0598	Project implementation under PMFME Scheme	Dr. Umesh H Hebbar	KAPPEC	16-03-2021	31-03-2026
10	GAP0599	Understanding the maternal hypercholesterolemia induced programming of epigenetic circuits involved in the growth and maintenance of off springs skeleton	Dr. Kunal Sharan	ICMR	15-03-2021	14-09-2024
11	GAP0602	Nutritional evaluation of protein and fibers from spent coconut and by-products of coconut processing	Dr. Ramaprasad TR	CDB	29-03-2021	28-09-2024

Sl. No.	Project No.	Project Title	Project Leader	Funding Agency	Start Date	End Date
12	GAP0603	Targeting improved gut health with underutilized Indian berries/pseudo berries as source of prebiotics and nutraceuticals	Dr. Praveena Bhatt Mudliar	ICMR	10-03-2021	09-09-2024
13	GAP0608	Fine tuning of millet value chain for export markets: Preparation of export strategy in wake of International Year of Millets-2023	Dr. Vjayaraj P	APEDA	01-04-2021	31-03-2025
14	GAP0609	Valorization of byproducts from fish industry: Isolation and characterization of glycosaminoglycans for various applications	Dr. Nandini CD	DBT	08-09-2021	31-03-2025
15	GAP0611	Skill development programme on processing, preservation and value addition of food and agro based products for commercial use in eight aspirational districts of UP with special emphasis on development of women entrepreneurs	Dr. Gothwal PP	DSIR	01-12-2021	31-07-2024
16	GAP0613	Numerical analysis of heat and mass transfer in various grain drying process for food processing applications	Sathisha HM (Shruti Joshi)	SERB	15-12-2021	17-07-2023
17	GAP0616	Mobile processing unit (MPU) in North-East for processing of fruits & vegetables	Mr. Punil Kumar HN	DST (NECTAR)	25-03-2022	30-06-2025
18	GAP0617	Effect of nanoformulated apocynin against abnormal fatty acid metabolism induced by fumonisin B1 in liver	Ms. Krupashree K	ICMR	11-04-2022	10-04-2025

Sl. No.	Project No.	Project Title	Project Leader	Funding Agency	Start Date	End Date
19	GAP0620	Development and characterization of coconut oil and bioactive enriched edible oleogel as a shortening alternate to bakery fat	Dr. Vijayaraj P	CDB	12-07-2022	11-01-2025
20	GAP0621	Probing structure and reaction mechanisms of microsomal epoxide hydrolases through multiscale modeling to understand lipid signaling and metabolism	Dr. Usharani D	SERB	13-07-2022	12-07-2025
21	GAP0622	Design and development of integrated spouted bed roaster	Mr. Shesha Narayana K	PCRA	29-07-2022	31-03-2025
22	GAP0624	Understanding diet-mucomicrobiome interaction in functional gastrointestinal disorder (FGID) and development of prophylactic and therapeutic and nutrient supplements for FGID	Dr. Mahejibin Khan	SERB	10-10-2022	09-10-2025
23	GAP0625	Bioincubators nurturing entrepreneurship for Scaling Technologies (BioNEST)	Dr. Vikas Singh Chauhan	DBT-BIRAC	08-09-2022	07-09-2025
24	GAP0626	Scale-up of sustainable production of squalene using engineered *Saccharomyce cerevisiae*	Dr. Sarma MVRK	DBT-BIRAC	13-12-2022	12-12-2024
25	GAP0627	Value added dietary formulation by the virtue of coconut milk exosomes and sesamol: a novel coadjuvant therapeutic approach targeting breast cancer	Dr. Anbarasu K	CDB	17-01-2023	16-01-2026

Sl. No.	Project No.	Project Title	Project Leader	Funding Agency	Start Date	End Date
26	GAP0628	Evaluation of garlic and small onion derived nanovesicle topical formulation for the treatment of inflammatory skin disease, Psoriasis	Dr. Gopinath M	ICMR	27-01-2023	26-01-2026
27	GAP0629	Prevention of cardiometabolic risk factors by multi-sources edible oil fortified with lipid nutraceuticals: Nutritional intervention for obesity related complication	Dr. Vijayaraj P	ICMR	15-01-2023	14-01-2026
28	GAP0630	Customised anti-fatigue products from coconut and by-products	Dr. Chetana R	CDB	17-01-2023	16-04-2025
29	GAP0631	A greener processed ayurvedic anti-cancer formulation (*Phyllanthus niruri, Tinospora cordifolia and Boerhaavia diffusa*) for liver cancer management	Dr. Sandeep N Mudliar	ICMR	01-03-2023	28-02-2026
30	GAP0632	Development of nanotechnology based neuroprotection using chitooligosaccharide (COS) for neurodegenerative disease	Dr. Suresh PV	ICMR	16-02-2023	15-02-2026
31	GAP0633	Post-biotics fermentate formulation for the management of diabetes, hyperlipidemia and gut health	Dr. Prakash M Halami	DFRL	11-01-2023	10-01-2026
32	GAP0634	Formulation and product development of Ayurveda recipes and nutritional evaluation of selected products	Dr. Ramaprasad TR	CCRAS	24-03-2023	23-03-2026

Sl. No.	Project No.	Project Title	Project Leader	Funding Agency	Start Date	End Date
33	GAP0635	Development of nano-formulated transdental patch for site-specific delivery of 3,3'-diindolylmethane (DIM) for complementary breast cancer therapy	Ms. Sumathy R	ICMR	29-03-2023	28-03-2026
34	GAP0636	Formulation and evaluation of instant mixes and other value added products from minor millets	Mrs. Sathiya Mala K	KVIC, Telangana	31-03-2023	30-03-2025
35	GAP0637	Decoding the role of the transcription factor, sterol regulatory element binding protein during hepatic stellate cell activation	Dr. Madan Kumar P	ICMR	03-04-2023	02-04-2026
36	GAP0638	Identification and analysis of tRNA derived fragments (tRFs) from rice(black, brown, red and white) derived exosome-like edible nanovesicles (ELN) for cancer therapeutics	Dr. Gopinath M	SERB	19-07-2023	18-07-2026
37	GAP0639	Capacity building of food testing laboratories - Training programs	Dr. Giridhar P	FSSAI	01-04-2023	31-03-2025
38	GAP0640	Analytical quality control and quality assurance in rice fortification	Dr. Giridhar P	IIIT, Delhi	25-08-2023	24-08-2026
39	GAP0641	Development and characterisation of sustainable food packaging materials based on functional polymer nanocomposites	Dr. Umesh Hebbar H	SERB	10-07-2023	07-12-2025
40	GAP0642	Process standardization for the preparation of Mohanthal prasadam	Dr. Chetana R	Shri Arasuri Ambaji Mata Devasthana Trust, Gujarat	23-08-2023	22-08-2024

Sl. No.	Project No.	Project Title	Project Leader	Funding Agency	Start Date	End Date
41	GAP0643	Centre for Promotion of Additive Manufacturing (CPAM) – Agri & food processing	Dr. Negi PS	MeitY	09-08-2023	08-08-2028
42	GAP0644	Validation of published test methods of vitamins in identified food matrices for revision of Indian Standards	Dr. Usharani D	Bureau of Indian Standards	01-12-2023	31-05-2024
43	GAP0645	Development of Green Chemistry method and pilot scale apomixation of Arabinoxylan oligosaccharides (AXOS) from pearl millet bran for their application in ameliorating diabetes-associated complications	Dr. Sachin M Eligar	SERB	01-01-2024	31-12-2026
44	GAP0646	Regulation of xanthosine metabolism and its effect on caffeine biosynthesis in coffee plants	Dr. Giridhar P	DBT	09-01-2024	08-01-2027
45	GAP0647	Antimicrobial leads from actinomycetes against some clinical pathogens in BRT Wildlife Sanctuary, Western Ghats: Evaluation and characterization	Dr. Thirumalesh BV	SERB	15-02-2024	14-02-2027
46	GAP0648	Targeting mitochondrial fission with dietary molecules inhibits hepatic stellate cell activation and progression of non-alcoholic fatty liver-disease: Preclinical & safety validation	Dr. Madan Kumar P	ICMR	27-05-2024	26-05-2027
47	GAP0649	Development of mulberry sericin powder for nutraceutical applications (second phase)	Dr. Anbarasu K	Central Silk Board, Bengaluru	07-05-2024	06-11-2024

Sl. No.	Project No.	Project Title	Project Leader	Funding Agency	Start Date	End Date
48	GAP0650	Exosome-like nanovesicle deived phytoferritin, isolated from edible plants as a novel bioavailable source of iron for the management of anemia	Dr. Gopinath M	ANRF (SERB)	21-05-2024	20-05-2027
49	GAP0651	Study of neutral spirits for Alcoholic drinks for their quality and safety parameters	Dr. Prakash M Halami	BIS	25-06-2024	24-12-2024
50	GAP0652	Evaluation and validation of nutritive and feeding value of silkworm (Bombyx mori) pupae meal in broiler and layer chicken	Mr. Shinde Vijay Sukhdeo	CSRTI	29-08-2024	28-08-2025
51	GAP0653	Validation of analytical methods for precise quantification of isoflavones, anthocyanins, lycopene, lutein and astaxanthin and chondroitin sulfate and hyaluronic acid in functional foods	Dr. Giridhar P	FSSAI	04-10-2024	03-10-2026
52	GAP0654	Development and Preclinical evaluation of lactoferin and nutrients enriched colostrum milk based formulation targeting Iron-deficiency anemia in children and women	Dr. Anbarasu K	ICMR	22-01-2025	21-01-2028
53	GAP0655	Preclinical studies using novel SIRTI activators of dietary origin for the management of PCOS	Dr. Asha Martin	ICMR	10-02-2025	09-02-2028
54	GAP0656	Evidence based research on arecanut and health	Dr. Nagarajan S	Dept of Arecanut & Spices (ICAR)	01-03-2025	29-02-2028

12. Ongoing CSIR Projects 2024-25

Sl. No.	Project No.	Project Title	Project Leader	Start Date	End Date
1	NWP100	CSIR Integrated Skill Initiative - Phase II	Mr. Raghunandan MV	29-08-2019	31-03-2025
2	HCP0101	CSIR-JIGYASA 2 Virtual Laboratory Integration Project (First Tranche)	Dr. Uma V Manjappara	21-04-2021	31-03-2026
3	HCP-24	Identification of potential locations across India for seaweed cultivation and their valorization	Dr. Chauhan VS	22-12-2021	31-03-2025
4	HCP-47	Phenome India: A long-term longitudinal observational cohort study of health outcomes	Dr. Prakash M Halami	18-11-2022	31-03-2027
5	MLP0304	Development of functional oleogel based bakery products	Dr. Prabhasankar P	27-09-2022	31-07-2024
6	HCP-37	CSIR Floriculture Mission Phase-II	Dr. Giridhar P	04-05-2023	31-03-2026
7	HCP-52	Millet – Sustaining Health through Research and Innovation by Analysis of Nutrients and Nutraceuticals to Achieve global awareness (SHRI ANNA)	Dr. Meera MS	18-07-2023	31-03-2025
8	HCP-54	Waste to Wealth: Comprehensive solutions towards circular economy and sustainability	Dr. Negi PS Dr. Jyothilakshmi A	04-09-2023	31-03-2026
9	FTT020504	To formulate grain-based food nutrient rich functional food for improving gut health status of geriatric people	Dr. Shruti Joshi	01-04-2024	31-03-2026
10	FTT020505	Advancing dietary fat quality in creamy condiments: Balancing taste and nutrition of effective weight management	Dr. Vijayaraj P	01-04-2024	31-03-2026
11	FTT020506	Development of essential oil based prophylactic agents for prevention of stored grain insect pests	Dr. Vivek Babu CS	01-04-2024	31-03-2026

Sl. No.	Project No.	Project Title	Project Leader	Start Date	End Date
12	FTC050503	Upscaling of CSIR-NEERI's Up-flow Compact Constructed Wetland (UCCW) based Sewage Treatment Plant (STP) and Compact Faecal Sludge/ Septage Separation and Treatment (CFSST) plant	Dr. Sandeep N Mudliar	01-04-2024	31-03-2026
13	FTT050508	Customizable odour control solutions: Development and demonstration of biological (biofilter) and advanced ozone-based technologies for managing obnoxious odours for community applications	Dr. Sandeep N Mudliar	01-04-2024	31-03-2026
14	FTT050510	Large scale production of collagen and development of nutraceuticals	Dr. Mamatha SS	01-04-2024	31-03-2026
15	MMP025201	Fermentation scale up and technology development of lead industrial enzymes for biofuel, food, feed, agriculture and vaccine applications	Dr. Mukesh Kapoor Dr. Sarma MVRK	08-04-2024	31-03-2026
16	CSP024001	Development of process for enrichment of certain dietary free-oligosaccharides and evaluation of their influence on gut microbiome	Dr. Gnanesh Kumar BS	01-04-2024	31-03-2026
17	CSP024002	Development of fruit incorporated herbal beverage	Mr. Gahire Anant Chintamani	01-04-2024	30-09-2025
18	CSP024003	Development of millet, mahua and other galactagogues based bakery food products for lactating women	Mr. Nehulkumar MS	01-04-2024	31-03-2026
19	CSP024004	Advanced portable electrochemical sensor for rapid detection of pesticides in fruits and vegetables	Dr. Sindhu R Nambiar	01-04-2024	31-03-2026

Sl. No.	Project No.	Project Title	Project Leader	Start Date	End Date
20	CSP024005	Exploring silica-loaded biopolymers for insect-resistant packaging	Dr. Parthiban P	01-04-2024	31-03-2026
21	CSP024006	Artificial Intelligence based classification for post-harvest waste management of onions during storage	Dr. Gomathy K	01-04-2024	31-03-2026
22	CSP024007	Standardization and Optimization of preparation process of “Dindki” a traditional food made from finger millet in Himalayan region	Dr. Leela Chauhan	01-04-2024	30-09-2025
23	CSP024008	Development of a portable, affordable and scientifically validated ozonation system for Indian chicken shops	Dr. Indira Dey Paul	01-04-2024	30-09-2025
24	CSP024009	Development and evaluation of nanocomposite based filter-bed for sugar processing industry wastewater treatment	Dr. Dinesha BL	01-04-2024	31-03-2026
25	CSP024010	Design and Development of table-top kitchen appliance for automated food preparation	Mr. Thimmaiah GR	01-04-2024	31-03-2026
26	CSP024011	Optimizing turmeric processing parameters to improve the quality of turmeric powder	Dr. Shyam R Garud	01-04-2024	30-09-2025
27	CSP024012	Development of Dissolved Air Flotation (DAF) based System for Efficient Scum Removal in Jaggery Processing	Dr. Chavan Ashutosh N	01-04-2024	31-03-2026
28	MMP035202	Sustainable packaing solutions for net zero future	Mr. Matche RS Dr. Arunkumar P	29-08-2024	31-03-2027
29	FIR020305	Fasting mimicking diet FMD as a nutritional intervention for obesity-associated breast cancer	Dr. Anbarasu K	29-08-2024	31-03-2026

13. Ongoing Collaborative Laboratory Projects 2024-25

Sl. No.	Project No.	Project Title	Funding Agency	Project Leader	Start Date	End Date
1	CLP0017	Validation of health beneficial effects of coconut oil & virgin coconut oil using *in-vivo, in-vitro* & clinical trails	M/s Marico Ltd., Coimbatore	Dr. Nandini P Shetty	08-12-2020	31-12-2025
2	CLP0022	Development of thermostable container for perishable food items	M/s Createcomm Tech Pvt. Ltd., Gurugram	Shri Rajeshwar S Matche	17-08-2021	16-08-2025
3	CLP0027	Immune boost food formulation for children and geriatric conditions	M/S Lapp india Pvt. Ltd	Dr. Vijayaraj P	26-09-2024	05-09-2025
4	CLP0028	Nutrition intervention programme for malnourished children in Mysuru district	M/s Bank Note Paper Mill india Pvt. Ltd	Dr.Sridevi A Singh	25-10-2024	30-09-2025
5	CLP0025	Nutrition intervention for Severely Acute Malnourished (SAM) children at Nanjanagudu taluk	M/s Jubilant Bhartia Foundation	Dr. Sridevi A Singh	29-11-2022	31-10-2025
6	CLP0026	Establishment of selected secondary millet processing lines suitable for farmers, fpos, SHGs and other allied sectors	M/s. Milltec Machinery Private Limited	Dr. Meera MS	08-05-2024	28-02-2026

14. Symposia, conferences and events organised / sponsored by CSIR-CFTRI

- **International Women's Day (April 19, 2024)**

"She Leads: Celebrating Women Achievers" was organised as part of International Women's Day 2024. Dr. S. Rathnamma, Research Associate, JSS, Mysore and Mrs. Prema N. Mahendrakar from Mysuru were the Chief Guests and Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI presided over the function. During this function, Director felicitated both women achievers for their outstanding contributions in their fields. Women entrepreneurs were also felicitated on this occasion.



- **National Technology Day (May 13, 2024)**

National Technology Day was held on May 13, 2024. Shri Arjun Ranga, Partner of NR Groups, the makers of “Cycle Pure Agarbathi” and CEO & Managing Director of N. Ranga Rao & Sons Pvt Ltd, Mysuru was the Chief Guest and he delivered a lecture entitled 'From Agarbathi to Aerospace… Creating an Innovation Mindset'. Agreements were exchanged with three industries, namely M/s DDR Ventures LLP, Bengaluru for a sponsored project, M/s MCPI Pvt Ltd., Kolkata and M/s Sun Enviro Technology Pvt. Ltd., Bengaluru for transfer of technologies. The Chief Guest distributed mementoes and certificates to licencees of CSIR-CFTRI technologies and also Appreciation Certificates to S&T team of CSIR-CFTRI. During the event 12 new technologies developed by scientific staff during 2023-24 were also introduced to the audience. Dr. Aashitosh A Inamdar, Head, TTBD welcomed the gathering and spoke about National Technology Day. Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI presided.



- **Symposium on Food for Our Future (May 29, 2024)**

Society of Biological Chemists (India), Mysore Chapter in association with CSIR-CFTRI, Mysore and AFST(I), conducted a symposium on 'Food for our Future: The Role of Biochemistry, Food Science and Nutrition' on May 29, 2024 at the Institute. It was organised in commemoration with the birth centenary year of Late Dr. M.R. Raghavendra Rao, Late Dr. H.S.R. Desikachar, Late Dr. M.S. Narasinga Rao (1924-2024) formerly Deputy Directors of CSIR-CFTRI. The above symposium was inaugurated by Dr. V. Prakash, Former Director of CSIR-CFTRI and Distinguished Scientist of CSIR. Former Chief Scientist's of the Institute Dr. Chandrashekara N., Dr. Tharanathan R.N., Dr. Salimath P.V., Dr. Ali S.Z., Dr. Malleshi N.G., Dr. Appu Rao A.G., and Dr. Arun Chandrashekar shared memories of their association with the centenarian scientists. Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI presided over the function.



- **World Environment Day (June 5, 2024)**

World Environment Day 2024 was celebrated at CSIR-CFTRI on June 5, 2024. The theme of World Environment Day was 'Land restoration, Desertification and Drought resilience'. As part



of the celebrations, sapling were planted by noted Environmentalist Sri. U.N. Ravi Kumar, Former Director, Centre for Appropriate Rural Technologies (CART), NIE, Mysuru and Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI.

- **World Food Safety Day (June 7, 2024)**

World Food Safety Day 2024 with the theme "Food Safety: Prepare for the Unexpected" was celebrated in the campus for the benefit of students. Dr. P. Giridhar, Chief Scientist & Head, FSAQCL welcomed the gathering. Shri Rajeshwar S. Matche, Chief Scientist & Head, Food Packaging Technology Dept. formally inaugurated the event and addressed the gathering on the importance and awareness of world food safety. Various demonstrations on detection of adulterants in edible oils, spice products, sweets, milk, honey etc., and the use of analytical instruments used by the food safety laboratories were exhibited during the programme. Demonstration on food hygiene and microbial safety was also arranged. More than 200 students from various colleges participated in the programme.



- **International Yoga Day (June 21, 2024)**

International Yoga Day 2024 with theme "Yoga for Self and Society" was held on June 21, 2024 at CSIR-CFTRI Campus. Director, staff, research scholars and students actively participated in the event.



- **Birth Anniversary Celebration of Dr. B.R. Ambedkar (July 29, 2024)**

Floral tribute was paid by Director and staff to Bharat Ratna Dr. B.R. Ambedkar, architect of Indian Constitution on his 134th birth anniversary on April 14, 2024. Birth anniversary was also celebrated on July 29, 2024 at CSIR-CFTRI. Prof. Ramchandra Guha, Historian & Writer inaugurated the event and delivered the special address. Dr. S. Narendra Kumar, Director, Gandhi Centre and Professor, Ambedkar Research Extension Centre, University of Mysore was the Chief Guest of the function and Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI presided.

- **Independence Day Celebrations (August 15, 2024)**

Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI hoisted the National flag in front of main mansion on August 15, 2024 and also addressed the staff and students

- **National Nutrition Week Celebrations (September 2-5, 2024)**

As part of National Nutrition Week 2024 celebrations, nutrition awareness lectures & various competitions were organized by CSIR-CFTRI during Sept 2-5, 2024. The inauguration of National Nutrition Week 2024 with theme “Nutritious Diets for Everyone” and Global Bio-India Road Show 2024 programme was held at CSIR-CFTRI on September 2, 2024. Prof. S. Kowsalya, Professor, Department of Food Science and Nutrition, Avinashilingam Institute for Home Science and higher Education for Women (Deemed to be University) Coimbatore, Tamil Nadu was the Chief Guest and delivered the talk on the topic “Fostering Health : Promotion of Nutritious Diets Through Life Cycle to Meet Sustainable Development Goals". Dr. Prachi Agarwal, Senior Manager-Technical, Biotechnology Industry Research Assistance Council (BIRAC), Govt. of India, New Delhi was the Guest of Honour and addressed about Global Bio-India Roadshow 2024. Dr. Sridevi Annapurna Singh, Director, CSIR- CFTRI Presided over the function. Prizes for winners were distributed during this event. Panel Discussion was also held as part of Global Bio-India Roadshow 2024 with theme” Fostering Innovations to meet Nutrition Challenges”. The panellists were Dr. Sridevi Annapurna Singh; Prof. S. Kowsalya;.Dr. Prachi Agarwal; Shri Kumar Sankaran, CEO, Leucine Rich Bio Pvt. Ltd; .Dr. Shrilakshmi Desiraju, CEO, AA Probics and Shri Santhosh Sahu, SBI. Shri Rajeshwar S. Matche was the moderator.



- **National Sports Day Celebrations (September 3-5, 2024)**

To commemorate the birth anniversary of legendary hockey player Major Dhyan Chand, National Sports Day was celebrated at CSIR-CFTRI during September 3-5, 2024. As part of the celebrations, various sports and fun activities including outdoor activities, fun games and indoor activities was organized for staff and students.



- **Conference on "Technology Showcasing and Networking Meet of CSIR-CFTRI Food and Millet Technologies (September 19-20, 2024)**

Conference on "Technology Showcasing and Networking Meet of CSIR-CFTRI Food and Millet Technologies" from September 19-20, 2024 at the Institute jointly organised by CSIR-CFTRI, CSIR- National Institute of Science Communication and Policy Research (NIScPR), Unnat Bharat Abhiyan (UBA) and Vijnana Bharati (VIBHA). The inaugural session was graced by

Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI; Prof. Ranjana Aggarwal, Director, CSIR-NIScPR; Shri Sam Cherian, Chief Guest, Chairman and Managing Director, Schevaran Laboratories Pvt. Ltd., Mysuru; Prof. Virendra Kumar Vijay, National Coordinator, Unnat Bharat Abhiyan (UBA); Dr P.K Singh, Project Director UBA; Shri N.P Rajive, Executive Director Vibha Vaani; and Dr Yogesh Suman, Chief Scientist, CSIR-NIScPR. The networking session was moderated by Dr. Aashitosh A. Inamdar, Head, TTBD Dept., where participants interacted with scientists to know about CSIR-CFTRI technologies and identify specific opportunities for collaboration and technology development with CSIR-CFTRI. An interactive session was also organised with the representatives from Banking sector, Government agencies responsible for implementing various Government schemes in the area of agriculture. Over 100 people from all over the nation participated in the event, which was a huge success.



- **Engineer's Day Celebrations (September 17, 2024)**

57th Engineer's Day celebrations was held on September 17, 2024. Floral tributes were offered by Director to Bharat Ratna Sir M. Visvesvaraya on his 164th birth anniversary. Dr. H. Umesh Hebbar, Chief Scientist & Head, Food Engineering Dept. welcomed and coordinated the event.



- **Birth Anniversary Celebration of Founder Director, CSIR-CFTRI (September 17, 2024)**

Birth anniversary of Dr. V. Subramanyan, Founder Director of CSIR-CFTRI, was held at at the Institute on September 17, 2024. The Chief Guest, Dr. S.Z. Ali (Retd., Chief Scientist & Former Head, GST Dept) delivered a talk on the topic "Dr. V. Subrahmanyan: The genius behind the development of Food Science and Food Technology in India". Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI presided over the function.



- **Gandhi Jayanthi (October 2, 2024)**

Gandhi Jayanthi celebration and "Swachhata Hi Seva" (Sept 17, 2024 - Oct 2, 2024) with the theme Swabhav Swachhata and Sanskar Swachhata event was conducted on 2nd October, 2024 at CSIR-CFTRI, Mysuru. As this part Swachhata Shramdan was undertaken by students and staff of the Institute.



- **CSIR-Foundation Day (October 7, 2024)**

Open Day was held on September 26, 2024, as part of CSIR Foundation Day. More than 500 students from various institutions of Maharashtra, Tamil Nadu, Telangana and Karnataka visited the CSIR-CFTRI facilities during the open day, where they witnessed demonstrations of food processing equipment, analytical methods and other displays.



83rd CSIR Foundation Day was held on October 7, 2024. Dr. S.V. Suresha, Vice Chancellor, University of Agricultural Sciences, Bangalore (UAS-B) was the Chief guest and delivered the CSIR Foundation day Lecture. Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI presided the event. The dignitaries distributed prizes to school children, meritorious students and also mementoes to retirees and staff who completed 25 years of service.



- **Directors Meeting of CSIR laboratories (October 22-23, 2024)**

The meeting of all Directors of CSIR laboratories was held during October 22-23, 2024 at Mysuru organized by CSIR-CFTRI. Dr. N. Kalaiselvi, Director General, CSIR and Secretary, Department of Scientific and Industrial Research (DSIR), Ministry of Science and Technology, Government of India was the Chairperson of the meeting. The Directors of various CSIR institutes across India and Heads of units from CSIR headquarters participated in the meeting

CSIR Directors' Conference

22nd - 23rd October 2024

at

CSIR-Central Food Technological Research Institute, Mysuru, Karnataka, India



Sitting Row (L-R): **Dr. Avanish Kumar Srivastava, Prof. Pradeep Kumar Ramancharla, Prof. Sunil Kumar Singh, Dr. Nettam V Choudary. Dr. Prabodh Kumar Trivedi, Ms. Dolly Choudhary, Dr. Vibha Malhotra Sawhney, Dr. N. Anandavalli, Dr. Kannan Srinivasan, Dr. Sridevi Annapurna Singh, Dr. N. Kalaiselvi, Shri. Mahendra Kumar Gupta, Dr. S. Sathiyanarayanan, Dr. Geetha Vani Rayasam, Prof. Venugopal Achanta, Prof. Arvind Kumar Mishra, Dr. P.K. Banerjee, Dr. C. Anandharamakrishnan, Dr. Naresh Chandra Murmu, Dr. Sridevi Jade, Dr. Harender Singh Bisht, Dr. Ajit Kumar Shasany**

Standing Row(L-R): **Dr. Jyoti Yadav, Prof. Manoranjan Parida, Prof. Vibha Tandon, Dr. Ranjana Aggarwal, Dr. B. Chandrasekaran, Dr. Ramanuj Narayan, Dr. V.M. Tiwari, Shri. Roop Kishore, Shri. Arindam Banerjee, Dr. Abhay Anant Pashilkar, Dr. K. Ramesha, Dr. Radha Rangarajan, Dr. Rajan Sankaranarayanan, Dr. Prakash Kumar, Dr. Sanjeev Khosla, Dr. Rama Swami Bansal, Prof. Bikramjit Basu,Dr. Vinay K. Nandicoori, Dr. K.J. Sreeram, Dr. Souvik Maiti, Dr. Debashis Bandyopadhyay, Dr. T.S. Rana, Shri R.S. Mani, Dr. D. Srinivasa Reddy, Dr. Ram A. Vishwakarma, Dr. P. C. Panchariya, Dr. Atul Narayan Vaidya, Dr. Sudesh Kumar Yadav, Dr. Sandip Ghosh Chowdhury,Dr. Bhaskar Narayan, Dr. Zabeer Ahmed, Dr. Kishore Sreenivasan, Prof. Shantanu Bhattacharya, Dr. G Mahesh, Dr. Ashish Lele, Shri. Chetan Prakash Jain.**

- **CSIR-CFTRI Foundation Day (October 22, 2024**

CSIR-CFTRI 75th Foundation day i.e. Platinum Jubilee celebration was held on October 22, 2024. Sri Yaduveer Krishnadatta Chamaraja Wadiyar, Hon'ble Member, Parliamentary Standing Committee on Science & Technology, Environment & Forests, Govt. of India and Hon'ble Member of Parliament, Mysuru-Kodagu Lok Sabha Constituency was the Chief Guest and addressed the gathering through online mode. Dr. N. Kalaiselvi, Director General, CSIR and Secretary, DSIR, Govt. of India was the Guest of Honour for this event in the august presence of Former Directors of CSIR-CFTRI, Dr. V. Prakash, CSIR Distinguished Scientist, Dr. Ram Rajasekharan and Dr. KSMS Raghava Rao. The Director General, CSIR, Dr. N. Kalaiselvi delivered the 75th CSIR-CFTRI Foundation Day address and the former Directors of CSIR-CFTRI shared messages and thoughts during this event. Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI preside the event. The dignitaries released three books namely Handbook on Millets of Bharat-Nutritional Profile Volume 1, Roots to Wings CSIR-CFTRI Employees Compendium (1950-2024) and Platinum Jubilee Plant Book. New products were also launched and MoU was exchanged in the presence of the dignitaries. New facility of Biodegradable Cutlery from Millet Bran was inaugurated by DG, CSIR. Platinum Jubilee logo of CSIR-CFTRI was launched and audio of CSIR-CFTRI song was also released. All the Directors of CSIR laboratories and Heads of units from CSIR headquarters were present on the occasion.

On the occasion of World Environment Day, our honourable, Prime Minister Shri. Narendra Modi launched the 'Ek Ped Maa Ke Naam' campaign, or “Plant4mother” a unique initiative combining environmental responsibility with a heartfelt tribute to mothers. 'Ek Ped Maa Ke Naam' is a movement that reflects India's commitment to a sustainable and environmentally conscious future. In this connection, to Commemorate 75th Foundation Day of CSIR-CFTRI, the plantation drive for the staff was inaugurated by Director, CSIR-CFTRI. As part of this initiative, all the staff planted the saplings at CFTRI staff quarters complex. Also, collective efforts to make a "PLATINUM JUBILEE GARDEN at CSIR-CFTRI, MYSURU" with plantation drive of 75 unique plants was inaugurated by Dr. (Mrs.) N. Kalaiselvi, Director General, CSIR & Secretary DSIR by watering the tree sapling, followed by all the CSIR Directors, Heads of units from CSIR Hqrs, CSIR Distinguished & Outstanding Scientists and Former Directors of CSIR-CFTRI, Mysuru.





- **Kannada Rajyotsava (November 1, 2024)**

Kannada Rajyotsava was held on November 1, 2024. Dr. Banjagere Jayaprakash, Former President Kannada Book Authority, Kannada writer and critic, was the Chief Guest and addressed the gathering.



- **Vigilance Awareness Week (November 5, 2024)**

Vigilance Awareness week valedictory programme was held on November 5, 2024. Sri B.G. Dinesh, Judge & Secretary, District Legal Services Authorities, Mysore was the Chief Guest and delivered the talk on vigilance. Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI presided the event and Sri K. Ravi Kumar, CoA welcomed the gathering. The Chief Guest distributed prizes and certificates to staff and students who won in the competitions held as part of Vigilance Awareness Week.



- **India International Science Festival (IISF) 2024 (November 6, 2024)**

Curtain Raiser event of India International Science Festival (IISF) 2024 celebrations with theme "Transforming India into a Science and Technology Driven Global Manufacturing Hub" was held at CSIR-CFTRI on November 6, 2024. Prof. S.N. Hegde, Former Professor and Chairman, Dept. of Zoology, University of Mysore was the Chief Guest and delivered a talk on the topic "Scientific Attitude". Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI presided over the function.



- **One Week One Theme (November 11, 2024)**

One Week One Theme (OWOT) Agri. Nutrition and Biotech (ANB) was held at CSIR-CFTRI campus on November 11, 2024 wherein Prof. Matam Vijay Kumar, Director, The University of Toledo-Microbiome Consortium (UT-MiCo),



Department of Physiology and Pharmacology, University of Toledo, USA was the Chief Guest and delivered the talk on "Dietary Fiber and Gut Microbiota Dysbiosis in Liver cancer". Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI presided over the function. As part of OWOT, Industry Project Agreement Exchange and panel discussion on ANB Theme were held.

- **Jan Jatiya Gaurav Divas (November 18, 2024)**

Jan Jatiya Gaurav Divas 2024 was celebrated as part of 150th Birth anniversary Year of Dharti Baba Bhagawan Birsa Munda on November 18, 2024 at CSIR-CFTRI. Dr. Harshawardhana, Deputy Director & Head of Office, Southern Regional Centre, Anthropological Survey of India, Manav Bhavan, Mysore was the Chief Guest and delivered a talk on "Birsa Munda as an Anthropologist". Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI presided over the function. As part of celebrations, the dignitaries inaugurated the programme by lighting the lamp and paid homage by offering floral tributes to the portrait of Bhagawan Birsa Munda.



- **Constitution Day (November 26, 2024)**

Constitution Day was organised on November 26, 2024 at the Institute, Prof. Muzaffar H. Assadi, Former Vice Chancellor (I/C), University of Mysore was the Chief Guest. Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI, presided the function and the Preamble of the Constitution was read by the members assembled.



- **Workshop on Journal Publishing (November 26, 2024)**

Half day workshop on Journal Publishing by Springer Nature was held on November 26, 2024 wherein Dr. Priya Sharma, Springer Nature India was the Resource Person.

- **Symposium on Integration of National Standardization and Food Ecosystem (November 29, 2024)**

Half day symposium on Integration of National Standardization and Food Ecosystem was held on November 29, 2024 organised by CSIR-CFTRI in association with Bureau of Indian Standards (BIS) & Association of Food Scientists and Technologists (AFST) India. Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI inaugurated the event and delivered the inaugural address. Dr. S. Barbuddhe, Director, ICAR-National Meat Research Institute, Hyderabad was the Chief Guest and delivered key note address entitled "Present Contours and Future Research & Development in Food Sector: The Meat Industry Perspective".

Shri Debasish Mahalik, BIS, New Delhi; Mr. Rajesh K., LICIOUS, Bangalore and Dr. M. Muthukumar, ICAR-NMRI, Hyderabad presented talks during technical session.



- **International School of Milling Technology (ISMT) Course Valedictory Function (December 6, 2024)**

43rd International School of Milling Technology (ISMT) Course Valedictory was held on December 6, 2024 at CSIR-CFTRI wherein Shri Phaneedra. K., Operations Manager, Manikchand Group, Hyderabad was the Chief Guest and delivered the valedictory address. Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI presided over the function. Dignitaries presented Medals and Certificate of Appreciation to students



- **Inauguration of Centre of Excellence for Millets and Incubation Centre (December 6, 2024)**

Centre of Excellence for Millets and Incubation Centre was Inaugurated by Sri N. Chaluvarayaswamy, Hon'ble Minister for Agriculture, Govt. of Karnataka on December 6, 2024. Sri K. Harish Gowda, Hon'ble MLA, Chamaraja Assembly Constituency presided over the function. The inaugural event was held in the presence of Sri Bandi Siddegowda, MLA, Srirangapatna Assembly Constituency; Sri B.V. Sudarshan, Former Speaker, Legislative Council; Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI;, Sri Y.S. Patil, IAS, Commisioner for Agricuture, Govt. of Karnataka. The dignitaries visited the Centre of Excellence for Millets and Incubation Centre and witnessed the operation of machines. They also visited other facilities such as CSIR-CFTRI showcase and Millet showcase.



