



# Book of Abstracts

Undergraduate Research Colloquium 2024

"SUSTAINABLE BIO-BASED PRODUCTION THROUGH  
RESEARCH AND INNOVATIONS"

04<sup>th</sup>, 05<sup>th</sup> & 06<sup>th</sup>  
MARCH 2024

**Department of Biosystems Technology  
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# **UNDERGRADUATE RESEARCH COLLOQUIUM**

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## MESSAGE FROM THE COORDINATOR



It gives me immense pleasure to print this message on the first Undergraduate Research Colloquium of the Department of Biosystems Technology, Faculty of Technology, South Eastern University of Sri Lanka to be held on on the 4<sup>th</sup>, 5<sup>th</sup> and 6th of March 2024. The theme of the first undergraduate research colloquium is “Sustainable Bio- based Production through Research and Innovation”. The theme is extensively relevant and get widely emphasized in the contemporary academic and research fora.

The primary aim of this Colloquium is to provide a platform for undergraduate students to present their research findings, engage in scholarly discussions, and receive valuable feedback from both peers and academic staff. This event will not only celebrate the accomplishments of our students but also foster a sense of academic community within the department. Furthermore, it offers an invaluable opportunity for our students to develop essential presentation and communication skills, which are crucial for their future academic and professional pursuits. The abstracts of papers presented at this colloquium will be published as e-proceedings of undergraduate colloquium 2024” in online.

Finally, I wish to thank all students, academics, demonstrators, non-academic and supportive staff members and sponsors who gave all support to carry out the process smoothly without any difficulties. I wish the first undergraduate research colloquium of the Department of Biosystems Technology, Faculty of Technology, South Eastern University of Sri Lanaka all the success.

***Mrs. H.A.P.W. Hettiarachchi***  
***Lecturer***  
***Department of Biosystems Technology***  
***Faculty of Technology***  
***South Eastern University of Sri Lanka***

## MESSAGE FROM THE DEAN



I am much delighted to write this message to the maiden colloquium of the Department of Biosystems Technology, proudly and colourfully organised by the Faculty of Technology. This colloquium is themed “Sustainable bio-based production through research and innovation”. The theme is something special as far as the present-day Sri Lanka is concerned.

Sri Lanka is gradually reviving from the impact of unprecedented scenarios like Easter Sunday attack, Global Pandemic-Covid 19 and economic bankruptcy. The country has to find its own ways and means to rebuild the already fallen socio-economic structure amidst the challenges that are interlocked globally. The development of the socio-economic concepts of a nation entirely relies on the shoulders of the three significant pillars such as the intellectuals, industries and the government.

Science, technology and research are indispensable for a country to move towards the sustainable socio-economic development in the competitive world. In achieving the sustainability, a holistic approach has to be applied to link the intellectuals, industries and the government as a triangle.

The research findings of the budding scholars of the Department of Biosystems Technology are an attempt and initiative to navigate the production of bio-based products as a remedy for self-sustainability and a means of export-oriented income to the country. Moreover, I strongly believe that the colloquiums like this will definitely make a platform for our budding scholars to excel in their future endeavours. It is a wonderful opportunity for them to share their innovation and exploration with the fellow students, academics, researchers, and the industry experts.

My big thanks for the coordinator, editor-in-chief and all the academics of the department who indulged in moulding the future researchers to share their research solutions at this colourful and impressive event.

***Dr. U. L. Abdul Majeed***  
***Dean***  
***Faculty of Technology***  
***South Eastern University of Sri Lanka***

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## MESSAGE FROM THE HEAD



I am delighted to compose this message for the inaugural Undergraduate Colloquium-2024, a pioneering event among the Technology Faculties in our country. This distinguished gathering is proudly orchestrated by the Department of Biosystems Technology at the South Eastern University of Sri Lanka.

The theme of the colloquium, "Sustainable bio-based production through research and innovations," resonates deeply with the current state of affairs in our nation. This milestone marks a significant moment in the history of South Eastern University, showcasing our commitment to advancing knowledge and addressing pertinent issues. As Sri Lanka gradually recuperates from the challenging aftermath of the COVID-19 Global Pandemic and the unprecedented economic downturn, initiatives like this colloquium are vital in propelling us forward towards a brighter future. At this crucial juncture, the use of Bio-based approaches for Sustainable Development Goals would uplift the nation.

