National Institute of Food Technology, Entrepreneurship and Management, Thanjavur (NIFTEM-T)
(An Institute of National Importance; formerly Indian Institute of Food Processing Technology - IIFPT)
Ministry of Food Processing Industries (MoFPI), Government of India
Thanjavur - 613 005, Tamil Nadu, India

सत्यमेव जयते
MOFPI

National Virtual Conference on

Food & Health Sciences: The Futuristic Outlook

e-Proceeding

9th & 10th February 2023

FHS - 23

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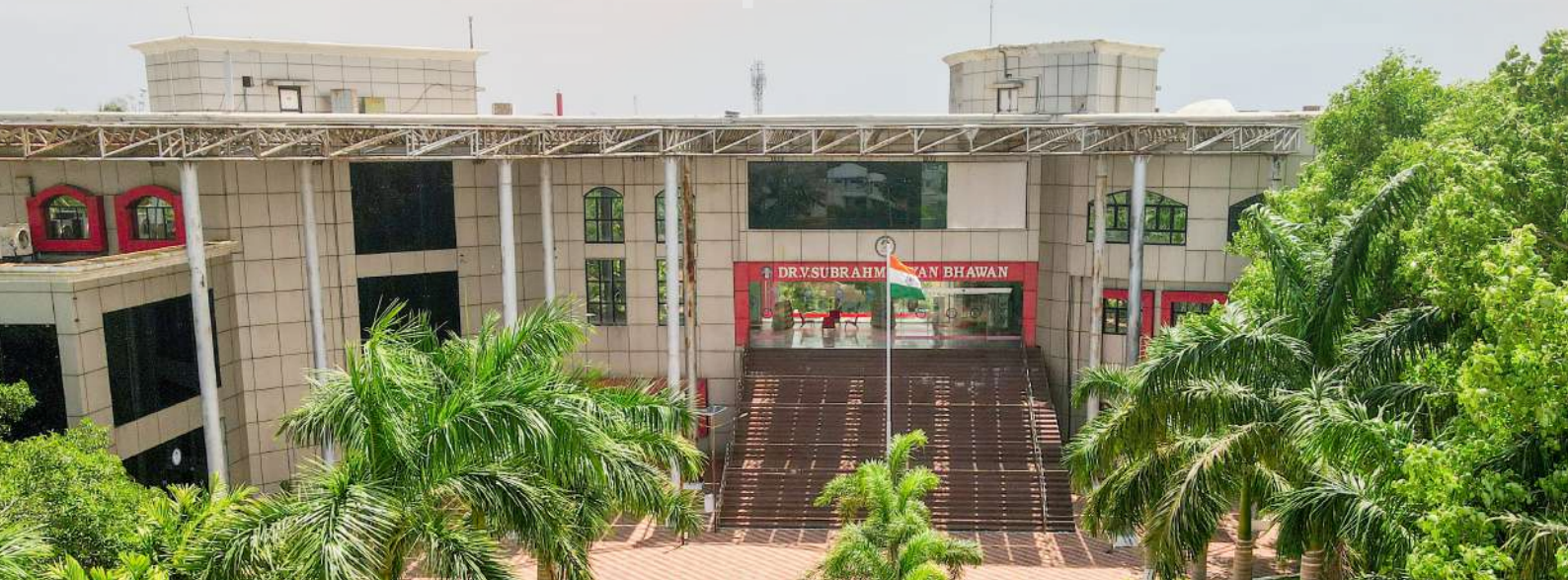

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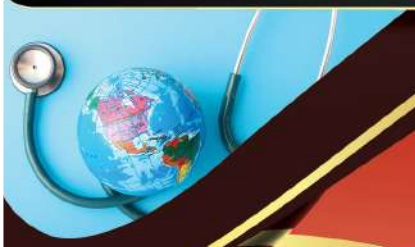


National Virtual Conference on

Food & Health Sciences: The Futuristic Outlook

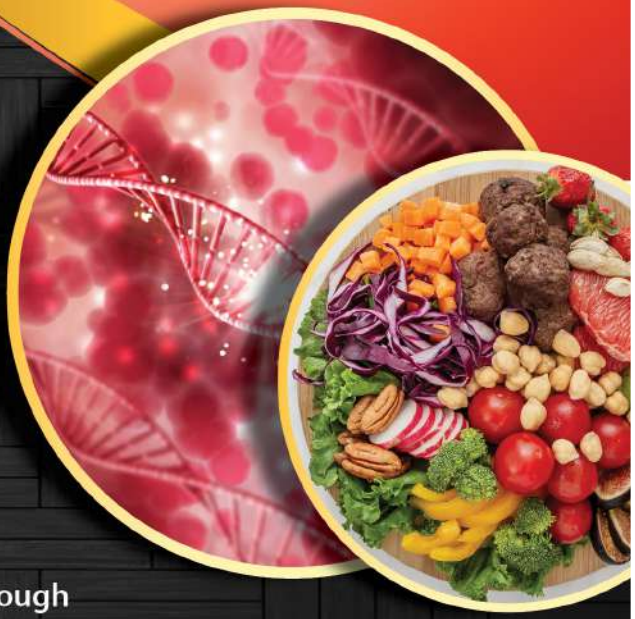
FHS - 23

9th & 10th February 2023

Time: 10:00 a.m. onwards

Conference Tracks

- Food quality, safety, security, & regulations
- Clinical or Therapeutic Nutrition, nutrigenomics, and food metabolism
- Functional Foods, Nutraceuticals, Probiotics
- Food nanotechnology & Bioavailability
- Safety Storge, Pest Control and Valorisation of food waste and co-products
- Healthy and sustainable future food: sources and technologies



Abstract / Full Paper Submission

- The authors of selected abstracts will be informed through registered e-mail id
- All abstracts will be published as an e-proceedings of FHS - 2023
- All accepted papers will be published in Book / Journal

Mode

Google Meet

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Last Date for Registration is 8th February 2023

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Students, Research Scholars, Professionals
Entrepreneurs / Agriculture / Stakeholders /
SHGs / Industry Persons, etc.

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Speakers

Dr. M. Loganathan
Director (i/c.), NIFTEM-T

Dr. R. Jaganmohan
Professor, DFPD,
NIFTEM-T

Dr. KA. Athmaselvi
Associate Professor, CEGS,
NIFTEM-T

Dr. S. Vignesh
Associate Professor, DA&HRD,
NIFTEM-T

Dr. V. Eyarkai Nambi
Associate Professor, DA&HRD,
NIFTEM-T

Dr. N. Baskaran
Assistant Professor, DA&HRD,
NIFTEM-T

National Virtual Conference on

Food & Health Sciences: The Futuristic Outlook

9th&10th February 2023

Schedule

Day 1

Inaugural Address & Plenary Lecture

Speaker: Dr. M. Loganathan

Director (i/c), NIFTEM-T

Lead Lecture- Title: Emerging trends in biopharmaceuticals and functional foods

Speaker: Dr. R. Jagan Mohan

Professor, NIFTEM-T

Oral Presentations

Session Chair(s): Dr. R. Jagan Mohan and Dr. S. Vignesh

Lunch Break

Lead Lecture- Title: Footprint analysis in food grains processing for better sustainability in post-harvest management

Speaker: Dr. V. Eyarkai Nambi

Associate Professor, NIFTEM-T

Oral Presentations

Session Chair(s): Dr. V. Eyarkai Nambi and Dr. S. Vignesh

National Virtual Conference on

Food & Health Sciences: The Futuristic Outlook

9th&10th February 2023

Schedule

Day 2

Lead Lecture-Title: Health benefits of millet and value addition

Speaker: Dr. KA. Athmaselvi

Associate Professor, NIFTEM-T

Oral Presentations

Session Chair(s): Dr. KA. Athmaselvi and Dr. S. Vignesh

Lunch Break

Lead Lecture-Title: Food waste to SC and its products

Speaker: Dr. S. Vignesh

Associate Professor, NIFTEM-T

Lead Lecture-Title: Food systems functional components

Speaker: Dr. N. Baskaran

Assistant Professor, NIFTEM-T

Oral Presentations

Session Chair(s): Dr. N. Baskaran and Dr. S. Vignesh

Oral Presentation Abstracts

Oral Presentation Abstracts

Oral Presentation Abstracts

Oral Presentation Abstracts

Oral Presentation Abstracts

Oral Presentation

Abstracts

NIFTEM-T/FHS-2023/001 A REVIEW ON VALORIZATION OF FOOD SCRAPS AND DERIVATIVES

Minal Rathore and Diksha Singh
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Agricultural food waste such as fruit and vegetable scraps are a significant resource for farmers who can use these waste to grow new plant. The valorization process involves using these agricultural food waste to produce animal feed and then using the resulting animal feed to produce meat or milk. Currently, most of the agricultural food waste is used in the form of methane gas, which is a potent greenhouse gas that cause global warming. The value-added products which are fine chemicals, nutraceuticals, antioxidants, bio-actives, bio-pol and many more are used to increase the value of a product. They help to reduce the cost of production and insure a high profit margin for companies. The average American throws away nearly two pounds of food per which add up to $2,275 worth of food that is wasted every year. It's estimated that households in India waste 50 kilograms of food per person year or 68,760,163 tonnes a year. It is also estimated that the average Indian household throws away over $1,200 worth of food each year. There are several valorization methods which are sustainable and profitable to manage. The most common is use of packaging. Packaging not only protects the food but also allows for a more efficient distribution of food. Another method is by using a cold chain which is a system that ensure the food stays at a certain temperature while being transported. This helps to ensure that food will stay fresh and can be distributed throughout the world without any problem.

Keywords: Valorization, Scraps, Nutraceuticals, Antioxidants, Packaging.

NIFTEM-T/FHS-2023/002 A REVIEW ON FOOD AEGIS AND CLIMATE DIVERSITIES

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Food security is one of the major issues which is followed up by whole world. The main factor affecting food security are climate changes and global warming, scarcity of land for farming, technology barrier, inadequate supply of water for irrigation, poverty. India is primarily an agricultural based country which leads to security paradigm in the contest of climate change. Extreme weather events such as heat, floods and sea level rise are already reducing productivity and disrupting food supply chain. Climate change will endanger the food security and slow down the country's growth. According to the report, 17 million people in India will face hunger by year 2030. Around 65 million people are at risk due to climate change. 60 percent of global food production may increase, but 50 million people will still be hungry and among them 7 million will suffer from hunger due to climate change 2050. The World Bank group's climate change action plan (2021-2025) is stepping up support for climate smart agriculture across the agriculture and food value chain via a policy and technological intervention. Making the food system resilient to climate change and pandemics while being green and sustainable is one of the things that needs to be considered in re-design of the food system. To achieve a net zero carbon emissions target, the need is to shift towards green sources of energy production.

Keywords: Food Security, Climate Changes, Food Supply Chain.

NIFTEM-T/FHS-2023/003 A REVIEW ON SIDDHA IN CONSUMING RICEFLAKES VARIETIES DURING SEASONAL VARIATION

S. Priyadharshini[1], S. Subaraj[2], R. Gomathi[1], E. Preetheeka[3], M. Suguna[1], Y. Kanimozhi[1]

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Rice flakes, or 'flattened rice' or 'beaten rice', is a popular processed rice product used as a breakfast cereal, a substitute for cereal in weaning foods and a snack food. About one-fifth of the rice produced is converted to flakes. Rice flakes is used as a base ingredient, which is converted to many types of finished products such as an item for breakfast or as a snack food. In siddha system of medicine rice flakes [aval] is more nutritional benefits with other rice varieties. Hence the varieties can be taken in six divisions (perumpozhuthu) of seasonal variations. The aim of this study is to consume the rice flakes varieties during various seasons with the dearrangement of kutrams. It is a review of literature in siddha perspective. The regular disciplines of food and action as mentioned for each season are followed as strictly as possible so that we could avoid the occurrences of the diseases due to the seasonal divergence.

Keywords: Rice flakes, Seasonal variations, Siddha medicine.