- **Republic Day Celebrations (January 26, 2025)**

As part of 76th Republic Day, Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI hoisted the National flag and delivered Republic Day address on January 26, 2025. Rangoli and photography competitions were held as part of the celebration. Director, CSIR-CFTRI distributed cash prizes and certificates were presented to winners of the competitions.

- **Symposium on Standardizing Spirits: Understanding Indian Standards on Alcoholic Beverages (February 27, 2025)**

Half-Day Symposium on “Standardizing Spirits: Understanding Indian Standards on Alcoholic Beverages” sponsored by The Bureau of Indian Standards (BIS) and organised by Microbiology & Fermentation Technology Department was held at CSIR-CFTRI on February 27, 2025.

- **National Science Day & Platinum Jubilee Lecture Series (February 28, 2025)**

Platinum Jubilee Lecture Series 2024-25 along with National Science Day-2025 with the theme “Empowering Indian Youth for Global Leadership in Science and Innovation for Viksit Bharat” were held on February 28, 2025. Prof. T. Ramasami, Distinguished Professor of Eminence & Former Secretary (DBT) and Former Director (CLRI) was the Chief Guest and delivered the Platinum Jubilee Lecture on "A well wisher peep into the centenary of CFTRI”. Dr. Sridevi Annapurna Singh, Director, presided over the event. Appreciation certificates were distributed to CFTRI staff, researchers and students under various categories as part of CSIR-CFTRI Annual Recognitions 2023-24.

Dr. Rakesh Mishra, Director, Tata Institute for Genetics and Society (TIGS) & Former Director, CSIR-CCMB was the Chief Guest & Distinguished Speaker for the 2nd Platinum Jubilee Lecture on "Genome Technologies for One Health: Novel Therapeutics to Nutritional Security” which was held on March 26, 2025. Director, CSIR-CFTRI presided the event.

- **National-Level Food Hackathon (February 27-28, 2025)**

BioNEST Incubation Center at CSIR-CFTRI, in collaboration with Siddaganga Incubation Foundation, successfully organized a National-Level Food Hackathon on February 27-28, 2025, at CSIR-CFTRI, Mysuru bringing together students, aspiring entrepreneurs, researchers, food and agriculture enthusiasts. The students interacted with Dr Sridevi Annapurna Singh, Director, CSIR-CFTRI and Prof T. Ramasami, Former Secretary, Department of Science and Technology who shared their insights on the prototypes displayed. Director, CSIR-CFTRI along with the esteemed jury members, distributed awards and certificates to winners.

- **Floriculture Mission Industry Meet (March 3, 2025)**

One day Industry Meet under CSIR - Floriculture Mission” with the theme 'Advancing Floriculture: Innovations, Opportunities and Sustainability'





was held at CSIR-CFTRI on March 3, 2025. Shri Manjunath Angadi, Deputy Director, Dept. of Horticulture, Mysore (Dist.) was the Chief Guest and Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI presided.

- **International Women's Day (March 5-7, 2025)**

On Occasion of International Women's Day 2025 following programmes and events were conducted at CSIR-CFTRI.

- Invited talk on "Diet and Nutrition" delivered by Dr. Shashikala, Dietician and Nutritionist, Cauvery Hospital, Mysore on March 5, 2025.
- Walkathon was arranged on March 6, 2025 wherein Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI along with all female staff and research students walked around the campus.
- Zumba session was conducted on March 7, 2025 in the campus and all the women employees and research students along with Director participated in the event.





16. MoU(s) Signed

- Padmashree Institute of Management & Sciences (PIMS), Bengaluru
- Madras Diabetes Research Foundation (MDRF), Chennai
- Grassroots Research and Advocacy Movement (GRAAM), Mysuru
- University of Horticultural Sciences, Bagalkot
- Bank Note Paper Mill India Private Limited (BNPM), Mysore
- Central Silk Board-Central Sericultural Research and Training Institute (CSB-CSRTI), Mysuru and Tamil Nadu Veterinary and Animal Sciences University (TANUVAS), Chennai
- Prayoga Institute of Education Research, Bengaluru
- Lapp India Private Limited, Bangalore
- Koneru Lakshmaiah Deemed to be University, Guntur
- All India Institute of Ayurveda, New Delhi
- Nestle R & D Centre India Pvt. Ltd., New Delhi



Signing of MoU between CSIR-CFTRI and Central Silk Board – Central Sericultural Research and Training Institute (CSB-CSRTI), Mysuru and Tamil Nadu Veterinary and Animal Sciences University (TANUVAS), Chennai



Signing of MoU between CSIR-CFTRI and Bank Note Paper Mill India Private Limited (BNPM), Mysore

17. Awards and Recognitions

Ph.D. Degree awarded

a) AcSIR

Sl. No.	Name of the Student	Title of the Thesis	Guide
1	Pinchu Elizabath Thomas	Structuring of virgin coconut oil based oleogel and its application in bakery products	Dr. Asha Martin
2	Yogendra Prasad K	Characterization of molecular mechanism underlying the cancer chemo-preventive potential of carotenoids in luminal and triple-negative human breast cancer cells	Dr. Ganesan P Co-guide: Dr. Poornima Priyadarshini
3	Vidhyalakshmi R	Processing of pearl millet (*Pennisetum Glaucum*) for the development of low glycaemic index food product for pre-diabetes	Dr. Meera MS
4	Urvashi Sahu	Physiological and toxicological effects of phytochemical volatiles on *Sitophilus oryzae* (Rice weevil): A comprehensive study	Dr. Ezil Vendan S
5	Sonkar Rutuja Murlidhar	Green process for xylooligosaccharide production from wheat bran and its prebiotic potential	Dr. Praveena B Mudliar
6	Gade Pravin Savata	Biosensing and mitigation of sterigmatocystin	Dr. Praveena B Mudliar
7	Vandana Padmanabhan	Investigations on nutrients and nutraceutical potential of seeds and flowers of *Clitoria ternatea* L.	Dr. Giridhar P
8	Sangeetha Sher Bahadur Singh	*trans*-Ferulic acid and sugar beet pulp-phenolic extract as a potential activators of AMPK: Molecular mechanism and implications in amelioration of hyperglycemia	Dr. Neelakanteshwar Patil K
9	Sruthi P	Studies on phenolic compounds from cashew nut (*Anacardium occidentale* L.) testa and its value addition	Dr. Madhava Naidu M
10	Raghavakumari Ramesh Sunagar	Impact of milling on phenolic profiles of browntop millet and its antidiabetic potential	Dr. Sreerama YN
11	Sandesh Suresh	Production and characterization of biodiesel from fish discards	Dr. Tanaji Kudre

Sl. No.	Name of the Student	Title of the Thesis	Guide
12	Sreevathsan	Studies on ozonation for treatment of complex organic waste waters	Dr. Sandeep N Mudliar
13	Anusha	Anti-aging potential of mealworm (*Tenebrio molitor*) protein-enriched fruit and vegetable-based products in *in-vitro* and *in-vivo* models	Dr. Negi PS
14	Sanjana J	Role of AMP-activated protein kinase modulation on hepatic O-GlcNAcylation in diet-induced hypercholesterolemia	Dr. Nandini CD
15	Veena Kumari	Thermal treatment effect on finger millet quality characteristics and development of nutrient rich food formulation	Dr. Jayadeep A
16	Pawde Subhash Vishwanath	Development of active packaging system – oxygen scavenger for bakery product	Dr. P Prabhasankar Co-guide: Mr. Matche RS
17	Divya Yadav	Development of a synbiotic nutraceutical formulation from mushroom waste for post-menopausal osteoporosis prevention	Dr. Negi PS
18	Aishwarya Praveen	Understanding structure and profile of curcuminoids present in turmeric and their augmentation *ex vitro*	Dr. Sachin R Chaudhari
19	Natesh	Targeted delivery of dietary bioactive compounds as an adjuvant therapy against breast cancer	Dr. Syed Musthapa M
20	Mawale Kiran Suresh	Nanoparticle-mediated modulation of phenylpropanoid pathway metabolites and antioxidant responses in chilli	Dr. Giridhar P
21	Krishna Prashanth MR	Cost effective production and characterization of bioactive pigment from marine bacteria	Dr. Mohan A Dhale
22	Tamilselvan T	Studies on development of gluten free bakery product using millets and its validation	Dr. Prabhasankar P
23	Tanzeem Meher	Bioprocessing of red and black rice varieties for nutraceutical enrichment, and their quality characteristics	Dr. Jayadeep A

Sl. No.	Name of the Student	Title of the Thesis	Guide
24	Shree Raksha S	Preparation and characterization of quinoa bran protein concentrate, and evaluation of antiproliferative activity in hepatocellular carcinoma cells	Dr. Sachin M Eligar
25	Bhavya Kotnala	Nutritional status and disease management of phenylketonuria using plant based phenylalanine free protein hydrolysate	Dr. Arun Kumar V Co-guide: Dr. Vijayaraj P
26	Steji Raphel	Identification of the biosynthetic gene involved in the synthesis of the peptide antibiotic of *Bacillus licheniformis* MCC 2514 and its application as a probiotic	Dr. Prakash M Halami
27	Priya Mondal	Dietary epigenetic modulators as adjuvant therapy against lung cancer: Development of healthy gut formulation for lung-gut homeostasis	Dr. Syed Musthapa M
28	Sanjay K	Inhibitor selectivity towards pancreatic lipase and fatty acid binding proteins for reducing fat digestion and absorption	Dr. Usharani D

b) University of Mysore

Name of the Student	Title of the Thesis	Guide
• Swathi Tej	Network motifs in gene regulation: Equilibrium behaviour and noise characteristics	Dr. Sutapa Mukherji
• Rani A	Chemometric analysis of selected food commodities for authentication and adulterant identification	Dr. Sarma MVRK
• Shivani Sharma	Characterization and valorization of indian hemp seed fractions for its application in wheat based foods	Dr. Prabhasankar P
• Aditi Goel	Genetic and molecular evidences of plantaricin produced by *Lactobacillus plantarum* isolated from fermented milk and their probiotic properties	Dr. Prakash M Halami
• Bhavana BK	Bioprocessing of agro-industrial residue(s) for food and fuel applications	Dr. Sukumar Debnath

c) Mangalore University

Name of the Student	Title of the Thesis	Guide
• Geetha V	Modulatory effect of Gycosaminoglycans (GAGs) from fish waste on obesity induced atherosclerosis	Dr. Suresh Kumar G

d) Recognitions by Academies

Recognition	Instituted by	Awardee
• Fellow	AFST(I), Mysore	Dr. Sridevi Annapurna Singh
• Fellow	AFST(I), Mysore	Dr. Prabhasankar P

e) Individual Awards

Award Title	Instituted by	Awardee
• Dr Kalpana Chawala Young Women Scientist Award	Govt of Karnataka	Dr. Pushpa S Murthy
• ESI Senior Entomologist Award	The Entomological Society of India, New Delhi	Dr. Rajashekar Y

f) Other Recognitions

Dr. Sridevi Annapurna Singh

- Member of CSIR Governing Body; Senate Member of AcSIR, CSIR; Member of Advisory Committee of CSIR – Traditional Knowledge Digital Library (CSIR-TKDL); Member of CSIR Taskforce Committee to review/monitor and guide the implementation of Jigyasa 2.0 programme
- Member of CSIR Taskforce on Nutra Sector; Member of Task-Force Committee on “CSIR-Mission Mode Programme on Advancing Technological Leads for Assuring Safety of Food (ATLAS); Member of Recruitment and Assessment Board of CSIR; Member of Food Authority of FSSAI
- Member of Expert Committee for Tomato Grand Challenge for development of Comprehensive and focused intervention in design of tomato value chain, pre-production, primary processing, post-harvest, storage and valorization constituted by Ministry of Consumer Affairs, Food and Public Distribution
- Chairperson of SIRO (DSIR) Screening Committee for recognition to In-house R&D (RDI) units; Chairperson of Taskforce for developing standards for Indian Mithai and Namkeens constituted by FSSAI; Chairperson of Expert Committee to examine the approval of Non-specified Food and Food Ingredients, FSSAI
- Chairperson of the 'Task Force on Enhancement of Shelf Life of Millets' constituted by the Ministry of Agriculture and Farmers Welfare; Chairperson of

Drinking Water & Carbonated Beverages Sectional Committee, FAD 14, Bureau of Indian Standards

- Member of Codex Coordination Group (CCG3): Foods of Plant Origin (Sub-group on Fresh Fruits & Vegetables); Member of Codex Committee on Contaminants in Foods (CCCF15) of FSSAI; Member of DST Fund for Improvement of S&T Infrastructure (FIST) Program, DST, GOI, New Delhi; Member of the Committee on 'Smart Proteins', BIRAC, DBT

- Advisory Committee Member of NIFTEM Research Development Council; Member of Research Advisory Committee of ICAR-Indian Institute of Millet Research (IIMR), Hyderabad

- Member of the Governing Body of National Agri Food Biotechnology Institute (NABI), DBT, Mohali; Member of Governing Body of Centre of Innovative and Applied Bioprocessing (CIAB), DBT, Mohali; Member of Project Review & Monitoring Committee, NECTAR, DST, GOI

- Member of Scientific Advisory Committee, International Life Science Institute (ILSI), India; Member of Board of Studies of Adikavi Nannaya University, Rajamundry; Member of Sub-Committee of Women Child Health & Nutrition TEC, DBT, GOI

- Member of Selection committee – National Technology Day Awards 2022 of TDB/DST; Member of Pushti Committee of Department of Women and Child Development, Government of Karnataka

- Member of Vision Group on Biotechnology, Directorate of Electronics, IT and BT, Government of Karnataka; Member of the Core Group on 'Right to Food and Nutrition' of the National Human Rights Commission (NHRC); Member Representative of the Governing Body of Coffee Incubation Centre

- Member of delegation led by Director General, CSIR visited Norway to strengthen India-Norway S&T relations and to discuss focused technology cooperation through CSIR & Norwegian Research and Technology Organisations

Dr. Giridhar P

- Member, BOS in Botany, Kakatiya University, Warangal, TS; Member, BOS of Food Technology, JNTU Anantapuram, AP

- Member, BOS of Pharmaceutical Sciences, JNTU Anantapuram, AP; Member, BOS of Food Technology, Davangere University

- Member, BIS, PCD-18 Sectional Committee of Flavours and Fragrances; Member, BIS, Project Advisory Committee; Member, Food Analysts Exam Board, FSSAI, New Delhi

- Expert Member, FSSAI's SP-01 on Food additives, flavourings and Processing Aids

Dr. Umesh Hebbar H

- Expert Member, Screening committee for selection of various Job Positions at DST-iTBI-GSSSTBIF, Mysore, GSSS technology business incubator foundation, Mysore

- Member, BOS, Department of Food Technology, Faculty of Agricultural Sciences, Rajiv Gandhi University, Arunachal Pradesh

- External Member, DAC, School of Biosciences and Technology for 3 Fellows, VIT University, Vellore
- Member, BoS, Food Science and Technology, University of Mysore
- Member, National Advisory Committee of FCMPE WellH 25 Conference to be held in BIT, Mesra, Jharkand

Dr. Prabhasankar P

- Member, FSSAI - Scientific Panel on Cereals, Pulses & Legume and their Products (Including Bakery)
- Member, BOS, Home Science, Sri Padmavathi Mahila Visvavidyalayam (SPMVV), Tirupati
- Academic Council Member, Faculty of Food Technology, University of Mysore
- Member, Ready-to-Eat Foods and Specialized Products Sectional Committee, FAD 24 (Food and Agriculture Department, Bureau of Indian Standards)

Dr. Negi PS

- Member, APEDA Authority; Convener, Fruits, Vegetables and Allied Products Sectional Committee (FAD 10 / Panel IV) of BIS
- Expert Member, Technical Advisory Committee (TAC) of Technology Development and Utilization Programme for Women (TDUPW) of Department of Scientific and Industrial Research
- Expert Member, Fruits and Vegetables Processing of appraisal Committee of MoFPI to review the proposals received from States/UTs for Common Incubation Centre establishment under PMFME scheme
- Member, Technical Committee Meetings of APEDA, New Delhi; Member, Research Advisory Committee, ICAR-CPCRI, Kasaragod
- Member, BOS, Faculty of Food Technology of the University of Calicut, Calicut, Keral
- Member, BOS, Faculty of UG B.Voc / PG M.Voc Food Processing & Engineering, JSS College of Arts, Commerce and Science, Mysore

Dr. Gothwal PP

- Expert Member, in the area of Agriculture Sci. (Food Technology) for the selection of SRF/RA Selection Committee at Human Resource Development Group (HRDG), CSIR, New Delhi
- Member Expert, in the area of Food Technology/Food Biotechnology/Dairy Technology for the selection of Chief Chemist/Analyst/Food Safety Officer/ Assistant Director in various Central government organization at Union Public Service Commission, New Delhi
- Member, Promotion of various schemes of NHB, State level Monitoring-cum-Guidance Committee on promotion of food processing industry through EDP-Skill Development Programme in UP, Uttranchal and Bihar
- Subject Expert, in the area of Food Science & Nutrition, Dairy Chemistry, Dairy Technology for Selection Committee of

Agricultural Scientist Recruitment Board, ICAR, New Delhi

Dr. Usha Dharmaraj

- Member, BIS, Food Grains, Allied Products and Ready-to-Eat Foods Sectional Committee, FAD 16
- Member, EWG on Standard for foods for older infants and young children, established by the 44th Session of Codex Committee on Nutrition and Foods for Special Dietary Uses (CCNFSDU44), FSSAI, New Delhi
- Member, Technical Specification Finalization Committee to review and finalize the technical specifications of Energy Dense Nutrition Supplementation (EDNS), Department of Health and Family Welfare, Government of India

Dr. S. Nagarajan

- Board Member, BOS in Chemistry, Madurai Kamaraj University (Lady Doak College)
- Principal Member, FAD 09 and PCD18 of BIS

Dr. Pushpa S Murthy

- Expert Member, Consultative group meeting of Geographical Indications Registry, Government of India
- Principal Member, FAD 6, BIS for coffee cocoa and tea
- Member, Advisory Board, Siddaganga Institute of Technology, 2020-2025, under graduate course, Biotechnology
- Member, Selection Committee for selecting suitable applicants from the second batch of Pre-incubation participants & aspiring entrepreneurs for the incubation program of AIC CCRI, Coffee Board, Govt of India
- Research Council Member, ICAR Cashew Research Directorate, GOI
- External Member, DAC, School of Biosciences and Technology, VIT University, Vellore
- Jury Member, Food Hackthon, BIRAC Bionest, CSIR CFTRI

Dr. Bettadaiah BK

- Member, FAD 09 of BIS

Dr. Prasanna Vasu

- Member, BOS, Subject Expert, Department of Food Science and Technology, St. Joseph's University, Bangalore
- Member, BIS Sectional Committee, FAD 28; Member, BIS Sectional Committee, FAD 29; Member, BIS Sectional Committee, CHD 07

Dr. Usharani D

- Member, Scientific Panel of Pesticide Residues (SP 02) of FSSAI, New Delhi
- Nodal Person, National Reference Laboratory for Health supplements and Nutritional Information recognised by FSSAI, New Delhi
- Principal Member, BIS Technical Committee -FAD 13- Oils and Oil seeds; FAD 28 Test methods for Food Products; FAD 15- Food Hygiene, Safety Management and other Systems Sectional Committee; Alternative Member, BIS-

Technical Committee -CHD -05, Chemical Hazards

Dr. Sreedhar RV

- Member, Screening-cum-evaluation and selection committee, University of Agricultural Sciences, UAS(B), GKVK, Bangalore

Dr. Tanaji Kudre

- Expert Member, Slaughter House and Meat Industry Sectional committee (FAD 18) under the Bureau of Indian Standards (BIS), India
- Member, Codex committee for Seafood

Dr. Mukesh Kapoor

- Member, FAD 31, Food Microbiology Sectional Committee, BIS, Ministry of Consumer Affairs, Food & Public Distribution, Government of India, New Delhi
- Member, FAD14, Drinking Water and Carbonated Beverages Sectional Committee, BIS, Ministry of Consumer Affairs, Food & Public Distribution, Government of India, New Delhi

Dr. Poornima Priyadarshini

- ANRF – Task force Panel member (Project review)

Dr. Nandini CD

- Member, Sugar Industry Sectional Committee, FAD 2, BIS

Dr. Vijayraj P

- Member, FSSAI Scientific Panel on Oils and Fats (SP-15)

Dr. Ezil Vendan S

- Member, Research Advisory Committee, Thiagarajar College, Madurai

Mrs. Vanajakshi V

- Alternate Member, Technical Committee, BIS, FAD 14, Drinking water and carbonated beverages Sectional Committee
- Alternate Member, Technical Committee, BIS, FAD 30, Water purification systems Sectional Committee
- Member/Convener, Working group of experts in field of microbiological examination of water for preparation of revised draft for IS 1622 in CHD 36/BIS
- Member, Content Development Committee (CDC) for Capacity Building of the industry on Product specification

Mr. Arunakumar

- Member, BIS, FAD 8, Drinking water and carbonated beverages Sectional Committee

Dr. Dinesha BL

- External Member, BOS, B.Sc. Food Technology, Vijayanagara Sri Krishnadevaraya University (VSKU), Bellary, Karnataka.

Srinivasulu Korra

- Member, BOS, Food Science and Technology, Veeranari Chakali Ilamma Women's University (VCIWC) Koti, Hyderabad

h) Best Research Papers / Posters Award

- Shivani Tripathi, Gnanesh Kumar B.S., Lincy, Pushpa S. Murthy, Cello-oligosaccharides from coffee husk a new generation prebiotic, National Seminar on Microbiome, Nutrition and Health, Emerging Research and Clinical Applications, Trirunapalli, Tamil Nadu, September 26-27, 2024

- Akansha Dalal, Shruti Joshi, Exploring the potential of buckwheat starch residue for various applications. International conference on food processing for the future: Sustainable solutions for quality and safety in global food system IFPFS-2024, Graphic Era, Deemed to be University, Dehradun, Uttarakhand, October 18-19, 2024

- Shikku P., Pushpa S. Murthy, Levering All Spice leaf oil: organic approach to sustainable food preservation, IISF, IIT Guwahati, Assam, November 30 - December 3, 2024

- Pramod Kumar P., Harish Prashanth K.V., Development of self-assembled low molecular weight chitosan-bilobalide micro-suspension for management of Alzheimer's disease: A preclinical evidence, CARBO-XXXVIII: International Conference on "Recent Advances in Glycoscience and Glycotechnology" being jointly organized by the Department of Bioengineering and Technology, Guwahati University, Guwahati, Assam, and the Association of Carbohydrate Chemists & Technologists (India), December 4-6, 2024

- Aishwarya Praveen, Naresh K.S., Sachin R. Chaudhari, NMR Spectroscopy for Quality Analysis and Profiling of Curcuminoids in Turmeric, National Symposium on Spices and Aromatic Crops (SYMSAC XI) – *Strategies for Smart Production, Product Diversification, and Utilization*, ICAR–Indian Institute of Spices Research (IISR), Calicut, Kerala, January 7-9, 2025 (*Best Oral Presentation*)

- Amalraj R., Meeran S.M., Dietary green tea polyphenols-altered gut homeostasis attenuates metabolic crisis in TNBC through epigenetic modulations, DST-ANRF sponsored conference on Innovative Strategies for Advancing Biomedical Research (NCISABR), Dayananda Sagar University, Bangalore, January 15-17, 2025

- Nikil D., Epparti P., Shym R.G., Halami P.M., Microencapsulation of probiotics and dragon fruit bioactive in biopolymeric matrices under food engineering and rheology theme, at the International Conference on Recent advances in food science and technology: A way forward organized by DSLD CHEFT, Devihososur-Haveri, January 22-24, 2025

- Veeranna Hitlamani, Inamdar A.A., Reduction of arylamide formation in wheat based products by selecting the roller flour mill fractions at International Conference on Advance in Chemical and Physical Science, Organized by Department of Science, Amrita Vishwa Vidyapeetham, Mysuru Campus, January 23-24, 2025

- Gomathy K., Seema Kumari, Artificial intelligence based classification for post-harvest waste management of onions during storage, National conference on digital technologies for transforming the horticulture sector, IARI, New Delhi, January 28-30, 2025

- Sachin P Shinde, Suraj P., Sachin R. Chaudhari, Rajeshwar S. Matche, Development of Freshness Keeper Paper to Enhance Vase Life of Flowers, National-level food hackathon organised by BioNest Incubation Centre, CSIR-CFTRI and Siddaganga Incubation Foundation, Mysore, February 27-28, 2025

National Conference on Trends in Multi disciplinary Research: Challenges and Applications, organised by M S Ramaiah College of Arts, Science and Commerce-Autonomous, Bengaluru, in collaboration with Department of Biotechnology, GOI and Microbiologists Society on May 15-16, 2024

- Navneeth V.P., Epparti P., Halami P.M., Synbiotic Fortified Barnyard Millet Based Functional Beverage,

- Epparti P., Halami P.M., Oral presentation on Evidences that B. subtilis SC3.7 produces sublichenin and subtilosin type of lantibiotcs

National Seminar on Emerging Trends in Food Processing Technologies for Food Security and Safety by AFST(I) Hyderabad Chapter on July 20, 2024

- Akkara Clara, Joseph Raju P., Narsing Rao G., Srinivasulu K., Sridhar Rachakonda, Madhusudhan Rao D., Development and evaluation of browntop millet cookies with sugar and palm jaggery as sweetener - A comparative study

- Preethi Joy, Vijayendra S.V.N., Nagender A., Srinivasulu K., Madhusudan Rao D., Sridhar Rachakonda, Development of protein rich millet based vermicelli by using defatted sesame seed cake

18th International Conference on Trace elements in man and animals, organized by Pennsylvania State University, USA and the Ramaiah Group of Institutions, held at Ramaiah Group of Institutions, Bengaluru, November 8-12, 2024

- Haritha P.K., Sreedhar R.V., Studies on biofortification and bioaccessibility of zinc and iron in wheatgrass

- Gopinath M., Phytoferritin from plant derived nanovesicles as a bioavailable source of iron to treat anemia

56th Annual National Conference, organized by The Nutrition Society of India (NSI) at Symbiosis International (Deemed University), Lavale, Pune, India, November 14-15, 2024

- Ch Saranya Tejaswi, Narsing Rao G., Sulochanamma G., Sathiya Mala K., Vijayendra S.V.N., Prabhakara Rao P.G., Sridhar Rachakonda, Protein Enriched Extruded Millet Snacks using Sesame (*Sesamum indicum* L.) Seed Cake

- Monvitha A.S.V., Sreedevi Mudumby, Nagender A., Srinivasulu K., Madhusudan Rao D., Prabhakara Rao P.G., Sridhar Rachakonda, Development of protein enriched millet noodles using sesame seed cake

30th ICFoST on "Food Safety, Standards, Security and Sustainability" organized by AFST(I) held at D.Y Patil Deemed To Be University, Navi Mumbai Centre of Excellence, Nerul, Navi Mumbai, December 19-21, 2024

- Veeranna Hitlamani, Inamdar A.A., Impact of different milling techniques on acrylamide formation in wheat based baked and fried products

- Suhasini, Asha Martin, Therapeutic implications of *Cucurbita maxima* (pumpkin) seeds for the management of PCOS: A rodent model study

- Atreyee Bal, Ayush Anand, Chakkaravarthi A., Sukumar Debnath, Navin Kumar Rastogi, Formulation of jelly candy with blue pea and hibiscus flower extracts as natural antioxidant and colourant

- Rani Amsaraj, Sarma M.V.R.K., Rapid detection of sunset yellow adulteration in tea powder with variable selection coupled to machine learning tools using spectral data

National Conference on 3SDGHS 2025 - Strategies and solution in achieving sustainable development goals through home science, at Avinashilingam Institute for Home Science, Coimbatore, TN organized by Avinashilingam Institute for Home Science and Higher Education for women in association with Home Science Association of India, January 22-23, 2025

- Manjula N., Mahendran D., Brundha A.R., Suresh P.V., Vanitha T., Development and characterization of protein-enriched chocolate bars using egg white hydrolysate

- Mahendiran D., Vanitha T., Prevalence and impact of dysphagia and malnutrition in the geriatric population,

International Conference on Futuristic Trends in Chemical Sciences, St. Xavier's College, Palayamkottai, February 20, 2025.

- Manikannan S., Anand A., Aswathi K.S., Vendan S.E., Thermal stability of carcinogenic benzoquinones: Secretion from *Tribolium castaneum* and its contamination risk in food flours.

- Ragul A., AnandA., Aswathi K.S., Vendan S.E., Green chemical extraction efficiency: A comparative analysis of physicochemical characteristics of phytochemicals with particle sizes of green gram flour

I) Editors / Editor-in-Chief /Co-Editor / Executive Editor / Associate Editors of reputed journals

Sl.No.	Name of the Staff	Role	Journal / Publisher
1	Dr. Giridhar P	Associate Editor	3 Biotech, Springer
2	Dr. Umesh Hebbar H	Editor	Journal of Food Science and Technology, AFST(I), Mysore, Springer
3	Dr. Vijayendra SVN	Editor	Journal of Food Science and Technology, AFST(I), Mysore, Springer
4	Dr. Negi PS	Associate Editor	BMC Complementary Medicine and Therapies, BMC, Part of Springer Nature, New York, USA
5	Dr. Aashitosh A Inamdar	Editor	Journal of Food Science and Technology, Springer

Sl.No.	Name of the Staff	Role	Journal / Publisher
6	Dr. Nandini P Shetty	Editor	Journal of Food Science & Technology
7	Dr. Syed Musthapa M	Review Editor	Frontiers in Medicine, Frontiers
		Editor	Non-coding RNA Research, Elsevier
8	Dr. Rajashekar Y	Associate Editor	Chemical & Biological Technologies in Agriculture, Springer Nature
9	Dr. Ezil Vendan S	Academic Editor	PLOS ONE Journal, PLOS

j) Editorial and Advisory Boards

Sl.No.	Name	Journal / Publisher
1	Mr. Matche RS	• Methodox, Elsevier • Indian Journal of Nutrition, Open Science Publications, Hyderabad • International Journal of Food Science and Nutrition, Engineering, Scientific & Academic Publishing Co., Rosemead, CA, 91731, USA • International Journal of Agriculture Food Science & Technology (IJAFST), Research India Publications, Delhi • International Journal of Knowledge Management and Information Technology (IJKMIT), Research India Publications, Delhi • Indian Journal of Nutrition, Open Science Publications Hyderabad
2	Dr. Negi PS	• Journal of Food Science, IFT, Chicago, USA • Science Reporter, Springer Nature
3	Dr. Suresh Kumar G	• Nutrition and Food Science Technology, Frontiers
4	Dr. Gangapur DR	• Journal of Innovative Agriculture, Cornous Publications LLP

Sl.No.	Name	Journal / Publisher
5	Dr. Syed Musthapa M	• Indian Journal of Natural Products and Resources (IJNPR), CSIR-NIScPR, India
6	Dr. Rajashekar Y	• Hexapoda, The Entomological Society of India
7	Dr. Ezil Vendan S	• Scientific Reports, Nature • Discover Agriculture, Springer
8	Dr. Kunal Sharan	• Nature Scientific Reports, Springer Nature

j) Awards and Certificates to Institute

- CSIR-CFTRI was certified as **"Eat Right Campus"** as per guidelines established by Food Safety and Standard Authority of India (FSSAI) for the period of May 6, 2024 to May 5, 2026
- CSIR-CFTRI Main Mansion Garden awarded 1st Prize in Mysuru Dasara 2024 Ornamental Gardens"contest


ಫಲಪುಷ್ಪ ಪ್ರದರ್ಶನ 2024
ತೋಟಗಾರಿಕೆ ಇಲಾಖೆ, ಜಿಲ್ಲಾ ಪಂಚಾಯತ್, ಮೈಸೂರು
ಜಿಲ್ಲಾ ತೋಟಗಾರಿಕೆ ಸಂಘ (ರಿ)., ಕರ್ಜನ್ ಪಾರ್ಕ್, ಮೈಸೂರು
ಪ್ರಶಸ್ತಿ ಪತ್ರ
ಶ್ರೀಮತಿ/ಶ್ರೀ DIRECTOR, CISR - CFTRI, Mysore.
ಅವರು ದಿನಾಂಕ 03-10-2024 ರಿಂದ 12-10-2024 ರವರೆಗೆ ನಡೆದ ದಸರಾ ಫಲಪುಷ್ಪ ಪ್ರದರ್ಶನದ
ಸ್ಪರ್ಧೆಯಲ್ಲಿ ಭಾಗವಹಿಸಿ ಕೆಳಕಂಡ ಬಹುಮಾನಗಳನ್ನು ಪಡೆದಿರುತ್ತಾರೆ.
1 ಪ್ರಥಮ
2
3
ಶ್ರೀಮತಿ ಗಾಯತ್ರಿ ಕೆ.ಎಂ. ಐ.ಎ.ಎಸ್
ಅಧ್ಯಕ್ಷರು, ಜಿಲ್ಲಾ ತೋಟಗಾರಿಕೆ ಸಂಘ (ರಿ)
ಹಾಗೂ ಮುಖ್ಯಕಾರ್ಯನಿರ್ವಾಹಕ ಅಧಿಕಾರಿಗಳು
ಜಿಲ್ಲಾ ಪಂಚಾಯತ್, ಮೈಸೂರು.
ಡಾ. ಡಿ. ಪ್ರಭಾಮಂಡಲ್
ಉಪಾಧ್ಯಕ್ಷರು
ಜಿಲ್ಲಾ ತೋಟಗಾರಿಕೆ ಸಂಘ (ರಿ)
ಮೈಸೂರು
ಶ್ರೀಮತಿ ಹಬೀಬಾ ನಿಶಾತ್
ಪದನಿಮಿತ್ತ ಕಾರ್ಯದರ್ಶಿ
ಜಿಲ್ಲಾ ತೋಟಗಾರಿಕೆ ಸಂಘ (ರಿ)., ಹಾಗೂ
ಹಿರಿಯ ಸಹಾಯಕ ತೋಟಗಾರಿಕೆ ನಿರ್ದೇಶಕರು
ರಾಜ್ಯಪಲಯ, ಮೈಸೂರು

k) CSIR-CFTRI Annual Recognitions under various categories to the staff for their meritorious / outstanding contribution during 2023-24

Sl.No.	Name of the Recognition	Name of the Awardee
1	Best Contribution for General Administration	**Shri Ramesh S** Assistant Section Officer
2	Best Contribution for Finance	**Shri Anil Kumar** Finance and Accounts Officer
3	Best Contribution for Stores & Purchase	**Shri Lakshmi Nath Thakur** Section Officer
4	Best Research Paper Published by the Staff (Basic Science)	Geetha V., Chathur K.N., Smitha Ramkumar, Prakash M. Halami, **Suresh Kumar G.** *In vitro* fermentation of glycosaminoglycans from mackerel fish waste and its role in modulating the antioxidant status and gut microbiota of high fat diet-fed C57BL/6 mice, *Food & Function*, 2023,14(15), 7130-7145
5	Best Research Paper Published by the Staff (Applied Science)	Bhavana B.K., Sandeep N. Mudliar, **Sukumar Debnath**. Life cycle assessment of fermentative xylitol production from wheat bran: A comparative evaluation of sulphuric acid and chemical-free wet air oxidation-based pretreatment, *J. Cleaner Production*, 2023, 423, 138666
6	Best Student Recognition for M.Sc. (Food Technology)	**Ms. Sandra Rose Wilson**
7	Best Student Recognition for ISMT	**Mr. Madhusudhan V**
8	Best Student Recognition for Research Fellows	**Mr. Subhash V. Pawde**, SRF, Department of Flour Milling, Baking & Confectionery Technology
9	Best Technology Transferred to Industry	**Dr. Suresh D Sakhare, Dr. Aashitosh A Inamdar, Dr. Usha Dharmaraj, Shri Sudhir G Walde, Shri Rajeshwar S Matche, Shri Basavaraj Mundalamani, Shri Sathyendra Rao B.V.** Technologies for development of millet and multi millet semolina and instant mixes

Sl.No.	Name of the Recognition	Name of the Awardee
10	Best Department for Contribution towards Technologies, ECF, Patents, Processes and any other Outstanding R&D Achievements	**Department of Microbiology & Fermentation Technology**
11	Best Support Department	**Department of Planning, Monitoring & Coordination**
12	Best Technical Support (Gr. II)	**Shri Umesha B.A.** Department of Grain Science & Technology **Shri Hemaraju R** Department of Engineering & Mechanical Maintenance
13	Best Technical Support (C(NT))	**Shri Subbaraya N** Department of Food Protectants & Infestation Control
14	Individual Scientific & Technical Contributions (Gr. IV from R&D Departments)	**Dr. Suresh D. Sakhare** Department of Flour Milling, Baking & Confectionery Technology
15	Individual Scientific & Technical Contributions (Gr. III from R&D Departments)	**Dr. Ashwath Kumar K** Department of Flour Milling, Baking & Confectionery Technology
16	Individual Scientific & Technical Contributions (Gr. IV Support Departments)	**Shri Raghunandanan M.V.** Department of Planning, Monitoring & Coordination
17	Individual Scientific & Technical Contributions (Gr. III from Support Departments)	**Shri Vatcharavelu K** Department of Central Instruments Facility & Services **Shri Narayanan K** Department of Engineering & Mechanical Maintenance
18	Individual Maximum ECF contribution as PIs / Co-PIs (2021-22, 2022-23 & 2023-24)	**Dr. Vikas Singh Chauhan** Department of Plant Cell Biotechnology

I) Other Awards

Dr. Pushpa S. Murthy, Senior Principal Scientist & Head, Plantation Products, Spices and Flavour Technology (PPSFT) Department, CSIR-CFTRI, was awarded with coveted Dr. Kalpana Chawla Young Women Scientist State Award 2022, instituted by Government of Karnataka. This award is in recognition of her outstanding contribution in the field of Science and Technology, which includes a cash prize of Rs.1,00,000, memento and citation. She received the award from Shri Siddaramaiah, Hon'ble Chief Minister of Karnataka in presence of Shri N.S. Bose Raju, Hon'ble Minister for Minor Irrigation, Science and Technology, Govt. of Karnataka, and other dignitaries. Bharat Ratna Professor C.N.R. Rao, Linus Pauling Research Professor, Honorary President, JNCASR was the Chief Guest at award presentation function which was held at J.N. Tata Auditorium, Indian Institute of Science campus, Bengaluru on Thursday September 26, 2024. Prof. Govindan Rangarajan, Director, Indian Institute of Science and Sri A.S. Kiran Kumar, Chairman, Awards Selection Committee and Former Chairman, ISRO were the Guest of Honour for this function.