The younger generation in the country is highly connected with the technology that can be utilized to enhance research and innovations. Department of Biosystems Technology always promotes research, innovation, and new product development, this is another platform for the student community to prosper further. With the objective of giving the opportunity for students to develop their research skills, and presentation skills and foster critical thinking, the Department decided to initiate the Undergraduate Colloquium. I believe that the response from the students from all aspects was amazing. All the submitted abstracts offer a distinct perspective that promotes Sustainable Development on the country and global fronts.

I highly appreciate the interest of all students who used this opportunity to gain their skills and knowledge from different perspectives. The remarkable support provided by all staff members was truly impressive, and their unwavering dedication did not go unnoticed. The commitment shown by the coordinator, Mrs. HAPW. Hettiarachchi, Chief Editor, Dr. MG. Mohamed Thariq and co-editor, Mrs. MBF. Jemziya are highly appreciated. Moreover, I would like to extend gratitude to the sponsors, Amana Bank PLC. And Akram Farm House for their generous financial support.

***Dr. Muneeb M. Musthafa***  
***Head of the Department***  
***Department of Biosystems Technology***  
***South Eastern University of Sri Lanka***

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## **ABSTRACT OF KEYNOTE SPEECH**

### **Developing New Bio-Fertilizers: Microbial and Biotechnological Approaches**

#### ***Keynote Summary:***

The biofertilizers are formulations containing live or latent cells of effective microbial strains cultured in the lab and packed in appropriate carriers. When applied to seeds, soil, or plant surfaces, they enhance the availability of plant nutrients and growth stimulus to target crops. Biofertilizers are known to deliver many benefits, including plant nutrition, disease resistance, and tolerance to adverse climatic conditions. During the past few decades, notable progress has been made to explore microbes' potential and for biofertilizer production to enhance agricultural productivity. Biofertilizers, when applied, add nutrients to the soil through the natural processes. They also add plant growth-promoting substances like phytohormones and enzymes, thus increasing the productivity of crop.

Biofertilizers were developed with the discovery of biological nitrogen fixation (BNF). BNF is a natural source of nitrogen and plays a vital role in the sustainable production of leguminous and even non-leguminous crops. The most striking relationship that these have with plants is symbiosis, in which the partners derive benefits from each other. As plants have many connections with fungi, bacteria, and algae, the most common of which are with Mycorrhiza, Rhizobium, and Cyanophyceae. These microbes are used in the formation of different types of biofertilizer through many ways including biotechnology.

All biofertilizers are known to be environment-friendly and valuable inputs for the farmers. Their application has been considered an essential component of integrated nutrient management and a potential alternative to chemical-based agriculture due to its vital role in food security and sustainable crop production. Currently, biofertilizer demand and production are gaining momentum, as there is burgeoning passion for organically grown food among the health-conscious societies.

There is a competitive export agricultural sector available for Sri Lankan farming community to catch up with growing global insecurity in food supply chain. As we know, Sri Lanka is overwhelmingly reliant on imports for meeting its fertilizer needs. Meantime in 2021, Sri Lankan government had taken a very challenging policy decision to convert its chemical fertilizer use to bio fertilizer use within very short period of time. The Government had established a task force that would ensure production of organic fertilizer which would be used in the agriculture sector. Since practical policy frameworks are not in place for agriculture sector, there were many issues and failures of using the imported organic/ biofertilizer by Sri Lankan farmers.

A bibliometric analysis of Sri Lankan research on biofertilizers carried out from 2000 to 2021 has revealed that an increasing interest in biofertilizer researches over the study period. Therefore, the Government of Sri Lanka should explore innovative ideas to build self-reliance on environment friendly fertilizers to reduce the dependence on imports.

Application of these eco-friendly and cost-effective biofertilizers would not only promote growing healthy food, but also help to maintain a sustainable environment and holistic human well-being.