NIFTEM-T/FHS-2023/004 HARMFUL FOOD COMBINATIONS CAUSING ADVERSE EFFECTS – A REVIEW

N. Sabari Girija, A. F. Glara, A. Sureka, Rajeswari K
National Institute of Siddha, Tambaram Sanatorium, Chennai
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Food plays a decisive role in development, reproduction and termination of life. Through centuries, Food has been recognized as an important factor for human beings, in health and diseased state. When food is taken judiciously and according to the codes of dietetics then only the benefits of food can be achieved. Any aberration in diets and even in their preparation style leads to ill health. Hardly few individuals follow these codes and rules of dietetics. In Siddha system of medicine, the concept of incompatible food is described vividly in Siddha literatures by Siddha ancestors. The incompatible food is one of the potent causative factors for several diseases. It gives rise to various disturbances of mild to violent nature and disease of acute to chronic nature. This shows the potency and lethal effect of incompatible food.

Keywords: Incompatible diet, Food, Pathiyam, Siddha medicine.

NIFTEM-T/FHS-2023/005 EXPLORATIVE REVIEW ON AMMA MAGAPERU SANJEVI KIT SIDDHA SYSTEM OF WELLNESS FOR ANTENATAL CARE IN TAMIL NADU

M. K. Sathesh kumar [1], P. Sharmila [2], R. Gomathi [1], T. Subathra [1], K. Rajakumar [3]
R. Meenakumari [1]
[1]National Institute of Siddha, Tambaram Sanatorium, Chennai
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Siddha system of medicine is an ancient traditional system found by Siddhars, Siddhars followed many holistic principles for antenatal care, Childbirth is a happiest moment in Women's life as she take care for nine months terms antenatal care (ANC), superior care during pregnancy is needed for the health of the mother and the development of the unborn baby. Pregnancy is a worthless time to uphold healthy behaviors and parenting skills. Good ANC can also play a critical role in preparing a woman and her family for birth by establishing confidence between the woman and her health care provider and by individualizing promotional health message, the incidence of pregnancy complications is on the rise globally with severe consequences. According to the World Health Organization (WHO, 2009), every minute, at least one woman dies and 20 are affected, In order to prevent complications related to pregnancy or childbirth and maternal death former Chief Minister Jayalalithaa launched 'Amma Magaperu Sanjeevi kit,' which will have a bouquet of 11 Siddha medicines for pregnant women and newborn "The kit comprising the Siddha medicine for three trimesters has all the information about the properties of the medicines and their effects to improve the health of the mother and the baby. All government hospitals and primary health centers providing for antenatal care, this review explains in detail about "Amma magaperu sanjevi kit" benefits and usage in scientific manner.

Keywords: Siddha Medicine, Antenatal Care, Amma magaperu sanjevi kit, Siddha wellness.

NIFTEM-T/FHS-2023/006 NUTRITIONAL AND HEALTH BENEFITS OF SINGHARA – A REVIEW ARTICLE

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Background: Trapa Natans commonly known as Singhara or Paniphal in India. It is also known as Water Chestnut or Water Caltrops. It grows throughout the East of India such as in West Bengal, Jharkhand, and Bihar. Bihar in particular cultivates the fruit extensively in its districts of Darbhanga, Madhubani and Samastipur. Singhara is an annual aquatic plant that grows in ponds and marshes. Its thin stems vary in length depending on the water depth, and pinnate underwater leaves grow at the nodes. Nuts are the edible part of the singhara and are eaten boiled and sometimes roasted. Alternatively, dried and ground nuts are powdered to starchy flour to make a kind of porridge. Young nuts may be eaten raw with the greenish skin removed. Scope and Approach: This review article summarizes the Nutritional and Health benefits of Singhara.

Conclusion: The Singhara shell and core are rich in starch, dietary fiber, essential amino acids, certain types of phenols and minerals and have demonstrated various biological activities, including anticancer and antioxidant properties. Singhara contain several antioxidants that may reduce the risk of many chronic diseases and conditions. Other health benefits may include improved blood pressure, cancer prevention, weight loss and digestive health.

Keywords: Singhara, Water chestnut, Water caltrop, Trapa natans, Aquatic plant, Anticancer.

NIFTEM-T/FHS-2023/007 A REVIEW ON NUTRITIOUS BENEFICIAL FOOD GRAINS IN SIDDHA SYSTEM OF MEDICINE

S. Priyadharshini, S. Subaraj, R. Gomathi, E. Preetheeka, T. Subathra
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Food security has been a major concern to the world's population that is highly dependent on grains. Millet is superior to rice and wheat in terms of their mineral composition. Each millet contains more fiber than rice and wheat. The paper discussed about the food grains in siddha literatures such as Rice Pittu (Arisi Pittu), Rice Fake (Aval), Puffed Rice(Nerpori), Wheat(Kothumai), Finger millet(Kelvaragu), Pearl millet(Kambu), Common millet(Varagu) .This article gives the appropriate food grains for our sedentary lifestyle and functional components present in those varieties which may prevent the future metabolic disorder and other illness.

Keywords: Food grains, Millets, Siddha medicine.

NIFTEM-T/FHS-2023/008 PHARMACOLOGICAL REVIEW ON PANCHAMUTTI KANJI (PORRIDGE) FIGHTING THE MALNUTRITION IN CHILDREN

A. F. Glara, A. Sureka, N. Sabari Girija, Rajeswari. K
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Protein energy malnutrition (PEM) contributes to 60% of the total million deaths of children of less than five years. Two forms of PEM are kwashiorkor and marasmus, and they commonly coexist. Food is considered as the first pillar of our body. Indian food has strongly suggested the role of both preventive and therapeutic in nature. At present, recommendations are warranted to support the consumption of foods rich in bioactive components such as herbs and spices. Siddha is mainly based on preventive aspect first rather than curative. The curative effect of food is an established for many generations in India. Panchamutti kanji is a classic example of traditional Siddha porridge with all its five ingredients therapeutically enriched with protein and high nutritional values such as Oryza sativa, Vigna mungo, Cajanus cajan, Cicer arietinum, Vigna radiata. Hence, this study is aimed to review the ingredients of panchamutti kanji in the treatment of malnourished children.

Keywords: Panchamutti kanji, Protein energy malnutrition, Kwashiorkor, Marasmus, Siddha medicine.

NIFTEM-T/FHS-2023/009 ORANGE PEEL: AGRO-BASE WASTE AS SOURCE OF POTENTIAL PREBIOTIC AND ANTIOXIDANT

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Million tons of food are produced each year to feed the increasing global population. One of the widely consumed fruit is an orange (Citrus reticulate) and orange peel (OP) is often considered an agro-industrial waste. However, it is a potentially rich source of bioactive compounds such as dietary fiber as well as polyphenols. Hence, the objective of the present work was to determine the prebiotic potential and bioaccessibility of polyphenols by in vitro gastrointestinal model. The prebiotic potential was assessed by total viable count L. acidophilus (NCDC13) and acidification was analyzed by the change in pH during in vitro batch fermentation and bioaccessibility of polyphenols was analyzed by total phenolic content, total flavonoid content, and total antioxidant activity using Ferric Reducing Antioxidant Power (FRAP), 2, 2-Diphenyl-1-picrylhydrazyl Radical Scavenging Activity (DPPH-RSA) and 2,2-Azino-bis (3-ethyl benzothiazoline-6-sulfonic acid) diammonium salt Radical Scavenging Activity (ABTS-RSA) for the each step of in vitro digestion using the spectrophotometric method. The results showed that the growth of L. acidophilus in OP (16.66%) was increased significantly ($p \leq 0.05$) compared to the negative control. The acidification was measured by the change in pH was significantly ($p \leq 0.05$) increased in OP (pH-5.18) compared to inulin (pH-6.17). The TPC and TFC ranged from 2.28 to 28.33mg GAE/g and 1.05 ± 0.01 to 5.77 ± 0.03 mg RE/g, respectively. The range of total flavonoid content varied from. Results of antioxidant capacity (FRAP, DPPH-RSA, and ABTS-RSA) showed significant ($p \leq 0.05$) difference between the undigested as well as digested fractions. Overall, the findings revealed that orange peel might be used as a functional ingredient for human consumption in order to improve the overall health.

Keywords: In vitro digestion, Prebiotic, Fruit peel, Antioxidant, Bioactive compound.

NIFTEM-T/FHS-2023/010 SEAWEED AS A POTENTIAL ANTIFOULANT: A STUDY ON SCREENING OF BIOACTIVE METABOLITES AND ANTIBIOFILM ACTIVITY OF *Sargassum sp.*

S. Dharanie, Chichula Meghana, C.P. Motiram, Lavanya M, N. Baskaran and *S. Vignesh

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Seaweed produces various metabolites and acts as an antiviral, antiprotozoal, antifungal, and antibacterial agent. Macroalgae can be produced in large quantities, making them a desirable source of potential compounds that could be used to combat emerging illnesses and multi-drug resistant (MDR) strains and other strains like biofilm-forming strains, and fungal strains. The aim of this study is to explore the bioactive metabolites from different solvent extracts of Sargassum sp. and their antimicrobial activity. The seaweed sample (Sargassum sp.) was collected from Rameswaram coastal region, cleaned and then powered for further processes. Further, Sargassum sp. solid-liquid extraction procedure was employed (using petroleum ether, ethyl acetate and methanol) for characterization and antimicrobial studies. The three solvent-extracted Sargassum sp. samples were characterized by GC-MS and FTIR. Also, the antioxidant activity and the nutritional profile of the sample was studied by proximate analysis. Antimicrobial activity of those solvents extracts were tested against NCIM, ABR and biofilming cultures. Moreover, standard antibiotic and test samples combination effect was studied against those organisms. All the three solvent seaweed extracts exhibited promising antimicrobial properties. From the antimicrobial study, it was identified that the ethyl acetate solvent Sargassum sp. sample showed more inhibition zone in the range of 10 to 25mm. Thus, bioactive compounds from Sargassum sp. act as effective antimicrobial agents in both pharmaceutical and food industries in the near future.

Keywords: *Sargassum sp.*, Antibiofilm activity, Antioxidant studies, GC-MS, FT-IR, Antifoulant.

NIFTEM-T/FHS-2023/011 STORAGE STUDY ON JAMUN JUICE UNDER DIFFERENT PRESERVATIVE LEVELS AND PACKAGING MATERIALS

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The research work was undertaken to study the physico-chemical properties of jamun fruits and study the storage behavior and sensory properties of jamun juice during storage. The uniformly size, well matured and healthy jamun fruits of Cv. Local with firm texture were selected. The pulp was be extracted by brush type extractor. The preservative i.e., sodium benzoate with levels 200, 300, 400, 500, 600 ppm was added followed by pasteurization of juice at 90°C for 5 minutes. Pasteurized juice was filled in pre-sterilized PET and glass bottles, filled bottles sterilized and stored at room temperature. The experiment was planned with 10 treatment combinations with three replications and FCRD design was used to check the statistical significance. The average weight of fruit was 9.20g. The average pulp and seed were found to be 71.30 and 28.7%, respectively. The fresh jamun juice had 81.32% moisture content (wet basis), 13.75°Brix total soluble solid, 1.12% acidity, 3.80 pH, 9.76% total sugars, 8.27% reducing sugars and 216.0 mg/100mL anthocyanin. TSS, acidity, total sugars and reducing sugars were found to be increased whereas pH and anthocyanin were decreased with advancement of storage period. A gradual decrease was observed in scores for color, flavor, taste, and overall acceptability during storage. Among different treatment combinations, treatment of 600 ppm preservative and packed in glass bottle followed by treatment with 500 ppm preservative and packed in glass bottle was found to be more suitable for jamun juice storage for 90 days in respect of chemical properties and sensory properties.

Keywords: Sensory, Extractor, Sodium benzoate, Pasteurize, Flavor, PET.