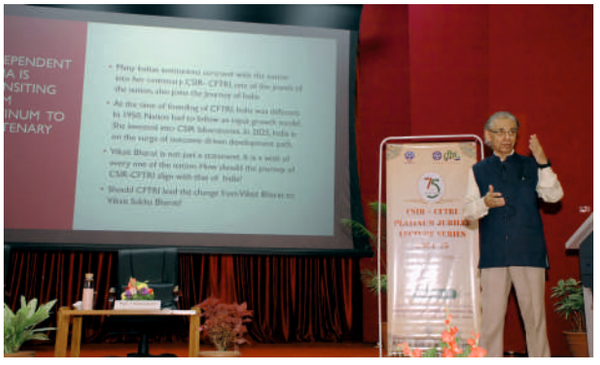
18. Prominent Visitors & Lectures

Sl. No.	Distinguished Visitors	Title of the Lecture	Date
1	**Dr. C. Anandharamakrishnan** Director, CSIR-NIIST, Thiruvananthapuram	My Fascination with Science: A Transformative Journey	September 9, 2024
2	**Prof. Arun Kumar Bhunia** Professor, Microbial Pathogenesis and Food Microbiology, Purdue University, USA	Microbes as Medicine: Leaky Gut Repairing Strategies	November 19, 2024
3	**Dr. Yelloji-Rao Mirajkar** International Convener, Global Indian Scientists & Technocrats Forum, USA	Aahar Kranti: Uttam Aahar Uttam Vichar	December 10, 2024
4	**Dr. Rajeswaran Jagadeesan** Senior Scientist, Queensland Department of Primary Industries (QDPI) & Adjunct Research Fellow, University of Queensland , Australia	Managing genetic resistance to insecticides: A multidisciplinary approach ensuring food sustainability and market access	December 19, 2024
5	**Smt. S. Anuradha** Advocate, Mysore	Prevention of Sexual Harassment (POSH) at Work Place	December 26, 2024

19. CSIR-CFTRI Platinum Jubilee Lecture Series

The CSIR-CFTRI Platinum Jubilee Lecture Series (2024–25) is a prestigious knowledge-sharing initiative launched to commemorate 75 years of excellence in food science and technology by CSIR-Central Food Technological Research Institute, Mysuru. As a part of this milestone celebration, the lecture series brings together eminent scientists, researchers, and thought leaders from across the CSIR network and beyond to share their experiences, insights, and pioneering contributions. The series aims to foster a spirit of scientific collaboration, inspire young researchers, and highlight the role of science and technology in addressing national and global challenges in food and nutrition. Following are the details of Platinum Jubilee lecture during 2024-25.

Sl. No.	Date	Name of the Delegate	Title of the talk
1	28.02.2025	**Prof. T. Ramasami** Distinguished Professor of Eminence, Secretary, DST (2006–14), Director, CSIR-CLRI, Chennai (1996–2006), SS Bhatnagar Award (1993) Padma Shri (2001), Padma Bhushan (2014)	A well-wisher peep into the centenary of CFTRI
2	26.03.2025	**Dr. Rakesh Mishra** Director, Tata Institute for Genetics and Society (TIGS) & Former Director, CSIR-CCMB	Genome Technologies for One Health: Novel therapeutics to Nutritional Security



Inauguration of Platinum Jubilee Lecture Series and National Science Day by Prof. T. Ramasami, Distinguished Professor of Eminence, Secretary, DST, Former Director, CSIR-CLRI, Chennai



Dr. Rakesh Mishra, Director, Tata Institute for Genetics and Society (TIGS) & Former Director, CSIR-CCMB delivering the Platinum Jubilee Lecture

20. Distinguished Visitors to the Institute

- Delegation from Australian Consulate-General, Bengaluru headed by Ms. Hilary McGeachy, Consul General; Mr. Andrew Collister, Consul & Ms. Steffi Cherian, Strategic Communication & Public Diplomacy Officer visited CSIR-CFTRI on June 19, 2024. The team interacted with scientific staff for exploring collaborations in the areas of Agro-Food Processing Technologies, Infestation control, Food Security and HRD activities. The team also visited some of the facilities in the campus such as CSIR-CFTRI Showcase and Millet Showcase.



- Shri Hari Ranjan Rao, Additional Secretary, Prime Minister's Office (PMO), Govt. of India, New Delhi visited CSIR-CFTRI on July 12, 2024. He interacted with Director and Scientists and also visited some of the facilities of the Institute.



- Netherlands Delegation consisting of Dr. Dhoya Snijders, Innovations Counsellor from Netherlands Embassy in New Delhi and Dr. Nutan, Senior Innovation Advisor, Netherlands Innovation Network India, Bengaluru visited the CSIR-CFTRI on September 20, 2024 and interacted with scientific staff pertaining to Indo-Netherlands cooperation strategies, HRD activities, Food protection & Technologies.



- Shri. M.J. Dinesh, Chairman, Coffee Board of India, Ministry of Commerce and Industry, Government of India visited the Institute on September 30, 2024. He interacted with scientific staff pertaining to technologies



related to coffee and allied sectors developed by CSIR-CFTRI and also visited Centre for Excellence related to coffee under PMFME scheme and other facilities available at the Institute.

- Prof. K. Sandeep Prabhu, Department Head and Professor of Immunology and Molecular Toxicology Department of Veterinary and Biomedical Sciences, The Pennsylvania State University, USA along with 50 International Delegates (comprising of highly distinguished scientists and academic scholars) working in molecular nutrition and medical sciences visited CSIR-CFTRI and its facilities on November 11, 2024. The visit was part of International Conference on Trace Elements in Man and Animals (TEMA)-18 held during November 8-12, 2024 at Bengaluru jointly organised by Pennsylvania State University, USA, Ramaiah Group of Institutions, Bangalore and co-partnered by CSIR-CFTRI.



- Poland delegation consisting of Prof. Dr. Hab. Karolina Pawlak, The Vice-Rector; Dr. Hab. Maciej Kuligowski, The Vice-Dean; and Prof. Dr. Hab. Joanna Kobus-Cisowska, Department of Gastronomy Science and Functional Foods, Faculty of Food Science and Nutrition, Poznan University of Life Sciences, Poznan, Poland visited CSIR-CFTRI and its facilities on January 6, 2025 and interacted with Director and Scientists about HRD activities, students exchange programmes and collaborative research on post harvest technologies and value added products from ginger.



- University College Dublin (UCD), Ireland Delegation consisting of Prof. Colm O'Donnell, Professor, School of Biosystems & Food Engineering, UCD along with Dr. Surabhi Joshi, Director of South Asia, UCD visited CSIR-CFTRI and its facilities on February 14, 2025 and interacted with Director and Scientists to discuss about HRD activities, students exchange programmes and collaborative research on Food Process Engineering.

- Coca-Cola Research & Development at Atlanta, USA delegation consisting of Dr. Prashanthi Jella, Vice-President, Flavour and Ingredient Research, R&D; Dr. Fernanda Martins, Senior Director, Functional Ingredients, R&D along with Dr. Rajendra Dobriyal, Senior Director - Scientific & Regulatory Affairs, Coca-Cola, India and South West Asia, Gurugaon visited CSIR-CFTRI on February 24, 2025 and interacted with Scientists for further possible

collaborative research projects in the research areas related to traditional foods, ayurveda, functional genomics and bioinformatics, pilot plant capabilities and also visited the facilities of the Institute.



- Dr. Dinesh Arora, Alumnus of M.Sc. Food Technology (1974-76 Batch), Principal Engineer & Scientist, Bio Manufacturing, Renewables, Sustainability, League City, Texas, USA visited CSIR-CFTRI on March 4, 2025 and interacted with M.Sc. students and researchers and shared the experiences and future trends in Food Technology.

- Dr. Srikanth, Dy. Director General, Central Council for Research in Ayurvedic Sciences (CCRAS), Ministry of Ayush, Govt. of India, New Delhi and his team along with Dr. Sulochana Bhat, In-charge, Central Ayurveda Research Institute, Bangalore and her Team visited CSIR-CFTRI on March 18, 2025 and interacted with Director and Scientists for a collaborative project on 'Role of Millets in Diabetes' and also visited the facilities of the Institute.



- The Tamil Chamber of Commerce (TCC) delegation of 12 members led by Mr. Chozha Naachiar Rajasekar, President of TCC, Chennai visited CSIR-CFTRI on March 24, 2025 and interacted with Scientists in terms of technologies, entrepreneurship and development.

21. Visits and Deputation Abroad

Sl. No.	Name of the Staff / Designation	Reason for Visit	Deputation Period
1	**Dr. Mahejibin Khan** Senior Scientist	To avail long term ICMR-DHR International Fellowship for Young Indian Bio-Medical Scientists-2023-24 for the period of 10 months with Dr. Lavanya Reddivari, Department of Food Science, Purdue University, Lafayette, Indiana, USA	24-06-2024 to 29-04-2025

Sl. No.	Name of the Staff / Designation	Reason for Visit	Deputation Period
2	**Dr. Suresh D Sakhare** Senior Principal Scientist	To visit Iowa State University (ISU), USA to work as visiting scholar	01-09-2024 to 31-12-2024 (Sabbatical Leave)
3	**Dr. Prabhasankar P** Chief Scientist **Dr. Inamdar AA** Senior Principal Scientist	To visit Nigeria to impart specialized training to the staff of M/s First Blends Ltd., Nigeria on wheat laboratory milling, flour quality and pasta manufacturing as part of implementation of Industrial Consultancy Project	09-09-2024 to 13-09-2024
4	**Dr. Umesh Hebbar H** Chief Scientist **Dr. Negi PS** Chief Scientist **Dr. Inamdar AA** Senior Principal Scientist	To visit Nepal in order to assess the requirements, engage with key stakeholders, and carry out preliminary groundwork in alignment with the proposal to establish the Agro-Industrial Park in Nepal	13-11-2024 to 15-11-2024
5	**Shri Rajeshwar S Matche** Chief Scientist	To visit USA for attending meeting of ISO/TC 61 plastics, its Sub committee's and working group at West Conshohocken, USA	18-11-2024 to 22-11-2024
6	**Dr. Sarma MVRK** Principal Scientist	To avail Raman Research Fellowship for the year 2024-2025 to carry out research on "Repurposing of peroxisome for synthesis of terpenoids in *S.cerevisiae*" under the guidance of Prof. Irina Borodine, Professor, Novo Nordisk Foundation Center for Biosustainability, Yeast Metabolic Engineering, Denmark Microbes Initiative, Lyngby, Denmark	20-01-2025 to 18.03.2025

22. Participation in Exhibition

- **CMPL Expo 2024:** Organised by Jio World Convention Centre, Mumbai, May 16, 2024
- **Govt. Schemes Expo:** Organised by NSS Media, Govt of India, New Delhi, July 20-24, 2024
- **Unlocking Opportunities for Business Ecosystem in Kodagu District, Gonikoppa:** Organised by Hindu Economic Forum, Gonikoppa in association with Laghu Udyog Bharat, Kodagu District, Gonikoppa, Aug. 3, 2024

- **Global Bio-India 2024:** Organised by Department of Biotechnology (DBT), Ministry of Science & Technology, Government of India, along with its Public Sector Undertaking, Biotechnology Industry Research Assistance Council (BIRAC), Pragati Maidan, New Delhi, Sept. 12-14, 2024

- **Propak India 2024:** Organised by ProPak and FI India at BIEC Bengaluru, Sept. 25-27, 2024

- **World Food India-2024:** Organised by Ministry of Food Processing Industries and Federation of Indian Chambers of Commerce and Industry (FICCI) at Pragati Maidan, New Delhi, Sept. 19-22, 2024

- **CSIR Foundation Day celebration and Thematic Exhibition:** Organised by CSIR, New Delhi, Sept. 26-29, 2024

- **60th CSIR-IITR Foundation Day:** Organised by IITR, Lucknow, exhibited the major technologies of CSIR-CFTRI on the occasion of 60th CSIR-IITR Foundation Day Function at IITR, Lucknow during Nov. 4-5, 2024

- **India International Science Festival 2024:** Organised by CSIR (Ministry of Science & Tech, Ministry of Earth Science, Vijnana Bharathi), IIT Guwahati, Nov. 30-Dec. 3, 2024

- **87th Akhila Bharata Kannada Sahitya Sammelana:** Organised by Government of Karnataka, Mandya, Karnataka, Dec. 20- 22, 2024

- **Regional Official Language Conference of South and South-West Region:** Organised by The Department of Official Language, Ministry of Home Affairs, Government of India, KSOU Mysuru, Jan. 4, 2025

- **International Conference on Millet Fusion:** Cultivating Sustainability, Nourishing Nations Beyond 2024: Organised by Amity University, Uttar Pradesh, Noida, Jan. 22-24, 2025 (Received Best Exhibitor Award)

- **International Trade Fair on Millets and Organics 2025:** Organised by Government of Karnataka, Tripuravasini palace grounds, Bengaluru, Jan. 23-25, 2025



World Food India-2024 held at New Delhi



CSIR Foundation Day celebration and Thematic Exhibition held at New Delhi

- **Kisan Mela:** Organised by CSIR-CIMAP, Lucknow, Jan. 30-31, 2025

- **First Industry Academia Meet & International Conference on Trends and Innovations in Science & Engineering (TISE CON 2025):** Organised by Integral University, Lucknow, Feb. 20-22, 2025

- **FPO Mela:** Organised by COEFPO, Dept of Horticulture, Govt. of Karnataka, Bengaluru, Feb. 28 - Mar. 2, 2025

- **Mysuru Akasavani 90-Nudi Nada Sangama:** Organised by Prasara Bharathi, Government of India at Akashavani Mysuru, Mysuru, Mar. 7, 2025



International Trade Fair on Millets and Organics 2025 held at Bengaluru



India International Science Festival 2024 held at New Delhi



Mysuru Akasavani 90-Nudi Nada sangam held at Mysuru



International Conference on Millet Fusion: Cultivating Sustainability, Nourishing Nations Beyond 2024 held at Noida



CSIR-IITR Foundation Day Function at IITR, Lucknow

Societal Programmes

I. Facilities for the Benefit of Society at Large

a) Common Incubation Centre (CIC)

CSIR-Central Food Technological Research Institute has established a Common Incubation Centre (CIC) in its premises in Mysuru, with an outlay of around Rs. 200 lakh. The CIC has been established under Pradhan Mantri Formalization of Micro Food Enterprises (PMFME) scheme, funded by Ministry of Food Processing Industries, Government of India, with Karnataka Agriculture Produces Processing and Export Corporation Limited (KAPPEC), Bengaluru as the State Nodal Agency for implementation of PMFME scheme in the State of Karnataka. Since, Banana and Coffee have been identified as products under One District One Product (ODOP) theme for Mysuru and Kodagu districts, respectively, two dedicated processing lines have been established with a Common Laboratory for testing. The banana processing line has a capacity of handling nearly 2.5 MT of banana while that of Coffee processing line is around 1.0 MT of Coffee per day. The Banana & Coffee processing lines have array of equipments for the production of several products that have good market potential. Banana based products such as banana puree, raw banana slice, raw banana powder, banana fig, etc., could be produced in this facility, while Green Coffee powder & extract, Roasted Coffee bean & powder, Coffee extract & concentrate are some the products that could be handled using coffee processing line equipments. A common testing facility is also established under this scheme for carrying out simple analysis of raw materials, ingredients used and products developed in CIC.

As per the guidelines of the scheme, units of CIC are being operated by Operation & Management Agencies. The Joint Venture of M/s. Bhoomi Basket and M/s. Abhaya Natural Food Processing Unit, Mysuru and M/s. Pradhaan Associates, Mysuru are the agencies identified for Banana and Coffee processing, respectively. The following two firms have been selected as O&M agency for Banana and Coffee based units, respectively. M/s. Bhoomi Basket Company is working with farmers and primary food processing from last ten years. And they have experience of setting up weekly farmers' market and running Organic stores in Mysore and Bangalore. And also working with seven Farmers Producers Companies having around 500 farmers. Currently, the O & M agencies are processing Banana & Coffee beans to produce various value added products.





b) Centre of Excellence on Millets (COEMIC)

Centre of Excellence on Millets (COEMIC) is a state-of-the-art facility created to benefit farmers and consumers by strengthening the production of millets. This facility has been created with the funding from Directorate of Agriculture, Government of Karnataka through the RKVY scheme.

The nutritious and sustainable grain gaining global recognition, and with support from the State Government, the centre is designed to bolster India's role in the global millet market. The centre will serve as a hub for research, development, and entrepreneurship. It's equipped with advanced technology and will provide expert support to help startups and small businesses create innovative millet-based products. The goal is to improve processing techniques and add value to millet products, making them more popular and accessible to a wider market. By bringing together entrepreneurs, researchers, and industry experts, the centre aims to drive advancements in millet technology and commercialization. This initiative supports India's commitment to food security and sustainable agriculture while also helping to revive traditional grains and support the farmers who grow them. The centre is poised to strengthen India's role as a global leader in millet production and innovation, paving the way for a "millet revolution."

The processing lines, its usage and capacity which is available on COEMIC are as follows:

i. Minor Millet processing line

Use: Primary processing (dehusking and polishing) of Minor Millets

Capacity: 2000 kg/day



ii. Sorghum / pearl millet processing line

Use: Primary processing and pulverizing of Sorghum / pearl Millets

Capacity: 2000 kg/day



iii. Ragi processing line

Use: Primary processing and decortication of Finger Millet (Ragi)

Capacity: 500 kg/day

iv. Roller flour Mill

Use: Primary processing and Milling of Millets

Capacity: 3000 kg/day



v. Flaking line
Use: Flaking and drying
Capacity: 200 kg/day

vi. Extruder line
Use: Extrusion and coating
Capacity: 100 kg/day

vii. Baking line
Use: Planetary and spiral mixer, bread sheeter & moulder, proofing chamber, rotary & deck Oven baking and bread slicer
Capacity: 30 kg / day

With the aim to enhance awareness and accessibility of the COEMIC facilities located at CSIR-CFTRI, Mysuru among the local public, small-scale millet-based enterprises, entrepreneurs, and Self-Help Groups (SHGs); the Institute extended the utilization of these facilities on a nominal pay-and-use basis.

c) BIRAC BioNEST

The BIRAC- BioNEST incubator facility at CSIR-CFTRI is designed to nurture entrepreneurial talent in food bioprocessing and biotechnology research. BioNEST has signed MoU's with three incubation centres. These incubation centres will collaborate, and coordinate to support the startup ecosystem in specific domains of food biotechnology, functional foods, bio-manufacturing, and other allied domains. They will also actively engage in organizing joint workshops/events. The incubation centres with whom the MoUs were signed are as follows:

- Atal Incubation Centre (AIC)- Central Coffee Research Institute, Bangalore
- Bootstrappers Research Council (BRC) by SRM Institute of Science and Technology, Chennai
- Siddganga Institute of Technology, TBI, Tumkuru

BioNEST has boarded following start-ups namely:

1. **Ninigey:** They are an urban youth-focused food-tech start-up founded by a group of passionate entrepreneurs committed to bring new and innovative food offerings. Their mission is to develop nutritious, delicious, and shelf-stable food products that seamlessly integrate into the daily lives of consumers, enhancing their food experience with convenience and variety. They are currently focused on developing a Ready-To-Eat Sandwich Filler using Retort Processing Technology
2. **Terraforms Innovation Pvt. Ltd.:** They are a start-up company that focuses on a line of beverages made with upcycled food that would otherwise be trashed. They aim to develop nutritious and healthy drinks using avocado. They are passionate about sustainability and creating a beverage that alleviates food waste.
3. **Sugarcane Innovation Pvt Ltd.:** The company focuses on Sugar Can formula technology. Their innovative additive can be incorporated into high-sugar, high-calorie beverages and foods. Sugar Can formula intends to lower the Glycemic Index (GI) of these products and helps reduce the rate at which sugar is absorbed into the bloodstream.
4. **Abhaya Foods Pvt Ltd.:** They aim to develop a range of coconut-related products including ready-to-drink fruit blended carbonated beverage of matured coconut water obtained from VCO process. Other products include ice creams, desserts and milkshakes.
5. **Iniya Bioprobes Pvt Ltd.:** It is dedicated to the sustainable production of natural

pigments derived from microbial sources like microalgae, fungi, and bacteria. Targeting the food, cosmetics, pharmaceutical, and textile industries, they offer eco-friendly alternatives to synthetic dyes. They have a strong commitment to environmental stewardship and product safety, Iniya Bio probes caters to meet the growing demand for sustainable and natural products through CRISPR technology

6. **One gram Pvt Ltd.:** The company aims to produce Germinated Brown Rice (GBR) by utilizing optimal germination techniques so as to maximize the yield of GABA and ensure a low GI product.

II. Skill Development Programmes

CSIR-CFTRI has been conducting various Skill Development Programs and Short Term Courses under various streams targeted to different segments of the society. This includes training to prospective entrepreneurs & entrepreneurial aspirants, Farmers/FPOs, SHGs and industry professionals for a duration spanning 3 days to 5 weeks. These courses are of short duration, but intensive and packed with lectures and demonstrations. The faculty members for the courses have vast experience in specific areas of Food Science and Technology. The demonstrations and practical classes are conducted in the state-of-the-art laboratories and pilot plants of CSIR-CFTRI. The Institute is being identified as a Technical Institute by the Govt. of Karnataka for the implementation of PMFME scheme, training programs are being conducted for Farmers/ FPOs and prospective entrepreneurs. Also, innovative and empowering workshops (Farmer Centric Activities) for the benefit of Farmer Producer Organizations (FPOs), Officials from Horticulture / Agriculture departments of various State governments are organized regularly for a shorter duration (2-3 days) which include Theory, Demonstrations and Hands-on-sessions. Altogether, CSIR-CFTRI has trained 1791 personnel in 2024-25 under various training streams which includes 1065 participants under CSIR Integrated Skill Initiative.

Program Category	No. of Programmes	No. of Participants
● Short Term Courses / Skill Development Programmes	51	1065
● Dissertation	-	311
● Summer Interns	-	133
● 12 months Residential Program in Flour Milling Technology at International School of Milling Technology, Mysuru	1	17
● PMFME Scheme	4	265
	Total	**1791**

Highlights of some of the training programs:

i) Two batches of the popular 15-days training program on "Fumigation, Prophylaxis and Pest Management Techniques for Stored Food Commodities" were organized at CSIR-CFTRI, Mysuru during 31-05-2024 to 14-06-2024 and 22-11-2024 to 06-12-2024. Total of 83 participants attended these programs. The training program covered all the topics related to infestation control for stored food products, modern instrumentation techniques for pesticide residue analysis, demonstrations and field visits to industry as well as FCI warehouses arranged in connection with the training program.

ii) Basics in Flour Milling and quality evaluation of flour was organized at CSIR-CFTRI during 5th to 9th August 2024 with14 participants. The training program covered topics related to wheat quality and grading, flour mill machineries, principles of wheat cleaning, wheat cleaning & conditioning flow sheet, mill control & management, flour constituents, energy management, audit and its conservation in roller flour mill and atta (whole wheat flour) milling.

iii) Special training programs arranged for the personnel from Tirumala Tirupati Devasthanam, Tirupati, Andhra Pradesh on “Sensory Evaluation of Cow Ghee”. Two batches were organized during 12-14th August and 11-13th November 2024 with 16 participants. The topics covered during the training includes processing of ghee for product development, demo on qualitative analysis of ghee using standard methods, sensory evaluation of cow ghee with E-Nose and E-tongue and practical on instrumental analysis using IS 7770 standard methods.

iv) Processing and Value Addition to Tamarind was organized at CSIR-CFTRI during 23-25th September 2024. This program was sponsored by Karnataka State Agricultural Produce Processing & Export Corporation Limited (KAPPEC) and was inaugurated by the Chief Guest, Shri B.H. Harisha, Chairman, KAPPEC Ltd. on 23rd September 2024. Shri M.H. Banthanal, MD, KAPPEC Ltd., attended the inaugural session as Guest of Honour. The function was presided over by Shri. Rajeshwar S Matche, Director In-charge, CSIR-CFTRI. 44 participants across Karnataka attended this training program. The topics covered during the training includes tamarind processing and technologies, packaging and machinery. Demonstration on tamarind value addition i.e. candy preparation, preparation of tamarind powder and sauce were included.



v) Training program on “Food Process Engineering and Recent Advances” was organized during 02.12.2024 to 06.12.2024. 11 participants attended this programme with majority representing food industry. The course aimed to

disseminate knowledge on conventional and emerging food processing technologies to a diverse group of participants, including students, prospective entrepreneurs, and industry personnel from organizations such as Parle Agro and TTK Healthcare etc. Topics such as Drying, Freezing, and Electromagnetic Radiation (EMR)-based Processing; Evaporation, Extrusion, Membrane filtration, High pressure processing; Fundamentals of Food Packaging; Oil Seeds Processing; Automation in Food Industry - Application of Robotics, 3D Printing etc. were covered. The program offered practical insights into the role of food engineering in enhancing processing efficiency and product quality. The programme served as an effective platform for knowledge sharing and skill development, fostering interaction between researchers and stakeholders in the food processing sector.



vi) Under Farmer Centric activities, thee-days training program on "Processing of Fruits & Vegetables, Millets, and Value Addition" was organized at CSIR-CFTRI for the officials of Agricultural Technology Management Agency (ATMA), Salem, Tamil Nadu, during 25-06-2024 to 27-06-2024. 10 participants attended this training program. Several other programs like Value Addition to Ragi, Rice, Millet, and Maize; Hands on Training Program in fruits and vegetables; Hands on Training Programme in Pickle Processing; Turmeric Processing and Value Addition etc. were organized under Farmer Centric Activities during the year 2024-25.

vii) The Farmer's Centric Training Programme on 'Processing of Turmeric and Value Added Products' was organised from 23-07-2024 to 25-07-2024. A group of around 30 members from Shri Mauli Turmeric Processing Association, Kalamnuri Dist., Hingoli, Maharastra were introduced to the details of turmeric processing, processing missionaries, analytical and chromatographic techniques and its value added products by demonstration and also theoretical aspects.

viii) The Short Term Training Programme on 'Spices and Flavours Current Trends in Processing, Formulations and Quality Evaluation' was organised from 16-12-2024 to 20-12-2024. A group of around 37 members from different region from all over India participated and got introduced to the Spices and Flavour aspects. Most of them were entrepreneur's and group of farmers, who learned about Spice based value added products & technology, processing machinery for Spices and Flavours, sensory analysis of spices and spice products, applications of sophisticated instruments for the analysis of spices/ flavours.

ix) Custom-made training programmes organised for the benefit of Department of Food Processing, Govt of Meghalaya;

Tamil Nadu Civil Supplies Corporation; Tirumala Tirupati Devasthanam; Directorate of Marketing & Inspection (DMI), Ministry of Agriculture & Farmer's welfare, GoI (Agmark), KAPPEC etc. Several industries also approached the Institute to conduct exclusive training programs for their staff.















Participants of skill development / short-term courses

Total of 51 Skill Development Programs/Short Term Courses were conducted under CSIR Integrated Skill Initiative during 2024-25 in which 1065 participants representing 24 states/UTs of the country attended. Details of the training programs as follows:

Sl No.	Title of the program	Duration / Dates(s)	No. of participants	Program Category
1.	Fumigation, Prophylaxis and Pest Management Techniques (Batch 1)	31.05.2024 - 14.06.2024	40	Regular
2.	Sensory Analysis of Frozen Potato-Based Snacks	03.06.2024 - 05.06.2024	10	Custom-made / Exclusive
3.	Strategies for probiotic dairy product development	19.06.2024 - 21.06.2024	6	Regular
4.	Barista training program by Coffee Board of India	24.06.2024 - 28.06.2024	15	Special program in collaboration with Coffee Boad of India
5.	Processing of fruits and vegetables, millets and value addition	25.06.2024 - 27.06.2024	10	Farmer Centric
6.	3D Bio printing	18.07.2024 - 18.07.2024	41	Special program by BioNest
7.	Food Processing Technologies (Sponsored by Agriculture technology management)	18.07.2024 - 18.07.2024	10	Farmer Centric
8.	Post-Harvest Technologies for Fruits and Vegetables	22.07.2024 - 02.08.2024	13	Regular
9.	Analytical Quality Evaluation of Fortificant and Fortified Rice	22.07.2024 - 24.07.2024	10	Special program under GAP-640
10.	Processing of Turmeric and Value-Added Products	23.07.2024 - 25.07.2024	10	Farmer Centric
11.	Basics in Flour Milling and Quality Evaluation of Flour	05.08.2024 - 09.08.2024	14	Regular
12.	Sensory Evaluation of Cow Ghee	12.08.2024- 14.08.2024	8	Custom-made / Exclusive
13.	Chromatographic Techniques (GC, HPLC, UHPLC) and their analytical approaches in Food Analysis	19.08.2024- 23.08.2024	20	Custom-made / Exclusive
14.	Training Programme on Value Addition to Banana	02.09.2024- 04.09.2024	20	Custom-made / Exclusive

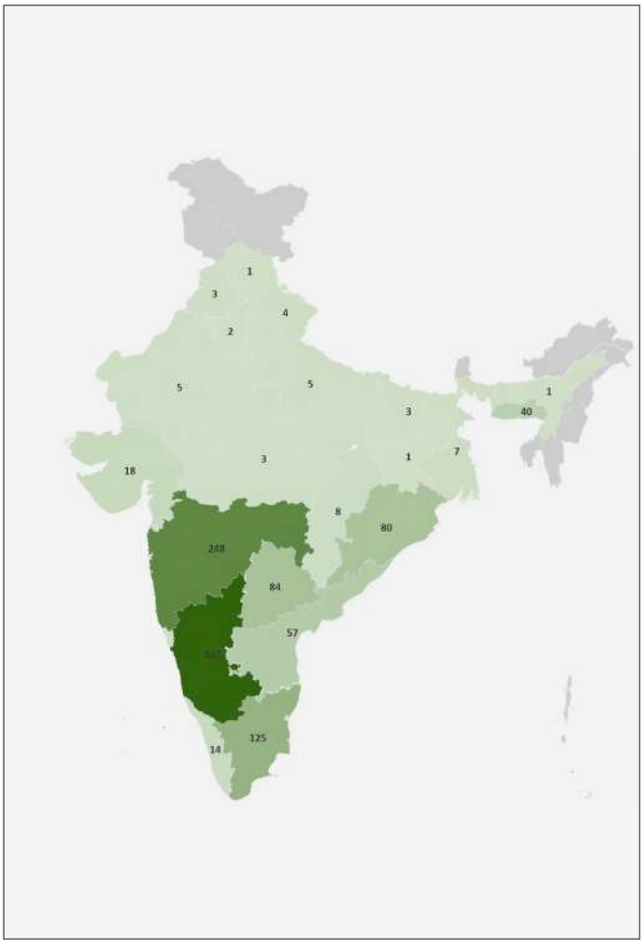
Sl No.	Title of the program	Duration / Dates(s)	No. of participants	Program Category
15.	Training Programme on Spice processing: value addition, current trends and quality evaluation	09.09.2024-13.09.2024	20	Custom-made / Exclusive
16.	Grain Process & Products for Health & Wellness	09.09.2024-13.09.2024	9	Regular
17.	Hands on training in Microbial analysis	10.09.2024-13.09.2024	3	Regular
18.	Extraction and quality assurance of edible fats and oils	18.09.2024 - 20.09.2024	23	Regular
19.	Processing and Value addition to tamarind	23.09.2024 - 25.09.2024	44	Custom-made / Exclusive
20.	Hands on training in fruits and vegetables processing	24.09.2024 - 27.09.2024	20	Custom-made / Exclusive
21.	Cereal and Grain Processing	28.10.2024 - 30.10.2024	20	Custom-made / Exclusive
22.	Post-Harvest Technology for Fruits and Vegetables	04.11.2024 - 08.11.2024	20	Custom-made / Exclusive
23.	Sensory Evaluation of Cow Ghee	11.11.2024 - 13.11.2024	8	Custom-made / Exclusive
24.	Hands on Training Programme in Food Processing, Preservation and Quality Control	18.11.2024 - 20.11.2024	15	Custom-made / Exclusive
25.	Fumigation, Prophylaxis and Pest Management Techniques for Stored Food Commodities (Batch 2)	22.11.2024 - 06.12.2024	43	Regular
26.	Baking Science and Technology	25.11.2024-29.11.2024	25	Regular
27.	Food Process Engineering and Recent Advances	02.12.2024-06.12.2024	11	Regular
28.	Baking Science and Technology (Batch -2)	09.12.2024 - 13.12.2024	8	Custom-made / Exclusive
29.	Nutri-Cereal Process and Products Technology	09.12.2024 - 13.12.2024	7	Regular
30.	Awareness Program on Nutrition Intervention for Children and Women (Batch -1)	10.12.2024 - 10.12.2024	24	Custom-made / Exclusive
31.	Hands on Training Programme in Fruit and Vegetable Processing	15.12.2024-18.12.2024	20	Custom-made / Exclusive

Sl No.	Title of the program	Duration / Dates(s)	No. of participants	Program Category
32.	Awareness Program on Nutrition Intervention for Children and Women (Batch -2)	12.12.2024 - 12.12.2024	33	Custom-made / Exclusive
33.	Processing of Millets for Value Added Products	13.12.2024 - 13.12.2024	15	Farmer Centric
34.	Spices and Flavours Current Trends in Processing, Formulations and Quality Evaluation	16.12.2024 - 20.12.2024	37	Regular
35.	Awareness Program on Nutrition Intervention for Children and Women (Batch -3)	13.12.2024 - 13.12.2024	68	Custom-made / Exclusive
36.	Sophisticated analytical instruments in food applications GC- MS, LC-HRMSMS, FT-IR, NMR, E-Nose & E- Tongue	06.01.2025 - 10.01.2025	6	Regular
37.	Processing and Value Addition to Pulses	08.01.2025 - 09.01.2025	5	Farmer Centric
38.	Value added products from minor millets	20.01.2025 - 23.01.2025	19	Custom-made / Exclusive
39.	Method Validation of Fortificant ie., Iron, Vitamin B9 & B12 in fortified rice	22.1.2025 - 24.01.2025	25	Special program under GAP-640
40.	Value Addition to Ragi, Rice, Millet, and Maize	03.02.2025 - 04.02.2025	29	Farmer Centric
41.	Hands on Training Programme in fruits and vegetables	29.01.2025 - 01.02.2025	22	Farmer Centric
42.	Hands on Training Programme in Pickle Processing	05.02.2025 - 07.02.2025	26	Farmer Centric
43.	Turmeric Processing and Value Addition	17.02.2025 - 19.02.2025	16	Farmer Centric
44.	Rice Parboiling, Milling, Processing and Value Addition (Batch -1)	24.02.2025 - 28.02.2025	29	Custom-made / Exclusive
45.	Rice Parboiling, Milling, Processing and Value Addition (Batch -2)	03.03.2025 - 07.03.2025	29	Custom-made / Exclusive
46.	Trainers Training Programme	04.03.2025 - 07.03.2025	18	Custom-made / Exclusive
47.	Hands on Training Programme on Value Added Products from Minor Millets	10.03.2025 - 13.03.2025	22	Farmer Centric