***Prof. Dr. M. I. S. Safeena***  
***Professor in Botany***  
***Department of Biological Sciences***  
***Faculty of Applied Sciences***  
***South Eastern University of Sri Lanka***

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**TRACK: ANIMAL AND AQUATIC SCIENCE AND  
TECHNOLOGY (AAT)**

# **Salt Production Process and its Socio-economic and Environmental Impacts of Kinniya Saltern**

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## ***Abstract***

Saltern located close to the residential areas causes several socio-economic and environmental issues in the surroundings. This study investigated salt production methods, and socioeconomic and environmental impacts on the surrounding areas in Kinniya saltern. Thirty-one salt farmers and 100 households in the vicinity of saltern, living in <10m, up to 50m, 100m, and 150m distance from the saltern were interviewed through a structured questionnaire during August to October 2023. The results showed that 87% and 13% of salt farmers used 3-step and 2-step traditional methods, respectively despite the 4-step recommended method to produce salt. The impacts on environment were identified as; salty well water, land salinity, corrosion of fence wire, corrosion of fence metal and damage to fence walls by 69%, 100%, 71%, 9% and 5% of the respondents, respectively. The impacts on socio-economic aspects were identified as; corrosion of household equipment, corrosion and colour changing of vehicles, damage to house walls, damage to wall paint of houses, damage to roofing wood, short term crop loss, long term crop loss and health effects by 57%, 50%, 40%, 44%, 15%, 95%, 5% and 43% of the respondents, respectively. The distance between the house and the saltern was significantly associated with effects on household equipment ( $p<0.05$ ), buildings ( $p<0.05$ ), and health ( $p<0.001$ ). It is concluded that corrosion/damage of household equipment and buildings, short-term crop losses, salinity in lands and well water and health effects were the major socioeconomic and environmental impacts. It is recommended that relevant authorities should take measures to minimize the impacts and to also stop further expansion of the impacts to the surrounding areas.

***Keywords: Crop loss, Corrosion, Health effects, Salt production, Salinity in land and well water***

## **Assessing Carrying Capacity and Overall Stocking Rates of Grazing Resources in Addalachchenai DS Division, Ampara District, Sri Lanka**

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### ***Abstract***

The sustainable management of rangeland ecosystems is crucial for ensuring the health and productivity of grazing resources. This present study investigated the annual production potential, carrying capacity and stocking rates of the grazing resources in Addalachchenai DS division using free cloud satellite images downloaded from Google Earth Engine and processed and obtained the grazing and browsing land use and cover map. Field estimation of above ground biomass (AGB) production was done with quadrant method. The study found varying levels of AGB in Oluvil, Deegawaapiya, Palamunai and Addalachchenai as 1,908.8 (ton DM/ha/year), 11,494.1 (ton DM/ha/year), 1,460.9 (ton DM/ha/year) and 1448.2 (ton DM/ha/year) respectively. The grazing resource levels in the four subdivisions are influenced by the seasonal variations between rainy and dry season. The findings revealed the carrying capacity for each subdivision of Oluvil, Deegawaapiya, Palamunai and Addalachchenai as 41.34 TLU/ha/year, 733.13 TLU/ha/year, 45.79 TLU/ha/year and 11.41 TLU/ha/year respectively. Similarly, the stocking rates were identified for Oluvil, Deegawaapiya, Palamunai and Addalachchenai as 20.93 ha/TLU/year, 5.6 ha/TLU/year, 23.84 ha/TLU/year and 32.78 ha/TLU/year respectively. The stocking rate at Addalachchenai subdivision indicated the overstocking of livestock compared to the other subdivisions. The land area with high “growth grazing resources” were significantly higher ( $p < 0.05$ ) in Deegawaapiya than the other subdivisions. The study found the grazing resources in the Addalachchenai DS division to support the livestock population, which will be useful for the authorities and the farmers to take necessary measures for the sustainable management of grazing resources and livestock.