NIFTEM-T/FHS-2023/012 USE OF IXORA COCCINEA FLOWER EXTRACTS, AS A RAPID TEST ASSAY TO ASCERTAIN THE PROPER PASTEURIZATION OF MILK

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Pasteurization is one of the most important unit operation for hygienic safety and for extension of shelf-life of milk and milk products. Alkaline phosphatase (ALP) is an enzyme naturally present in raw milk, which is used as an indicator for proper pasteurization of milk. Based on ALP activity, dairy industry determine the pasteurization efficiency of milk; but most of these (ALP activity determining) methods are either time consuming or required sophisticated instrument facilities which are rare in rural based dairy or collection centers in India. Present study was aimed to develop a simple, quick and economical chromogenic test protocol; based on the activity of Alkaline phosphatase (ALP), for assessing the efficiency of proper pasteurization of milk. The chromogenic dye was prepared from water extract of Ixora Coccinea (flower). Pasteurization of milk inactivates Alkaline phosphatase (ALP) enzyme and under the selected assay conditions, the raw (un-pasteurized) milk which gives Olive green colour under the test conditions, pasteurized milk remains brownish green colour; which is visualized by the naked eyes within ten minutes. The assay has a sensitivity of >1.5 units/L. Conclusion: This test is extremely useful at rural areas of our country where modern instrument facilities are rarely available.

Keywords: Alkaline phosphatase, Chromogenic dye, Ixora coccinea, Milk, Pasteurization.

NIFTEM-T/FHS-2023/013 NUTRITIONAL ASSESSMENT AMONG KURMI-SANTAL TRIBAL CHILDREN AGED 4-11 YEARS OF REMOTE AREA OF RANIBANDH BLOCK, IN WEST BENGAL, INDIA

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In Developing country, many tribal children are facing malnutrition issues in remote area of Ranibandh block of Bankura district in West Bengal which severely affects the health of children. This cross sectional survey, the objective of this study is to know the various factors and nutritional status of different aged group 4 to 11 years of tribal children The cross sectional study of total 351 childrens (190 boys & 161 girls) is assessed in Ranibandh block during April, 2021- September,2022. To ensure better understanding of nutrition status, it is decided to carry out the analysis by approaches, such as, i) Interview method with questionnaire, ii) Anthropometrics measurement of children is measured with standard procedure and children were considered as underweight, stunting & wasting of their weight-for-age, BMI-for-age, and height for-age Z-scores <-2.0 SD of the WHO reference standards. The p-value <0.05 was considered as statistical significance. Overall prevalence of underweight, stunting, and wasting was 56.6%, 29.1%, & 42.3%, respectively.The children were found to be severely underweight, stunted, and wasted. According to WHO classification of severity in malnutrition, the overall prevalence of underweight and wasting was very high. Nutritional status of studied tribal children was poor with high prevalence rate of under nutrition. It is resulted that tribal childrens are facing a number of nutrient deficiencies with standardized RDA. Their families and communities on increased food intake, proper dietary practices and also need to govt. approved nutritional funding polices.

Keywords: Malnutrition, Tribal children, Anthropometry, Nutritional, Remote area.

NIFTEM-T/FHS-2023/014 ISOLATION OF POTENTIAL PROBIOTIC BACTERIA FROM HUMAN FECAL

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Probiotics are non-pathogenic bacteria that can present and interact with the gut microbiota. In addition to enhancing the host immune response, they also have anti-inflammatory, anti-cancer, anti-allergic, and antibacterial activities. They can be isolated from different sources. However, it is frequently suggested that probiotics for human use should come from human sources. In the present research we attempted to isolate potential probiotic organism from human fecal. The isolated strains using De Mann Rogosa Sharpe (MRS) with bromocresol purple dye media. Total 11 strains were selected on the basis of their morphological characteristics, Gram staining and catalase test. On the basis of these results a gram positive strain was selected having characteristics such as small rod shaped, catalase negative and non-spore forming. This strain investigated for sugar fermentation test, their capabilities to survive under low pH and different Bile salts concentrations, their tolerance against Nacl and Phenol. This strain showed a good fermentation ability for Cellobiose, Arabinose, Maltose, Mellibiose, Raffinose and Sucrose sugars. This strain has shown a moderate pH tolerance (pH 3.0), high bile tolerance (2.0%), Nacl tolerance (5.5%) and Phenol tolerance (0.5%). The results demonstrated that the isolated strain could be a potential probiotic organism.

Keywords: Probiotic, Human fecal, Gut microbiota, MRS agar.

NIFTEM-T/FHS-2023/015 VALUE ADDITION OF POTATO PEEL WASTE USING CUSTOMIZED MOLECULARLY IMPRINTED SOLID-PHASE EXTRACTION (MISPE)

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Sustainable management of potato peels produced during processing of potatoes can be done by value addition to the peel waste. Peels contain polyphenols, which have antioxidant and anti-carcinogenic properties. However, specific segregation of any one polyphenol can be challenging due to the complex nature of the potato peel extract and low concentration of polyphenols in it. This research offers a solution to this problem by employing customized molecularly imprinted solid-phase extraction (MISPE) using rationally designed graphene oxide-based molecularly imprinted composite (GOMIP) as a sorbent for the selective recovery of p-hydroxy benzoic acid (P-HA), from potato peels. P-HA is an antioxidant with wide application in food, cosmetics and many more. In order to successfully segregate the desired P-HA, a number of parameters were optimized, including flow rate, vacuum manifold pressure, conditioning solvent, washing solvent, and elution solvent. The breakthrough curves study showed imprinting factor of 2.14 under optimal conditions. GOMIP sorbent based MISPE cartridge reusability and selectivity studies were carried out using extract of potato peel waste as a real sample. HPLC studies demonstrated that the MISPE cartridge filled with GOMIP could recover 77.4 % of P-HA. Thus, MISPE with customized GOMIP sorbent can be a long-term solution to value addition of potato peel solid waste.

Keywords: Molecularly imprinted solid-phase extraction, Potato peel waste, Polyphenols, Antioxidant, Value addition.

NIFTEM-T/FHS-2023/016 BASIL SEEDS AS NOVEL FUNCTIONAL INGREDIENTS WITH SIGNIFICANT NUTRITIONAL, ANTIOXIDANT AND ANTIMICROBIAL POTENTIAL

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The rising disposable income, urbanization, changing food habits and lifestyle led to consumption of faulty diets with increased prevalence of life style diseases nationwide. This has spurred health consciousness among food consumers and drastically enhanced demand for functional foods amidst the COVID 19 pandemic. In such a scenario, the underutilized clove basil (Ocimum gratissimum) and sweet basil (Ocimum basilicum) seeds being good source of protein (9.16, 8.55%), dietary fibre (56.45%, 48.46%), calcium (603.60, 568.40 mg/100g), polyphenols (17.28, 17.71 mg GAE/g extract) and flavonoids (106.22, 121.47 mg QE/g extract) exhibited vast potential for utilization as functional ingredients. The clove and sweet basil seeds exhibited total antioxidant capacity of 127.46, 266.13, 120.57, 531.98, 634.68 mg TE/g extract and 235.73, 344.63, 309.28, 609.83, 694.11 mg TE/g extract respectively for reducing ferric ions, scavenging DPPH, ABTS+, O2– radicals and inhibiting lipid peroxidation respectively with a potential to prevent development of many diseases induced by oxidative stress. Both the clove and sweet basil seeds ethanolic extracts showed significant antibacterial potential against food borne illnesses causing microbes such as Bacillus subtilis, Vibrio parahaemolyticus, Salmonella enterica and Escherichia coli with minimum inhibitory concentration of 128.0, 32.0, 64.0, 8.0 mg and 64.0, 8.0, 64.0, 8.0 mg respectively. Further, they inhibited Aspergillus flavus ON470194 growth by 76.65 and 69.40 % respectively, which is a potential food spoilage microbe. Henceforth, both the clove and sweet basil seeds with superior nutritional profile, antioxidant and antimicrobial capacities can be efficiently utilized for formulation of nourishing designer foods with enhanced shelf life.

Keywords: Basil seeds, Functional ingredients, Dietary fibre, Antioxidants studies, Antimicrobial activity.

NIFTEM-T/FHS-2023/017 DEVELOPMENT AND QUALITY EVALUATION OF MULTI-MILLETS MALT FORTIFIED PIZZA BASE

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The millets with amazing functional qualities are now referred to as superfoods and are used in the creation of nutritious foods. A research project was undertaken with the aim of developing pizza base using malted millets (finger millet, foxtail millet) flour in various proportions (0 to 20%) at equal share (1:1) in place of wheat flour and assessing its quality characteristics. The intent behind utilization of malt was to enhance functional efficacy of pizza base with increase in dietary fibre and mineral content. Pizza base developed with 18% malted millets flour received the highest ratings in sensory evaluation and same was further studied. The millets malt fortified pizza base has showed enhanced nutritional components especially dietary fibre and minerals as follows, moisture (33.01%), total fat (0.71%), protein (6.1%), fiber (5.34%), ash (1.44%), Carbohydrate (53.92%), calcium (91.1 mg/100g), phosphorus (106.5 mg/100g), Magnesium (63.41 mg/100g), Iron (1.8 mg/100g) and the energy value 246.47 kcal/100gm. The fortified pizza base was found to microbiologically safe for consumption for 4 days in LDPE package. Further, texture profile analysis (TPA) was done and results are reported such as Hardness (154.0 g), Springiness (3.89 mm), Gumminess (126.0 g), Chewiness (4.80 mJ), Cohesiveness (0.38 g). According to TPA it was found that there was increase in hardness, springiness, gumminess and chewiness in fortified pizza base than control. The outcome of study reveals that millets malt could be utilized as a replacement ingredient in preparation of pizza base with maintaining good quality characteristics and this product can be encouraged for commercial exploration as it is techno-economically feasible.

Keywords: Millets, Malting, Pizza base, Fortification, Dietary fibre, Minerals.

NIFTEM-T/FHS-2023/018 INVESTIGATION OF MICROBE-METAL INTERACTION: A STUDY ON EFFECT OF BIOFILM COMMUNITIES FROM SEAFOOD WASTE ON ALUMINIUM ALLOY

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A concerning problem for the food industry is the ability of different foodborne bacterial pathogens including Salmonella sp, Listeria sp, Escherichia coli, Campylobacter sp, Bacillus sp, and Staphylococcus sp etc. to attach to different surfaces and form biofilms on them. Biofilms imply major challenges for the food industry because they allow bacteria to bind to a range of surfaces, including rubber, plastic, glass, and even food products, within just a few minutes, which is followed by mature biofilms developing within a few days. It can cause fouling of the equipment, contaminate products and damage the water distribution system and also contaminate the food. Hence, it is difficult to eradicate the biofilm in the food industries. In order to understand this complex process, this research has been carried out to give new perspectives on creating biofilm-free food processing systems by using biofilm-producing microorganisms from seafood waste. In this study, aluminium metal alloys were submerged in seafood waste for 15 days, and the weight of the alloys and the amount of biofilm formation were assessed every 5 days. According to the study findings, extracellular matrix / metabolites was found in the aluminium alloys due to an increase in dry density of 3.2 g/100g biomass. A total of 96 strains were previously isolated from meat waste through various selective media and quantified the biofilm formation and its properties. Further, from the meat waste immersed in aluminium alloys, a total of 24 biofilm-forming bacterial strains were isolated and partially identified. The treated Al alloys were analyzed by SEM and EDAX. These findings indicated that biofilm formation in aluminium alloys causes severe biocorrosion and economic losses in the industries. Further research is required for addressing the control of biofilm formation.

Keywords: *Seafood waste, Aluminum alloy, Biofilm-forming strains, SEM.*

NIFTEM-T/FHS-2023/019 DEVELOPMENT OF TURMERIC AND CURRY LEAF FORTIFIED BIOBASED SUSTAINABLE AND EDIBLE BOWL

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Plastics are synthetic organic polymers of hydrocarbons that are modified to suit our purposes. They are robust but less bio-degradable and toxic for environment and human health. With an increase in the usage of plastics, food stalls and convenience food junctions have adopted usage of plastic cutlery, which provide maintenance free service to the consumers. Although inexpensive and easy to use, plastic cutlery is used and discarded in large quantities and often end up in the soil and water environment. It is necessary to find a sustainable alternative to plastic cutlery, which are bio-degradable, eco-friendly, inexpensive. Globally, countries are coming up with new and better strategies to decrease the usage of plastic cutlery, cups, bowls using bio-degradable and eco-friendly material to decrease the amount of wastes, thereby taking steps in reducing global plastic waste influx. In this report, an attempt was taken to develop edible bowl using bajra, wheat flour mixture as base and jaggery powder as a sweetener. The edible bowl was further fortified with turmeric and curry leaf powder. The edible bowl was compact and light yellowish in color. The moisture content of the bowl was reduced while the hardness increased significantly in presence of curry leaves and turmeric powder. Moreover, the curry leave (1%) and turmeric powder (0.5%) included edible bowl was most acceptable as per the sensory analysis. The edible bowl also showed strong antioxidant activity. Thus, from the preliminary results showed the fabricated cutlery can be used as an alternative to plastic-based cutlery.