Sl No.	Title of the program	Duration / Dates(s)	No. of participants	Program Category
48.	Processing of Fruits and Vegetables	17.03.2025 - 19.03.2025	40	Farmer Centric
49.	Rice Parboiling milling processing and value addition	17.03.2025 - 21.03.2025	31	Farmer Centric
50.	Hands on Training Programme in Food Processing, Preservation and Quality Control	19.03.2025 - 21.03.2025	25	Farmer Centric
51.	Osmotic Dehydration of Fruits & Vegetables	25.03.2025 - 26.03.2025	23	Farmer Centric
	Total no. of Participants		**1065**	

CSIR-CFTRI Footprints (Skill Activities)

[State/UT-wise Representation of Participants of STC/SDP : 2024-25]



Sl. No.	State	No. of Participants
1	Andhra Pradesh	**57**
2	Assam	**1**
3	Bihar	**3**
4	Chhattisgarh	**8**
5	Delhi	**2**
6	Goa	**2**
7	Gujarat	**18**
8	Haryana	**2**
9	Himachal Pradesh	**1**
10	Jharkhand	**1**
11	Karnataka	**351**
12	Kerala	**14**
13	Madhya Pradesh	**3**
14	Maharashtra	**248**
15	Meghalaya	**40**
16	Odisha	**80**
17	Pondicherry	**1**
18	Punjab	**3**
19	Rajasthan	**5**
20	Tamil Nadu	**125**
21	Telangana	**84**
22	Uttar Pradesh	**5**
23	Uttarakhand	**4**
24	West Bengal	**7**
	TOTAL	**1065**

Implementation of PMFME Scheme - Training Programmes Conducted during 2024-2025

Sl No.	Name of the training	Duration	No. of participants	Mode
1.	Two days District Level Trainers Training (EDP)	August 08-09, 2024	**39**	Online
2.	Two days District Level Trainers Training (Food domain)	September 11-12, 2024	**29**	Online
3.	Two days training for District Resource Persons	December 10-11, 2024	**157**	Online
4.	Two days District Level Trainers Training (EDP)	March 11-12, 2025	**40**	Online

Training programmes conducted by Resource Centres

Sl No.	Name of the training programme	Date	Details of the training programme	No of Beneficiaries
	RC-Hyderabad			
1.	Hands-on Training Programme in Microbial Analysis	Sept 10-13, 2024	Organized for employees of Telangana Foods, Hyderabad.	**03**
2.	Hands-on Training Programme on Food Processing and Preservation	Sept 24-27, 2024	Sponsored by Rashtriya Krishi Vikas Yojana, ICAR, New Delhi & Govt. of Odisha	**20**
3.	Hands-on Training Programme in Food Processing, Preservation and Quality Control	Nov 18-20, 2024	Organised for students from Bhavans college of Arts Science and Humanities, Hyderabad	**15**
4.	Hands-on Training Programme on Food Processing and Preservation	Dec 5-8, 2024	Sponsored by Rashtriya Krishi Vikas Yojana, ICAR, New Delhi & Govt. of Odisha	**20**
5.	Hands-on Training programme on Value added products from Minor millets	Jan 20-23, 2025	Organized under KVIC, Mumbai sponsored Project	**20**
6.	Hands-on Training Programme on Food Processing and Preservation	Jan 29 - Feb 1, 2025	Sponsored by Rashtriya Krishi Vikas Yojana, ICAR, New Delhi & Govt. of Odisha under GAP-0558	**22**

Sl No.	Name of the training programme	Date	Details of the training programme	No of Beneficiaries
7.	Hands-on Training Programme on Pickle Processing	Feb 05-07, 2025	Sponsored by SERB, Department of Rural Development, Govt. of Telangana for women entrepreneurs/SHGs	**20**
8.	Trainers Training Programme on Food Processing and Preservation	Mar 04-07, 2025	Sponsored by Rashtriya Krishi Vikas Yojana, ICAR, New Delhi & Govt. of Odisha	**20**
9.	Hands-on Training Programme on Value added products from Minor millets	Mar 10-13, 2025	Conducted under KVIC, Mumbai	**20**
10.	Training Programme on Quality Control and Food Processing	Mar 19-21, 2025	Organized for students from St. Theresa College for Women, Eluru, Andhra Pradesh.	**24**

RC-Lucknow

01.	One Day Training programme for Director, Deputy Director, Joint Director, staff, and students exhibited the major technologies of CSIR-CFTRI	Feb 22, 2025	To enhance awareness and understanding of advanced food technologies. During the session, key CSIR-CFTRI technologies were showcased, highlighting their practical applications in value addition, processing efficiency, and product development. The programme facilitated knowledge exchange and encouraged future collaboration in promoting sustainable and innovative food processing practices. The training programme was conducted to participants from the Horticulture and Food Processing Department, Lucknow.	**40**

III. JIGYASA

As the Scientific Social Responsibility (SSR) of CSIR, the JIGYASA program had seen much interest among children in the year 2024-25 as usual. The Institute conducted fourteen Jigyasa programs through which the scientists directly interacted with the students and teachers. Highlights of major activities under Jigyasa as follows:

- Built a new Jigyasa Laboratory in the Institute dedicated for the Jigyasa programs
- Visits of students to CSIR-CFTRI.
- Visit of CFTRI Jigyasa team to Govt. High Schools /Teachers program.
- Organized Quiz for children on the occasion of National Nutrition Week.
- Open day Exhibition in which College students from Karnataka, Tamil Nadu, Maharashtra and Telangana participated.
- Visit of CFTRI Jigyasa team to the adopted ATL school and arranged a talk on Energy conservation. Assessment of the performance of 9th standard students was also done.
- A total of 1352 students and 185 teachers have participated in these programs in the year 2024-25.

In connection with Jigyasa activities, which is a motivational and scientific temper inculcating initiative for high school students by CSIR, a dedicated Jigyasa laboratory was inaugurated by Dr. Sridevi Annapurna Singh, Director, CSIR-CFTRI on 20th May 2024. 50 Students and two teachers from CSIR-CFTRI high school participated in the event. The laboratory will be a platform for demonstration and performing experiments that convey basic aspects of food science and nutrition.

As part of its JIGYASA activities, "Summer Camp" with the theme "obesity" was conducted for 40 high school students and 4 teachers of KV Chamarajanagar and KV BRBNMPL Mysuru on 26th June 2024, at CSIR- CFTRI. The program featured talks delivered on "Balanced nutrition for adolescents" by Dr. Jyothi Lakshmi A., and "Childhood obesity - a growing concern" by Dr. Uma V. Manjappara. They were followed by visits to CFTRI and Millet showcases and a demonstration of "Diversity in edible oils and their beneficial role in health" by Dr. Vijayaraj P.



Director, CSIR-CFTRI interacting with students





Students at Jigyasa programmes

Interaction with JNV, Ramanagara students - Under the JIGYASA programme (Programme Coordinator- Dr. Uma V. Manjappara), on December 13, 2024, students from Jawahar Navodaya Vidyalaya (JNV), Ramanagara visited CSIR-CFTRI, Mysuru. As part of this visit, interacted with the students on the topic '*Emerging Trends in Food Science and Technology*'. The brief session focused on creating awareness about the role of Food Engineering in everyday life, with emphasis on food processing machinery and technologies. The students were introduced to basic working principles of various machines and their relevance in food production and safety. In the afternoon, students visited the pilot plant of the Food Engineering Department, where they were introduced to the in-house developed machinery developed for traditional foods. The interaction aimed to inspire curiosity in students about scientific innovation in food technology and its impact on society.




IV. Disaster Management Activities

CFTRI is always forthcoming in planning and executing delivery of food packets in bulk quantity which are nutritious and hygienic during natural disasters that affected population of different zones in the country.

Wayanad Landslide

CSIR-CFTRI supplied nutritious, ready-to-eat & ready-to-cook food materials to survivors & rescuers of Wayanad Landslide as disaster relief in 3 consignments first batch was sent on 2nd August, 2024, and the subsequent batches were sent on 5th and 7th August, 2024 respectively. These food materials along with Hand sanitizers and Wet wipes that were generously provided at no cost by M/s Scheveran Laboratories Pvt. Ltd, Mysore were handed over to Sub-Collector, Wayanad in coordination with M.S. Swaminathan Research Foundation.





Vijayawada Floods

Disaster relief supplies viz., ready-to-eat and ready-to-cook food were provided by CSIR-CFTRI to representatives from the Andhra Pradesh government for flood-affected people of Vijayawada, Andhra Pradesh (September 6, 2024).



V. CSIR-CFTRI Tableau in Mysuru Dasara

The Mysuru Dasara Procession, which took place on October 12, 2024, featured the CFTRI tableau. The Institute's contributions to society and the nation were emphasized in the tableau. Additionally, it demonstrated the range of technology the institute has developed.



Progress Under R & D Projects

ENGINEERING SCIENCES

Coconut cutting and grating gadget *(Dinesha BL)*

The compression and shear forces required for effective coconut processing were systematically determined through mechanical testing. Based on performance requirements and design parameters, a 0.5 HP motor was selected for driving the cutting and grating operations. A cutter blade of 10 cm diameter with helical teeth was precisely fabricated to achieve efficient cutting and grating performance. The conceptual design of the coconut cutting and grating gadget was finalized, integrating the functional and mechanical components. The shear force of coconut meat was assessed at various orientations to assess material resistance and optimize grating efficiency. Natural cracking tests were conducted using appropriately selected samples to simulate practical handling conditions. Dimensional measurements, including major, minor, and intermediate diameters of coconut samples, were obtained using a digital Vernier caliper to ensure accuracy. The forces required for cutting and grating the coconut meat were measured to guide mechanical design specifications. The breaking points of coconuts were determined by applying force at different specimen positions, including both horizontal and vertical orientations.

Conceptual prototype model for tamarind fruit (*Tamarindus indica*) deseeding machine *(Ramesh G)*

A comprehensive literature review and market analysis were conducted to assess tamarind fruit and its cultivars. Materials were procured from multiple sources, including the local market. Further, a visit to ICAR-IIHR was made to study different tamarind varieties, from which PKM-1 and Urigam cultivars were selected and procured for detailed investigation. The study focused on evaluating the physical properties of different tamarind varieties including moisture content and load analysis. Experimental trials were conducted at the pilot plant, focussing on the texture analysis of the processed product. Deseeding trials of tamarind were performed using various machines, including a pulper machine, flaking machine, screw press, hydraulic press, hammer mill and multi-mill, each yielding distinct outcomes with respect to seed breakage, pulp loss and fibre contamination in the paste.

Gadget/ machinery for deseeding and cutting of citrus fruits, apples and similar fruits *(Shesha Narayana K)*

Fabrication work to develop a gadget for deseeding of select fruits has been initiated. The proposed unit is a hand operated gadget which can be utilized at the domestic level and small scale canteens, restaurants etc. Based on this working principle automated machinery can be designed.

Filling/ forming type dumpling-making machine *(Shyam R Garud)*

Dumplings are a popular traditional food across Asia, widely consumed in India during festive occasions and as a typical street food. They are typically prepared from rice or wheat flour dough, exhibiting varied textures ranging from soft and elastic to crisp depending on the ingredients and cooking method used. With increasing demand

for dumplings in both domestic and commercial sectors, there is a growing need for mechanized processing systems to overcome the limitations of manual preparation and ensure uniform quality in large-scale production. As part of the ongoing project, a dough sheeting extruder was designed and developed to standardize the dough preparation process for dumpling production. The prototype consists of a 50 mm diameter barrel with a 450 mm length, equipped with a screw assembly that enables controlled mixing and extrusion of dough sheets with consistent texture and thickness. To enhance the system's automation capability, a conveyor mechanism and a sheeting die measuring 4 mm in thickness and 100 mm in width are under development. These components will facilitate continuous dough sheeting and efficient handling, thereby improving productivity and process uniformity. The project aims to establish a scalable, hygienic and energy-efficient mechanized dumpling production system suitable for small- and medium-scale food industries.

Integrated spouted bed roaster
(Shesha Narayana K)

The Integrated Spouted Bed Roaster (ISBR) consists of an electric heater, heating chamber, forced draft blower, induced draft blower and a blower for preheating raw materials. Additional components include a feeder hopper for feeding raw material, a product collection unit, and a chaff separator. The process control and instrumentation system comprises variable frequency drives for each blower motor, an energy meter, and temperature sensors at critical locations. Real-time energy readings, temperatures, and blower speeds are displayed on the control panel. The forced draft blower directs air into the heater chamber, where raw material is dried and roasted. Hot air can be discharged completely or partially through the chaff separator. The induced draft blower creates draft within the heater chamber and facilitates hot air circulation, while an additional blower preheats raw material in the hopper using the hot air outlet. The two primary process parameters to be controlled are airflow and temperature in the heating chamber. Temperature control is achieved through a system in which the heater cuts in and out to maintain the set temperature, while airflow is regulated by varying blower speed. Heating capacity during each cycle can be adjusted according to the raw material type and load. By varying heater capacity, the rate of heat transfer can be modified at different process stages. The ISBR can be operated in three modes: open cycle, closed cycle, or with minimum bypass through the chaff separator. Roasting of groundnuts, finger millet, and other



Integrated Spouted Bed Roaster

materials has been successfully demonstrated. Stage-wise processing of groundnuts achieved complete dehusking, splitting, and germ separation, with roasted kernels, husks, and germs each finding applications in the food industry.

Project implementation under PMFME scheme *(Umesh Hebbar H)*

As part of PMFME Scheme implementation programme, training programmes were conducted by CSIR-CFTRI for different stakeholders. These programmes were organised with the support from KAPPEC, Bengaluru, the State Nodal Agency for the implementation of PMFME Scheme. The training programmes included three District Level Trainers (DLTs) and a District Resource Persons (DRP) for nominated participants from KAPPEC. Of these 2 DLT training programmes were on Entrepreneurship Development Program (EDP), 1 DLT training program was on Food Domain and 1 DRP training program was on a combined EDP and Food Domain. The participants were from different organizations and NGOs. The major topics covered in these training programmes included the PMFME scheme, Entrepreneurial Risks, Establishing an Enterprise, Financial Management, Understanding Banking & Funding, Marketing &Branding, Business Registration and other Legal Compliances, Food safety & Standards, Credit Related details of PMFME Scheme, Registration & Licensing related to FSSAI and other Legal compliances. These training programmes helped DLT's and DRP's to know more about the scheme and domain knowledge and provided guidance, training to the applicants of the scheme to become beneficiaries of the PMFME scheme.

Multi-optional sustainable sterilization processes for spices *(Sukumar Debnath)*

Microbial contamination in spices, often due to poor post-harvest handling and unhygienic drying poses serious food safety and quality issues. Pathogens such as *Salmonella* and toxigenic molds can reduce shelf-life and compromise consumer health. Conventional sterilization methods like ethylene oxide (EtO) fumigation are increasingly restricted due to carcinogenic risks, prompting the need for safer, non-thermal alternatives. This study explores the efficacy of emerging decontamination techniques including cold plasma, ozonation, and essential oil fumigation on microbial reduction and quality retention in spices, with a focus on chili (*Capsicum* spp.). Accordingly, the objectives of the study were: (i) assessing cold plasma individually and in synergy with ozone or essential oils; (ii) evaluating microbial inactivation; (iii) analyzing impacts on chemical, aromatic and sensory attributes; (iv) developing and field-testing a prototype system for 10 kg spice batches, particularly for ozonation and biofumigation; (v) evaluating sensory qualities during cooking; and (vi) performing risk and life cycle assessments comparing EtO with bio-based alternatives. Preliminary ozone treatment (30 min) on Guntur chili resulted in reduced moisture content (7.29%), stable oleoresin levels (12.97%), improved extractable color (1939.75 units), and higher capsaicinoid levels (1.2236 mg/g vs. 0.9182 mg/g). Ongoing studies aimed to validate these treatments as safe, effective, and sustainable sterilization solutions for the spice industry.

Mobile processing unit in North-East for processing of fruits and vegetables
(Punil Kumar HN)

The main objective of this project was to develop mobile unit for demonstration and processing of fruits and vegetable in North-East States. The unit proposed under the project is a versatile unit mainly for demonstration of technologies. The Mobile Food Processing Unit (MFPU) is ready and processing equipments need to be mounted to make the unit operational. The proposed unit can be used in farms to produce semi-finished or finished product at small scale (~50 kg/batch). Proposed unit also helps to conduct on-site demonstration of technologies/ training programmes to entrepreneurs, farmers etc.



Mobile Food Processing Unit

TECHNOLOGY DEVELOPMENT

Black rice-based anthocyanin-rich prototype products *(Crassina Kasar)*

Aromatic black rice (*Chak-hao*) (*Oryza sativa*) has received increasing attention due to its unique sensory characteristics (aroma, exotic natural colour) and its high anthocyanin content. Black rice-based food products are currently rare in the market, and its use has been limited to cooked rice, porridge and traditional pancakes. Food product developed from aromatic black rice has the potential to capture the consumers who want exotic product sand to serve as functional ingredient in the commercially viable food products. Hence, the objectives of this study were to standardize the production of (a) quick-cooking extruded rice analogues for kheer premix and (b) semi-dried noodles from composite flours of wheat and black rice, to quantify anthocyanins and bioactive contents along processing steps, and to evaluate sensory attributes, including aroma and taste profiling. The key findings indicated that important technological properties such as physical attributes, functional and cooking properties of rice analogues with varying amount of black rice were satisfactory at 40% black rice incorporation and hence was considered the optimal. The hardness of the dried extrudate ranged from 27.04N - 53.27N, while the length and thickness were 6.55 mm-6.42 mm and 2.87mm-3.72 mm respectively. The cooking time of the rice-analogues with 30-40% black rice was in the range of 8.15-6.30 min, while the water uptake and cooking yield decreased with increasing amount of black rice incorporation. The colour characteristics of the rice analogues indicated that the *L** value is highest for the control and lowest for the B-50 in both the raw and cooked samples. The *a** values were found to be positive and the values increased with the addition of black rice while *b** values decreased. The aroma profiling identified acetylpyrazine and propanal as the most prominent volatile compounds in the black rice analogues.



Images of rice analogues at different stages of processing

Plant-based 3D printed meat analogs *(Negi PS)*

This study explores the development of high-moisture meat analogues (HMMAs) utilizing two distinct processing technologies: high-moisture extrusion and three-dimensional (3D) food printing. The formulations were composed of various plant-based ingredients, including jackfruit powder, pea protein isolate and wheat gluten. The HMMAs obtained through high-moisture extrusion exhibited desirable characteristics at glycerol: oil ratios of 1:3 and 1:1 compared to the control (oil). The rheological behaviour of the inks formulated for 3D printing demonstrated shear-thinning properties, with a higher storage modulus (G') than loss modulus (G''), indicating solid-like viscoelastic behaviour. The viscosity of the finalized 3D printed formulations was found to be 1465.6 mPa·s and 1308 mPa·s for the 1:3 and 1:1 glycerol:oil ratios, respectively, showing excellent structural stability. Addition of glycerol resulted in better shelf-life and lipid plasticizer interaction, thereby improving overall quality of product.



HMMAs obtained through high-moisture extrusion and 3D printing

Shelf-life extension of grapes, mangoes and drumsticks for internal and export trade *(Revathy Baskaran)*

Seedless green grape samples were subjected to various treatments and stored under two conditions: ambient temperature (27 ± 3°C) and cold storage (7 ± 1°C). The cold-stored samples remained fresh for 12 days, while those stored at room temperature spoiled within 6 days. Among the non-thermal treatments evaluated, plasma-activated water (PAW) treatment demonstrated a significant extension of shelf-life of grapes. Control samples exhibited a higher weight loss (17.5 and 13.3%) compared to PAW (11.5 and 5.2%) at room temperature (RT) and cold conditions (CS), respectively. Furthermore, PAW treatment was highly effective in extending the shelf-life and preserving the quality of seedless green grape by mitigating the activity of browning enzymes. Active impregnated sheets were prepared using hinokitiol at different concentrations. Hinokitiol release rate from the sheets was measured at 10, 20 and 30°C for 8 days. The hinokitiol content in the sheets rapidly reduced at higher temperature compared to lower temperature. This might be due to the volatility of hinokitiol at higher temperatures. Hinokitiol impregnated sheets increased the shelf-life of tomato (35 days at room temperature), broccoli (15 days at 5°C, 5



Control Treated

days at 20°C) and banana (4 wks at room temperature). The storage study for mangoes is under progress. Optimization of pre-treatments to retain the freshness of drumsticks are being undertaken. Different pre-treatments and different packaging materials (PP, LDPE with and without perforations) were screened for extending the shelf-life and maintaining the freshness of moringa pods. The storage studies are underway.

Formulation from bio-waste for shelf-life extension of selected fruits and vegetables *(Vanitha T)*

Waste valorisation plays an important role in sustainability and technological advancement of the country. Dried orange and lime peels were used to extract essential oil and pectin. Essential oil yields ranged from 0.5% (lime) to 5.5% (orange). Conventional extraction of pectin showed higher yield (34.19 - 44.96%), and anhydra uranic acid (AUA) (73.33 - 76.85%). The synergistic effect of pectin and essential oil will be studied for shelf-life extension of fruits and vegetables. Polyphenols and flavonoids were extracted from cruciferous vegetable waste (cauliflower, cabbage, radish, and broccoli) using deep eutectic solvent (DES) and 70% ethanol. Radish leaves showed the highest polyphenol content (17.99 ± 0.87 mg GAE/g) with betaine-ethylene glycol. Flavonoid content ranged from 5.32 to 9.21 mg QE/g and was lowest in 70% ethanol extracts. The powders were also used in instant soup mixes. The quality and shelf-life evaluation of developed soup mixes are under progress. Onion peel powder was prepared by washing, drying, and grinding the peels. Compound extraction using green solvents was assessed via ultrasonication and stirring, followed by evaporation. Ultrasonication combined with magnetic stirring resulted in the highest levels of total polyphenols, flavonoids, and anthocyanins. Starch extracted from jackfruit seed flour via alkali treatment and purification showed higher viscosity (2370 cP) at 5% concentration than corn starch (2310 cP), highlighting its potential as a thickener in gravies, sauces, and chutneys.

Centre for promotion of additive manufacturing (CPAM) – agri and food processing *(Negi PS)*

The development of three-dimensional (3D) printed food with therapeutic properties, using additive manufacturing technology is being explored in this project. The 3D printing approach enables the creation of food products with customizable shapes, sizes, textures, and nutritional profiles, offering advantages like personalized nutrition, sustainable practices, and waste reduction. Designing texture-modified foods for people with swallowing difficulties using food inks formulated from fresh vegetables such as potato, carrot, pumpkin, beetroot, green pea, and cauliflower was done. The resulting products were evaluated for nutritional content, antioxidant properties, rheological behaviour, and texture to ensure ease of swallowing and compliance with International Dysphagia Diet Standardization Initiative (IDDSI) guidelines. These findings demonstrated the potential of 3D food printing to create visually appealing and nutritionally balanced foods tailored to individuals with dysphagia.



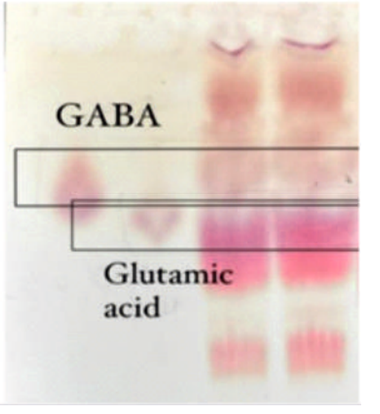
3D Printed products

Nutritional profile of selected traditional rice varieties of Karnataka *(Doddabhimappa RG)*

The traditional rice varieties boast unique aromatic and colored types that are not only culturally significant but also possess unique nutritional profiles with numerous health benefits. Selected traditional rice varieties of Karnataka viz., Raja Mudi, Sidda Sanna, Kartha, Chitti Muthyala, Chethana, Singri, Boliya, Kaga Sanna, Krishna Purple, Maya Malli, GSB, Intan, Mysore Sanna, Medhini, MSP, BKR, RNR 15048, Raja Mudi (Red), Kempu Neelam, Mani Sanna were collected from the Agricultural and Horticultural Research Station(AHRS), Ponnampet, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences (KSNUAHS) Iruvakki, Sagar Taluk, Shivamogga, Karnataka. In addition, Neeru Mulaka was collected from a progressive farmer in Sirsi, Uttara Kannada district, Karnataka. Physical grain characteristics, such as kernel length and breadthwere highest in the Neeru Mulaka (9.40mm) and Raja Mudi (Red) (8.55mm) and lowest in the Kage sanna (0.01mm) and Mani sanna (0.02mm) of traditional rice varieties. Further physico-chemical, and phytochemical analysis are ongoing.

γ-Aminobutyric acid (GABA)- enriched rice for geriatric populations *(Meera MS)*

Gamma-aminobutyric acid (GABA) has significant impacts on stress reduction, sleep improvement and the regulation of blood pressure, cholesterol metabolism, and neuro protection. It has garnered widespread attention for its potential health benefits, making it a highly sought-after bioactive compound in functional foods. Brown rice (BR) naturally contains GABA, along with other beneficial phytochemicals such as ferulic acid and γ-oryzanol, which contribute to its health-promoting effects. However, the consumption of BR is limited by its less desirable texture and appearance compared to white rice. Germination of brown rice (GBR) has been reported as a cost-effective method to enhance its nutritional value, improve its organoleptic properties, and increase the bioavailability of functional compounds such as GABA. Hence the aim of the study was to explore and develop processing technologies for the γ-aminobutyric acid (GABA) enriched rice from selected rice varieties.To analyse the milling quality and physico-chemical characteristics of the processed GABA enriched rice varieties. The germinated paddy samples from pigmented and non-pigmented varieties were subjected to various processing treatments to enhance GABA accumulation. The processed paddy was dehusked and milled to obtain brown rice and milled rice, the GABA content was evaluated by TLC method. It was observed that rice samples with a lower degree of milling (DOM) displayed slightly more intensified GABA spots than the rice samples milled to higher DOM. This suggested that milling significantly reduces the GABA content in rice grains. This loss can be attributed to the removal of bran layer during milling which harbors the enzyme necessary for synthesis of GABA.



GABA content in rice varieties

Ready-to-eat nutri-snack suitable for elderly population *(Usha Dharmaraj)*

Initial trails were carried out to optimize ingredient composition and pre-processing parameters for the development of a snack product suitable for elderly population. The process parameters were standardised, and the nutrient profile, physical and functional properties of the product was evaluated. The product was found to contain16.28 g protein, 6.51 g fat and 3.57 g ash. Evaluation of the rest of the nutrient components and other quality characteristics of the product is in progress. Further, the design drawing for developing a gadget suitable for estimation of husk/ bran content in cereals was finalised and the development of the prototype gadget is in progress.



Ready-to-eat nutri-snack

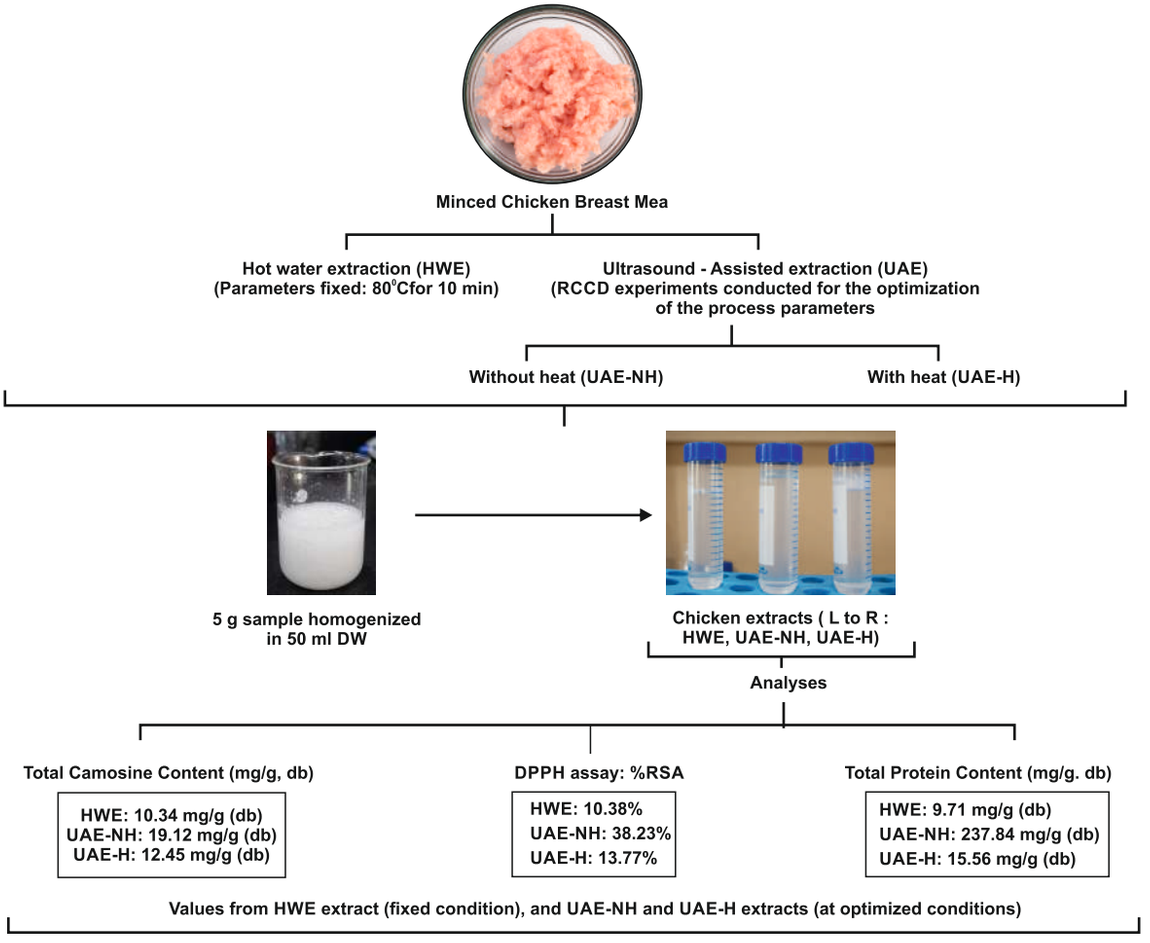
Numerical analysis of heat and mass transfer in various grains drying *(Shruti Joshi)*

The main objectives of this project was to develop a mathematical model to analyze the cooking of rice kernels and to extend the model to food processing applications, such as rice puffing. A numerical model was developed to describe the distribution and evolution of moisture content, as well as the volumetric expansion of dehulled rice grains undergoing hygroscopic swelling under three different cooking temperature conditions. To simplify the complexity, the following assumptions were applied: the rice grain was considered continuous, homogeneous, and isotropic; initial moisture content was assumed uniform; and the initial surface temperature of the grain was equal to the water temperature. The transient model describing mass and heat transfer during rice cooking was based on Fick's second law and Fourier's law, respectively, and 3D numerical results are currently being validated. The rice puffing process involves a complex interplay of mass, momentum, and energy transport, accompanied by large volumetric expansion of the solid matrix. By treating rice as a porous material, a fundamentals-based model was developed to describe heat and moisture transport, rapid evaporation, and large deformations of the solid matrix, allowing identification of factors affecting the puffing process. Mathematical modelling and numerical simulations, increasingly applied in bioprocess engineering, reduce experimental cost and time while providing insight into physical phenomena. Simulations were conducted using the COMSOL Multiphysics solver, based on the finite element method, to predict temporal variations in temperature, moisture, volume, pressure, stress, and strain. A fundamental model predicting rice kernel expansion during hot air puffing is under development, highlighting the critical role of evaporation rate in generating sufficient internal gas pressure to achieve a high expansion ratio.

Extraction of bioactive compounds present in muscle foods *(Indira Dey Paul)*

The project aimed to evaluate the suitability of two green technologies viz., microwave-

assisted extraction and ultrasound-assisted extraction (UAE) technologies for the extraction of bioactive compounds from meat and fish, and standardize the process parameters of the selected method. UAE method (with and without application of heat) has been attempted for the extraction of carnosine from fresh chicken breast meat using a probe type ultrasonic processor with a circulator water bath. The extracts produced by UAE were compared with the extracts produced using hot water extraction (HWE) in terms of carnosine content (mg/g, db), total protein content (mg/g, db) and %RSA (using DPPH assay). The graphical abstract shows that the UAE extracts gave a better yield of carnosine and higher % radical scavenging activity (RSA) than the HWE extract. The protein content was also higher in the UAE extracts compared to the HWE extracts. The lower carnosine recovery in the heated extracts (HWE and UAE-H) may be attributed to the destruction of carnosine or the association of carnosine with precipitated proteins. The higher %RSA of UAE extracts may be due to the presence of other antioxidants such as phosphates, free amino acids and low molecular weight peptides (anserine and glutathione). Further studies are needed to draw a robust conclusion.



Graphical extract of the work progress

Fish and chicken meat-based complimentary baby/toddler food products *(Tanaji G Kudre)*

Meat proteins are rich sources of high-quality protein, containing essential amino acids, vitamins, minerals, and growth factors. Recently, lactic acid fermentation has emerged as a significant method for preparing protein hydrolysates with enhanced bioactivity. In this context, screened various *Lactobacillus* strains (*L. plantarum, L. casei, L. pentosus, P. acidilactici, P. pentosaceus*) to identify those with the highest antioxidant and antimicrobial activity. Among these, *P. pentosaceus* exhibited highest activity. Subsequently, optimized different hydrolysis conditions to maximize the antioxidant activity in chicken meat (CPH) and fish meat protein (FPH) hydrolysates adopting Response Surface Methodology (RSM). For CPH, the optimal conditions were 2% dextrose, 10% inoculum, and 48 h of fermentation, resulting in 48.25% DPPH, 53.31% ABTS, 446.30 µM TE/g FRAP, and 19.98% iron chelating activity. FPH, under optimized conditions of 30% meat, 2% dextrose, and 48 h of fermentation, achieved 49.68% DPPH, 57.04% ABTS, 298.54 µM TE/g FRAP, and 18.18% iron chelating activity. Both CPH and FPH demonstrated antagonistic activity against *Bacillus cereus, Salmonella enterica, Escherichia coli, Listeria monocytogenes and Staphylococcus aureus* under the optimized conditions. Scaled up production of both CPH and FPH (up to 50 L) under optimized condition and assessed the physicochemical, functional, and nutritional properties of the resulting hydrolysate powders. CPH had a protein content of 75.13%, with 47.53% essential amino acids, while FPH exhibited a protein content of 71.94%, with 46.63% essential amino acids. SDS-PAGE analysis of both CPH and FPH revealed the breakdown of higher molecular weight (MW) proteins into smaller MW peptides. FTIR spectra confirmed the presence of proteins in both CPH and FPH by showing characteristic amide bands. Purified and identified one antioxidant peptide (LGQESLSPD) from CPH and two peptides (DPGYMHHKFAV and LTGIESM) from FPH using ultrafiltration, gel-filtration, RP-HPLC, LC-MS/MS, and Mascot software analysis. CPH and FPH demonstrated higher solubility, emulsifying, and foaming properties across different pH range of 2-10.



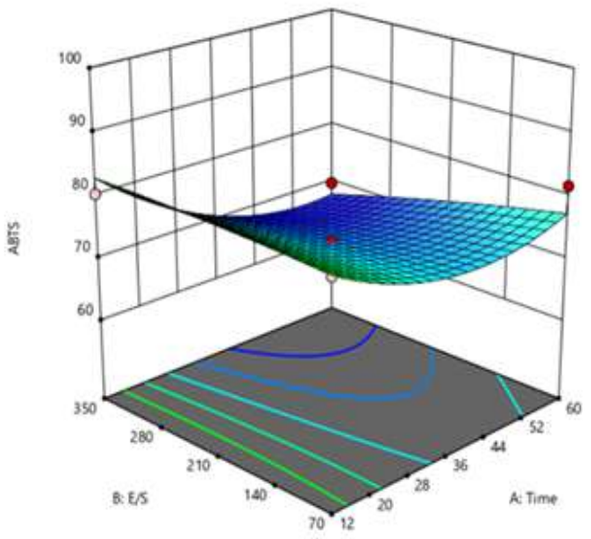
Lactobacillus fermented fish meat protein hydrolysate

Lactobacillus fermented chicken meat protein hydrolysate

Nutrient-dense ready-to-use food product using egg white protein hydrolysate for elderly populations *(Suresh PV)*

Hen eggs are a rich source of protein for developing nutritional rich products for elderly populations. The study investigated the development and characterization of protein hydrolysate powder from hen egg white. This study optimized the production of hen egg white hydrolysate (HEW-PH) powder with enhanced antioxidant properties using a commercial food grade protease. Commercial hen eggs were sourced from a local farm and characterized for various quality parameters, including weight, volume, pH, air cell size, shape index, albumen and yolk index, and shell thickness. Egg white

albumen was subjected to enzymatic hydrolysis using a food-grade protease. Process optimization was performed using a central composite design (CCD) within the framework of response surface methodology (RSM), where hydrolysis time and enzyme-to-substrate (E/S) ratio served as independent variables, and antioxidant activity, measured by ABTS radical scavenging assay, was the response. Optimal hydrolysis conditions were identified as 48.7 h and an E/S ratio of 295.4 µl, resulting in a predicted ABTS activity of 69.32%, which was experimentally validated. The optimized hydrolysate was spray-dried to obtain a stable powder suitable for food applications. FTIR spectroscopy confirmed the presence of characteristic protein and peptide functional groups, while colour analysis showed no change compared to control powders. Antioxidant potential of the hydrolysate was further established through functional assays. The optimized HEW-PH powder demonstrated strong potential as a functional ingredient with nutritional and bioactive properties, making it suitable for incorporation into ready-to-use food formulations. Overall, the study highlights the application of HEW-PH powder in developing nutrient-dense products to address malnutrition and support healthy aging in elderly populations.

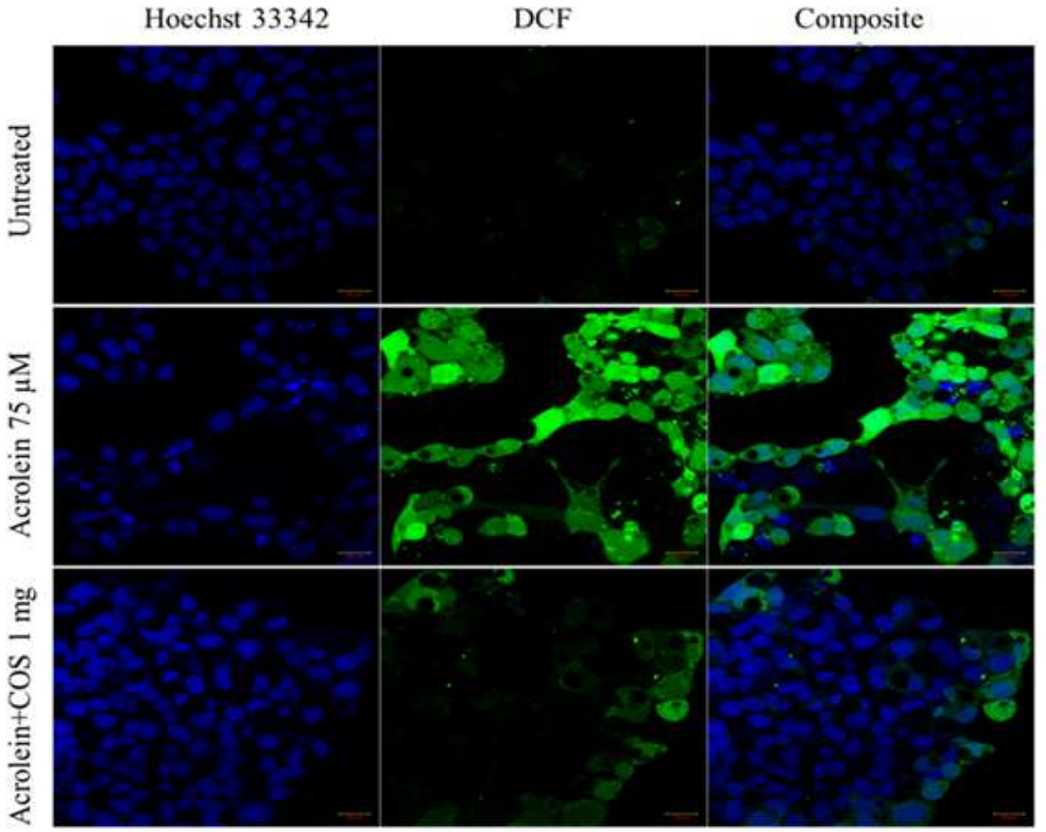


Response surface plot of RSM design of hen egg white hydrolysate production using a commercial protease

Nanotechnology-based neuroprevention using chitooligosaccharide (COS) for neurodegenerative disease *(Suresh PV)*

Chitooligosaccharides (COS), low molecular weight derivatives of chitosan (≤10 kDa), possess enhanced bioavailability, potent antioxidant activity and neuroprotective potential, making them promising candidates for managing neurodegenerative diseases such as Parkinson's disease (PD). This study aimed to produce high-quality COS using green enzymatic methods, develop COS-based nanoparticles, and evaluate their antioxidant and neuroprotective properties *in vitro*. Chitosanase from *Purpureocillium lilacinum* CFR NT12, cultivated under optimized submerged fermentation conditions with colloidal chitosan as inducer, efficiently hydrolyzed high %DDA chitosan to yield COS (21.0 mg/ml at 72 h with 10 ml enzyme/50 ml substrate). The resulting COS were confirmed by TLC, HPLC, DSC, and LCMS analyses. COS nanoparticles (COS-Au NPs) were synthesized via a green method using $HAuCl_4 \cdot 3H_2O$ as a stabilizing agent at 80°C, with visual colour transition (yellow to wine red) indicating successful nanoparticle formation. Characterization revealed a surface plasmon resonance peak at 526 nm, zeta potential of -30.4 mV indicating stability, FTIR peaks corresponding to COS functional groups, and an average particle size of 113.4 nm (DLS). Antioxidant and neuroprotective potential of COS was evaluated using SH-Sy5Y human

neuroblastoma cells. Cytotoxicity was assessed via MTT assay, and protective effects against acrolein-induced oxidative stress were determined using DCFH-DA assay. Preliminary results demonstrated that COS and COS-Au NPs exert significant antioxidant activity and cytoprotection *in vitro*. These findings highlight the potential of COS nanoparticles as nutraceutical candidates for PD management, warranting further validation in *in vivo* experimental models.



Overlaid fluorescent micrograph depicted the DCF expression in untreated and treated with Acrolien with 75 uM alone and co-treatment of COS followed by Acrolein with 75 uM on SH-Sy5Y cells at the magnification of 40x at Blue and Green channels. Cell nuclei are counter stained with Hoechst 33342 solution

Fortification of coffee and jaggery with iron and folic acid *(Pushpa S Murthy)*

A comprehensive screening of seven iron salts, such as ferrous sulfate, ferrous gluconate, ferric sodium EDTA (FSE), ferric pyrophosphate, ferrous fumarate, ferrous bisglycinate, and electrolytic iron was undertaken to identify the most suitable fortificant. Each iron compound was incorporated into coffee powder and evaluated based on key physicochemical properties, including pH, titratable acidity, total soluble solids, colour parameters, particle size, and zeta potential to assess stability and compatibility. Sensory profiling was carried out to determine the effects on aroma, flavour, body, and aftertaste. Additionally, FTIR spectroscopy was used to investigate iron-polyphenol interactions and GC-MS analysis was employed to monitor changes in the volatile compound

profile. Among all tested forms, FSE emerged as the most promising candidate, exhibiting superior solubility, minimal sensory deviations, and physicochemical stability. A similar fortification approach was applied to jaggery, with FSE again showing optimal results in terms of moisture content, acidity, water activity, and other physico-chemical parameters. Iron-fortified jaggery was further used to develop fortified food products, which exhibited no significant alterations in sensory attributes. Ongoing work includes fortification of coffee and jaggery with folic acid to enhance nutritional value and their bioaccessibility.



Iron fortified coffee powder

Spice extractives and flavorants for value addition of 'Chayote' *(Shivakumar L)*

Spice extractives and essential oils add value addition and provide health benefits to the various foods particularly to the underutilized and processed food products. Chayote (vegetable pear, *Sechium edule (Jacq.) Swartz*) despite its nutritional quality, is highly perishable making proper utilization and shelf-life enhancement crucial for the benefit of agriculture producers, farmers and food processing industries. In the present study, the value addition with the spice extractives to the vegetable pear was undertaken. Chayoteis known to contain significant amount of essential vitamins, amino acids and minerals like K, Ca, Mg and P etc. Further the quality evaluation including physical, chemical, nutritional and shelf-life studies were carried out to explore its potential for effective utilization. The product was analysed for its nutrient content such as ash, protein, crude fibre and total carbohydrates. The colour analysis suggests that the vegetable pear jam maintained a greenish yellow colour for storage period, although refrigerated storage resulted in a slight darkening effect. The rheological parameters indicated that product exhibit non-Newtonian pseudo plastic behaviour. The studies on microbial analysis by serial dilution method indicated that the refrigerated sample showed good microbial stability within the permissible limit when compared to the samples at room temperature which showed slightly higher microbial count but within the permitted levels of microbial load. The systematic sensory evaluation with semi-trained panellists indicated the overall acceptable (like very much) range. Thus, the studies on the quality parameters indicated that the prepared jam with spice extractive and vegetable pear is acceptable and provide scope on scale-up with market potential.

Value addition to the seeds from date fruits to enhance flavour and nutraceutical value *(Anil Kumar K)*

Date seeds procured from the market were soaked in hot water to remove any residual impurities and subsequently dried at 60°C for 45 minutes using a cross-flow drier. The dried seeds

were roasted under different time-temperature combinations to optimize the degree of roasting, employing both an electric rotary roaster and a spouted bed drier (SBD). The roasted seeds were cooled to room temperature, ground into powder using a mixer, and sieved through a 30-mesh screen. Roasted date seed powder (RDSP) obtained from both roasting methods was then blended with (i) Arabica Plantation "A" coffee (a mixture of Arabica and Robusta procured from Coffee Day) and (ii) chicory in different proportions. Roasting of date seeds produced physical and chemical characteristics similar to those of roasted coffee beans. Optimized RDSP was blended with coffee, and brews were prepared using the French press method, followed by sensory evaluation of different formulations: S1 - 70% Coffee Arabica Plantation "A" + 30% Chicory; S2 - 100% Arabica Plantation "A" (Arabica and Robusta blend); S3 - 70% Coffee Arabica Plantation "A" + 30% Roasted DSP (drum roasted); and S4 - 70% Coffee Arabica Plantation "A" + 30% Roasted DSP (spouted bed roasted). Sensory analysis revealed that sample S3 (70% Coffee Arabica Plantation "A" + 30% Roasted DSP, drum roasted) was closest to the control in aroma profile, though with slightly reduced intensity.

Reforming *Garcinia cambogia* fruit processing methods *(Naveen J)*

Garcinia cambogia or Malabar tamarind, is an important tree spice used as a flavoring agent in curry preparations due to its sour taste and flavour and also as ayurvedic medicine. Processing of the *G. cambogia* is laborious, time consuming and unhygienic. Hence, the easy, quick and hygenic method for processing of the *G. cambogia* was attempted requiring only 6 h to dry the rind of *G. cambogi*a. Also, the nutraceutical content of the processed and powdered *G. cambogia* was analysed in comparison with the traditional method. Hydroxy citric acid the major nutraceutical known for antiobese property was significantly higher in processed sample (57.64 g/L) compared to the traditional method (33.94g/L). Polyphenolic content was screened with 100% ethanol extract showing higher phenolic content in processed powdered sample (5.79 mg/g), thanin the traditionally processed sample (4.35 mg/g). Chlorogenic acid, p-coumaric acid, ferulic acid, resvertrol, ellagic acid and rutin were identified as the major polyphenolic in the extract. A similar trend was observed in flavonoid content; 5.38 mg/g was estimated in powdered sample, whereas 3.521 mg/g was found in traditional processed sample. Total lipid content was 8.75% in conventionally processed *G. cambogia* powdered and 6.30% in traditional processed *G. cambogia*. Antioxidant potential was also higher in the processed sample as observed in total antioxidant activity, DPPH and ABTS assay whereas traditionally processed samples showed relatively lower values. From this, it was observed that the scientific way of processing can be considered in food and ayurveda formulations. As of now traditionally processed *G. cambogia* is only being used in non-vegetarian preparations, but scientifically processed powder can be used in vegetarian preparations as it known for its various medicinal properties.

Enhancing shelf-life and quality of peanut butter using curcumin and turmeric oil *(Sachin R Chaudhari)*

This project investigates the incorporation of *Curcuma longa* (turmeric) industrial byproducts specifically curcuminoid-removed turmeric oleoresin (CRTO) oil and curcuminoids into peanut butter formulations to enhance antioxidant

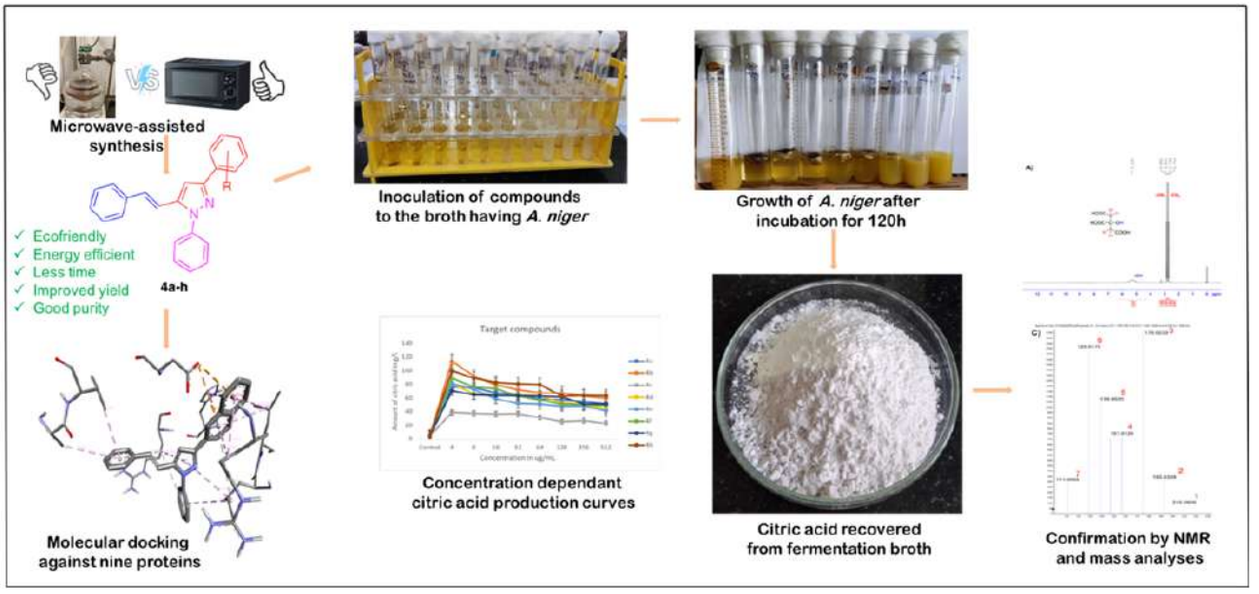
properties and extend shelf-life. The study evaluates the efficacy of these natural additives in delaying rancidity, improving flavour, and maintaining microbial safety. Results indicate that CRTO oil and curcuminoids effectively prolong peanut butter's shelf-life while enriching its nutritional profile. This approach offers a sustainable, clean-label alternative to synthetic preservatives, aligning with industry trends towards natural food preservation and waste valorization.

Semi-synthetic derivatives of principal constituent of cinnamon for the production of citric acid *(Suhas R)*

Considering the importance of food preservation, this study reports the synthesis of cinnamaldehyde derivatives i.e., chalcones and pyrazoles with an atom economy of >94% using an energy-efficient and eco-friendly MW synthesis that resulted in high purity and yield. All synthesized compounds were evaluated for their ability to enhance the growth of *A. niger* for citric acid (CA) production via submerged fermentation, which showed that the pyrazoles significantly outperformed both untreated samples and chalcones in CA production, with enhancements of up to 25-times and 4-times, respectively. Compounds at lower concentrations yielded CA levels of 100-113 g/L. The purity and authenticity of recovered CA was confirmed through NMR and MS. Molecular docking studies against the aconitase enzyme from nine different sources revealed various types of interactions with binding affinities ranging from -7.2 to -10. The target compounds can be regarded as valuable chemical 'lead' for CA production, effectively addressing both demand and supply.

Cooking of food in iron utensils for enhancing the bioaccessibility of iron for overcoming anemia *(Jyothi Lakshmi A)*

Iron deficiency anemia is one of the major nutritional problems in India, affecting nearly 50% of women, pregnant women, more than 65% of pre-school children, adolescent girls and around 25% of men attributable to low intake of



Citric acid production by *A. niger* using cinnamaldehyde derivatives

iron and poor bioavailability of iron. Cooking food in iron cast pots/with ingots is known to leach iron into the cooked food and whether the leached iron is bioaccessible and would help in alleviation of anemia. Hence the current investigation has been undertaken to study the effect of cooking traditional foods in iron utensils and studying their bioaccessibility. *Upma* a traditional breakfast food prepared from semolina was chosen, it involves two stages of processing such as dry roasting and cooking. *Upma* was prepared in conventional aluminium and a cast iron utensil with different volumes of water and acidulant i.e. citric acid at sensorially acceptable levels. The presence of citric acid increased the total iron by around three folds in upma cooked in aluminium pan and that cooked in iron pan by around 12 folds. The bioaccessesible iron was enhanced by 2.4 folds in the sample cooked in aluminium pan and that cooked in iron pan was enhanced by 14.0 folds which was extremely significant. Alternate to cooking in iron pan using an iron ingot in the cooked food is also to known to enhance the total and bioaccessible iron content of the foods. *Upma* cooked in aluminium pan along with iron ingot showed 18.5 to 20 fold increase in the total and bioaccessible iron respectively. These results confirm the fact that cooking food in iron utensils and using a ingot is a cost effective and promising strategy for increasing the iron content of foods. Further experiments are warranted for adopting this strategy for mass intervention programmes.

Customized anti-fatigue products from coconut and by-products *(Chetana R)*

The anti-fatigue activity of coconut testa, a powerhouse of flavonoids and phenolic compounds, has not been reported in food applications. In this study, antioxidant-rich food formulations were developed using combinations of virgin coconut oil (VCO), testa oil, testa fibre, and coconut testa phenolic concentrate. An antioxidant-rich powder derived from testa phenolic concentrate was prepared for easy incorporation into food products, including chocolate, jellies/gummies, oleogels, extruded snacks, and chikki. Dark chocolates fortified with varying concentrations (1%, 3%, and 5%) of testa polyphenol concentrate exhibited enhanced functional properties, with 3% enrichment (V2) showing the highest antioxidant activity (RSA: 0.56%) and total polyphenol content (TPC: 5.97%), indicating its potential in alleviating chronic fatigue and supporting performance, especially in athletes. Jellies fortified with 1.5% concentrate (TJ3) and vitamins demonstrated increased polyphenol content (TPC: 20.97 µg GAE/g), radical scavenging activity (RSA: 25.68%), and retained 73% of added vitamins after processing. Oleogels prepared with VCO, honey, and testa polyphenols exhibited superior functional and sensory qualities, improved thermal stability (peak melting point up to 28.20°C), and higher phenolic retention (up to 3.07 µg GAE/g in honey-based formulations). Extruded snacks developed with coconut fibre, testa fibre, and testa concentrate, alongside corn grits and barnyard millet, showed significant improvements in antioxidant activity and polyphenol levels, establishing their potential as functional foods. Chikki fortified with 5% testa fibre and 3% testa concentrate was sensorially well-accepted, offering an energy-dense nutrient profile. Collectively, these findings establish coconut testa polyphenols as effective functional ingredients for fatigue alleviation, oxidative stress reduction, and sustainable health-focused food innovations.

Formulation and product development of ayurveda recipes *(Sridevi A Singh/ Ramaprasad TR)*

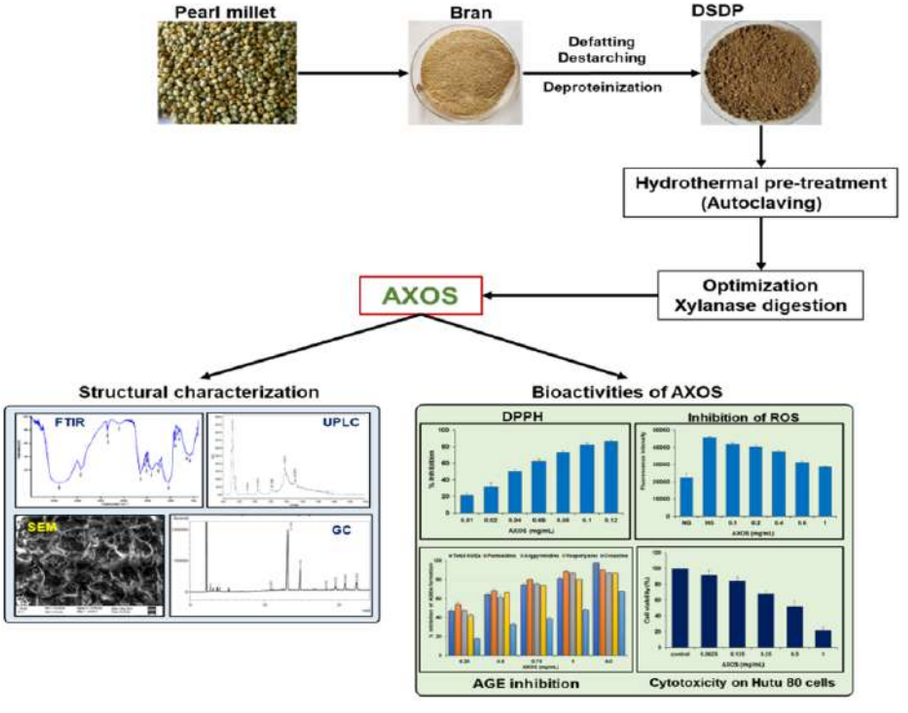
Ten ayush products were developed as per the authoritative books of Ayurveda, and the selected products were subjected for nutritional and safety evaluation in experimental rats. The products indicated acceptable sensory results and did not affect the growth and food intake of experimental animals. Further studies on the blood and tissue parameters are under progress.

Process standardization for preparation of Mohanthal prasadam *(Chetana R)*

The Ambaji temple Mohanthal Prasadam was standardized by optimizing the particle size of Bengal gram flour, sugar syrup crystallization, and ghee quality, which significantly influenced its texture and sensory properties. The preparation involved crumbling besan (75:25 fine to coarse), roasting in ghee, mixing with sugar syrup at 108°C, and molding. The final product showed ideal texture at 108°C syrup temperature, with moisture content of 2.86%, fat content around 22%, and water activity between 0.79-0.82. Temple ghee had higher PUFA, making it more prone to rancidity but of good quality. Addition of 500 ppm sorbic acid improved shelf-life without affecting fat stability. Packaging with metallized PET/PE and tray sealing extended the product's stability up to four months under ambient storage conditions.

Green chemistry method and pilot scale optimization of arabinoxylan oligosaccharides from pearl millet bran *(Sachin M Eligar)*

Arabinoxylan-oligosaccharides (AXOS) are the degradation products of polymeric AXs gaining importance as upcoming prebiotic oligosaccharides. They are known to have several health benefits. Pearl millet bran is an agro-processing waste from



Green chemistry method of production of AXOS

the milling industries and is known to contain a high amount of AX. Effort has been made to understand the structure-function correlation of AX and AXOS from pearl millet bran. Developing industrially viable green chemistry methods is the need of the hour for their commercial use. The current proposal aims to optimize the green chemistry method at a pilot scale and establish its antidiabetic properties *in vitro* and *in vivo*. The green chemistry method using hydrothermal pretreatment and enzymatic hydrolysis using specific xylanases was optimized. Solid-to-liquid ratio, enzyme units, and time of hydrolysis were optimized at the lab scale and the optimized method was adopted at the pilot scale with 2 kg starting material. *In vitro* antioxidant and antiglycation activities confirmed the efficacy of AXOS. Detailed structural characterization revealed the higher bound ferulic acid in the AXOS which may be contributing to the observed effect. The current method of extraction followed by the optimized downstream processing yielded nearly 17% AXOS with higher bound ferulic acid and these oligosaccharides showed better bioactivities compared to the alkali-extracted AXOS. The green chemistry method optimized at the pilot scale can be adopted by the industries to produce the AXOS from an agro-processing by-product of millets. This will contribute to the efficient utilization of agri-produce. The *in vivo* validation of bioactivities and development of functional foods is in progress.

Farm based S & T interventions for socio-economic development in the aspirational district of Nabarangpur, Odisha *(Nagender A)*

Three 4-day hands-on training programmes and one Trainers Training Programme were organized on 24-27 September 2024, 5-8 December, 2024, 29 January to 1st February, 2025 and 4-7 March, 2025 at the Common Facilities Centre (CFC), Nabarangpur established by CSIR-CFTRI Resource Centre, Hyderabad. Each programme trained 20 participants and aimed to create awareness on food processing operations and value addition. A wide range of fruit and vegetable products such as dehydrated potato chips, tomato pickle, mango RTS beverage, mango bar, orange squash, mixed fruit jam, tomato ketchup, home-made chocolates, bakery biscuits, muffins, bio plates, malted weaning food using ragi and green gram, etc., were demonstrated.

Instant mixes and value-added products from minor millets *(Sathiya Mala K)*

Two hands-on training programmes on 'Value added products from minor millets' were conducted during Jan 20-23, 2025 and March 10-13, 2025. During the training, preparation of instant soup mix, instant idli mix, instant dosa mix, vadiams, papads and millet flakes-based nutri bar were demonstrated.

Acceptability study of deep-fried snack foods with salt substitutes *(Prabhakara Rao PG)*

Preliminary trials were initiated to prepare traditional *murukulu* using rice flour and fried channa flour. In the control trials, the salt (sodium chloride) content in the standardized recipe was optimized to 2.3-2.5%. To reduce sodium levels, partial replacement of sodium chloride with potassium chloride was attempted at 10, 20, 30, 40, 50, 80, and 100% substitution levels. Sensory evaluation revealed that all products were generally acceptable; however, an aftertaste was observed in samples with 50% or higher KCl substitution. Similarly, sodium chloride was partially replaced with calcium

chloride at 10, 20, 30, 40, and 50% levels. While sensory evaluation again confirmed the acceptability of the products, aftertaste was noted in samples where KCl or $CaCl_2$ substitution exceeded 50%.



Deep-fried snack foods

Green pea pod powder and banana peel powder usage in dietary fibre-rich extruded and bakery products *(Sridhar R)*

Preliminary trials were undertaken by drying green pea pod husk and banana peel, followed by enhancement of fiber content from green pea pod husk. Basic parameters were analyzed, and the enhanced fiber was subsequently incorporated into extruded snacks at different proportions. Further analyses are currently in progress. The enhanced pea pod husk was found to contain 16-18% crude fiber and 55-65% dietary fiber, highlighting its potential as a value-added functional ingredient.

Formulation of healthy instant RTS beverage mix from ash gourd (*Benincasa hispida*) *(Srinivasulu K)*

The preparation of Ready-to-Serve (RTS) beverage using ash guard was standardized. The formulation included ash guard paste, salt, green chilli paste, lime juice, coriander leaves, sugar, black slat, pectin, lemon yellow colour and approved preservative. It contains 5.6% total sugars, 0.27% acidity, pH of 3.59 and 9.0° Brix.

Betel leaf powder and extracts utilization in foods *(Sulochanamma G)*

Preliminary studies were carried out to standardize a betel leaf powder-based spice blend for application in extruded snack. Extruded product with millets was developed and spice coating was done with betel leaf powder-based spice blend. Volatile oil from both fresh and dried betel leaves was extracted using a Clevenger apparatus. Quality analysis for fresh, dried and spice coated extruded snack is under progress.

Value added products from dragon fruits (*Hylocereus monacanthu*)
(Madhusudhana Rao D)

Preliminary studies were initiated to prepare ready-to-eat chips and jujubes. Dragon fruits were cut into slices of about 4 mm thickness and soaked in water containing preservative then dried in solar dryer and tray dryer for 48 h. It was observed that the dragon fruit slices dried in solar dryer turned into dark reddish brown colour where as in tray dryer no change in colour was observed. The dragon fruit slices above 4 mm thickness were not drying completely and slices less then 4 mm were becoming very thin in 48 h of tray drying. From the above results it is optimized that the slice thickness should be 4 mm, dried in tray dryer for 48 h at 55°C. Dragon fruit jujubes were prepared by boiling and adding sugar, pectin, citric acid to the pulp. Further trails are under progress to standardise optimum pectin concentration to set the jujubes.

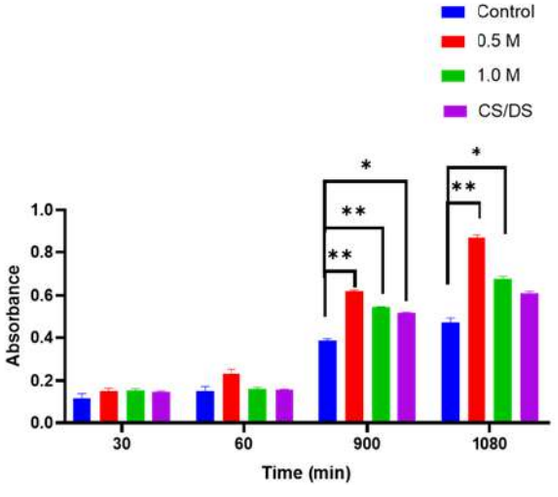
Minimization of post-harvest losses and shelf-life extension of selected fruits and vegetables grown in northern parts of India *(Khushbu Sharma)*

India continues to experience high post-harvest losses in fruits and vegetables, largely due to limited preservation and storage infrastructure, with crops such as amla (*Phyllanthus emblica*) and pointed gourd (*Trichosanthes dioica*) being highly perishable and vulnerable to spoilage. To address this challenge, the project explored eco-friendly and low-cost interventions - UV-C light treatment and basil oil-based edible coatings under both ambient and cold storage conditions. Experimental trials demonstrated that these treatments effectively delayed spoilage, minimized physiological weight loss, and maintained quality attributes such as colour, texture and pH with UV-C showing slightly superior results in retaining the firmness and green coloration of amla for up to 15 days and pointed gourd for 7 days under cold storage. Nutritional profiling confirmed that key bioactive compounds in amla, including ascorbic acid (439.34 mg/100g), fiber and phenolics were largely preserved. These findings suggest that such interventions can extend the shelf-life of amla by 10-15 days in fresh form and 2-3 months in processed products like murabba, candy and powder, thereby reducing post-harvest losses, improving marketability, and opening avenues for small-scale value addition enterprises. Importantly, the outcomes hold strong potential for promoting women-led Self-Help Groups in rural areas, contributing to livelihood generation, food waste reduction and nutritional security.

TRANSLATIONAL RESEARCH

Glycosaminoglycans from fish waste *(Nandini CD)*

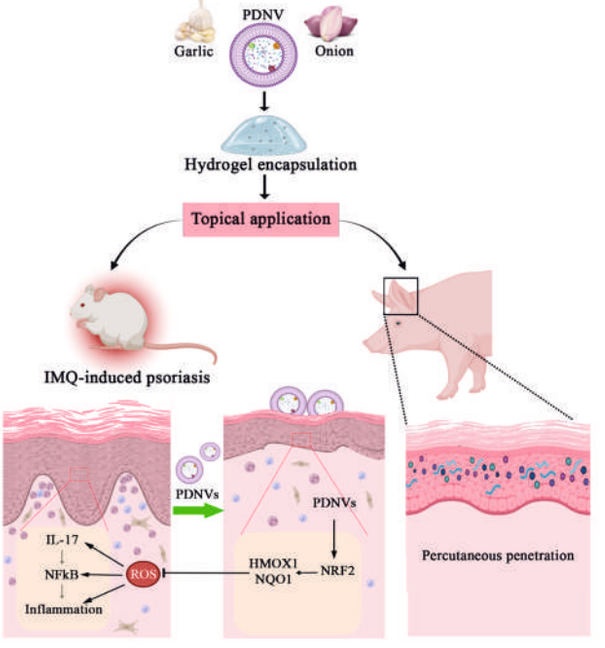
India, the world's second-largest fish producer, generates substantial inland fish processing waste, contributing to environmental pollution. While gelatin, fish oils, and protein hydrolysates are produced from this waste, many biomolecules remain underexplored. This proposal aims to isolate glycosaminoglycans (GAGs) from fish waste, adding value to byproducts and tapping into the high market potential of GAGs, which have applications as nutraceuticals and in biomedical fields such as osteogenesis, wound healing, and regenerative medicine. Building on the demonstrated osteogenic potential of chondroitin sulfate/ dermatan sulfate (CS/DS) derived from fish waste, the CS/DS was further fractionated into low- and high-affinity fractions based on charge density. *In vitro* studies showed that the 0.5 M fraction most effectively supported collagen fibrillogenesis and also exhibited the highest activity on early osteogenesis markers. These findings indicate that CS/DS can be selectively fractionated to isolate highly potent fractions, highlighting its potential as a valuable nutraceutical for bone health and regenerative applications.



Effect of various fractions on collagen fibrillogenesis

Garlic and small onion derived nanovesicles for treating psoriasis *(Gopinath M)*

Psoriasis is an inflammatory skin disease with aberrant epidermal differentiation and chronic inflammation. Plant-derived exosome-like nanovesicles (PDNVs) are exosome-mimetic structures isolated from plants with enhanced bioavailability and solubility. Herein, the therapeutic efficacy of PDNVs for psoriasis treatment was investigated. In the initial phenotype-driven screen, PDNVs from apple, garlic, and shallot displayed both pro-

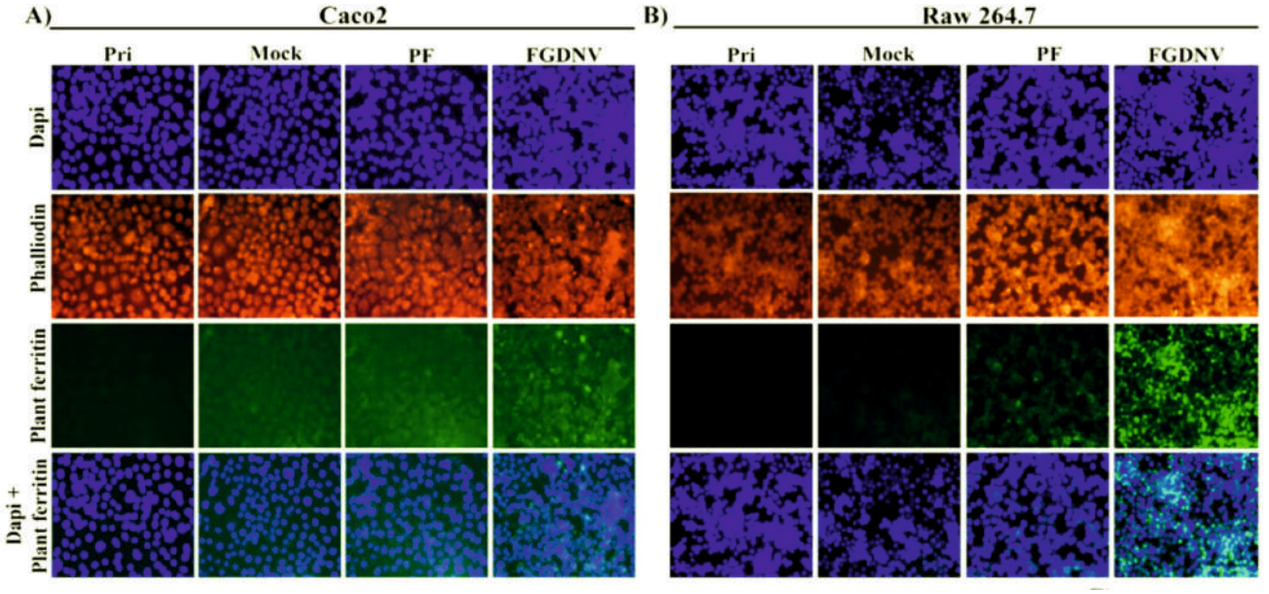


Schematic depicting the anti-psoriatic activity of garlic and shallot PDNVs validated in murine models of psoriasis for its efficacy and porcine skin for its transdermal penetration efficiency. Detailed mechanistic investigation through next generation sequencing reveal the modulation of NRF2-IL-17-NFKB axis by both PDNVs

differentiation and anti-inflammatory activity *in vitro*. In imiquimod-induced psoriasis-like murine model, topical application of either shallot or garlic PDNV hydrogels, led to complete recovery of normal skin phenotype. In porcine skin *ex vivo* assay, both shallot and garlic PDNVs displayed percutaneous penetration up to the suprabasal epidermis. Using next generation sequencing, and quantitative mRNA profiling in keratinocytes, and murine skin, a suppressive effect of shallot and garlic PDNVs on IL-17 signalling via modulation of upstream NRF2 pathway was elucidated. Since PDNVs are economical to produce, shallot and garlic PDNVs could be natural and cost-effective topical alternative for psoriasis.