Keywords: Plastic pollution, Bio-degradable, Edible bowl, Bajra, Turmeric, Curry leaf.

NIFTEM-T/FHS-2023/020 DEVELOPMENT OF POMEGRANATE-CHERRY JELLY ENRICHED WITH BEET ROOT JUICE

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Mixed fruit jelly was developed from pomegranate and cherry fruit juice and further enriched with beetroot juice. The pomegranate, cherry fruits along with beetroot were analyzed for different physic-chemical characteristics and were found to contain total phenolic content ranging 18.86±0.68, 6.75±0.44 and 2.68±0.19 mg GAE/g, respectively. Further, the jelly was prepared from mixed fruits and enriched with beetroot juice in the ratio of 70, 20 and 10% were rated for overall acceptability on the basis of sensory evaluation. The jelly was found rich in nutritional value with total phenolic content of 17.51±0.68 mg GAE/g and Antioxidant activity 35.68±1.64%. Further, the jelly retained sensory attributes like color, taste, texture, and nutritionally enriched in terms of antioxidant capacity.

Key words: Pomegranate juice, Beetroot juice, Cherry extract, Jelly, Total phenolic content, Antioxidant activity.

NIFTEM-T/FHS-2023/021 ARE NUTRACEUTICALS BENEFICIAL IN KIDNEY DISEASES?

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Nutraceuticals are substances that may be considered a food or part of a food available in the form of granules, powder, tablet, capsule, liquid, jelly or gel, semi-solids which provides medical or health benefits, encompassing prevention and treatment of disease like obesity, nephrological disorders, cardiovascular diseases, cancer, osteoporosis, arthritis, diabetes, cholesterol etc. Reduction of inflammation, modulation of oxidative stress, and inhibition of interstitial fibrosis, promotion of renal blood flow and glomerular filtration rate and stimulation of tubular regeneration was seen in people affected with renal diseases like acute kidney injury, chronic kidney diseases, nephrolithiasis and people who have undergone dialysis and renal transplant by nutraceutical supplementation. This article summarises the effects of nutraceuticals in people affected with kidney diseases. The related articles were collected using the databases PubMed, ScienceDirect and Google Scholar from March 2017 to March 2022. All the studies involving nutraceutical supplementation in nephrological diseases were included in this article. Thus this article concludes that the nutraceutical supplementation was beneficial in improving the symptoms of renal diseases.

Key words: Nutraceuticals, Renal, Kidney, Nephrological diseases.

NIFTEM-T/FHS-2023/022

ASSESSMENT OF PH VARIATIONS DURING EXTENDED PERIOD OF FERMENTATION OF COW MILK WITH DIFFERENT LACTIC ACID BACTERIAL CULTURES

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Lactic acid bacteria (LAB), the Gram positive, catalase negative bacteria are widely used as dairy starter cultures due to their ability to efficiently utilize milk constituents, principally the lactose and caseins. Due to their ability to produce lactic acid, typical flavour compounds, desirable textural attributes and to inhibit the spoilage microflora they play a significant role in dairy fermentations. In this study, eleven different LAB cultures were assessed for their acidification pattern in terms of changes in pH, the major indicator of progress of fermentation processes.The study revealed remarkable differences in between the cultures in terms of the time taken for coagulation (tc) and for attaining a pH of 4.5(tpH4.5). tc varied in the range of four hours for S. thermophilus DMM1 to fifteen hours for five out of the eleven cultures tested. pH noted at different stages of fermentation revealed culture specific variations in the extent of pH reduction. Marked decrease in pH was observed after 24 h of extended incubation of cultures at their optimum temperature. Highest pH24 was exhibited by Lb. delbrueckii 304 (4.07) and lowest pH24 was exhibited by Lb. acidophilus 307 (2.37). Considering the remarkable regional, individual and use specific variations reported in consumer preferences with respect to acidity, a major quality attribute of fermented milk products, observations of the current study could effectively made use while selecting the starter cultures for the preparation fermented milk products meeting the acidity preferences of the consumers. Data obtained in the current study would also help in categorizing LAB cultures to low and high post acidifying cultures.

Keywords: Lactic acid bacteria, Post fermentation acidification, Horrall elliker test.

NIFTEM-T/FHS-2023/023 PROBIOTICS AND PERBIOTICS IN SIDDHA SYSTEM OF MEDICINE

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Worldwide Siddha system is one of ancient medicine given by Siddhars, who are experts in living a healthy life from dietetics, life style modifications and preventing, curing diseases in a holistic way. In the methodology of science, definitions are distinctly established, with the International Scientific Association for probiotics and prebiotics (ISAPP). Traditionally lactobacilli, bifidobacteria, and other lactic acid-producing bacteria (LAB) predominantly used in probiotics, foremost isolated from fermented dairy products and faecal microbiome. Siddha medicines are prepared from herbs, minerals, herbo-mineral, metals, and animal products. Primarily some of the herbs and several animal products are purified using buttermilk before they are formulated into medicine. Chooranam (Medicinal powder) particularly Thayirchundi chooranam that prepared using five kinds of salts, dried ginger, sour curd in greater quantity, is repeatedly dried in sunlight and powdered that is best used in diarrhoea with undigested food particles. Most of the Siddha medicines are prepared using dairy products milk and ghee are aswagandha legium(Withania somnifera), panchadepakini legium, thettrankottai legium (Strychnos potatorum), venpoosani legium (Benincasa hispida). Medicines used in paediatric diseases are prepared with ghee, butter, butter milk, milk, curd are veliparuthi nei (pergularia damia), paruthi (Gossypium arboreum), othiyampattai (Lannae cormandelica). Ayajambira karpam is fermented with gingely oil for 40 days then is given for anaemia and rejuvenating the body. Bhavana kadukkai (Terminalia chebula) is prepared by purifying with fermented rice washed water for three days, and is treated for many of disease like asthma, anorexia, splenomegaly, sinusitis, vomiting, diarrhoea, anaemia, pitham, and rathapitham.

Keywords: Siddha medicines, Probiotics, Prebiotics, Dairy products, Fermented medicines.

NIFTEM-T/FHS-2023/024 ELECTROSPINNING: A NOVEL TECHNIQUE FOR ENCAPSULATION OF LACTIC ACID BACTERIA

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Probiotics are live microorganisms that when administered in adequate amounts confer a health benefit on the host. In this study, Lactocaseibacillus rhamnosus was encapsulated within nanofibres using electrospinning to determine its effect on the viability of the probiotic encapsulated. The probiotic loaded nanofibres were produced using pullulan as the encapsulating material at concentrations of 12, 14 and 16% (w/w) along with various lyoprotectants such as lactose, sucrose and maltodextrin. The lyoprotectants were added at 10% of pullulan (w/w) to enhance the survival rate of the probiotic bacteria after encapsulation. Optimization of the electrospinning process was carried out by Taguchi orthogonal array design, with survival rate and viability as response factors. The optimized conditions for maximum survival rate were found to be 18 kV applied voltage, 14% concentration of pullulan and maltodextrin as protectant. The survival rate of probiotic was greater than 80% after electrospinning, and the population decreased by 1-2 log scale. SEM images of electrospun L. rhamnosus showed that the microorganisms were successfully encapsulated within the nanofibres. Fermentation kinetics showed that the encapsulated bacteria were able to ferment skim milk and formed dahi after 12 h of incubation. Acidity of skim milk inoculated with electrospun L. rhamnosus was 0.18% LA at 0 h of incubation, and reached 0.8% LA after 12 h. Similarly, pH of milk decreased from 6.235 to 4.59 after fermentation. The acidity and pH of dahi prepared using encapsulated probiotic did not show noticeable difference with that prepared using unencapsulated bacteria. However, the viscosity of dahi prepared from electrospun probiotic was higher as compared to that produced by unencapsulated probiotic due to the presence of pullulan and maltodextrin, which acted as stabilizers.

Keywords: Electrospinning, Nanofibers, Survival rate, *Lactobacillus rhamnosus*.

NIFTEM-T/FHS-2023/025

FOOD AND DIETARY REGIMEN ACCORDING TO BODY CONSTITUTION (THEGI) IN SIDDHA SYSTEM OF MEDICINE

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The siddha system of medicine is one of the traditional medical systems, providing preventive, curative, promotive, rejuvenative and rehabilitative health care by adopting scientific and holistic approach. The corner stone of siddha medicine for healthy living is food and lifestyle." Food itself is medicine and medicine itself is food" is one of the basic principles of siddha medicine. The siddha system of medicine refines the process of eating a meal to being Thegi (Udaliyal) friendly. Each Thegi should maintain compatibility with its own set of food for healthy life. Guidance has been given in the Siddha classics for identifying specific types of body constitution, various dietary recommendations and disease susceptibility. The objective of this study is to provide descriptive information on food and dietary regimen according to on Thegi (body constitution/physique) features of Vali (Vatham), Azhal (Pitham) and Aiyam (Kabam) as given in Siddha literature. Foods like grains, cereals, vegetables, fruits, millets, non vegetarian, milk & milk products, oils, spices are recommended for three types of constitution. Preference of food habits according to body constitution paves way for healthy and disease free life by maintaining equilibrium of vital factors Vali (Vatham), Azhal(Pitham) and Aiyam (Kabam).

Keywords: Body constitution, Dietary regimen, Prakriti, Siddha system, Thegi, Uyirthaadhu.

NIFTEM-T/FHS-2023/026 EXPLORING SIDDHA BASIC FOOD AND HEALTH FOR PROVIDING INNOVATIVE SOLUTIONS TO SURAM (HYPERPYREXIA)

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Siddha system of Medicine is a traditional system of medicine that originated over three millennia ago in the South Asian region, offers all-embracing insights about food and health based on certain unique conceptual as well as theoretical positions. As per Siddha system, Human body is made of Aimbootham [five elements] in the form of Vatham, Pitham, Kabam known as Tridosam, Health is defined as a state of equilibrium with one's self but which is inextricably linked to the environment, alteration in these humours leads to diseased condition. The strength of the Siddha Medicine lies in its holistic approach -- the physical, mental, social and spiritual well-being by adapting simple lifestyle practices (postures, breathing exercises, meditation, etc.) dietary regimens relevant to six tastes, usage of safe and effective plant based drugs and drugs of mineral and animal origin. Siddhars have recommended certain basic food habits, lifestyle guidelines, preventive measures that help to prevent diseases. The quotes said by Sage Theraiyar, "Kudal thanil seethamalaathu suram varathu" Decreased functioning of Agni leads to the formation of Aamam in stomach leads to fever, which is a sign of various pathological condition. This article briefly reviews about Aamam, foods and porridges which would be taken to prevent as well as at the time of Suram [fever].

Keywords: Suram, Aamam, Siddha food, Siddha porridge.

NIFTEM-T/FHS-2023/027 VALORIZATION OF GHEE RESIDUE THROUGH MICROWAVE ASSISTED EXTRACTION OF PHOSPHOLIPIDS

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Ghee residue, a by-product obtained from ghee making, is reported to have substantial amount of phospholipids which possess health benefits as well as techno-functionality. Their bipolar nature opens avenues for their utilization as emulsifiers. The present study was aimed to optimize the extraction conditions for phospholipids from ghee residue using micowave assisted technique and in turn assist in valorization of ghee residue. Using microwave assisted extraction with distilled water as solvent; microwave power, time and solvent to solid ratio were optimized for yield of phospholipids. Through Taguchi designed T9 orthogonal array, parameters were optimized to 540 W power, 60s of treatment time and 10 solvents to solid ratio for phospholipids yield. Whereas, 180W power, 40s treatment time and 10 solvents to solid ratio were optimal parameters for highest antioxidant activity. At optimal operating conditions, phospholipids yield was 21.84%. Optimization trials reported R 2 value of 97.04% with time and power playing significant effect on phospholipids extraction (p<0.01). With short extraction time, the study proved that microwave is having potential to assist in extraction of phospholipids from ghee residue. Scanning electron micrograph images of microwave treated samples showed significant damage to the surface of ghee residue with flaky features indicating mechanical action during assisted extraction. The extract contained phosphatidylcholine, phosphatidylinositol, phosphatidylethanolamine, phosphatidylserine and phosphatidylglycerol classes of phospholipids as obtained by liquid chromatography mass spectrometry. Also, using water as a solvent, has advantage of being an eco-friendly technique for extracting this valuable compound thereby resulting in valorization of ghee residue.