Phytoferritin, from plant derived nanovesicles to treat anemia *(Gopinath M)*

Iron deficiency anemia (IDA) is prominent in India with frequencies ranging from 59% to 87% in pregnant women. Due to the low bioavailability of iron, very high doses of iron supplementations are often prescribed for patients with tremendous side effects. Phytoferritins are iron storage proteins and has been proposed as an alternate source of Fe for anaemia, though its bioavailability is disputed due to its instability in gastric pH. Plant-derived exosome-like nanovesicles (PDNVs) are intrinsic nanosized vesicles present in plants which contains plant bioactives, proteins, lipids and small RNAs. Herein, the presence of phytoferritin was evaluated within PDNVs isolated from edible plants such as mint, spinach, moringa, red sorrel leaves, fenugreek, soybean, cumin and fennel seeds. All PDNVs had a size range below 500 nm and zeta potential in the range of -20 to -30mV. SEM photographs exhibited the presence of round shaped nano-sized vesicles and TLC validated presence of lipids in PDNVs. Western blot confirmed the presence of ferritin in fenugreek PDNVs (FGDNV). The native-PAGE revealed the presence of ferritin in



Intracellular uptake of the FGDNVs associated ferritin. Immunocytochemistry analysis of ferritin (in green) using anti-plant ferritin antibodies in Caco2 cells (A) or RAW macrophages (B) treated with either PF or FGDNVs for 3 h. Mock-untreated cells and Pri- immunocytochemistry performed without primary antibody. Cells were counterstained for actin (red) and nucleus (blue)

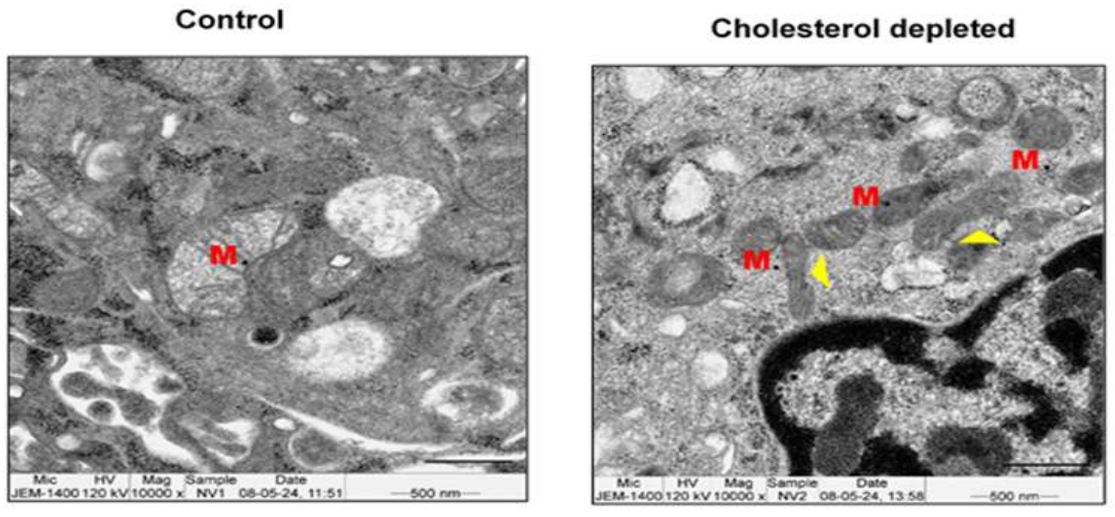
nanocage form in FGDNVs and in-gel iron staining showed the presence of iron in the ferritin nanocage. Immunocytochemistry analysis confirmed the spontaneous intracellular uptake of ferritin from FGDNVs. Overall, results suggest that the FGDNVs as a promising and potential agent for bioavailable source of iron.

Targeting mitochondrial fission with dietary molecules inhibits hepatic stellate cell activation and progression of non-alcoholic fatty liver disease *(Madan Kumar P)*

Human liver derived stellate cell lines (LX-2 cells) was employed as a cell model for this study. The main objective of this study was to determine the role of mitochondrial fission (MF) during HSC activation. To address this question, LX-2 cells were stimulated by cholesterol depletion and measured the expression of fibrotic and MF markers. It was observed that cholesterol depletion led to increase in the protein levels of α-SMA, DRP1 determined by Western blot analysis. Treatment with Midvi-1 (a known inhibitor of MF) downregulated the levels of α-SMA, DRP-1 significantly which confirmed the occurrence of MF during HSC activation. Also, the effect of cholesterol depletion on LX-2 cell mitochondria was determined by TEM analysis. Cells treated with cholesterol depleted media showed MF as evidenced by fragmented and dumbbell shaped mitochondria. Presently, generation of CRISPR mediated DRP1 knock out is currently underway which will further substantiate the significance of MF during HSC activation. Also, screening and validation of food bioactive(s) for MF inhibitory activity is in-progress.

Sterol Regulatory Element Binding Protein (SREBP) during hepatic stellate cell activation *(Madan Kumar P)*

The central hypothesis of this study is to determine whether Sterol Regulatory Element Binding Protein(SREBP) signaling play any role during hepatic stellate cell (HSC) activation. An experimental condition was developed to stimulate SREBP signaling in LX-2 cells. The SREBP signaling was induced by depleting cholesterol using DFBS and HPCD. Fatostatin, a known SREBP inhibitor was also used to study the regulation of SREBP signaling in response to cholesterol depletion.

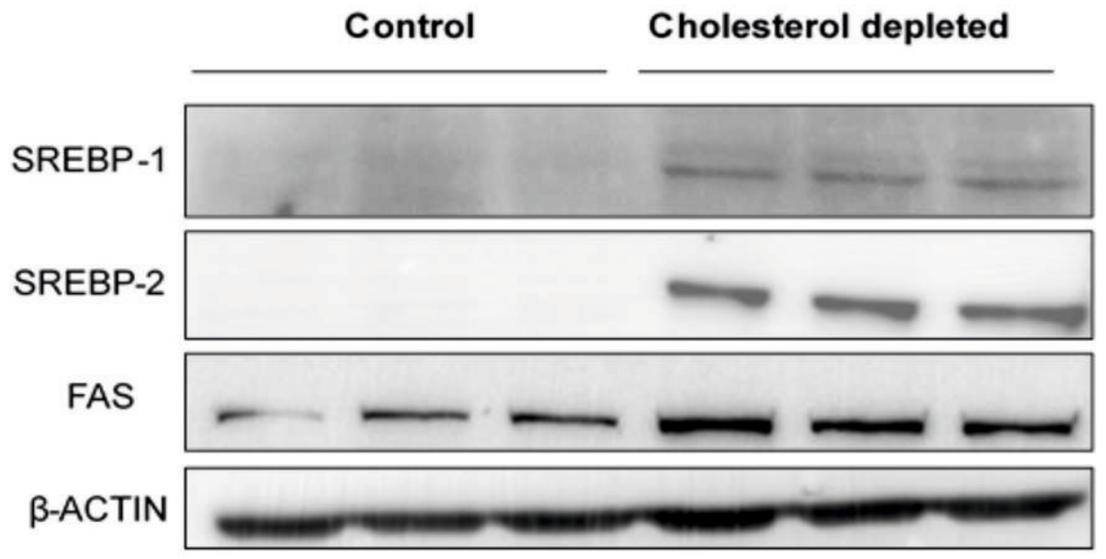


Representative TEM images of control and treated cells; M (Mitochondria)

Initially, the effect of cholesterol depletion on LX-2 cells was determined by MTT assay and Phase contrast microscopic analysis. It was observed that DFBS and HPCD treatment upto 4 h did not showed any significant cell inhibition and the cell morphology was also intact up to 4 h. The mRNA and protein levels of α-SMA, SREBP-1, SREBP-2 and their targets were determined by real time PCR and Western blot analysis. Cholesterol depletion induced SREBP activation as evident from the marked upregulation of SREBP-1, SREBP-2, and FAS levels. Treatment with fatostatin inhibited the activation of SREBP-1, and SREBP-2. The cell cycle profile between the control and cholesterol depleted cells did not show any significant alterations. Overall, for the first time a cell model was developed which showed an increased activated HSC phenotype along with SREBP activation for delineating the role of SREBP during HSC activation. Also, cell and animal experiments to delineate the SREBP inhibitory activity of a food bioactive is in-progress.

Adipocyte-derived extracellular vesicles activate hepatic stellate cells mediated by SREBP-cleavage activating protein
(Madan Kumar P)

This study shed light on the critical role of adipocyte derived extracellular vesicles (EVs) in driving metabolic dysregulation in obesity and MASLD. The distinct RNA profiles observed in pre adipocyte-EVs (PA-EVs) and mature adipocyte-EVs (MA-EVs) provided a molecular framework for understanding their contrasting effects on metabolic regulation. Notably, MA-EVs injection to high fat diet fed mice exacerbated liver fibrosis and inflammation, emphasizing its significance in the crosstalk between adipose tissue and the liver. Moreover, the differential impacts of PA-EVs and MA-EVs highlight the importance of deciphering the unique contributions of adipocyte subpopulations to systemic metabolic balance and the progression of metabolic disorders. This is the first study to delineate the pro-fibrogenic potential of MA-EVs determined in cell and



Representative Western blot image of SREBP-1, SREBP-2, FAS with β-actin as loading control

animal models. The findings from this study opened avenues for further exploration of the molecular pathways mediating the pro-fibrotic actions of MA-EVs, which could inform the development of targeted therapies for metabolic and liver diseases.

Culture ghee preparation and evaluation of its health benefits vs non-cultured ghee (commercial ghee) *(Ramaprasad TR)*

Ghee, an integral component of Indian food and culture, holds both culinary and medicinal significance, with 30-35% of milk in India converted into ghee. As the world's largest producer and consumer of ghee, India recorded a market size exceeding ₹10,000 crores in 2017, with production estimated at 5.6 MMT in 2018, reflecting a 3.7% rise due to increasing domestic demand driven by population growth and demographic shifts. Widely regarded as the most consumed value-added dairy product, ghee serves as a medium for cooking, frying, and garnishing. Beyond its dietary use, Ayurveda recognizes ghee for therapeutic applications in treating allergies, skin disorders, and respiratory diseases. Traditional commercial preparation involves creaming milk, churning butter, and heating to remove water and solids whereas the Ayurvedic method emphasizes culturing milk into curd, spinning to obtain butter, and slow heating to yield “cultured ghee.” This method, considered standard in classical texts, is believed to enhance therapeutic value as ghee functions as an anupana (vehicle) for transporting the bioactive properties of herbs into deeper tissue layers. Despite these claims, the molecular mechanisms underpinning the health benefits of cultured ghee remain poorly understood, necessitating systematic investigation. The present study is designed to develop cultured ghee and evaluate its biofunctional potential for human health benefits. In terms of progress, essential chemicals and consumables have been procured, and bacterial strains (*Lactobacillus acidophilus, Lactobacillus casei*) have been ordered from the National Collection of Dairy Cultures (NDRI, Karnal, Haryana) to ensure consistent fermentation outcomes. Discussions with local vendors, including Nandini Dairy and private milk suppliers, have also been initiated for the collection of diverse milk and butter samples to support experimental requirements. The study is expected to provide a scientific foundation for validating the functional and therapeutic properties of cultured ghee.

Value-added dietary formulation by the virtue of coconut milk exosomes and sesamol *(Anbarasu K)*

The project focuses on the use of a phytochemical-based approach targeting breast cancer and fabrication of a novel dietary formulation of yoghurt/milkshake using coconut milk exosomes and sesamol, utilizing the dual action of which, efficient targeting of cancer cells can be accomplished. Sesamol-loaded mature coconut kernel-derived exosomes (MCKE-S) exhibited enhanced cell viability against MCF-7 and MDA-MB-231 breast cancer cells with IC_{50} values of 25-45 µg/ml, compared to 1.2-1.3 mg/ml for free sesamol. Apoptotic induction was confirmed by AO-EtBr, Hoechst staining, and JC-10 dye-based mitochondrial membrane depolarization. ROS accumulation and extracellular oxygen consumption assay indicated mitochondrial dysfunction upon treatment with both free sesamol and MCKE-S. Colony formation and migration assays showed >70% reduction in proliferative and migratory potential post-treatment. Western blot and qPCR revealed

differential expression of apoptotic markers including Bax, Bcl-2, cleaved caspase-3, and PARP, confirming post-transcriptional and translational modifications. *In vitro*, simulated digestion assay (dialysis method) showed a 3.8-fold increase in bioavailability for exosome-loaded sesamol compared to free sesamol. Experimental design includes pharmacokinetics, tumor volume progression, and toxicity assessments. Two functional food prototypes - Coconut milk-based yogurt and Sesamol-loaded MCKE-infused coconut milk beverage was developed. Products remained organ oleptically and physically stable for 2 days at room temperature and 7 days at 4°C. Optimization of isolation and formulation parameters is ongoing to enhance shelf-life.

Basic studies on lipase for shelf-life extension of selected millet products *(Sridevi Annapurna Singh / Vijayaraj P)*

Millets, often referred to as "nutricereals" due to their balanced nutritional composition, are recognized for their health-promoting properties. However, their commercial utilization is limited by the short shelf-life of milled millet products, which are prone to rapid rancidity and nutrient loss. This instability hampers large-scale commercialization and export potential, where longer storage and transport durations are critical. To address this challenge, CSIR-CFTRI leveraged its expertise to enhance the storage stability of millets and strengthen the millet value chain for global markets. Key objectives included the design and fabrication of advanced processing machinery, development of semolina production protocols, and deployment of preservation techniques. Lipase activity was characterized, and structural insights enabled the development of enzymatic interventions for shelf-life extension. The influence of polishing on nutrient retention and storage stability was systematically studied, while de-hulling efficiency was optimized across millet species using rubber roll shellers, hydrothermal pre-treatments, and integrated de-hulling methods. A novel machine with an inbuilt sheller was designed for improved de-hulling. Process optimization for Kodo and Proso millets resulted in semolina with verified storage stability of nine months, while thermal and milling treatments extended pearl millet flour shelf life to eight months, validated by packaging studies. Lipid profiling and enzymatic assays of sorghum and pearl millet bran identified distinct lipase isoforms across bran, germ, and endosperm. Minimal polishing of foxtail, little, and proso millets preserved essential micronutrients and bioactives. Product innovations included phytonutrient-enriched instant multi-millet mixes and spirulina-fortified ready-to-cook porridges with enhanced nutrition, sensory acceptability, and shelf stability. These advancements in post-harvest processing, enzymatic stabilization, and product development substantially improve the commercial viability of millets, positioning India as a leader in sustainable and health-focused global cereal markets.

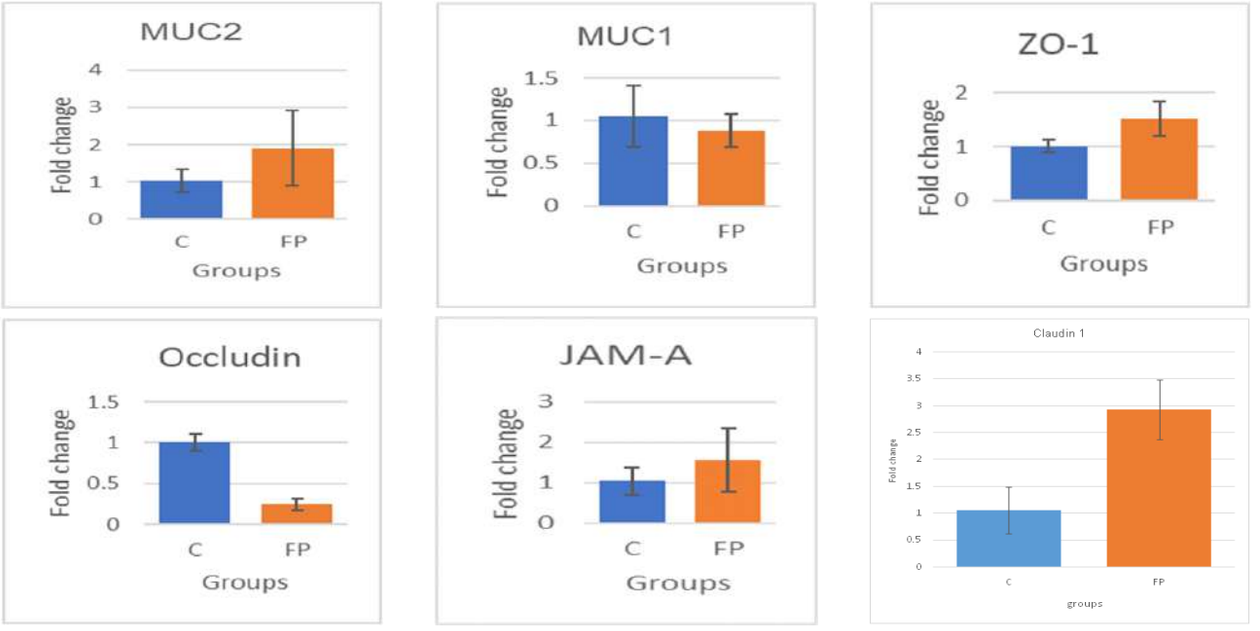
Multi-sourced edible oil fortified with lipid nutraceuticals *(Vijayaraj P)*

The health impact of dietary fats and oils is strongly influenced by the balance between saturated fatty acids (SFA), monounsaturated fatty acids (MUFA, ω-6), and polyunsaturated fatty acids (PUFA, ω-3). Both WHO and ICMR recommend a 1:1:1 ratio of these fatty acids. However, as no single oil naturally provides this balance, FSSAI has introduced Multi-Source Edible Oil (MSEO), a blend of three different oils

to ensure sufficient ω-3 intake while maintaining the recommended fatty acid profile. At CSIR-CFTRI, we developed a process to produce MSEO with a balanced fatty acid composition. Characterization of the blends revealed high quality and stability, indicating promising health benefits, practical applicability, and industrial potential. Notably, the thermal stability of ω-3 fatty acids was improved at the blended concentrations compared to native oils. Additionally, the efficacy of the oil in reducing body weight in high-fat diet induced obese mice will be validated.

Prophylactic and therapeutic nutrient supplements for functional gastrointestinal disorder (FGID) *(Mahejibin Khan)*

A synbiotic formulation was prepared using millets, pectic oligosaccharide and *L. fermentum* for the prevention of gut dysbiosis. Prophylactic mix was rich in various volatile compounds including dodecanoic acid, dodecane,2,6,11-trimethyl, butylated hydroxytoluene, 9,12,15-octadecatrienoicacid, methoxyaceticacid, 3-tridecylester, and indolamines etc which contribute to its anti-inflammatory and antioxidant effects. The *in vitro* analysis of the formulated mix revealed significantly higher total phenolic content and antioxidant capacity in DPPH, FRAP, and TBTS assays when compared to the control. Pre-clinical trials conducted on dysbiotic Balb/c mice demonstrated that the formulated mixture increased the mRNA expression levels of MUC-2, ZO-1, JAM-A, and claudin-1, while decreasing the expression of MUC-1 and occludin genes. These proteins play a crucial role in maintaining the structural integrity of tight junctions and supporting intestinal barrier function. Additionally, the mixture was effective in inhibiting zonulin expression in the dysbiotic mice, which is a biomarker of impaired intestinal barrier function. These results demonstrate that the prophylactic mixture could potentially prevent gut dysbiosis and restore intestinal barrier function, which is often impaired during gastrointestinal disorders. Ongoing studies are



Effect of prophylactic mix on mucosal layer and tight junction genes

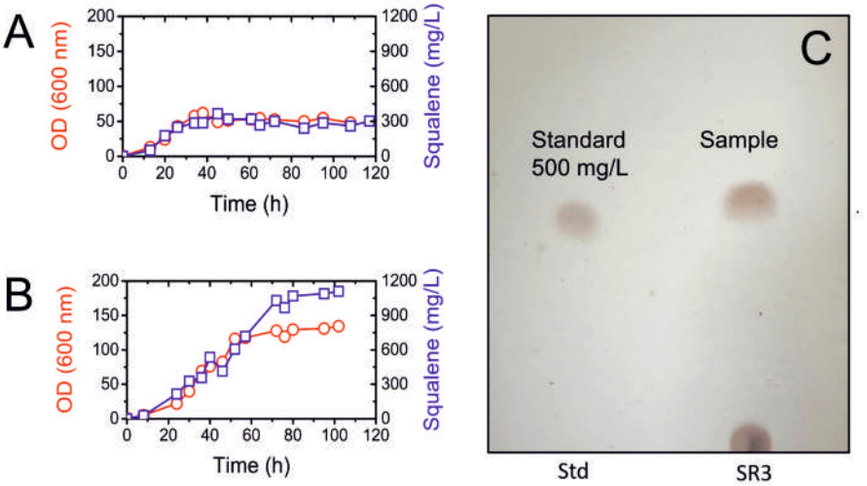
focused on elucidating the mechanisms and effects on gut microbiota.

Engineered *Saccharomyces cerevisiae* for production of squalene *(Sarma MVRK)*

Engineered *S. cerevisiae* for production of squalene by overexpressing native and non-native gene targets summing to a total of 14 genes to improve sterol pathway flux. Later, fed-batch cultivation was carried out at 5 L scale to produce squalene in the controlled conditions. After ethanol exhaustion from the batch phase, linear or pulse feeding was carried out, with an initial flow rate of 40 ml/h and gradually raised to 100 ml/h for 16 h. Programable peristaltic pump was used for handshake mechanism with the LABVIEW software. Batch was over by 20h, further 1L glucose feed was added to the bioreactor in the next 16h. Ethanol feeding was done by adding 50 ml pulse to the reactor four times after glucose was over. Linear feeding strategy resulted in a max biomass of 69 at OD600 nm and max squalene produced was 364.94 mg/l, whereas pulse feeding resulted in a max biomass of 134 at OD600 nm and squalene titre achieved was 1.11 g/l at 102 h. The TLC picture shows the confirmation of squalene titre against the standard.

Millet-based fermented product for management of neurological disorders *(Vinod Kumar N)*

The rising elderly population underscores the urgent need to address major geriatric health concerns, particularly neurological disorders. Gamma-aminobutyric acid (GABA), the primary inhibitory neurotransmitter in the central nervous system (CNS), plays a crucial role in maintaining the balance between excitatory and inhibitory neurotransmission. Disruption of this balance is associated with numerous neurological and psychiatric disorders, highlighting the importance of GABA in sustaining healthy brain function. Lactic acid bacteria (LAB) have emerged as a promising source of GABA due to their natural production capabilities and their generally recognized as safe (GRAS) status. This makes them ideal candidates for incorporation into functional foods aimed at enhancing GABA intake. In this

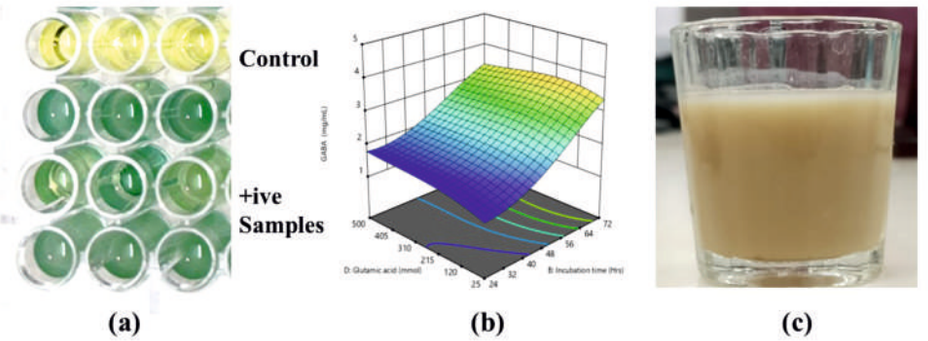


Showing the time-course of squalene titre and OD600 (A) Linear feeding (B) Pusle feeding (C) Shows the picture of sample against the standard in TLC plate

project, the potential of LAB for GABA production was explored. Optimization studies were conducted to identify a suitable millet-based substrate, leading to developing a beverage based design for GABA enrichment. The developed product's organoleptic characterization is underway with preclinical trials planned for the next phase.

Galactomanno-oligosaccharides as potential therapy for inflammatory bowel disease using omics based approaches *(Mukesh Kapoor)*

Global gene expression patterns of *L. plantarum* (environmental strain) fed with LBG-β-MOS and control sugars (glucose, galactose, and mannose) were analyzed by using volcano plots and heat maps. Presence of LBG-β-MOS led to a significant up-regulation ($p < 0.05$, fold change > 1.0) of 127, 125 and 111 genesand down-regulation ($p < 0.05$, fold change < −1.0) of 593, 632 and 591 genes, when compared with glucose, galactose, and mannose, respectively. The larger number of DEGs pointed toward the global effect of LBG-β-MOS on the overall metabolism of *L. plantarum*. Heat map analysis of the top 50 DEG's illustrated that 47 genes were upregulated (fold change ≥ 2), while 3 genes were found downregulated (fold change ≤ - 2). Among the up-regulated genes, we were able to assign three distinct gene clusters; cluster I, L-rhamnose utilization operon [rhamnulokinase (rhaB,AVR82_RS03745);L-rhamnose mutarotase (rhaM, AVR82_RS03750); L-rhamnose isomerase (rhaA, AVR82_RS03755); rhamnulose-1-phosphate aldolase (rhaD, AVR82_RS03760)], cluster II [Two gene: 6-phospho-beta-glucosidase (pbg6, AVR82_RS01475); PTS sugar transporter subunit IIC (AVR82_RS01480)], cluster III [Three genes: acetylglucosamine 2-epimerase (AVR82_RS03870); sodium: proton antiporter (AVR82_RS03875); sodium:solute symporter (AVR82_RS03880)] which are possibly employed by *L. plantarum* (environmental strain) for the uptake and deconstruction of LBG-β-MOS into monosaccharides. Clusters I and III (highest up-regulated in the presence LBG-β-MOS; up to 6.01 and 6.68 respectively) are mapped to be involved in fructose and mannose utilisation pathways, whereas cluster II (up-regulated up to 3.81) has been previously mentioned to be involved in the uptake and catabolism of starch and sucrose metabolism. GG-β-MOS(ii) supplementation successfully counteracted the DSS-induced changes in



Development of a GABA-rich probiotic beverage. a) Screening of GABA production by probiotic strains,
b) RSM optimization of GABA production using millet extract as media, and
c) developed beverage with probiotic culture

specific MACs, including oxalate, palmitic acid, acetate, and D-mannose. These findings suggest that GG-β-MOS(ii) supplementation helps in restoring the metabolomic balance disturbed in the UC mice. Pearson's correlation analysis between the fecal MACs and 17 intestinal bacteria enriched at genus level in GG-β-MOS(ii) group was carried out. D-mannose, coprostanol, pentadecane, alpha-linolenic acid, dihomo-γ-linolenic acid, D-ribose, L-fucose, D-arabinose, N-acetyl-D-glucosamine, acetate and butyrate showed positive correlation while oxalate, palmitic acid, arachidonic acid and erythritol had negative correlation with *Lactobacillus, Bifidobacteria, Bacillus* and *Enterococcus.*

Post-biotics fermentate formulation for management of diabetes, hyperlipidemia and gut health *(Prakash M Halami)*

Postbiotic components were extracted and partially characterized from *Lactobacillus fermentum* and *Bifidobacterium breve* strains. Carbohydrate and protein contents were quantified using the Dubois method and NanoDrop spectrophotometry. *In-vitro* assays revealed significant anti-diabetic potential, with the cell-free supernatant of *L. fermentum* MCC2759 demonstrating 74.8% α-amylase and 91.3% α-glucosidase inhibition. Exopolysaccharides from *L. fermentum* MCC2760 and *B. breve* NCIM5671 also exhibited marked inhibitory activity against these enzymes. The results underscore the dose-dependent bioactivity of postbiotics and their potential application in functional foods for metabolic health management.

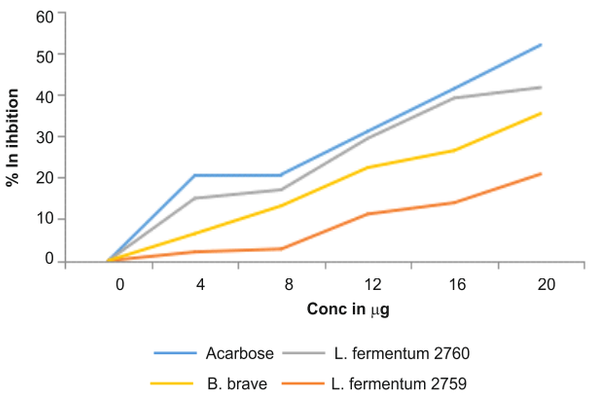
Regulatory genes involved in pungency in Capsicum sp. *(Giridhar P)*

The impact of temperature on capsaicinoids, particularly capsaicin and dihydrocapsaicin, in chili suspension cultures. Significant increases in capsaicin (56.92 µg/g FW) and dihydrocapsaicin (31.96 µg/g FW) were observed at 32°C on the 18th day. However, capsaicinoid levels began to decline after the 27th day due to extreme temperatures, while a notable increase was seen at 24°C. Expression analysis of transcription factors MYB, ERF, JERF, and CS revealed they were significantly influenced by temperature. At 16°C, MYB and JERF expression increased by 8.23-fold, and ERF showed a 9.02-fold rise at the 9th day. At 24°C, MYB, ERF, JERF, and CS exhibited considerable variation, with ERF peaking at 8.49-fold on the

a)



b)



(a) Exopolysaccharides (EPS) from *B. breve* NCIM 5671 and (b) Percent inhibition of Amylase from Acarbose, and EPS from *L. fermentum* 2759, *L. fermentum* 2760 and *B. breve* NCIM 5671

9th day. The maximum expression for MYB and CS was 6.45-fold and 6.98-fold on the 18th day, respectively. At 32°C, MYB, ERF, JERF, and CS showed maximum up-regulation on the 9th and 18th days, with MYB peaking at 5.78-fold on the 9th day, and CS increasing by 8.78-fold on the 18th day. Down-regulation of MYB and JERF occurred after the 27th day.

Xanthosine metabolism and its effect on caffeine biosynthesis in coffee plants *(Giridhar P)*

Gene-specific primers for *GSDA* and *NSH1* were designed using Primer3Plus software, ensuring specificity, optimal melting temperature, and product size. These primers were synthesized by Bioserve and validated for their efficiency. Quantitative RT-PCR (qRT-PCR) was conducted using the SYBR Green Master Mix. Action was used as the internal reference gene for data normalization. A manual control set was established, consisting of seeds collected from mature fruits, which served as a baseline for relative expression analysis. The qPCR reactions were optimized for primer specificity and amplification efficiency, with melt curve analysis confirming the absence of primer-dimer artefacts or non-specific products. The analysis revealed a consistent gene expression pattern for *GSD*A and *NSH1*. Both genes exhibited an upregulation from Stage1 to Stage 2 of berry development, indicating their potential involvement in early developmental processes. However, as the berries matured to Stage 3, the expression levels of both genes declined significantly.

Micropropagation of GI-tagged banana varieties *(Sreedhar RV)*

Authentic planting material was collected from the sources (Nanjanagud & Kamalapur) and mother plants are maintained at CFTRI, Mysuru. *In vitro* cultures of Nanjanagud Rasabale (NR) banana have been established for need based multiplication. Plastid DNA region matK and rbcL which act as the barcode for land plants supplemented with nuclear ribosomal internal transcribed spacer (nrITS2) of NR banana were amplified, sequenced and analyzed. For developing DNA barcoding,



(a) hoot bud induction from apical bud (b) Shoot multiplication (c) Shoot cultures (d) Hardening
(e) Tissue cultured plant in field (f) Mother plant (Nanjanagud rasabale) (g) Mother plant (Kamalapur red banana)

protocol for extraction of DNA from various parts of banana like leaf, peel and stalk has been standardized. The matK, rbcL, and ITS2 genes from different collections of NRB were successfully amplified and sequenced. Amplicons had a length of 823 bp, 679 bp and 795 bp respectively. Sequences were subjected to further analysis. Sequence variation among above varieties (collections) for ITS2, matK and rbcL genes was observed which can serve as a differentiator. Sensory/metabolomics analysis of different banana collections using e-nose and e-tongue were also undertaken. Sensory evaluation with e-nose showed significant variation in flavor profile. Odour map based on PCA showed significant discrimination. Taste profile analysis using e-tongue also revealed differences among NR banana fruit collections. Metabolomic profiling is in progress. *In vitro* cultures of NR banana which can serve as source for need based commercial multiplication have been establishment and maintained. *In vitro* cultures KR banana have been initiated.

Biofortified wheatgrass as a sustainable source for Fe and Zn nutrition *(Sreedhar RV)*

The pattern of mineral accumulation (Zn and Fe) in wheatgrass was studied on days 3, 6, and 9 through foliar spraying of varied concentrations of $ZnSO_4 \cdot 7H_2O$ and FeEDDHA, respectively. Both Zn and Fe treatments led to a dose-dependent increase in mineral accumulation. The extent of accumulation was more pronounced at higher concentrations and at later stages of growth. The results support use of controlled eustress through micronutrient fortification to enhance the mineral content in wheatgrass, with 1.73 mM $ZnSO_4 \cdot 7H_2O$ and 4.0 mM FeEDDHA being the most effective concentrations. Bioaccessibility of Zn and Fe was evaluated using *in vitro* digestion method, and mineral absorption was analysed with MPAES. The results showed an increase in bioaccessibility of both minerals across treatment concentrations compared to the control. In addition, the uptake of zinc was investigated using the everted gut sac model in the small intestine of Wistar rats. The results indicated a 14.7% increase in zinc uptake for the zinc-fortified wheatgrass sample compared to the control wheatgrass sample.

Actinomycetes against some clinical pathogens in BRT wildlife sanctuary, Western Ghats *(Thirumalesh BV)*

Actinomycetes are a group of gram-positive bacteria that are well-known for their ability to produce a wide variety of bioactive compounds, including antimicrobial agents. Actinomycetes strains from the Western Ghats region of Karnataka were isolated and studied along with earlier strains obtained from the same region. Isolation of actinomycetes was done from the seven distinct soil samples collected from the BRT Wildlife Sanctuary, Western Ghats forest region of Karnataka. The organisms were isolated in different media like Nutrient Agar (NA), Potato Dextrose Agar (PDA), Actinomycete Isolation Agar (AIA) and Starch Casein Agar (SCA), besides some selective media by serial dilution and spread plate methods. A total of 115 actinomycete isolates were obtained, with SCA and AIA media yielding the highest recovery. The isolates were maintained on respective media slants at 4°C for further studies and the purified strains were identified through morphological, cultural and genomic signatures by 16S rRNA sequencing.

FOOD PROTECTION AND SAFETY

Grain storage system for prevention of insect infestation in stored food products *(Ezil Vendan S)*

Insect pests cause qualitative and quantitative damages to stored food grains. The *Callosobruchus maculatus* (Pulse beetle), *Sitophilus oryzae* (Rice weevil), and *Tribolium castaneum* (Red flour beetle) are most common insect pests of pulses, cereals and grains, and processed foods, respectively. Gaseous fumigation is a most efficient method for controlling insect infestation in bulk grain storages. However, conventional fumigant pesticides have not allowed for home scale operations. This study focused to design and develop a prototype of grain storage system with pushing force mechanism for the prevention of insect infestation in stored food commodities. Understanding of movement behavioural patterns of insects are important for the effective management of pests. Accordingly, vertical movement pattern analysis was performed for the *C. maculatus*, *S. oryzae* and *T. castaneum* adults with suitable food commodities. Locomotor behaviour analysis revealed that about 60% of *S. oryzae* adults were moved to the middle layer from lower part within 12 h. Subsequently, 40% of *C. maculatus* adults were moved to middle layer and 6.6% to upper layer. Locomotor activity of *S. oryzae* was more and 33.4% of adults reached to upper layer with the significance of $P < 0.05$. Locomotory rates of *S. oryzae* and *C. maculatus* adults were increased with the increase of treatment durations with the significance of 0.89 and 1.00 R2 values in linear regression analysis. Whereas, the locomotor behaviour of *T. castaneum* adults was lower (< 6.6%) inside the wheat flour. As a result of locomotion deterrence assay, 100% deterrence was recorded inside the food grains for all the tested species up to 12 h of observation. Study results indicated that the pushing force mechanism prevented the insect's movement and controlled the feeding and reproductive activities during the experimented period. Fabrication of prototype of grain storage system with pushing force mechanism is under progress.