Keywords: Phospholipids, Optimization, Ghee residue, Valorization, Assisted extraction.

NIFTEM-T/FHS-2023/028 NUTRACEUTICALS FOR CHILDREN

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Siddha system of medicine is an ancient traditional system of medicine which comes under AYUSH, contributed by siddhars which deals with physical, psychological, social and spiritual well-being of an individual."Food itself is medicine and medicine itself is food" is the basis of siddha medicine. The food is considered to be basic building material of human body which gets transformed into humours, body tissues and waste products. The equilibrium of humours is considered as health and its imbalance leads to diseases. Childhood is the age of both physical and mental growth and also stressful period such as puberty and adolescence that affect the health of growing child and youth.Here we are going to discuss about nutrition and diet for infant and toddler mainly concentrated importance of breastfeeding and its benefits, complementary feeding and importance of traditional food and its nutritive values explained. Good nutrition promotes not only better physical health and reduced susceptibility to disease,but has also been demonstrated to contribute to cognitive development and academic success.

Keywords: Pediatric nutrition, Nutraceutical, Exclusive breastfeeding, Complementary feeding, Infant and toddlers traditional diet.

NIFTEM-T/FHS-2023/029 EVIDENCE BASED MECHANISM OF SIDDHA PREBIOTICS AND PROBIOTICS IN GUT IMMUNITY

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Prebiotics and Probiotics are the two remarkable terms that are being emphasised by the nutritionists and health professionals for a healthy life, in recent decades. They both have their own role to play in the battle for better gut health. Siddha, a traditional system of medicine originated in South India, also mentioned these prebiotics and probiotics in their own methodology explaining its uses in gut health and also for the diseases related to Gastro-Intestinal tract. This article aims to highlight the prebiotics and probiotics mentioned in Siddha literatures with the possible scientific reasoning regarding its mechanism of action. Anna Kaadi,Thayirchundi chooranam, Gunma Uppu chooranam are few Probiotics mentioned in Siddha system. Similarly, resistant starch rich foods like Vaazhai Kachchal (Unripe young banana), Karuvelam pisin (Babul gum), etc. also mentioned for gut disorders in Siddha which may act as prebiotics and promote the growth of good bacterium in the gut. The properties of probiotics isolated from the above mentioned Siddha medicines are planned to be evaluated in our future works. Based on this, easily available Siddha medicines with lower cost comparative to the market available pre- and pro-biotics could be a best alternative and also safer for human consumption.

Keywords: Prebiotics, Probiotics, Siddha medicine, Anna kaadi, Resistant starch.

NIFTEM-T/FHS-2023/030 QUALITY ASSESSMENT OF BANANA BLOSSOM AND ITS UTILIZATION FOR THE DEVELOPMENT OF PRODUCTS

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Consumption of edible flowers is been reported since ancient times due to their richness in bioactive components exhibiting various medicinal properties. Banana flower is an edible by product of banana plant which has been traditionally used in many countries including India. It is a dark maroon colored heart shaped structure which is grown at the end of the bunch of banana. The flower is a good source of dietary fiber and phytochemicals and is found to be helpful in treating diabetes, hypercholesterolemia, anemia, ameliorating menstrual cramps, bronchitis, dysentry, diarrhea along with possessing anti-cancer, anti-oxidant, anti-inflammatory and anti-microbial properties. The present study was conducted to analyze the nutritional, functional and antioxidant profile of banana flower and its utilization for the development of antioxidant rich ready-to-serve carrot, orange, sugarcane based beverages and fiber rich banana flower mix powder. The nutritive analysis, organoleptic and cost evaluation of the products was done. The study revealed that banana flower, which is underutilized edible flower can be used for the development of various food products and in future the concentrated form of extract can be used as a nutraceutical or as drug in the treatment of cancer and diabetes.

Keywords: Edible flower, Banana blossom, Cancer, Antioxidants, Underutilized by-product.

NIFTEM-T/FHS-2023/031 ROLE OF GUT MICROBIOTA IN THE DEVELOPMENT OF INSULIN RESISTANCE AMONG PCOD PATIENTS

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Polycystic ovary syndrome (PCOS) is a complex endocrine and metabolic disorder characterized by hirsutism, hyperandrogenism, ovulatory dysfunction, menstrual disorders and infertility. Its pathogenesis though remains unclear but insulin resistance (IR) is considered as the primary pathological basis for its reproductive dysfunction. Hyperinsulinemia or Insulin Resistance /Hyperinsulinemia are associated with chronic inflammation, hormonal changes, follicular dysplasia, endometrial receptivity changes, and abortion or infertility. It also increases incidence of complications during pregnancy and associated with anxiety, depression, and other psychological disorders. Gut microbiota which is the "second genome" acquired by the human body, can promote metabolism, immune response through interaction with the external environment. Gut microbiota dysbiosis can cause insulin resistance, which is closely linked to the occurrence of PCOS. Gut microbiota plays an important role in PCOS and T2DM. Modification of gut microbiota with probiotic, prebiotic, and synbiotic agents suggests that these products may serve as new treatment options for PCOS. In this review, it is aimed to explain the relationship between PCOS and gut microbiota with possible mechanisms and to understand the new treatment approaches that can be developed.

Keywords: PCOS, Dysbiosis, Gut microbiota, Insulin resistance.

NIFTEM-T/FHS-2023/032 DIET DIVERSITY, EMOTIONAL EATING HABITS AND PSYCHOLOGY OF EATING AMONG THE ADOLESCENTS RESIDING IN TWIN CITIES OF HYDERABAD

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The pandemic had greatly influenced the dietary profiles of adolescents, who are prone to developing unhealthy eating habits. Adolescents have bad dietary practices that increases their likelihood of degenerative diseases namely diabetes, cardiovascular disease, obesity, diabetes, to name a few among the non-communicable diseases. Objective: To understand diet diversity, nutritional status and eating habits of adolescents by using the FAO based diet diversity questionnaire, after the pandemic. To study the intake of micronutrients, fermented foods (pre and probiotics) with respect to nutritional adequacy among adolescents. To understand the adolescent psychology on body weight, (calculating the BMI) and their consumption processed foods. To understand the psychology of the adolescents while eating different types of foods and diets being followed to lose weight. Method: This is a quantitative observational study; aged between18 - 21 years participated whose BMI was mostly between 18 and 24. For sampling, purposive method was adopted; information about anthropometry, eating pattern, emotional eating of participants was obtained using self-administered questionnaires. Result: greater than 40% of the population had emotional eating habit, they have a greater tendency to develop obesity. Conclusion: subjects consumed a diverse diet, with an inadequacy of minerals such as selenium, zinc, iron. Emotional eating in our country, is on the rise, which denotes the risk for development of obesity, attention to exercise, creating awareness about healthy eating habits should be adopted.

Keywords: Adolescence, Emotional eating, Diet diversity, Micronutrients, BMI.

NIFTEM-T/FHS-2023/033

HEALTHY AND SUSTAINABLE FUTURE FOOD FOR SUNFLOWER AND PUMPKIN SEED FLOUR BISCUITS

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Sunflower seed and pumpkin seed are found to be nutritious in means of healthy fat, vitamins and mineral. The potential use of these oil seed will impact a healthier change to the people's lifestyle. The purpose of the study is to investigate that sunflower and pumpkin seeds influence the proximate, physicochemical, and sensory properties of wheat biscuits. The Asteraceae family of plants includes the sunflower, which is rich in proteins. Sunflower has an essential mineral called selenium, which is used to treat cancer. Pumpkin seeds are commonly referred as a nutritional powerhouse because of their high zinc and phosphorus content that can fight against inflammation and prostate cancer. This wheat biscuits with sunflower seed and pumpkin seed will be very useful in combating the micronutrients deficiency problem in population of all age groups.

Keywords: Sunflower seed, Pumpkin seed, Powerhouse, Oil seeds, Biscuit, Wheat flour.

NIFTEM-T/FHS-2023/034 NUTRACEUTICALS FOR WOMEN WELLBEING

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Menstrual health is an integral part of overall health because between menarche and menopause. Menstruation, is a normal consequence of hormonal changes in a woman's body is affected by dietary habit. The food you eat and your menstrual cycle have a complementary relationship. Proper nutrition offers one of the most effective and least costly ways to decrease the burden of many diseases and their associated risk factors, including menstrual disturbances. The physical, mental and emotional disturbances that females experience during their menstrual cycle include hot flushes, changes in appetite, nausea, vomiting, bloating, diarrhoea, acne breakouts etc. Psychological issues like emotional disturbances, diminished libido and constant fatigue are common. In siddha system of medicine mentioned about the tridosham such as vatham, pitham and kabam. Foods plays main role in balancing the tridhosam. During menstruation vitiated vatham will be pacified by many foods. Pitham pacifying diet enables blood cleansing. Kabam pacifying food reduce the bloating of the abdomen during menstruation.

Keywords: Healthy diet, Menstrual diet, Tridosham, Siddha medicine.

NIFTEM-T/FHS-2023/035

ISOLATION, IDENTIFICATION AND MOLECULAR CHARACTERIZATION OF SELECTED FOOD BORNE PATHOGENS FROM PANIPURI SAMPLES SOLD AT DIFFERENT LOCATIONS OF ANAND CITY, GUJARAT

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Food safety is progressively becoming a significant public health issue as foodborne illnesses present a widespread and increasing public health problem in both developing and developed nations. Street foods are readily available sources of meals for many people, but the safety of these foods is always in doubt. These foods are perceived as having a potential risk of foodborne illness; therefore, the present study was conducted to detect the presence of foodborne pathogens, especially Escherichia coli and Bacillus cereus from Pani puri sample. Total 06 samples of pani puri (in triplicates) from 6 different locations were selected from Anand city. Bacteria were isolated, biochemically characterized, and their genomic DNA was retrieved using the boiling method. The phoA and nheA genes were amplified from DNA isolated from E. coli and B. cereus respectively. The total plate count as well as yeast and mould count ranged from 5.74 to 8.13 and 5.53 to 8.34 log cfu/gm respectively. Total 14 isolates were positive for E. coli while 09 were found to be positive for B. cereus using conventional culture techniques. In the PCR assay, 13 isolates tested positive for the phoA gene, and 05 tested positive for the nheA gene. The highest count of B. cereus was found in the sample obtained from location No. 2 while location No. 1 possessed the maximum number of E. coli. The study revealed possibility of microbial health risks to humans through contamination; therefore, it is important to monitor and enhance hygienic practises among street food vendors.

Keywords: Street foods, Bacillus cereus, *Escherichia coli*, Hygienic practices, Food safety.

NIFTEM-T/FHS-2023/036 *Hibiscus rosa-sinensis*: PHYTOCHEMICALS & ITS POTENTIAL APPLICATIONS IN FOOD & HEALTH

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Hibiscus rosa-sinensis, also known as Hibiscus, is a member of the Malvaceae family and grows in the wild in tropical areas. Hibiscus has a long history in traditional medicine due to its high concentration of pharmacologically active chemicals and consequently effective therapeutic capabilities. Additionally, it exhibits the morphology of a genus with roughly 300 species. These include shrubs, semi-shrubs, and annual or perennial herbs. It is utilized extensively in the culinary arts as a source of nutrients or as a natural color that is employed in the food and textile sectors, in addition to its medical use. Every portion of the hibiscus plant has different therapeutic and medical benefits. It has several biological functions in the human body, such as phytochemical, and pharmacological activities including anti-bacterial, anti-oxidant, anti-fungal, anti cancerous, anti-hyper epidemic, anti-inflammatory activities, diuretic properties, etc. Phytochemicals-nonnutritive, bioactive substances-found in all portions of the hibiscus, including sugars, organic acids, anthocyanin, flavonoids, phenolic acids, and terpenoids. The herb of the plant has the power to eliminate free radicals that can harm DNA. Other health advantages of the plant include its impact on lipid metabolism, significant impact on blood pressure regulation, and shown to the reduction of systolic and diastolic blood pressure, which can help prevent the development of heart disease, calming effects on the nervous system, anti-analgesic properties and antioxidant potential are higher, allowing for additional health advantages to be derived from the medicinal plant hibiscus.