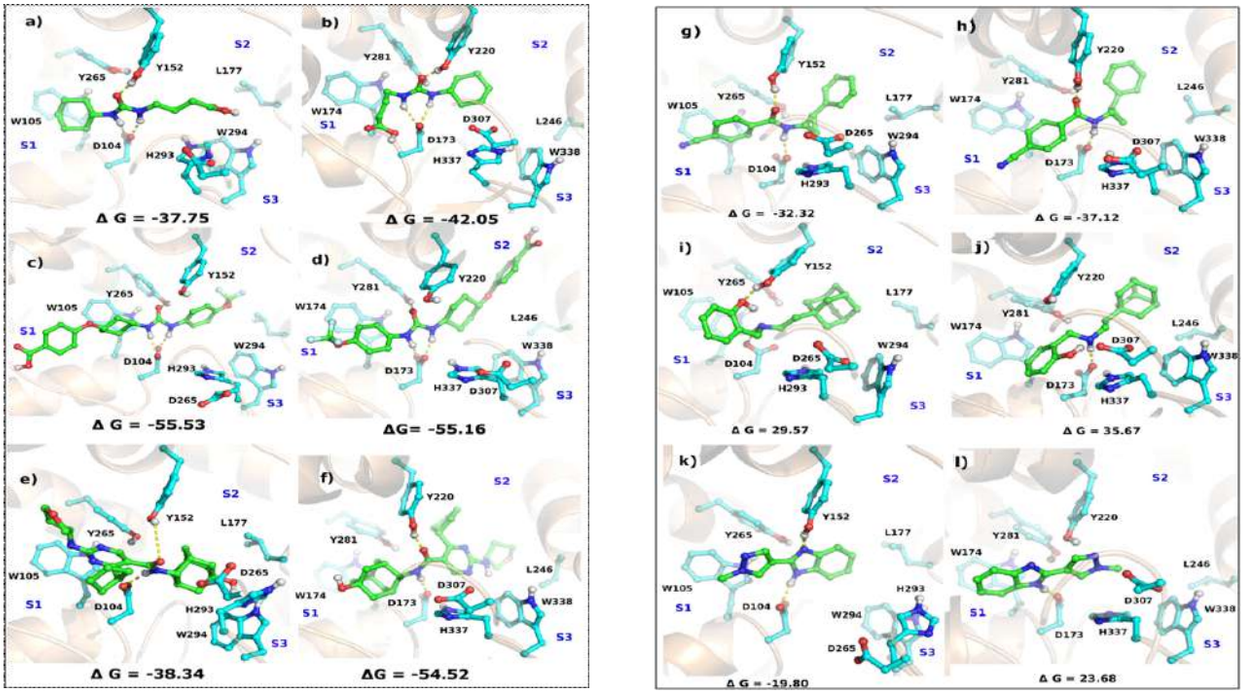
Analytical quality control and quality assurance in rice fortification *(Giridhar P)*

Testing the consistency of iron-fortified blended rice using Standard operating procedure was carried out. Optimization of the reagent (iodine solution, Lugol's solution, Wijs solution and povidone iodine solution), optimization of the concentration of the povidone iodine solution, blending efficiency test by measuring the number of FRK grains per one gram of FRK and the number of FRK in 100 g of blended fortified rice and blending efficiency test for around 22 samples from different zones of India was done. Povidone iodine solution was identified as the only reagent to detect FRK through a colour change linked to forming an iodine-starch complex. After testing concentrations ranging from 0.01 to 2%, the optimal concentration for rapid detection was between 0.2 and 0.3%. Rapid detection of Fe in fortified kernels was validated using 14 FRK rice samples collected from diverse regions in India to ensure its robustness against varying conditions. Analysis of 14 samples helped identify patterns and areas for improvement in the detection method. The feedback is being utilised to refine the detection kit, enhancing its reliability and user-

friendliness for quality control and monitoring of fortified rice.

Microsomal epoxide hydrolases through multiscale modeling to understand lipid signaling and metabolism *(Usharani D)*

The X-ray crystal structure of EH2 reveals two distinct domains: an N-terminal phosphatase domain and a C-terminal epoxide hydrolase domain. The hydrolase domain consists of eight β-strands and six α-helices forming the characteristic α/β hydrolase fold, along with a cap domain. These domains are linked by conserved N/C and cap loops, which play critical roles in substrate recognition, binding, catalysis, and inhibitor selectivity. Molecular dynamics (MD) simulations were used to examine the flexibility of EH isoforms (EH1, EH2, and EH3) and the interactions among these structural elements. Superimposition of soluble EH2 with microsomal EH1 and EH3 revealed ~22-23% sequence identity and a conserved α/β hydrolase fold, but with distinct variations in the N/C and cap loops. These differences shape water channels and contribute to the evolution of tunnels, influencing substrate access and inhibitor specificity. To further evaluate inhibitor selectivity, molecular docking and binding affinity estimations were performed using known EH2 inhibitors, broadly classified as urea-, amide-, amine-, and pyrazole-based analogs. Structure-activity relationship analysis of urea-based inhibitors identified potent EH2 binders. Docking and MD simulations validated the methodology and revealed differences in binding poses. The potent urea inhibitor displayed a flipped orientation in EH2 and EH3, with conserved hydrogen bonding of the urea



Binding poses of urea inhibitors to EH2 (a,c) and to EH3 (b,d). The binding poses of amide inhibitors to EH2 (e,g) and to EH3 (f,h). The binding poses of amine inhibitors of EH2 and EH3 are shown in (i) and (j) respectively. The binding poses of pyrazole inhibitor bound to EH2 and EH3 are shown in (k) and (j) respectively. The key active site residues EH2 and EH3 interact with synthetic potent inhibitors

moiety to D104 and Y152 in EH2, and to corresponding residues in EH3, while substituent positioning in S1 and S2 pockets was interchanged. Despite these conformational differences, net interactions and binding affinities remained comparable. By contrast, amide, amine, and pyrazole inhibitors exhibited stronger affinity toward EH3. Similar to the urea case, amide analogs maintained conserved hydrogen bonding but showed flipped substituent orientations between S1, S2, and S3 pockets. Collectively, these findings highlight loop variability and pocket-specific interactions as determinants of inhibitor selectivity across EH isoforms.

Validation of published test methods of vitamins identified food matrices for revision of Indian Standards *(Usharani D)*

The multi-laboratory validation of vitamin B12 was initiated in the Institute. Nestle initiated multi-laboratory validation of vitamin B9 and Envirocare initiated multi-laboratory validation of Vitamin D. The homogeneity, stability of matrices and method optimization of LC-MS/MS method were successfully achieved by the lead laboratory and the samples were analyzed in five different laboratories for a fully validated method. Also, single laboratory validation of vitamin B12 and B5 are completed by Nestle. The performance characteristics of each method have satisfactory $HORRA_{Tr}$ and $HORRA_{TR}$.

Quantification of ethylene oxide and its metabolites in oil seeds and spices (*Giridhar P)*

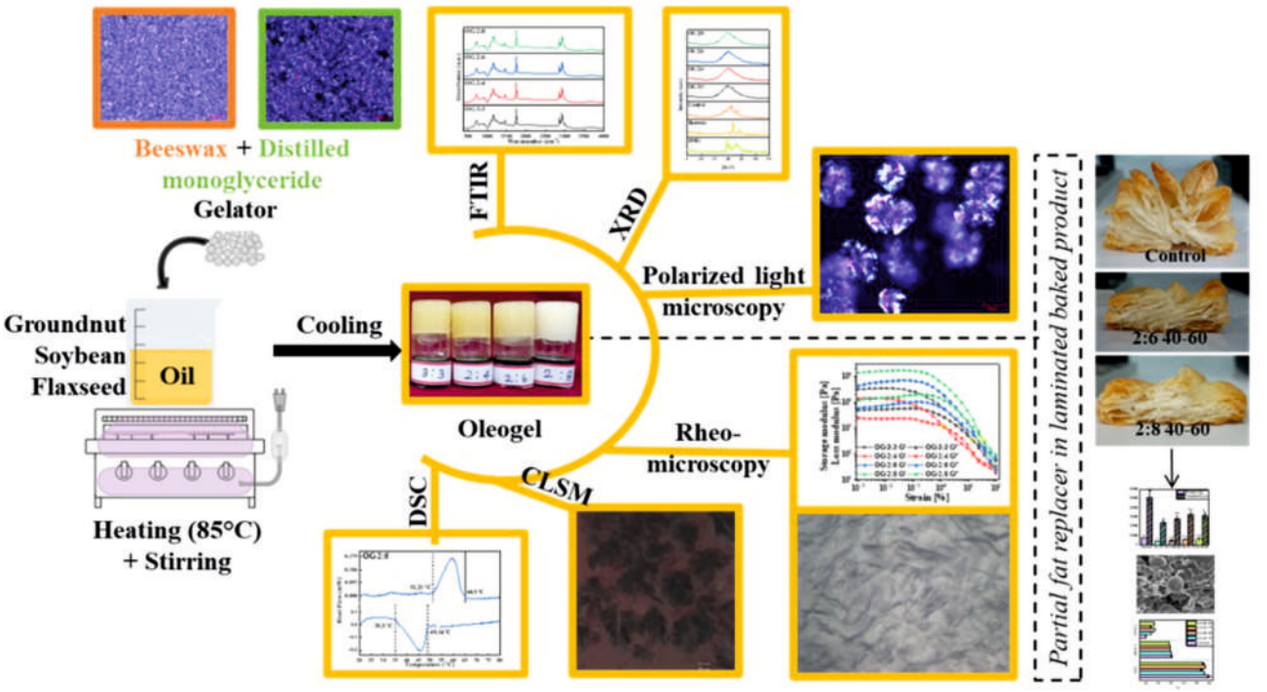
The fumigant ethylene oxide is known to undergo degradation, resulting in the formation of 2-chloroethanol, a metabolite of concern. To aid in analytical assessment, certified reference materials for both ethylene oxide and 2-chloroethanol have been procured, allowing for the optimization of analyte responses using a variety of organic solvents. In testing, it was determined that the use of water as a diluent led to significantly less interference, particularly when employing an MXT column coupled with an electronic nose (e-nose) equipped with a Flame Ionization Detector (FID). Notably, the limit of detection for the analytes under investigation was established at a sensitivity level of 1 ppm. Additionally, qualitative analysis of ethylene oxide content in sesame seeds is currently underway using the e-nose technology, which offers an innovative approach to detection. Concurrently, work is being done on the quantitative estimation of ethylene oxide along with its degradation product, 2-chloroethanol, utilizing Solid Phase Microextraction Gas Chromatography Mass Spectrometry (SPME-GC-MS), which ensures accurate and reliable measurements of these critical substances.

CSIR PROJECTS

Fast Track Translational / Fast Track Commercialization Projects

Functional oleogel based bakery products
(Prabhasankar P)

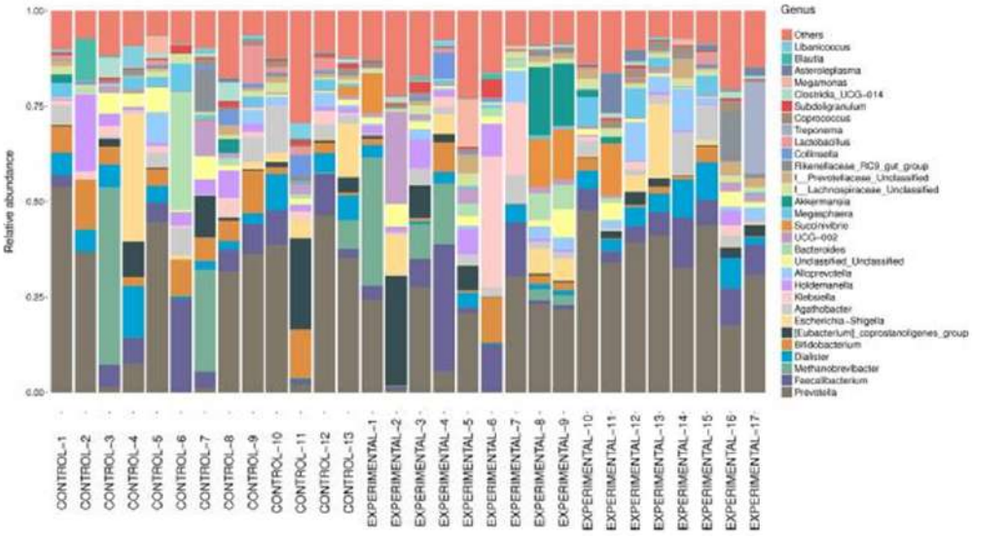
This study synergistically employed food grade gelators to prepare oleogels with varying ratios and concentrations of gelators, using a PUFA-rich oil blend. An oil binding capacity greater than 90% was achieved. The rheology showed that the oleogels are exhibiting a shear-thinning behaviour, further the temperature ramp revealed a melting temperature of 83°C in OG 2:8 and a structure recovery of 66-70%. This study attempted to calculate the elastic yield stress of the oleogels by acquiring the maximum elastic stress values as the actual yield stress. The rheo-microscopy was performed with heating and cooling cycles which showed the microstructures of gelation as rod-like structures increasing in length formed as the temperature was decreased. In DSC, OG 2:8 showed the highest melting/ crystallization temperature and enthalpy, indicating the highest thermal stability and gelator crystallization in the matrix. The existence of α, β' and β crystal polymorphs in oleogels was confirmed with XRD. With the polarized microscopy and CLSM, mixed crystals were observed along with rosette-like, feather-like, and needle-like crystals indicating that both co-assembly and self-sorting gels have formed. The OG 2:6 and OG 2:8 was determined to be appropriate for use in the laminated baked product (Khari), oleogels were used in place of 25% and 40% of the conventional shortening.



Schematic representation of oleogel preparation and characterization

Grain based nutrient rich functional food for improving gut health status of geriatric people *(Shruti Joshi)*

Ageing is a natural process involving physical, physiological, and cognitive changes, while geriatrics is a specialized field addressing the healthcare needs of older adults. Although aging cannot be halted, nutrition plays a pivotal role in successful aging. Geriatric malnutrition is prevalent and leads to reduced functional capacity, diminished bone density, impaired immunity, delayed recovery, higher hospitalization and increased mortality risk. A vital link exists between gut microbiota, diet and nutrition in older adults. With advancing age, shifts in gut microbial composition occur, influenced by reduced dietary fiber intake, altered nutrient absorption and changes in gut motility. Hence, this project aimed to develop specialized geriatric food fulfilling nutritional requirements while restoring gut eubiosis. For gut genome studies, human fecal samples were collected, DNA isolated using HiPurA stool DNA kit, quantified via nanodrop at A260/A280, and quality checked by gel electrophoresis with *E. coli* Hind III ladder. Samples were sent for metagenomic sequencing. Initial results revealed higher proportions of *Escherichia –Shigella*, *Klebsiella*, and *Collinsella* in experimental samples, while *Prevotella* was abundant irrespective of age. In parallel, *in-vitro* screening of millets and cereals was carried out to identify grains with positive gut-modulating effects. Optimized millet-based spray-dried drinks were developed using RSM Box-Behnken design with browntop and kodo millet. Selected formulations underwent *in-vitro* fermentation with fecal samples. pH changes indicated acid production, with significant increases in total phenolic content (TPC). GC-MS analysis showed elevated short-chain fatty acids (SCFAs) - notably acetic, propanoic, and butanoic acid-over 24 h compared to controls. Spray-dried powders exhibited bulk density (0.45 g/ml), tapped density (0.50 g/ml), Hausner ratio (1.1), and Carr index (16). Proximate composition included 6% moisture, 15.23% protein, 3.12% fat, 2.99% ash and 12% fiber. Further shelf-life and animal studies are planned to validate these findings.



Stacked bar plot of species distribution (Control - Non Geriatric sample, Experimental - Geriatric sample)

Advancing dietary fat quality in creamy condiments: Balancing taste and nutrition for effective weight management *(Vijayaraj P)*

The global shift towards urbanization and changing lifestyles in both urban and rural areas has led to unhealthy dietary patterns, with over 50% of the population currently residing in these regions projected to exceed 70% by 2050. Increased consumption of high-calorie, fatty and sugary fast foods has contributed to rising obesity rates, causing approximately 2.8 million deaths annually, while sedentary lifestyles have become the fourth leading cause of mortality. To address these health concerns, a commercial process for producing a healthy modified fat base using enzymatic and non-enzymatic strategies was developed. This innovative fat base is enriched with targeted fatty acids and nutraceuticals, making it suitable for integration into various creamy condiments such as mayonnaise, spreads, dips and toppings for fast foods like pizza and burgers. The aim is to help reduce weight gain and manage obesity-related complications even in the context of high-fat food consumption. The desired fat composition was successfully achieved through enzymatic processing and produced healthy emulsified products, including mayonnaise. The process was optimized for large-scale production, with detailed physicochemical characterization and accelerated stability studies conducted to ensure product quality. Shelf-life studies and sensory evaluations are currently underway. The encouraging outcomes of this research lay a strong foundation for introducing healthier alternatives in the processed food industry, with the potential to significantly enhance public health outcomes while preserving taste, texture, and overall consumer acceptance.

Essential oil based prophylactic agents for prevention of stored grain insect pests *(Vivek Babu CS)*

Storage of food grains requires application of curative fumigants (Phosphine) and prophylactic agents (Deltamethrin). Moreover, in India loss of food grains during storage conditions, accounts to 4.5 to 6%, of its total grain production. Control of insect infestation in food grains needs highly selective and systematic approach. However, application of these chemical insecticides is quite challenging. In addition, over reliance of phosphine had increased the concerns of rph1, rph2 resistance development in most of the stored grain insect pests (*Sitophilus, Tribolium, Rhyzopertha*). At present, due to limited availability and impositions on usage of conventional insecticide, there is an urgent need for deployment of safe and selective insecticides for the management of stored grains. In addition, Food Corporation of India since 2022 had shown its keen interest on deployment of plant based prophylactic agents (Biopesticides) in storage warehouses to control the stored grain insect pests. Considering the above facts, application of Indian herbs with scientific approach for management of stored grain insects will be an economically viable and environmentally safe option. In this context, development of essential oil based prophylactic agents for effective prevention of stored grain insect pests (*Sitophilus, Tribolium, Rhyzopertha*) under storage conditions has been carried out.

Biological (biofilter) and advanced ozone-based technologies for managing obnoxious odours for community applications *(Sandeep N Mudliar)*

The project focuses on developing and validating an indigenously designed odour control system through progressively scaled prototypes. Prototype I features a baffled reactor with and without pall ring packings, handling odour emissions at gas flow rates of 100-330 m^3/h. Initially it was tested with standard odorants that achieved over 60% odour reduction. When connected to an in-house 200 kg/day food compost unit, it achieved upto 90% reduction. Results validated through sensory science analysis, odour detectors, gastec tubes, and VOC meters. Prototype II (1000 m^3/h) is a scaled-up version, 90% of fabrication is complete with additional temperature and pressure monitoring. Prototype III retains Prototype I's design features with an added ultrasonic humidifier for humidity control, set for commissioning.



Prototype 1



Prototype 2

Upscaling of CSIR-NEERI's up-flow compact constructed wetland (UCCW) based sewage treatment plant & compact faecal sludge /septage separation & treatment (CFSST) plant *(Sandeep N Mudliar)*

The project scaled up the ozone-based disinfection system (10 L and 200 L sewage)





Compact faecal sludge/septage separation & treatment (CFSST) plant

with ozone (1-6 g/h) and validated it for CFTRI's combined ETP-STP sewage, achieving up to a 2.9-log reduction in total and faecal coliform for a residence time of 5-30 minutes. Validation of ozone treatment for faecal sludge from FSTP, Bangalore, showed a 2.9-log reduction for 5–60 minutes, with disinfected water containing faecal coliform <2 MPN/100 mL. A venturi-assisted ozone-based absorption and disinfection system (200 L sewage) was developed and validated, with initial trials showing a 2.9-log coliform reduction for a 60-minute residence time. The validation at the 200 L scale using CFTRI's ETP-STP wastewater is in progress, and scale-up criteria have been developed for a demo plant installation in Nagpur by June 2025.

Large scale production of collagen and development of nutraceuticals *(Mamatha SS)*

Nutraceuticals are gaining significant attention due to their potential to enhance nutrition, safety, and therapeutic benefits. Among these, marine collagen has emerged as a promising nutraceutical ingredient, particularly for skin health and anti-aging applications. Jellyfish-derived collagen, rich in type I and II collagen peptides, is known to improve skin elasticity, hydration and regeneration, potentially mitigating signs of aging. However, a comprehensive safety assessment is essential before its widespread use. This study evaluates their toxicity using the *Caenorhabditis elegans (C. elegans)* model and the anti-aging potential of jellyfish collagen peptides. Collagen peptides were extracted, characterized, and administered to *C. elegans* at varying concentrations. Key parameters, including lifespan, locomotion behaviour, brood size and oxidative stress resistance, were assessed to determine both beneficial and adverse effects. The results demonstrate that jellyfish collagen at moderate doses enhances stress resilience and modestly extends lifespan, supporting its anti-aging properties. Importantly, no significant toxicity was observed at effective doses, as indicated by unchanged brood size and preserved neuromuscular function. These findings suggest that jellyfish collagen peptides can be safely used as a functional nutraceutical, with *C. elegans* serving as an effective in vivo model for preliminary toxicity and efficacy screening. Proximate analysis of collagen pepsin hydrolysate (peptide) revealed a composition of 61.25% protein, 22% carbohydrate, 12% moisture, 4% ash, and 0.01% fat. Low, medium, and high-dose collagen nutraceutical formulations will be prepared in combination of vitamins and hyaluronic acid powder in compliance with FSSAI guidelines.

Mission Projects

Integrated approaches for bioactives and value addition for floral resources under `CSIR Floriculture Mission'

Postharvest technologies for wet packaging to the extension of the vase life of flower *(Matche RS)*

Fresh-cut flowers are highly perishable, vulnerable to postharvest losses, and dependent on storage, transport, and cold-chain management. Commonly adopted storage methods include wet and dry storage, but market losses remain high due to inefficient facilities, lack of cold storage and packhouses, and inadequate transportation systems. Conventional technologies, such as ethylene blockers, imported solutions, and spraying methods, are used to extend shelf-life, yet they face challenges such as microbial deterioration, foul-smelling chemical solutions, frequent water changes, high costs, and limited convenience. To address these limitations, a pulsing solution has been formulated to significantly prolong the shelf-life of cut flowers, offering advantages over existing tools. For *Gerbera hybrida*, the natural shelf-life of 4 ± 1 days at 25-30°C was extended by an additional 8 ± 1 days, achieving a total vase life of 8-9 days. Similarly, for *Chrysanthemum cv*. Pompom, shelf-life was prolonged from 4 ± 1 days to 6-7 days, nearly doubling vase life (1.5-2×). Such improvement is critical for storage houses, supply chains, and export markets. Formulated solutions have been validated under laboratory conditions, with free trial samples and SOPs distributed to local flower shops, including A.H.S. Flower Shop and H.K.G.N. Flowers, Mysuru, Karnataka. Pilot-scale production and field-level trials are ongoing. The pulsing solution has strong potential to benefit Indian and global floriculture industries, including domestic florists, wholesalers, resellers, malls, roadside vendors, and exporters, by reducing losses and ensuring longer-lasting freshness.

Isolation of globosa and marigold floral volatiles, pigments and spent utilization for value added products *(Bettadaiah BK)*

The project focussed on processing and characterization of *Gomphrena globosa* flowers to extract and evaluate betacyanin pigments with high efficiency and bioactivity. The fresh globosa flowers (50 kg) were graded, dried and size reduced. The fibrous part, husk and pigmented part of the flowers were separated. The pigmented portion was subjected to the colour extraction. The process is feasible as it could be completed with high turn-over resulting use of only 30% extraction media compared to un-processed method. The overall recovery was >95%. The betacyanin pigment was extracted in a yield of 10-12% on DWB. The characterization of extracted betacyanin pigment from *Gomphrena globosa* flower was carried out using analytical techniques. HRMS confirmed the molecular mass of betacyanin compounds such as betanidin (gomphrenin I) and isobetanidin (isogomphrenin I), showing



Pictorial presentation of processing stages

high accuracy in molecular ion detection. HPLC analysis separated the pigment components helpful for profiling of the extract. FT-IR analysis detected functional groups such as O–H, C=O, C–N, and C–O–C bonds, confirming the characteristic chemical structure of betacyanin. Antioxidant activity assessed by DPPH assay revealed strong free radical scavenging potential with an IC_{50} value of 1.647 mg/ml. EDAX analysis determined elemental composition with major elements including C, O, N, K, Al, and Mg, supporting the chemical characterization of the sample surface. Organic acid profiling identified oxalic acid, maleic acid, and fumaric acid, while polyphenol analysis revealed the presence of bioactive compounds such as epicatechin, rutin, caffeic acid, and vanillin, demonstrating a rich phenolic profile contributing to the bioactivity.

Ultrasound assisted extraction of anthocyanin from Blue pea and Hibiscus flower *(Rastogi NK)*

The objective of the work was to determine the optimal ultrasound-assisted extraction (UAE) conditions for Blue pea (*Clitoria ternatea* var. plenifora) and Hibiscus (*Hibiscus rosa-sinensis* var. brilliant red) flowers, and to characterize their bioactive compounds for potential food applications. A central composite design (CCD) was employed to evaluate the effects of ultrasonic amplitude, extraction time, and solid-to-liquid ratio on the extraction yield of total anthocyanin and phenolic content using response surface methodology (RSM). The optimized UAE conditions were identified as a solid-to-liquid ratio of 1:50 (g/ml), extraction time of 5 minutes, and ultrasonic amplitude of 90% for Blue pea; and a solid-to-liquid ratio of 1:50 (g/ml), extraction time of 10 minutes, and ultrasonic amplitude of 90% for Hibiscus. LC-MS analysis revealed that Blue pea extracts contained five delphinidin derivatives, three quercetin derivatives, two kaempferol derivatives, and one myricetin derivative, while Hibiscus extracts were characterized by three cyanidin derivatives, two quercetin derivatives, three kaempferol derivatives and one catechin derivative, confirming their richness in bioactive phytochemicals. In the second phase, Blue pea and Hibiscus extracts were utilized as natural colorants and functional ingredients in jelly and candy formulations. Extracts were incorporated at concentrations ranging from 0.5% to 2%, and products were evaluated for physico-chemical, phytochemical, and sensory properties, along with anthocyanin retention and texture profile. Jellies containing 1% Blue pea and 1.5% Hibiscus extracts demonstrated higher sensory acceptance and optimal anthocyanin retention (0.80 mg/100 g and 7.40 mg/100 g) with phenolic content of 14.27 mg/100 g and 34.29 mg/100 g, respectively. Similarly, candies formulated with 1% Blue pea and 1.5% Hibiscus extracts showed enhanced acceptability, with anthocyanin content of 0.83 mg/100 g and 7.67 mg/100 g, and phenolic content of 17.00 mg/100 g and 41.27 mg/100 g, respectively. Colorimetric analysis confirmed the distinct visual appeal, with higher redness (a*) values in Hibiscus products and higher blueness (b*) values in Blue pea products, demonstrating their potential as natural antioxidant-rich colorants in functional confectionery.

Edible floral pigments for development of value added product *(Giridhar P)*

Examined the impact of different drying methods on the bioactive content, pigment characteristics, and antioxidant potential of *Clitoria ternatea* (CT) floral extract, as well as its microencapsulation into a spray-dried powder with maltodextrin. Moisture content varied from 4.5% to 12.5% across methods. The highest

levels of the blue pigment delphinidin-3-glucoside and delphinidin chloride were found in microwave-dried (MD) petals (95.49 mg and 432.02 mg per 100 g, respectively). Rutin and sinapic acid, detected via UHPLC, showed maximum retention in hot-air oven-dried (HAD) petals (188.0 mg and 2.307 mg per 100 g). Antioxidant activity was notably higher in ethanolic extracts from HAD (14.99 g/100 g DW) compared to room-dried and sun-dried petals. The spray-dried powder retained about 49% of delphinidin chloride after one year, with FRAP activity decreasing from 1.09 g/100 g to 0.55 g/100 g during storage. No significant microbial growth or structural changes were observed after one year at 4°C, indicating that CT extracts hold potential as a natural colorant in food industries.

Identification of potential locations across India for Seaweed cultivation and their valorization

Cultivation and efficient utilisation of edible seaweeds for value addition, functional food *(Chauhan VS)*

The study focused on the preparation of buns incorporating the raw and fermented biomass of seaweed *Gracilaria debilis* at varying levels. Incorporation of biomass at 10% level was found to be acceptable. SEM analysis examined microstructural differences in control, raw unfermented seaweed (UFSW), and fermented seaweed (FSW) incorporated buns. The control bun showed a typical porous structure. The UFSW bun appeared denser with irregular particle sizes due to raw seaweed. The FSW bun had more uniform particles, suggesting fermentation improves structural consistency, potentially enhancing texture and other qualities. The addition of 10% FSW and UFSW significantly increased the total phenolic content in buns.

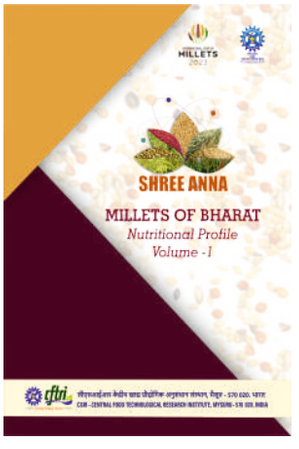
Phenome India: CSIR health cohort knowledgebase *(Prakash M Halami)*

Phenome India - CSIR health cohort knowledgebase (PI-CHeCK) initiative was continued in CFTRI focusing on comprehensive health assessments and consolidating cohort data. A major highlight was that all participants who had enrolled through CFTRI received their detailed health reports, covering biochemical, anthropometric and clinical findings. This ensured participant engagement and created awareness on lifestyle modifications for better health outcomes. CFTRI's core contribution centered on biochemical profiling and microbiome analysis of stool samples collected during the camp. Advanced sequencing and bioinformatics approaches were undertaken to explore links between gut microbiota, diet and cardio metabolic risk factors. Nutritional and lifestyle information was integrated with molecular datasets, providing valuable leads on the role of diet and gut health in aging and chronic disease. Parallelly, CFTRI collaborated with other CSIR laboratories in applying AI/ML models for risk prediction of diabetes, obesity and fatty liver disease. The institute also worked on standardizing protocols for sample handling and biomarker evaluation. By combining its expertise in nutrition, food science and gut health, CFTRI significantly strengthened PI-CHeCK's long-term goal of developing personalized nutrition strategies and precision health tools for the Indian population.

Millet sustaining health through research and innovation by analysis of nutrients and nutraceuticals to achieve global awareness (SHRI ANNA)*(Sridevi Annapurna Singh/ Meera MS)*

Millets also referred as 'Shri Anna' meaning the best among all the food grains can help to resolve malnutrition and at the same time

prevent lifestyle disorders. However, drawbacks like detailed scientific studies to prove their health benefits and standard product specifications storage solutions to enhance the shelf-life. Hence, the mission aims to promote millets nutritional value, develop innovative millet-based food products, enhance their shelf-life, and optimize processing methods to make millets and their products more accessible and beneficial to consumers and expand the export market for Indian millet products. The mission is structured into four work packages: WP1 focuses on the nutritional profiling of 100 millet varieties; WP2 emphasizes the promotion of region-specific millet products; WP3 targets the enhancement of shelf-life for millet-based products; and WP4 is dedicated to raising global awareness of the health and nutritional attributes of millets.





Nutritional profiling of 100 varieties of millets

About 130 millet varieties collected from different parts of the country were analyzed for 40 different parameters, including proximate composition, *in-vitro* protein and starch digestibility, mineral bioaccessibility, vitamins, fatty acid profile, amino acid profile and available lysine. Antinutrients such as phytic acid, oxalates, trypsin inhibitors and C-glycosylflavones were also profiled. The data was compiled, and the book Millets of Bharath-Volume 1 was released on 22 October 2024.

An investigation into millet consumption patterns, frequency of consumption, and their association with health and nutritional status was carried out using pre-tested questionnaires through interviews. The regions surveyed included rural, urban and tribal areas of Karnataka, Andhra Pradesh, Telangana, Maharashtra, Madhya Pradesh, the Western Himalayas, Gujarat and Odisha.

Information on around sixty indigenous millet-based recipes from different regions was recorded, and the recipes were standardized



Traditional millet-based recipes

and prepared in the laboratory. Their nutritional value and estimated glycemic index (eGI) were also determined.

Promotion of region-specific millet products

Formulation of multi-millet milk: A multi-millet milk formulation was optimized for nutrient stability and enhanced functionality. Natural nanovesicles derived from beetroot peel, orange peel, and sprouted ragi were incorporated to improve bioactive compound content and nutritional value. The product was further processed into a spray-dried powdered variant, significantly extending its shelf-life.

Ready-to-drink (RTD) products: Pearl millet and finger millet-based ready-to-drink (RTD) products with spice extracts were optimized to exhibit superior water holding capacity, emulsion stability, thermal behaviour, and viscosity. Two probiotic-rich products—a barnyard millet beverage and a millet curd were formulated and evaluated for proximate composition, sensory attributes, and microbiological safety. Animal studies were conducted to analyze SCFA profiles, histopathological changes and aging biomarkers. Additionally, an RTD millet beverage fortified with indoleamines was optimized as per Recommended Dietary Allowance (RDA) norms. The spray-dried variant showed significant levels of tryptophan (196 µg/100 mg), melatonin (73.9 µg/100 mg), and serotonin (150.98 µg/100 mg). It also exhibited high total phenolics (109.49 mg/100 g) and flavonoids (14.26 mg/100 g). In stressed mice, regular consumption of this beverage significantly normalized the levels of brain-derived neurotrophic factor (BDNF) in a dose-dependent manner, with effects comparable to the antidepressant citalopram (10 mg/kg, PO). The findings suggest that chronic intake of the millet beverage can modulate the gut microbiota, reduce elevated cortisol, and restore mood balance. Natural nanovesicles derived from beetroot peel, orange peel, and sprouted ragi millet were incorporated into the multi-millet milk to improve its nutrient profile and bioactive compound content.

Instant ready-to-eat products: In the domain of instant ready-to-eat products, pre-processing and processing conditions were optimized for noodles developed from a variety of millets including sorghum, pearl, finger, foxtail, little, proso, kodo, and barnyard. These noodles were evaluated for their nutrient composition, functional, nutraceutical properties and sensory characteristics. Further, mineral-rich starch was extracted from defatted foxtail millet after protein removal using high-energy ultrasonication and alkali treatment. The extracted starch exhibited



Instant traditional products from millets

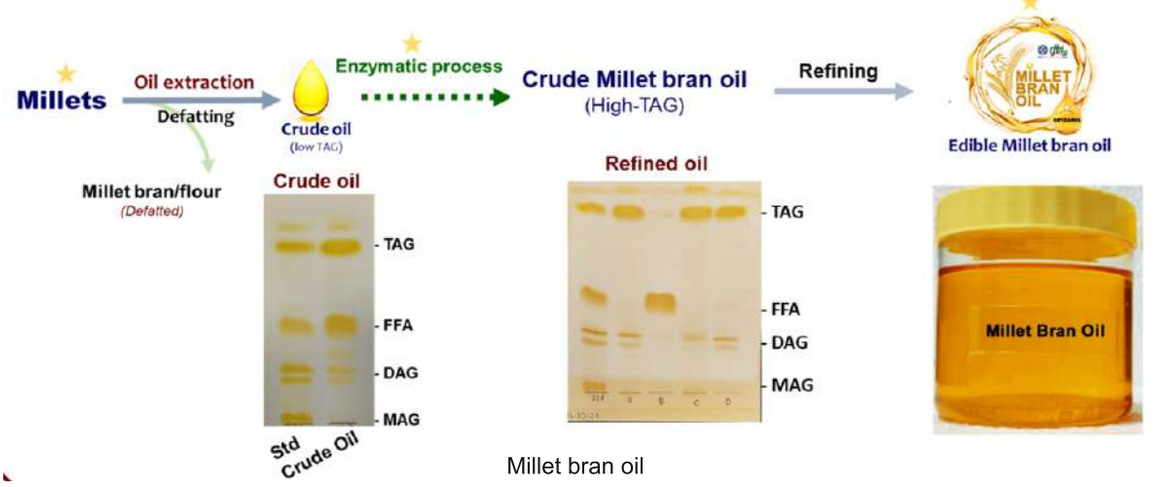
significantly improved oil (53% higher) and water (5.4% higher) absorption capacities and a low glycemic index (GI 47%). The mineral profile of the starch included iron (3.95 mg/100 g), magnesium (106.64 mg/100 g), zinc (3.33 mg/100 g), and potassium (82.15 mg/100 g). This modified starch demonstrated excellent functionality as a thickener/emulsifier and was successfully tested in the traditional Indian sweet "Khus-Khus Payasam." Additionally, the mineral content of millet-based noodles revealed notable levels of phosphorus, calcium, iron, zinc, manganese and magnesium across different millet types, highlighting their superior nutritional value. Pre-processing conditions were optimised for designing instant traditional products from kodo proso and foxtail millets. These developments underscore the potential of millet-based milk, beverages and convenience foods as functional and therapeutic products tailored for diverse regional preferences.

Development of biodegradable cutlery from kodo millet bran and husk: Kodo millet bran and husk (KMB), which constitute approximately 30% (w/w) of the waste generated by millet processing industries were explored as sustainable raw materials for developing biodegradable cutlery. This lignocellulosic-rich by-product was blended with modified starch and flours as binding agents to produce eco-friendly alternatives to plastic cutlery. The initiative not only offers a solution to reduce environmental impact but also adds value to agro-industrial waste. A dedicated facility for the production of biodegradable cutlery using KMB has been established at CSIR-CFTRI.



Bio-degradable cutlery from millet husk and bran

Edible oil production from millet bran: Millet bran was explored as a potential source for edible oil production and the extraction process was optimized for large-scale application. Physicochemical characterization and nutraceutical profiling of the extracted oil were conducted. The optimized process resulted in enhanced oil yield and a significant reduction in free fatty acid content, thereby improving the overall quality and stability of the oil.



Millet bran oil

Shelf-life extension of millets

Hermetic storage structures using GrainPro based polymer system provides better prevention of insect pests up to 8 months and in addition nutritional profile of fatty acid of stored pearl millets remains unchanged. Thus, extended shelf life up to 8 months along with reduced insect infestation in hermetic storage conditions provides better mitigation approaches for storage of millets. In next step, integration of advanced methods using ozone for prevention of aflatoxin has revealed that, ozone-treated samples showed a significant decline in microbial load, achieving up to a 1.7-log reduction. Further, studies on Ozone treatment effectively reduced AFB1 levels by 98–99% (<3.5 ppb). In the next phase, advanced ozone-based techniques were integrated for aflatoxin prevention. Ozone treatment led to a significant reduction in microbial load, achieving up to a 1.7-log reduction. Notably, the treatment effectively reduced Aflatoxin B1 (AFB1) levels by 98–99%, bringing them below the critical threshold (<3.5 ppb). The ozonation process was successfully scaled up using an engineered fumigation reactor with capacities of 10 kg and 20 kg (up to 50 liters). Key nutritional parameters —including protein, fat, carbohydrate content, free fatty acids, peroxide value, ash content, and moisture levels—remained unaffected, confirming the nutritional integrity of the treated grains. Additionally, biofumigation methods using plant-derived monoterpenes (MTs) were evaluated for the control of major storage insect pests of sorghum and pearl millet, namely *Sitophilus oryzae* (L.), *Rhyzopertha dominica* (F.), and *Oryzaephilus surinamensis* (L.). Fumigant toxicity assays demonstrated 100% insect mortality at a concentration of 333.3 µL/L air. In bulk biofumigation studies, combinations of MTs showed over 95% mortality for all insect species within a 5-day treatment cycle. Residue analysis revealed minimal persistence, and no significant differences were observed in the seed viability of treated grains, confirming the safety and efficacy of the method.

Global awareness of health and nutritional attributes of millets

CSIR-CFTRI, in collaboration with NIScPR, Unnat Bharat Abhiyan (UBA), and Vijnana Bharathi (VIBHA), organized a comprehensive technology showcasing and networking meet aimed at raising awareness about millet



250 Kg gradient biofumigation system



1 tonne gradient biofumigaion system



Multi millet Storage system (200 Kg)



Ozone system for aflatoxin mitigation in millets

technologies and fostering stronger engagement between scientists, industry stakeholders, and rural communities. The event specifically focused on increasing the knowledge of stakeholders regarding millet-based technologies, while also identifying potential areas where these technologies could be applied effectively. CSIR-CFTRI also exhibited a unique "Millet Platter" that highlighted an array of innovative millet-based technologies at the World Food India 2024, hosted by the Ministry of Food Processing Industries (MoFPI) in New Delhi.



Showcasing of millet based technologies and products

Comprehensive solutions towards circular economy and sustainability *(Negi PS)*

Several techniques are being explored to extend the shelf-life of fresh fruits and vegetables. The combined effects of different storage conditions and non-thermal treatments-including Plasma-Activated Water (PAW), Dielectric Barrier Discharge (DBD) and Ozone on the shelf-life, microbial safety and quality of various horticultural crops such as Indian green chilies, bell peppers, green seedless grapes, bitter gourd, okra and sapota was studied. These treated fruits and vegetables were stored under both ambient and optimum storage conditions. Among the treatments, PAW and DBD demonstrated significant effectiveness in extending shelf-life and maintaining quality by inhibiting browning enzyme activity. They also showed promising anti-microbial effects, with a microbial log reduction of 1 to 3 log cells. In addition, these treatments helped in retaining colour and chlorophyll content and improved the antioxidant capacity of the produce. The findings highlight these treatments as promising non-thermal technologies for preserving the freshness and quality of fresh produce. The work on phase change composite materials is currently being investigated for use in cold storage applications, with the aim of extending the freshness of fruits and vegetables during power outage

Bioconversion of edible oilseed meals into value added products *(Jyothi Lakshmi A)*

Protein concentrates were prepared from ghani and expeller pressed groundnut seed oilcakes under optimised conditions used for reference samples. The reference defatted oilseed cake/ flour contained around more than 50% protein, while the commercial cake with skin contained similar protein and that without skin showed pH and temperature reported previously. The protein content of the samples ranged was 86-89% in samples with and without skin and was comparable to the reference sample. The anti

nutritional factors such as phytate and tannins were found to decrease in protein concentrates. The commercial safflower cake contained commercially lower protein due to the contamination of outer hull. The optimization of protein concentrate preparation from safflower seed oilmeal is under optimization.

Dietary fiber-rich fraction (DF fraction) obtained after the protein extraction was further explored for its use as a source of dietary fiber. DF fraction contains ~50% dietary fiber and 10-14% residual protein. The cake obtained from the Ghani and Expeller method of oil extraction was evaluated for its various parameters. The removal of skin enhanced the protein extractability and reduced the residual protein in the DF fraction, which in turn increased the dietary fiber content. The monosaccharide composition was analyzed to identify the type of polysaccharides present in the DF fraction. The data revealed the presence of arabinose, xylose, galactose, and glucose as the major sugars present in the DF fraction. The glucose is mainly contributed by the presence of 9-10 starch. Further, the monosaccharide composition analysis revealed the presence of heteropolysaccharides in the DF fraction.

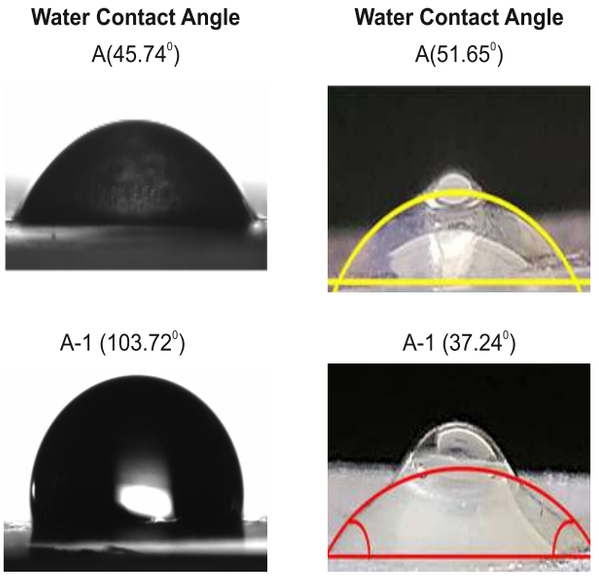
PLA-PBAT based biodegradable polymeric films with enhanced mechanical and barrier properties *(Matche RS)*

The increasing consumer demand for sustainable packaging has driven the development of biodegradable PLA and PBAT-based films. However, limitations in mechanical strength and barrier properties hinder their widespread adoption in food packaging. This study addresses these challenges by incorporating CFTRI additives and optimizing manufacturing parameters to enhance film performance while maintaining biodegradability. Experiments tested various masterbatch compositions, with 5% CFTRI additives (both liquid and solid) showing notable improvements during extrusion. Mechanical characterization revealed a 71.24% increase in tensile strength for 5% liquid additives, outperforming 5% solid (+21.94%) and 10% liquid (+13.07%). Elongation at break also improved significantly, with 5% liquid additives achieving a 59.83% enhancement, followed by 5% solid (+31.71%). Barrier properties saw optimal results with 5% liquid additives, reducing water vapour transmission rate (WVTR) by 15.04% and oxygen transmission rate (OTR) by 19.05%. Shelf-life testing on chrysanthemum cut flowers, evaluated using a 9-point hedonic scale (scores <5 deemed unacceptable), demonstrated the CFTRI-enhanced film's efficacy. Control polypropylene (PP) films showed wilting, colour changes, petal loss, and fungal growth after 4-5 days at 25°C and 85% relative humidity. In contrast, the additive-based film extended freshness to 7-8 days. These findings highlight the potential to reduce postharvest losses in the floral industry, enhancing economic value. By balancing enhanced mechanical performance, improved barrier properties, and composability, this optimized PLA/PBAT film offers a viable eco-friendly alternative to conventional plastics, aligning with sustainability goals without compromising functionality.

Detection of Per- and Polyfluoroalkyl Substances (PFAS) and development of PFAS-free food packaging materials *(Arunkumar P)*

Per- and poly-fluoroalkyl substances (PFAS) are a diverse group of chemicals that can impart characteristics like repellence to oil, grease and

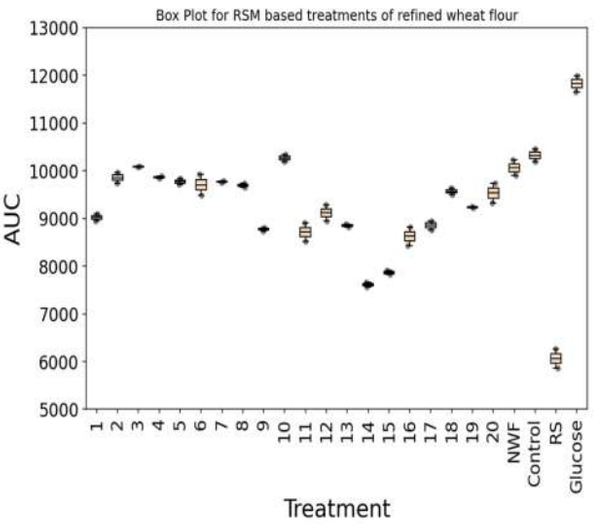
water, hence they are extensively used in paper and bio-based food contact materials like straws, paper wraps, etc. PFAS are termed “forever chemicals” because they don't break down easily and are found to be toxic to human health and the environment. LC-MS/MS was employed to detect PFAS from food contact materials. In addition, alternative materials for PFAS compounds for food packaging have been identified and primary testing for their water and oil contact angles was carried out to assess their efficiency. A biopolymer (A) with good film-forming properties was chosen. Four different surface modifying agents were added to it and their water and oil contact angles were analysed. The base material A showed a water contact angle of 45.74°, whereas post-modification (A-1), the water contact angle improved significantly to 103.72°, demonstrating enhanced hydrophobicity. For the oil contact angle, base material A showed 51.65°, which was the highest among its other modified variants.



Water and oil contact angles of biopolymer A

Transglycosylating α-glucosidase (tAG) for lowering *in-vitro* digestibility in food products
(Sarma MVRK)

Functional analysis of wheat flour and rice flour treated with transglycosylating α-glucosidase (tAG) was carried out in tandem with other starch degrading enzymes. It was observed that the tAG was able to lower the AUC (area under the curve) for both these flours significantly during *in-vitro* digestibility assays. In case of rice flour treatments, tAG treated samples were analyzed for colour, *in-vitro* digestibility of both solid and liquid fractions, water hydration properties, gelling and swelling properties, GI, oligosaccharide analysis, FTIR, XRD and SEM analysis to prove and validate the action of tAG leads to superior functionality. In case of wheat flour the tAG along with another starch degrading enzyme dosages were optimized using design of experiments over 20 different treatment conditions. Overall, the tAG was demonstrated to lower the *in-vitro* digestibility of both rice and wheat flour (Maida), and additionally increased the resistant starch content in them.



The AUC values of the 20 experimental designs based on RSM along with reference controls

Engineering, food-grade expression and industrial applications of chimeric endo-1,4-β-mannanase *(Mukesh Kapoor)*

ManB-XynB was fused with 5 amino acids flexible linker by overlap extension PCR and cloned in pRSETa vector and transformed in E. coli BL21 (DE3) cells for enzyme expression. Both ManB (176 U/ml) and XynB (11 U/ml) activities expressed extracellularly after 24 h of IPTG induction. ManB-XynB was fused with 10 [ManB-(GGGGS)2-XynB] and 15 [ManB-(GGGGS)3-XynB] amino acids flexible linker by overlap extension PCR and cloned in pET28a vector. pET28a-ManB-(GGGGS)2-XynB and pET28a-ManB-(GGGGS)3-XynB constructs were able to show both endo-mannanase and endo-xylanase activities. ManB and XynB were also fused with 5 [ManB-(EAAAK)-XynB] and 10 [ManB-(EAAAK)2-XynB] amino acids rigid linker by using overlap extension PCR and cloned into pUC19 vector. The bichimeric enzyme ManB-XynB was cloned with the pKLAC2 vector using the BamHI and EcoRI restriction enzymes followed by transformation in *E. coli* DH5α cells. For designing next-generation lignocellulose degrading chimeric enzymes, endoglucanase A gene (HMAOKGDN_01709) (EgA) from *Bacillus licheniformis* was used. EgA was cloned in pUC19 vector, followed by transformation in *E. coli* DH5α cells. EgA was amplified from respective pUC19 clone, digested and ligated into pET28a vector. pET28a- EgA construct was transformed in *E.coli* BL21 (DE3) cells and showed endo-glucanase, endo-mannanase and endo-xylanase expression. To increase the nutritional quality and viability of probiotic *Bifidobacterium adolescentis*, the osmodehydrated probiotic pineapple pieces were supplemented with oligosaccharides. The oligosaccharides were enzymatically generated using the chimeric enzyme MXCBM from plants sources. The oligosaccharides generated were found to be *prebiotic for Bifidobacterium adolescentis* DSM 20083 under *in vitro* conditions as indicated by increase in CFU/ml, decrease in pH and production of short chain fatty acids / organic acids. The oligosaccharide-infused pineapple showed better survivability under storage and simulated gastrointestinal stress after 28 days of storage. After osmotic dehydration treatment, an increase was observed in the short chain fatty acids and organic acids content compared to the untreated samples. All osmotically dehydrated pineapple samples showed an increased number of volatile compounds compared to control in HS-SPME-GC-MS analysis. Galactomannan-based lignocellulosic substrate hydrolysis was carried out synergistically using recombinant GH36 α-galactosidase (LpαG) and chimeric ManB-XynB, ManB-XynB-CBM, ManB-XynB-CelB and ManB-XynB-CelBΔCBM to generate reducing sugars. Overall, results suggested improved hydrolysis of locust bean gum and guar gum by up to 1.26- and 1.34- folds using synergistic hydrolysis strategy when compared to individual enzymes.

CSIR First Project

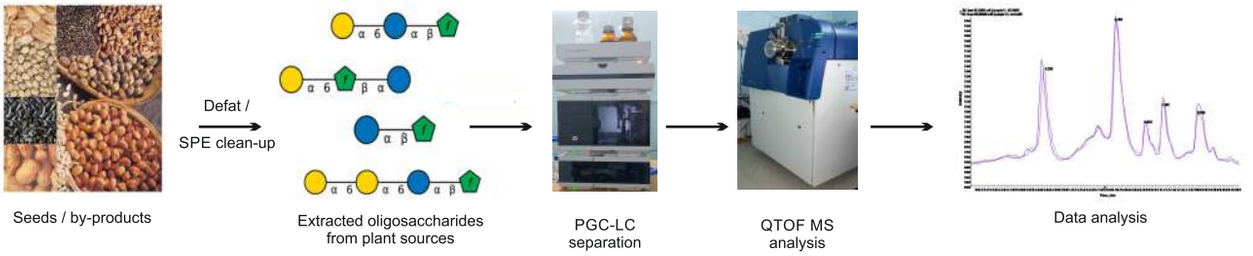
Fasting Mimicking Diet (FMD) as a nutritional intervention for obesity associated breast cancer *(Anbarasu K)*

The project primarily focuses on formulating a plant-based dietary regimen for obesity-driven breast cancer patients, emphasizing phytochemical-rich food components with a low glycemic index, low carbohydrate and low protein content. In this context, screening for such functional ingredients is a key objective of the project, and an in-depth literature-based screening is currently underway. Phytochemicals such as sesamol, a vital phytochemical present in sesame seed, zerumbone present in ginger, quinine sulphate present in the bark of the tree cinchona were used in the study. The MTT assay was carried out to determine the IC50 value of each phytochemical against both MCF-7 and MDA MB 231 cells and the results show that the IC50 value of sesamol on MCF-7 cell at 24 h and 48 h was found to be around 1.24 mg/ml and 347.16 µg/ml respectively. However, the same for MDA MB 231 cell was around 1.31 mg/ml and 600 µg/ml respectively. The IC50 value of zerumbone on MCF-7 cells at 24 h and 48 h was found to be around 16 µg/ml. However, the same for MDA MB 231 cell was around 20 µg/ml at 24 h. The IC50 value of sesamol on MCF-7 cell at 24 h and 48 h was found to be around 68.75 µg/ml and 59 µg/ml respectively. However, the same for MDA MB 231 cell was around 110 µg/ml and 90 µg/ml respectively. An *in silico* docking studies for the above phytochemicals was performed to check whether these phytochemicals can interact with the targeted molecules associated with obesity driven breast cancer such as adiponectin, leptin and insulin.

R & D Seed Fund Projects

Enrichment of certain dietary free-oligosaccharides and evaluation of their influence on gut microbiome
(Gnanesh Kumar BS)

Several plant sources possess native oligosaccharides that are prebiotic in nature. The most abundant and widespread oligosaccharides are galactosyl sucrose derivatives. Raffinose is the major trisaccharides in this class and has been characterized for various biofunctional properties. However, several isomers of raffinose such as planteose, umbelliferose are present exclusively in many plant dietary sources, wherein there are inadequate studies on their biofunctional properties. In order to address this research gap, the present project aimed to screen plant sources including seeds and by-products for the presence of raffinose isomers through PGC-



Schematic of workflow in profiling dietary oligosaccharides

LC-MS/MS. Several dietary sources were found to be abundant in planteose and umbelliferose. Based on this certain agro industrial seed by-products were selected for pilot scale extraction. The process of optimizing extraction, solvent treatment, ion exchange and ultra and nanofiltration steps are underway. Furthemore, evaluation of the prebiotic potential and other properties of these saccharides are being planned.

Fruit incorporated herbal beverage
(Anant Gahire C)

The increasing consumer demand for natural and health-promoting beverages has led to significant growth in the herbal beverages market. This study focuses on developing a refreshing, fruit-incorporated herbal drink that combines the health benefits of herbs with the sensory appeal of fruit-based beverages. Unlike existing medicinal herbal drinks made from ingredients such as gooseberry, aloe vera, ginger and basil, this formulation is intended for regular consumption and enjoyment. The main objectives of the project include formulation and optimization of ingredients, shelf-life studies (physicochemical, sensory, and microbiological) and product development at pilot scale. The beverage was prepared using natural ingredients such as dried Rama basil leaves, dried stevia, mandarin orange and ginger extract under FSSAI specifications. Initial analysis of Rama basil leaves revealed 8.33 mg/g essential oil content and a high concentration of methyl eugenol, contributing to its strong flavour. Sensory evaluation conducted by a panel showed favourable responses in terms of colour, taste, appearance and overall acceptability, with an average acceptability score of 7.10 out of 9. These results indicate strong consumer appeal and market potential. The final deliverable will be a shelf-stable, no added sugar, healthy herbal-fruit beverage with a shelf-life of six months.

Millet, mahuva and other galactagogues based bakery food products for lactating women *(Nehulkumar MS)*

Nutrient-rich cookies were developed using millet, mahuva flower and ayurvedic polyherb specifically for lactating women. The physical characteristics, including thickness, diameter, and spread ratio, remained close to the control. Sensory evaluation showed that all samples were acceptable, with CFPMK 3 performing best in crumb colour and flavour. Nutritional analysis revealed the cookies contained high protein (18.62 g/100 g), dietary fiber (6.18 g/100 g), and low added sugar (<1 g). The energy content was 469.7 kcal/100 g contributing 18.78% of the RDA for lactating mothers. The fatty acid profile showed a dominance of MUFA and PUFA. Safety analysis confirmed microbial and heavy metal parameters within permissible limits. A lactation bar was also developed, providing 397.26 kcal/100g, 22.12 g protein, 8.12 g dietary fiber and <1 g added sugar. Sensory evaluation indicated MPMK 1 had the most balanced acceptability. The bar contributed significantly to micronutrient needs, including calcium (20.21% RDA), iron (33.61%), and



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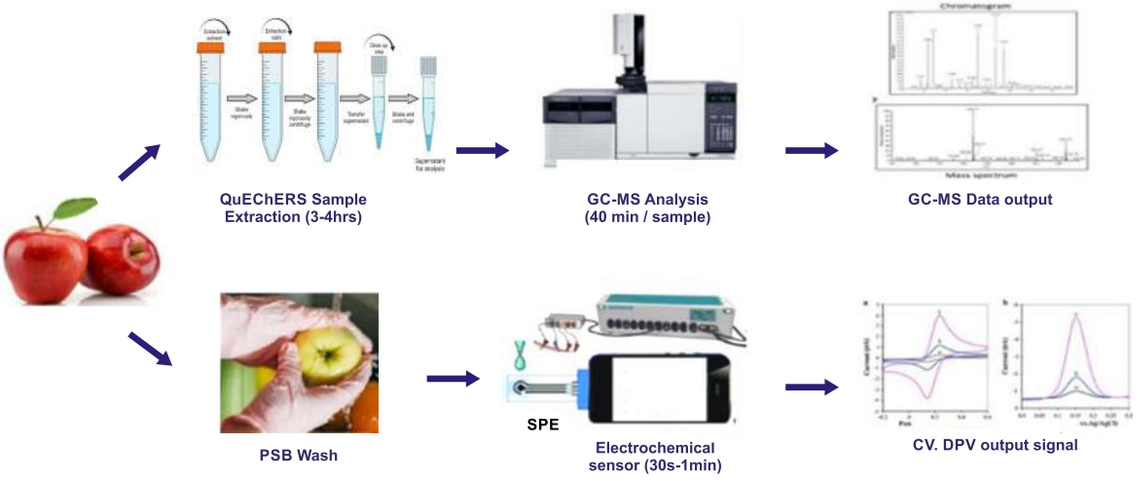


Bars

magnesium (47.24%). The fat content (14.06 g) provided a favourable balance of MUFA (4.048 g) and PUFA (3.641 g). Microbial and toxicological evaluations confirmed product safety. Both products are wholesome, functional, and safe, offering strong potential as specialized health snacks to support postpartum nutrition in lactating women. Both products were also tested for microbiological and heavy metal parameters and it was observed as compliant as per existing food safety and regulations in India.

Advanced portable electrochemical sensor for rapid detection of pesticides in fruits and vegetables *(Sindhu R Nambiar)*

The growing concern over pesticide residues in food has highlighted the need for rapid, cost-effective, and portable detection technologies. This project focuses on the development of an advanced portable electrochemical sensor for the rapid detection of spiromesifen, a miticide widely used in agriculture and commonly found in imported fruits and vegetables. According to FSSAI regulations, spiromesifen must not exceed defined maximum residue limits (MRLs) to ensure consumer safety. Conventional analytical techniques like GC-ECD and LC-MS/MS, while accurate, are time-consuming, expensive, and not suitable for on-site screening. To overcome these limitations, a nanocomposite-modified electrochemical sensor was developed and validated. Sample preparation was carried out using the QuEChERS method, followed by differential pulse voltammetry (DPV) for electrochemical detection. The sensor exhibited a clear and sensitive response to spiromesifen in 0.1 M phosphate buffer (pH 6.8), with a linear detection range between 1-7 ppm and a correlation coefficient (R^2) of 0.998. Method validation was performed using GC-ECD to confirm accuracy and reliability. Future work will focus on further optimizing the electrode materials to achieve lower detection limits and enhanced reproducibility. Validation in real samples is planned to assess field applicability. The developed platform offers a promising alternative for on-site pesticide screening, aligning with national food safety priorities and regulatory standards.



Schematic representation of portable electrochemical sensor

Exploring silica-loaded biopolymers for insect-resistant packaging *(Parthiban P)*

Silicon (Si) is an inorganic element that makes up to 27.8% of the earth's crust, making it the second most abundant element after oxygen (46.1%). The study thoroughly investigated the impact of silicon particles on various parameters of *Triticum aestivum* L., *Sorghum bicolor* L. and *Oryza sativa* L. grains, including, Moisture Content (MC); Test Grain Weight (TGW); Bulk Density (BD); Particle Density (PD); Porosity (P); Kernel Elongation Ratio (KER); Volume Expansion Ratio (VER); Water Uptake (WU), as well as the survival, death, and mortality percentage rate of *Sitophilus oryzae* L. and *Rhyzopertha dominica* F. The results indicated that the silica treatment did not significantly affect the physical parameters of the grains, maintaining consistency and mainly affecting the pests. In terms of pest control, the study demonstrated a clear correlation between increased silica concentration and reduced survival rates of *S. oryzae* and *R. dominica*. Higher concentrations (700-1000 ppm) led to a significant increase in insect mortality, achieving 100% mortality within 5 days of exposure. This was further supported by the observed reduction in grain weight loss and damage, indicating the effectiveness of silica treatment in protecting wheat and sorghum grains during storage. Silica residue on treated grains was minimal/no residue after a single wash, suggesting that silica particles can be a viable option for pest control with minimal risk of residue accumulation. The findings highlight the potential of silica-based treatments as a sustainable and effective alternative to conventional chemical insecticides for grain preservation.

Artificial intelligence-based classification for post-harvest waste management of onions during storage *(Gomathy K)*

The project focusses on simulating the manual grading adopted by farmers with an automatic AI based grading system. In this regard, the onion field in Nasik, Maharashtra was visited and data pertaining to onion classification was collected. The preliminary trials were 3000 data set and classification was performed. Also, 250 kg of onion was collected from the Agricultural Produce Market Committee (APMC), Mysore, and the images were captured using the Android mobile phone into different classifications: rotten, sprouted, improperly cured, fungal infected, good and damaged. The images were pre-processed and various programs were run using Python software to train and test the data set. The preliminary study was undertaken with 10,156 data set wherein 8464 data points were used for training the model,1692 data points were used for validation using conventional model namely random forest and Convolution Neural networking (CNN) models such as ResNet and EfficientNet. ResNet provided the highest classification accuracy of 87%. The prototype onion grading system has been fabricated to automatically grade the onions according to the different classifications. This prototype aids in improving the classification efficiency as well as in validating the accuracy of suggested AI models.

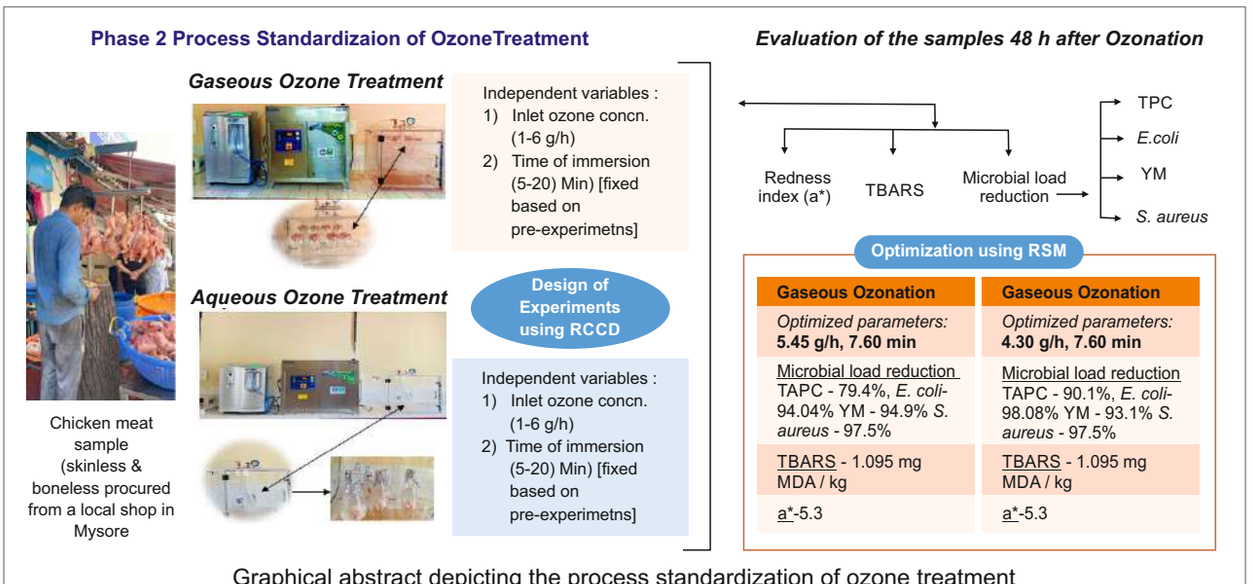
Standardization and optimization of preparation process of "Dindki" a traditional food made from finger millet in Himalayan region *(Leela Chauhan)*

A field-based survey was undertaken to document traditional product recipes and

preparation methods using locally available grains in the states of Himachal Pradesh and Uttarakhand. Questionnaires were designed based on preliminary insights gathered from local residents. The study encompassed three districts - Dehradun, Uttarkashi, and Shillai and five blocks - Kalsi, Purola, Mori, Chakrata, and Chopta - covering approximately 50 households. Interviews were conducted with both men and women across various age groups to capture a broad spectrum of traditional culinary knowledge. Proximate analysis was performed on local varieties of wheat and finger millet from Mysuru, as well as traditional varieties from the surveyed regions. Based on the data collected, a traditional grain-based product was formulated and assessed. Analytical evaluations included sugar profiling using Ultra-Performance Liquid Chromatography (UPLC), which revealed that the traditional wheat variety from Uttrakhand exhibited higher natural sugar content compared to local varieties from Mysuru. Additional analyses included texture profiling, storage stability studies, and sensory evaluation using the 9-point hedonic scale. The study highlights the importance of integrating traditional knowledge with scientific assessment to support the development of nutritionally rich, culturally significant food products.

Portable ozonation system for Indian chicken shops *(Indira Dey Paul)*

This project proposal aimed to develop a portable, affordable, and scientifically validated ozonation system for Indian chicken shops. The equipment can be easily installed in medium-scale shops and will be programmed to give quick and effective ozone treatment to the raw chicken pieces. The fresh chicken meat was procured from four Mysore local shops and their physicochemical quality and microbiological load were evaluated. The microbial load was above the acceptable limits of FSSAI. A laboratory-scale vacuum ozonation system suitable both for gaseous and aqueous ozone treatment of different food materials has been established. The acrylic vacuum ozone chamber was designed and fabricated, whereas the



Graphical abstract depicting the process standardization of ozone treatment

oxygen concentrator (5 LPM capacity) and ozone generator (6 g/h capacity with O^2 feed) were purchased as spare parts. The efficacy of both gaseous and aqueous ozone treatment in reducing the microbial load of fresh chicken meat (boneless and skinless) was investigated. Rotatable central composite design (RCCD) and response surface methodology (RSM) were used for the optimization of the process parameters of gaseous (ozone inlet concentration; g/h and time of exposure; min) and aqueous (ozone inlet concentration; g/h and time of immersion; min) ozone treatment. Total plate count (TPC), *Escherichia coli* count, yeast and mold (YM) count, *Staphylococcus aureus* count, redness index (a*) and TBARS values were the evaluated responses.

Nano-composite based filter-bed for sugar processing industry waste water treatment *(Dinesha BL)*

The physico-chemical characteristics of the sugar processing industry wastewater (SPIW) were examined and compared to standard effluent norms (CPCB and EPA). Results showed that BOD, COD, PO43-, NO_3-N, and NH3-N concentrations remained over the standard limits even after tertiary treatment. Chitosan-ZnO-TiO_2-Fe_2O_3-GO composite nanoadsorbent was successfully synthesized at an optimized chitosan concentration of 2% w/v, precipitation pH of 9, grinding time of 100 min, and ball milling for 4 h. The average particle size of 170 d.nm. was achieved with a zeta potential of 45.10 mV and a surface area of 15.22 m2/g. Characterization results of chitosan-ZnO-TiO_2-Fe_2O_3-GO composite nanoadsorbent were irregularly shaped, rough surfaces, amorphous lattice formations, and found Ti, Fe, Zn, and C functional groups of FTIR spectra, and TGA/DTA analysis confirms the stability of synthesized nanoadsorbent. The point of zero charge (PZC) of SPIW was found at 7.52, which means that the surface of the adsorbent has a neutral charge at a pH of 7.52. Batch adsorption experimental results suggested that the maximum %RE of COD (96%) was obtained at a pH of 6.47, dosage of 35 mg, contact time of 60 min, and initial COD concentration of 500 mg/L.

Table-top kitchen appliance for automated food preparation *(Thimmaiah GR)*

Selective laser sintering (SLS) is a popular technique in building complex metallic shapes by sintering metal powders. When this technique is applied to food category, there is a high chance of achieving baking/cooking along with structuring. Hence SLS technique suits the purpose. The objective was to achieve structure by sintering food powders and achieve simultaneous baked/cooked products. The main focus was on regular consuming foods like rotis of various flours which takes considerable time in preparation. Through this technology customization of the product by adding healthy ingredients is also possible. Overall the self-monitoring and cooking time can be partially reduced and also a healthy home food can be prepared. The 3 axes setup with the laser has been installed. The samples produced from this setup is subjected to various tests for its edibility.

Turmeric processing parameters optimization to improve the quality of turmeric powder *(Shyam R Garud)*

Turmeric (*Curcuma longa* L.), a member of the Zingiberaceae family, is predominantly cultivated in India, which accounts for over 75%

of global turmeric production and more than 62% of its trade. Post-harvest processing of turmeric rhizomescomprising sweating, curing, drying, polishing and grading is traditionally performed manually on farms, with cooking and drying being particularly labour- and energy-intensive. While solar drying is common, cooking poses challenges due to its high energy demands. Steam cooking, a more scalable alternative to hot water methods, is widely used by farmers. However, inconsistent cooking often affects rhizome quality and market value. To address this, experiments were conducted using two steam pressures with and without alkali treatment. Results showed that alkali treatment reduced rhizome hardness by 45-57% after 12 h, and further reductions were observed when combined with steam cooking. These findings suggest that alkali pre-treatment improves cooking efficiency and product quality, offering a more consistent and marketable turmeric output.

Dissolved Air Flotation (DAF) based system for efficient scum removal in jaggery processing *(Chavan Ashutosh N)*

Preliminary studies were undertaken to generate essential baseline data on factors influencing jaggery quality, particularly moisture content and juice stabilization methods. The moisture sorption behaviour in jaggery was assessed by drying dynamics and moisture interaction using gravimetric and vapour sorption analysis techniques. Moisture Sorption Isotherms (MSI) established a critical RH of 58% and moisture content of 13.95% (dry basis). Shelf-life modelling using the GAB equation and CFTRI's mPACK software predicted storage durations of 104 days at ambient and 207 days under accelerated conditions. These insights emphasize the importance of humidity control in extending jaggery shelf-life and improving stability. In another study, the effect of juice stabilization on jaggery quality was investigated by the use of natural clarificants (aloevera, moringa, fenugreek and wild okra) across different heating regimes. Aloevera at 85°C effectively reduced acid-insoluble ash to 0.15%, while moringa retained more reducing sugars and favourable colour. Most samples met FSSAI moisture limits (≤7.0%) and maintained microbial stability (a_w = 0.55-0.66). The study demonstrated that appropriate stabilizers and thermal conditions significantly improve jaggery's physicochemical properties, supporting development of efficient, quality-focused processing systems.

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