Keywords: *Hibiscus rosa-sinensis*, Phytochemicals, Food systems, Antioxidants, Detoxification.

NIFTEM-T/FHS-2023/037 EVALUATION OF BIOFUNCTIONAL POTENTIAL OF SEEDS AND PEEL OF NEPHELIUM LAPPACEUM AND ITS UTILIZATION FOR VALUE ADDITION

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Nephelium lappaceum, commonly called as Rambutan is a fruit composed of 40 % edible portion and 60 % of peel and seed. These are anti-diabetic, anti-oxidant and antimicrobial in nature. The outer skin that encases the rambutan fruit contains flavonoids and Gallic acid that are anti-cancer and anti-inflammatory in nature. Yoghurt is a fermented milk product obtained through fermentation of milk by Streptococcus thermophilus and Lactobacillus bulgaricus. The present study was carried for the process standardization of rambutan seed and peel incorporated yoghurt. Skim milk powder (SMP) was replaced by rambutan seed and peel. Peel incorporated yoghurt with 25% of SMP and seed incorporated yoghurt with 50% of SMP gave best sensory and textural attributes. Total phenolic content assay (TPC) assay showed that the peel addition increased the total phenolic content from 0.305mg/l to 0.5mg/l. Peel yoghurt exhibited an antioxidant activity of 86% as compared to 55% for seed yoghurt. Crude fat content of peel yoghurt was slightly higher as 0.66% when compared to 0.56% for seed yoghurt. The protein content is reduced in the seed and peel yoghurt. There was significant antimicrobial activity with zone of inhibition 10mm and 11mm diameter for seed and peel yoghurt respectively against Escherichia coli but not against Streptococcus sp. Rambutan seed and peel yoghurt found to have a shelf life of 15 days under refrigeration.

Keywords: Nephelium lappaceum, Rambutan seed and peel, Yoghurt, Biofunctional potential, Value addition.

NIFTEM-T/FHS-2023/038 IDENTIFICATION OF NUTRITIONAL PROFILE OF WAFERS MADE OF AMARANTHUS

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Amaranth seeds have been originated from archaeological sites in northern Argentina. They are capable of adapting to unfavorable conditions. They have a huge number of health benefits and its components are antioxidant and anti-hyperglycemic. The researchers had focused on various species of Amaranthus since these seeds consist of proteins, carbohydrates, lipids, dietary fiber and it could be useful in tackling malnutrition and cardio metabolic diseases and also for individuals diagnosed with food allergies and intolerance to gluten. The amino acid profile of this makes it an attractive source of protein. These seeds of Amaranthus are collected from 11.2667N, 77.4090E. Sterile samples of Amaranth seeds were collected and are cleansed and ground. The flour of Amaranthus is paired with wheat flour that it increases the nutritional quality of wafers made. The nutritional quality of wafers are analyzed by PER (Protein Efficient Ratio), NPR (Net Protein Ratio), water activity to determine the moisture content, caloric contribution of wafers in water method. Sensory analysis was caries out for the wafers made of Amaranthus and moderate values were obtained from the feedback of various participants. Further characterization in the upcoming studies helps to find the health beneficiaries of this Amaranthus wafers.

Keywords: Amaranthus wafers, Nutritional quality, Wheat flour.

NIFTEM-T/FHS-2023/039 AN OVERVIEW OF TRADITIONAL FOOD HABITS OF SIDDHA SYSTEM OF MEDICINE

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In current scenario, our younger generation is suffering from various types of diseases. The main reason for this condition is none other than modified food habits. Food is essential for our health. In which the role of plant origin is very necessary. All parts of plant including fruits, leaves, flowers, stem, root tubers gives nutrition to our body. According to Siddha, "Food is medicine and Medicine is food". But the quantity and quality of food also counts more importance. The timing of food intake is also clearly mentioned in Siddha text. We must rely on Siddhar's text for the food consumption to strengthen our body and prevent it from diseases. We must follow our ancient system. Unless we change our food style we will face huge problems in future.

Keywords: Food habits, Ancient medicine, Food plants.

NIFTEM-T/FHS-2023/040 DEVELOPMENT OF MILLET-BASED YOGURT INCORPORATED WITH COCONUT MILK

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Functional foods are foods that have added nutritional value by adding new ingredients. The growing demand for healthy foods stimulates the innovation and development of new products. Yogurt, a milk-based product offers a high nutritional value and contains protein, carbohydrates, and fats. The added value of Eleusine coracana milk fortified with coconut milk shows a great increase in protein, calcium, iron, and texture over cow's milk. Being lactose-free and low-fat will be an added advantage to lactose-intolerant and vegan diet people. According to studies, finger millet has several benefits being antioxidant, antitumorigenic, and antidiabetic. Coconut milk also has benefits like improving cardiovascular health and reducing stomach ulcers. Coconut milk and finger millet milk are mixed with the culture of Lactobacillus bulgaricus and Streptococcus thermophilus bacteria at 42°C and left to sit for several hours at a warm temperature for fermentation. These bacterias act as a probiotic that supports our immune system and improves digestive health by maintaining good gut bacteria levels.

Keywords: Functional foods, Yogurt, Coconut milk, Finger millet, Probiotic bacteria, Immune system.

NIFTEM-T/FHS-2023/041 OPTIMISATION OF MARSHMALLOW USING LOW CALORIE SUGAR AND AGAR-AGAR

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A Marshmallow is a fluffy treat that is sweet and made of sugar. "Citrus medica", Citron being rich in Vitamin B6, vitamin C contains many antioxidants, and blood sugar-lowering substances. Stevia from chrysanthemum family is a sweetener with few to no calories and carbohydrates by extracting steviol glycosides from the leaves of the stevia plant. Stevia sugar serves as a counterbalance to the tartness of the citron. Agar-agar a vegetarian source made from red algae, is gluten-free. When stevia syrup and marinated Agar-agar are boiled together and then whipped, a slimy structure forms that aids in binding the batter. White sugar consumption increases the risk of developing diabetes mellitus. Diabetes mellitus is a condition where blood glucose levels are not properly controlled. Lack of insulin release or no insulin synthesis is the cause of the rise in blood sugar levels. The team has developed a healthy sweetener for the intended audience while keeping in mind the challenges experienced by diabetes patients. This synthetic-free product is projected to provide a citrus complement without sugar while also being vegan and suited for all age groups in light of the expanding modern world and growing concern about health issues. All people will be benefited from the outcome, but diabetes patients in particular will be benefited from having a chance to consume sugary treats without risking their health.

Keywords: Marshmallow, Citron (Citrus medica), Stevie, Agar-agar, Diabetic mellitus.

NIFTEM-T/FHS-2023/042 PLANT MILK: SOURCE OF NUTRITIONAL AND MEDICAL BENEFITS

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Plant milk has overtaken milk acquired from different animals. This happens due to increasing awareness among people about the nutritional and health (preventive/ treatment) benefits of consuming a vegetarian or vegan diet as well as environmental and ethical awareness. Since the last two decades, a tremendous change has been seen in the kind of diet (fast food, western diet) consumed and its repercussions on the deteriorating health conditions of people of all age groups. With time and due to medical reasons, people become more health conscious and start regulating their diet from all spheres (from the source of nutrition, nutritional value, digestion, age factors, medical conditions, and specialized nutrition). Plant milk gets a dignified space in the market and acceptability among people on sufficient academic and research grounds. A wide range of reasons has made most of the world's population choose plant milk over animal milk and related animal milk-based products. Plant-based milk is undoubtedly very healthy and a great option for people who could not consume dairy products. It also acts as a replacement for animal milk and has the ability to regulate a number of disorders, including obesity, diabetes, hypercholesterolemia, nephropathy, and CVDs. It is considered a healthier option and is also involved in the treatment of various syndromes and diseases including lactose intolerance (LI), hypercholesterolemia, cow's milk allergy, etc. Vegetarian dietary sources of plant milk are cereals-oats, rice; pulses-legumes, kidney beans, peanuts, soybean; nuts-almonds, cashew, walnut; seeds; coconut, etc. Applied scientists have made a tremendous attempt to recognize the advantages of plant-based milk and its positive effects on gut microbiota, CVDs, type 2 diabetes, and nephropathy, with several case studies supporting the assertion.

Keywords: Plant milk, Veganism, Lactose intolerance, Gut microbiota, Obesity, Diabetes.

NIFTEM-T/FHS-2023/043

PREVALENCE OF MULTIPLE DRUG RESISTANT *ENTEROCOCCI* IN HOUSEHOLD CURD SAMPLES OF MANNUTHY – KERALA

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Antimicrobial resistance (AMR) is a global health threat with serious political and economic implications. Enterococcus, is an ubiquitous microorganism belonging to the genus of lactic acid bacteria. The prevalence of antimicrobial resistance and virulence has limited the use of enterococci in food, human and animal health. Twenty curd samples collected randomly from the households of Mannuthy were screened for the presence of enterococci by pour plating appropriately diluted samples in Bile esculin agar. Esculin hydrolysis with black precipitate presumptive for enterococci were selected and streaked to purity and stored in MRS agar slants. Antibiogram of the isolates was evaluated by the disc diffusion assay (Bauer et al., 1966). Biofilm forming potential of enterococcal isolates was determined by microtiter plate assay at 570 nm using Crystal Violet. Eight out of ten enterococcal isolates showed Multiple Drug Resistance. (resistance to more than three classes of antibiotics). All the eight isolates showed resistance to all tested Beta lactam antibiotics (Penicillin, Cephalothin and Methicillin) and Aminoglycosides (Kanmaymcin and Streptomycin). All the isolates were sensitive to Linezolides. 37.5% of the isolates were found to be resistant to Vancomycin, 25 % to Chloramphenicol and 40% to Tetracyclines. Microtiter plate assay revealed all the isolates to be moderate biofilm formers.

Keywords: *Enterococci*, Multiple drug resistance, Acid sample, Kerala.

NIFTEM-T/FHS-2023/044 HEALTHY AND SUSTAINABLE FUTURE FOOD: READY TO COOK PEARL MILLET STRING HOPPERS

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Pearl millet also known as Bajra is the most widely grown type of millet in India. pearl millet aka bajra is the best option as they are low calorie density whole foods. Their low calorie density constitutes to READY TO COOK pearl millet string hoppers are made to make your day nutritious and convenient. Just pour water and your string hoppers are ready to eat. This product save a lot of time and has amazing health benefits like they are High in protein, fiber& rich in folic acid, Complete proteins for vegetarians, Gluten free and gives a lot of energy for your day

Keywords: Widely grown, RTC, Low calorie diet, Gluten free, Convenient and more.

NIFTEM-T/FHS-2023/045 INVESTIGATION STUDIES ON THE EFFECT OF SONICATION IN PROCESSING OF COLD PRESS JUICES

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Juice is one of the most consumed beverages in food technology today. Juice is simple to consume, pleasant, and energizing. Depending on the raw materials utilized, juice is also high in vitamins, phytochemicals, and occasionally fiber. However, during thermal processing, juice frequently loses vital nutrients and suffers from a reduction in quality and freshness. In order to counteract the harmful effects of thermal treatment, novel technologies for juice processing have been created. Among the existing technologies, ultrasonic technology offers a lot of potential for creating juice that is of high quality, healthy, delectable, and reasonably priced. Additionally, it is claimed that ultrasound technology will increase juice yield and extract several significant chemicals during juice production. Watermelon juice processing for commercialization has not yet been undertaken by the food sector in a number of emerging nations. Watermelons are only briefly available on the market and are typically consumed to satisfy thirst on sweltering days. Due to its sensory, physical, and nutritional advantages, watermelon juice has been increasingly popular in recent years.

Keywords: Cold press juice, Thermal processes, Watermelon.

NIFTEM-T/FHS-2023/046

SEAWEED-MEDIATED BIOSYNTHESIS OF IRON NANOPARTICLES (FE-NPS) AND ITS EFFECT ON CONTROL OF BIOFILMING MICROORGANISMS ON DIFFERENT FOOD-GRADE MATERIALS

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Green synthesis of nanoparticles offers advantages such as cost-effectiveness, simple, convenient, eco-friendly, non-toxic, can be commercialized easily, less threat to human health, lack of use of harmful chemicals, high temperature, pressure, and energy in comparison to other physical and chemical approaches. Thus, biosynthetic/ biogenic techniques using biological microorganisms or plant extracts have received notable attention in the field of nanotechnology. Iron nanoparticles (Fe-NPs) were biosynthesized using the aqueous seaweed extract (*Sargassum sp*.) at different concentration as a reducing agent. The aim of this study is to control the biofilm-forming microbes in food-grade materials. The biosynthesis of Fe-NPs was preliminarily confirmed by the colour change and optical property. Also, it was characterized by using an ultraviolet–visible (UV–vis) spectrophotometer (in the range of 250 to 350 nm) and Fourier transform-infrared (FTIR) spectroscopy (Identification of functional groups which is involved in the reduction process). Further, Fe-NPs were tested against different microorganisms (ABR-ESBL strains, Biofilm forming microbes and NCIM cultures) and the combined effect was also studied. These results indicated that Fe-NPs were active against most of the microorganisms and it can act as an effective anti-biofilm agent. .

Keywords: Seaweeds, Iron nanoparticles (Fe-NPs), Antibiofilm activity, Food grade materials.

NIFTEM-T/FHS-2023/047 HEALTHY AND SUSTAINABLE FUTURE FOOD: MICROGREENS INFUSED CARICA PAPAYA SPREAD

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Papaya is a wholesome and a seasoned fruit. It has a rich source of carotene and fair source of Vitamin C. 100 g of ripe papaya consists of 32 calories, 0.6g of protein, 0.1g of fat,7.2g of carbs, 2.6g of fiber. It has a high water content which helps in improving digestion. Alkaloid Carpaine found in papaya reduces the blood pressure and heart rate. Most of the children would hesitate to consume it as a fruit, so when we give it in the form of spread they would gain more nutrients. When we come to microgreens, they are a good source of antioxidants and nutrients including minerals like Cu and Zn, carotenoids and phenolic compounds. Many studies showed higher nutritional quality in microgreens than in mature plant. An increasing number of recent studies attest to the health benefits of microgreens due to their high density of vitamins and nutrients. These are popular amongst health-conscious consumers and chefs that use microgreens as colorful and flavorful garnishes.

Keywords: Papaya, Future food, Antioxidants.

NIFTEM-T/FHS-2023/048

AMELIORATIVE EFFECT OF TAMARIND LEAVES (TAMARINDUS INDICA) AQUEOUS EXTRACT AGAINST THE INFLAMMATION VIA MODULATING PRO-INFLAMMATORY AND ANTI-INFLAMMATORY MEDIATORS IN WISTAR RATS

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Cancer, schizophrenia, and other forms of neurological disease, as well as metabolic diseases, may all be linked to chronic inflammation. Throughout history, tamarind leaves have been a popular ingredient in Asian cooking. Scientific research on the tamarind's constituents and medicinal uses reveals that the plant's fruit pulp and seeds are its most prized parts. However, there has been a dearth of research on tamarind leaves, and we want to investigate whether or not, like the fruit and seed, the leaves also have anti-inflammatory benefits. According to the findings of the current study, the inflammatory mediator IL-10 is upregulated, while IL-6 and COX-1 are downregulated by consuming tamarind leaves. To lower inflammation and oxidative stress, tamarind leaves suppress the synthesis of pro-inflammatory mediators and restore the body's natural antioxidant balance. The results of this first-of-its-kind study may guide the design of future investigations on inflammatory illnesses and suggest that supplementation with tamarind leaves may reduce inflammation.

Keywords: Tamarind leaves, Inflammation, Oxidative stress, Anti-inflammatory property.

NIFTEM-T/FHS-2023/049 DEVELOPMENT OF FIBER-PROTEIN ENRICHED SUGAR FREE BISCUIT FORTIFIED WITH SOYBEANFLOUR & OAT FLOUR

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The soybean flour contains a lot of essential amino acids and proteins of high biological value and oat flour also rich sources of protein, dietary fiber, several B complex vitamins and numerous dietary minerals, therefore, these are suitable for the development of protein and fiber rich food products. Biscuit is a wheat flour based baked, shaped and crunchy food product. They are usually sweet, hard, flat and untaught. Aim of the study is to development of fiber- protein enriched sugar free biscuit fortified with different combination of wheat flour, soy flour and oat flour. Control biscuit prepared by only using wheat flour and fortified biscuit prepared by using wheat flour, soybean flour and oat flour. Proximate composition analysis, physical analysis, shelf-life analysis and sensory evaluation will be place for both control and fortified biscuit. As a result, compare to control biscuit, fortified biscuit will be more nutritious and shelf life of the fortified biscuit will be longer than control biscuit.

Keywords: Biscuit, Oat flour, Soybean flour, Sugar-free biscuit, High protein –fiber biscuit.

NIFTEM-T/FHS-2023/050 DEVELOPMENT OF BETA- CAROTENE RICH RTE JAM SLICE

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Vitamin A deficiency is associated with significant morbidity and mortality from common childhood infections, and is the world's leading preventable cause of childhood blindness. An estimated 250,000–500,000 children who are vitamin A-deficient become blind every year, causing 50% fatality within 12 months of losing their sight. The overall prevalence of vitamin A deficiency in India is 17.54%. To combat this problem, fruits and vegetables rich in vitamin-A either unprocessed or minimally processed needs to be incorporated into the daily diet. Considering the modern lifestyle, these products also reduce the need for external nutritional supplements. The study was aimed to develop ready-to-use jam slices and analyze nutritional and organoleptic attributes. Quantity of fruit pulp, sugar, gelling agent, solidifying agent and acidulant were optimized with carrot, beetroot, pumpkin, papaya and banana and experimented for the formulation of jam slices. Gelling agents viz pectin, agar and china grass were varied from 0.5% to 3.5%, 0.1% to 2%, 1% to 5% respectively and the concentration of citric acid was varied accordingly. The product was incubated at 70°C for 2 hours for the slice formation. Proximate analysis, beta carotene quantification, physiochemical properties and texture analysis was performed for standarization of the final product.

Keywords: Beta-carotene, Vegetable, Fruit, Gelling agent, Jam slice.

NIFTEM-T/FHS-2023/051 COMPOSITE FLOUR

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Composite flours are a mixture of flours from tubers rich in starch and protein rich flours and cereals, with or without wheat flour. The development of food products using composite flour has increased and is attracting much attention from researchers, mostly used in the production of bakery products and pastries. This article mainly focuses on use of composite flour to produce food products like pasta. In this article cassava, oats and chick peas composite flour is taken for analysis. As cassava is tuber and it is rich in vitamin C, where oats is rich in protein and chickpeas is legumes and rich in iron and fiber. It was found that composite flour used to produce food products is still able to maintain similar characteristics to products made from full-wheat flour. Composite flour mostly fills the requirement of flour equally to the wheat flour. Analysis on composite flour and products from composite flour fulfills the basic nutrients requirements and also physical requirements

Keywords: Composite flour, Food products, Physical requirements, Protein rich.

NIFTEM-T/FHS-2023/052 PROBIOTICS IN NATURAL FOODS

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Probiotics are live microbial food supplements or components of bacteria which have been shown to have beneficial effects on human health. Siddha medicine has immense faith in miracle drugs and prolongation of life through rejuvenating treatments and unique feature is the removal of root cause of disease and perfect remedy for body and mind. There is a popular saying in siddha system of medicine that food is medicine and medicine is food. Probiotics bacteria are used to treat or prevent a broad range of human disease probiotics could be used for several conditions such as diarrhea, irritable bowel syndrome, urinary tract infections, immune disorders, cancer, Helicobacter, pylori, lactone intolerance, hyper cholesterolaema, and allergy. Probiotic bacteria are used to treat or prevent different species of microorganism such as lactic acid bacteria or yeast have been prepared for human use. Many dietetic preparations and medicinal preparations are mentioned in siddha pharmaceutics. These preparations have therapeutic effects as well as have nutritive value. These formulations and dietetic preparation have the effect of probiotics. Probiotics are dietary substances mostly consisting of non-starch polysaccharides and digorachrids poorly digested by human enzymes that nurture a selected group of microorganisms living in the gut. They favour the growth of beneficial bacterial over that of harmful ones.

Keywords: Probiotics, Siddha medicine, Probiotic bacteria.

NIFTEM-T/FHS-2023/053

PRODUCTION AND CHARACTERIZATION OF VALUABLE PROTEIN HYDROLYSATES FROM DE-OILED RESIDUAL BIOMASS-*SPIRULINA PLATENSIS*

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There is an increasing interest for exploring new alternative renewable resources to produce protein hydrolysates (PH). Thus, residual biomass of Spirulina after lipid extraction, which has not yet been extensively studied for food production, is a promising source of study. The objective of the present work is to investigate the technological and antioxidant properties of the 4 PH derived from residual biomass of Spirulina. Around 70% of biomass was obtained as residue after lipid extraction. The yield and protein content of the PH from residual biomass were 48% and 78% respectively. PH had a high solubility at acidic pH-5. The emulsification power and foaming capacity of PH were 56 m 2 /g and 275% respectively. PH had a higher ratio of α-helix to ß-sheet (3.4) compared with the raw (1.6) and residual biomass (0.7), which indicates a high digestibility of PH. The antioxidant capacity of PH by DPPH, ABTS and reducing power assay were 80, 1746, 618 µM Trolox g -1 respectively. The results indicate that the PH could be used as a potential ingredient in food and pharmaceutical industry, thus providing a sustainable valorization to protein rich residual biomass.

Keywords: Residual biomass, Protein hydrolysates, Functional properties, Antioxidant activity, *Spirulina platensis.*

NIFTEM-T/FHS-2023/054

DEVELOPMENT OF A NOVEL FERMENTED MILK DRINK WITH THE INCORPORATION OF ASHWAGANDHA, GINGER AND TURMERIC EXTRACT FOR THE ENHANCEMENT OF ANTIOXIDANT FUNCTIONALITY

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The addition of natural ingredients like herbs/spices in dairy foods for the development of functional foods is a proactive approach and has gained tremendous attention during post covid era. Fermented milk products added with spices and herbs combine the benefits of milk, beneficial microorganisms, and therapeutic spices and herbs. Hence the current study aimed to develop a flavoured fermented milk drink (FFD) with indigenous lactic acid bacteria and spices as a functional ingredients. The starter cultures selected were Lactobacillus acidophilus, Lacticaseibacillus case, Lactobacillus bulgaricus and Streptococcus thermophilus. Response surface methodology was employed for the optimization of the quantity of ashwagandha, ginger and turmeric extract and sugar. The optimal selections for developing flavoured fermented drink (FFD) were Ashwagandha extract, ginger extract, turmeric extract and sugar, which were 2.188%, 0.5%, 1% and 10% respectively. The physico chemical analysis in FFD showed that total solid (18.14%), carbohydrate (5.5%), fat (0.58%), protein (4.05%), ash content (0.66%) and vitamin C content (0.56%), carotenoid content (0.17%), curcumin (5.08 ppm) and pH (5.06). The LAB count in log 10 cfu/ml for the product and control were 8.35 and 8.39 respectively. The antioxidant property of FFD (76.33%) was found to be significantly higher than that of the control (17.01%). The enhancement of the antioxidant property of the product can be attributed to spices which are rich in phenolic compounds which offer antioxidant properties. The sensory evaluation revealed that spices/herbs enhanced the overall acceptability as compared to plain yoghurt with a shelf life of 30 days.

Keywords: Fermentation, Milk drinks, Functional Ingredients.

NIFTEM-T/FHS-2023/055 POMEGRANATE AS A POTENTIAL NATURAL THERAPEUTIC AGENT: AN UPDATED REVIEW ON ITS HEALTH BENEFITS

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Punica granatum L., the scientific name for the pomegranate, is a member of the Punicaceae family, which is found all over the world. It is regarded as an essential part of the human diet and has numerous health advantages in addition to its strong antioxidant activity. A diet high in antioxidant fruits and vegetables, according to epidemiological research, considerably lowers the incidence of many diseases linked to oxidative stress. This fruit have a variety of sections, including seed, peel, juice, and leaves, all of which have a wealth of potential bioactive substances. The fruits have a high level of flavonoids (luteolin, quercetin, etc.) and polyphenols (gallic acid, ellagic acid, etc.), which gives them antioxidant potential and the ability to scavenge free radicals. It possesses a range of biological properties, including as anti-inflammatory, anti-cancer, anti-diabetic, cardio-protective, and antibacterial potential. The entire fruit has medicinal and therapeutic uses in preventing the development of several malignancies, including prostate, breast, colon and lung cancers. The fruits are used in traditional medicine to treat conditions like gastrointestinal, endocrine, and cardiovascular problems, among others. Modern investigations have validated a number of traditional medicinal plant properties, making them a source for the creation of novel medication compositions. These traits therefore clearly suggest that the entire pomegranate fruit offers a range of advantages in therapeutic applications and that they might be used in the future to treat severe chronic diseases. The article focuses on the possibility of developing new drugs using the bioactive substances present in pomegranates. Their incidence, production, metabolism and health effects are all well explored.

Keywords: Punica granatum, Phytochemicals, Antioxidants, Chronic diseases, Oxidative stress.

NIFTEM-T/FHS-2023/056 SPIRULINA WITH HIGH PROTEIN FOR ALTERNATIVE FOOD SUPPLEMENTS

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Spirulina is a high-protein alga that can be farmed at a minimal cost and is extremely profitable. Algae come in 15 different varieties. Spirulina maxima and Spirulina platensis grow well in Tamil Nadu's climate. The Maxima variety is well-suited to machine cultivation. Small firms can successfully breed the platensis variety. You may learn about a few of these advantages in this post. It's a concentrated super alga that contains all of the essential amino acids as well as a whopping 68 percent protein. In addition, beta-carotene, vitamin B12, important fatty acids like Omega 3, and even zeaxanthin are antioxidants found in spirulina. Spirulina is a type of algae that is used as a food supplement. It is nutrient-dense and has numerous health advantages..

Keywords: *Spirulina*, Arthrospira platensis, Business plan.

NIFTEM-T/FHS-2023/057

IDENTIFICATION OF INTENTIONALLY AND NON-INTENTIONALLY ADDED SUBSTANCES IN MULTILAYER PACKAGING FILMS AND THEIR MIGRATION INTO GHEE

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Polymers are extensively used as material of choice in food packaging applications; however, there is rising concern due of the probable release of unwanted compounds into foodstuffs. Migration of plastic ingredients not only have the prospects to affect quality of food product but also establishes a chemical health hazard to consumers. In an effort to examine the safety of food packaging materials, analytical protocols to determine potent migrants are essential. In the initial part of study, GC/MS screening method was established for identification of compounds from ghee packaging films involving intentionally and non-intentionally added substances (NIAS) as potential migrants. While in the second part of work, presence of frequently occurring compounds, viz., Bis (2-ethylhexyl) phthalate (DEHP), Diethyl phthalate (DEP), Butylated hydroxytoluene (BHT), acetyl tributyl citrate (ATBC), Di-tertbutyl phenol (DTBP), bis (2-ethylhexyl) adipate (DEHA), 13-Docosenamide, Tris(2,4-di-tert-butylphenyl) phosphite, 3:1, (Irganox® 168), Octadecyl 3-(3,5-di-tert-butyl-4 hydroxyphenyl) propanoate (Irganox® 1076) were examined for their kinetic migration for 15 days to 6 months at 25° into ghee. For this purpose, extraction method was established and quantification was carried out using GC-MS/MS. The developed method was validated in terms of linearity, recovery, repeatability, and limits of detection and quantification. The recoveries varied between 80.6 and 118.7%, and relative standard deviation (RSD) was in the range of 4.07–17.6%. The plasticizer ATBC was found to be migrating at highest concentration of 31.72 ppm. Whereas, the migration of other plasticizers, such as: DEHA, DEHP, DEP was detected at concentrations of 3.24 ppm, 2.94 ppm, 1.49 ppm, respectively. The frequently detected antioxidants in the study; BHT, Irganox ® 168, Irganox ® 1076 and DTBP were noticed at concentrations of 01.57 ppm, 3.21ppm, 3.41ppm, 2.38ppm. Lastly, the slip agent 13-Docosenamide was also detected at 2.89 ppm

Keywords: Gas chromatography-Mass spectroscopy, Migration, Non-intentionally added substances (NIAS).

NIFTEM-T/FHS-2023/058 DEVELOPMENT OF HEALTH BENEFICIAL ICE CREAM WAFFLE FROM POMEGRANATE PEEL POWDER AND HIBISCUS FLOWER

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Pomegranate (Punica granatum), a fruit-bearing deciduous shrub, is a member of the Lythraceae family. Pomegranate peels are considered a major byproduct of pomegranate, making up half of the entire fruit weight. When compared to the pulp extract, pomegranate peel extract showed much stronger antioxidant activity whereas Hibiscus rosa-sinensis is also referred to as Chinese hibiscus or Chinese rose. It acts as a rich medicinal source and the petals possess various health benefits such as high anti inflammatory, beneficial for treating various ailments, including liver cirrhosis, heart disease, and kidney illness, and lowering blood uric acid levels. No study was established on pomegranate peel and hibiscus petals to convert it to an edible product. So that we focused to produce waffles by using various compositions. We have followed various scientific methodologies to assess the proximate analysis, physicochemical parameters, sensory characteristics and antioxidant activity. The proximate analysis shows that the consumption of Pomegranate peel powder and hibiscus powder-based waffles yields higher carbohydrates of 68.25%. The Physicochemical parameters including Water absorption capacity, Oil absorption activity, and swelling power were found to be higher and the water activity decreased with the increased concentration of the waffles. The antioxidant activity of the waffles was found to be lower when compared to both raw materials. The phenolic content was calculated in different concentrations for both samples. In sensory analysis, all the formulated waffles got acceptable sensory scores and the overall acceptability of the waffles was rated at level 9. The textural characteristics such as hardness and crispiness were found to be higher with increasing concentrations of pomegranate peel powder and hibiscus powder. The research revealed that waffles made from pomegranate peel and hibiscus petals are highly nutritious and have good sensory attributes.

Keywords: Punica granatum, *Hibiscus rosa-sinensis*, Waffle, Antioxidants, Proximate, Sensory analysis.

NIFTEM-T/FHS-2023/059

DIATOM OF INTEREST AS FOOD SOURCE: BIOCHEMICAL COMPOSITION OF HYDROGRAPHIC, SEASONAL DIVERSITY, DISTRIBUTION AND ABUNDANCE IN PAMBAN AREA OF GULF OF MANNAR. TAMIL NADU, INDIA

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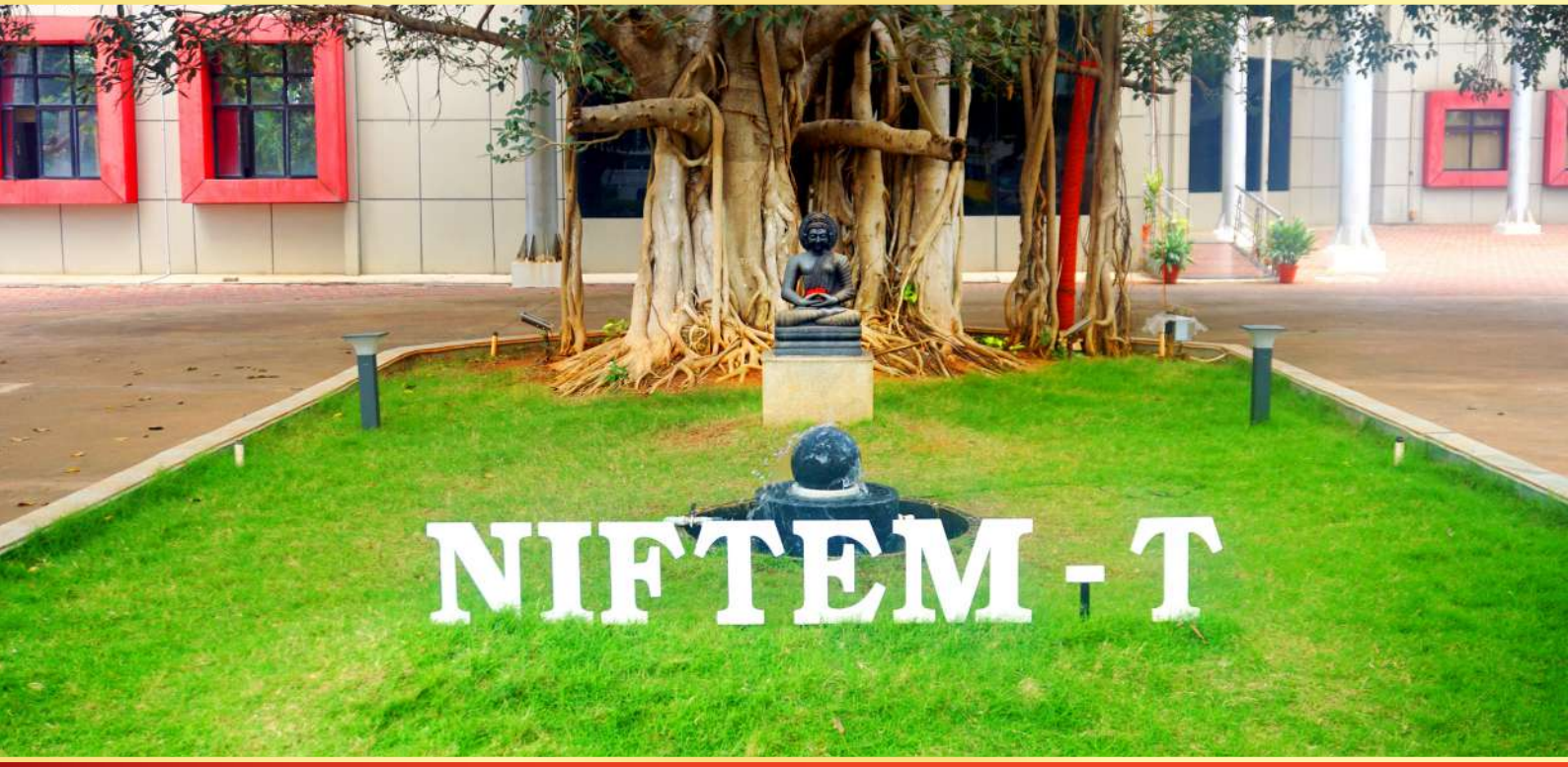
In this study, 62 species of diatoms were identified. Spatio-temporal analysis of diatom community composition revealed that Amphora lineata Gregory, Amphora ovalis (Kutzing), Amphora proteus Gregory, Bacteriastrum hyalinum var. Princeps (Castracane) Ikari, Cyclotella striata (Kutz), Grun. Mastogloya Arabica, navicula sp, and surirella armoricana were the main species observed during the study period. A study was conducted to identify the abundance of diatoms and environmental factors that affect the growth of diatoms in the region and to identify major changes in diatom species according to seasonal changes. Community analysis revealed that diversity, abundance, uniformity and dominance were pre-monsoon and low during the wet season. In the non quantitative multidimensional scaling method (MDS) of the Bray-Curtis ordination, the highest similarity (82.55%) was observed for the abundance of diatoms at observation sites 2 and 3 before and after the 2014 monsoon. 1, Art. The similarity for Monsoon 3 in 2015 was the lowest at 16.32%. Comparison of our results with previous studies revealed that nitrate and ammonia are the main factors that have the greatest influence on diatom distribution. Community structure studies have shown that the pre-monsoon and monsoon season are most favorable for diatom production in the Pamban region of Mannar Bay.

Keywords: Diatom, Environmental parameter, Biodiversity indices, Non-metric MDS, CCA.



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