***Keywords: Range lands, Sustainable livestock management, Tropical livestock unit***

## Study of Meat Quality Parameters of Broiler Chicken Under Halal and Kosher Methods

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### ***Abstract***

Chicken meat is the most popular protein dish in Sri Lanka. The Halal Method and Kosher Method are the two prominent slaughtering methods practiced all over the world. The objective of this study is to critically compare broiler chicken undergoing both the Halal Method and Kosher Method. Breed of Arbor Acres plus Broilers were collected from broiler farms and slaughtered at the age of 38+ days with an average weight of 2.05kg. The slaughtering processes were done at Nelna Processing Plant, Meethirigala. After the slaughtering process, proximate analysis for Crude protein content, crude fat content, Moisture content and Ash content was conducted at the Department of Biosystems Technology of South Eastern University of Sri Lanka. Data were analyzed using the Minitab 20 edition. According to the proximate analysis results, there was no significant difference between the results of Crude protein content, Crude fat content, Moisture content and Ash content ( $p > 0.05$ ). According to the results, there is no significant difference between two methods for Crude protein content, Crude fat content, Moisture content and Ash content. Furthermore, there was no significant difference between the proximate compounds. This study warrants a more detailed study to be conducted to compare both Halal Method and Kosher Methods.

***Keywords: Halal method, Kosher method, Proximate analysis***



# Investigation of the growth of Broiler Chicken Fed with Azolla Supplement

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## ***Abstract***

Broiler chicken plays an important role to meet the protein requirement of the growing population with low production cost. The study aimed to enhance broiler chicken weight gain using alternative feed, specifically dry Azolla supplement to contribute the sustainable feeding management. 90 chicks from Cobb-500 breed were randomly and equally divided into two groups with three replicates and each consisting of 15 chicks for the experiment. One group of chicks was given commercial feed (T1) and the second group was fed with feed containing 90% commercial feed and 10% of dry Azolla (T2). The feeding trial was conducted for eight weeks and the data were analysed statistically. The results on weight gain showed that weekly mean weight gain between T1 (54.50±44.32g) and T2 (54.67±43.36g) was not significantly different ( $p < 0.05$ ) throughout the feeding trial. Similarly, weekly mean FCR between T1 (1.48±0.20) and T2 (1.46±0.19) was not significantly different ( $p < 0.05$ ). The results on sensory evaluation of cooked broiler meat showed that chicken meat T2 group had a greater appearance (7.03±0.85), colour (7.16±1.01), odour (6.8±1.42), texture (7±7.17), tender (6.73±1.41), delicious (6.6±1.42), firmness (6.13±1.79), uniformity (6.86±1.13) and overall acceptability (6.9±1.51) than T1 group. Having the findings on the positive effects on sensory meat quality of the birds fed with the Azolla mixed feed (T2), it is concluded that the Azolla can be promoted in feeding broiler chickens even though no effects were found on weight gain and FCR. It is recommended that further studies are needed on the cost effectiveness of the Azolla feeding.

***Keywords: Sustainable feeding, Weight gain, FCR, Sensory meat quality***

## **Production of all male tilapia (*Oreochromis niloticus*) by immersing eggs in 17- $\alpha$ -methyltestosterone**

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### ***Abstract***

Tilapia referred to as the ‘aquatic chicken’ is a popular freshwater species. Tilapia quickly gained popularity among fish farmers due to its rapid growth rate and tolerance to a wide range of environmental conditions. The major problems linked with Nile tilapia (*Oreochromis niloticus*) in aquaculture are early reproduction and slow-growing females in the progeny. To solve this problem, production of all male tilapia in Sri Lanka was carried out by oral administration of 17-methyltestosterone (MT) mixed with feed. However, this strategy is very harmful to the environment. Therefore, this study sought to determine the efficiency of egg immersion in an androgen solution, find out the most effective MT concentration for producing sex-reversed tilapia as an alternative to oral administration, and determine the cost-effectiveness of the egg immersion method. Stage III eggs were immersed at concentrations of 1.2 mg/L and 1.5 mg/L of MT for 72 hours and 96 hours. The hatchability and survival rate, growth parameters, the proportion of males and females and cost factors were determined as components of the research. Immersing eggs in 1.5 mg/L for 96 hours resulted in the significantly highest percentage of male Nile tilapia, with 95.00% of fish being male ( $p < 0.05$ , ANOVA) and at a comparatively cost-effective. Literature suggests that oral administration results in greater environmental impacts due to the accumulation of hormones in water bodies. This study demonstrates the feasibility of this method and highlights its potential to be more cost-effective compared to traditional oral delivery techniques while reducing environmental impact.

***Keywords: All-male tilapia, 17- $\alpha$ -methyl testosterone, Egg immersion, Sex reversal***

## Formulation of Fry to Fingerling Feed for *Catla catla* using Sea Cucumber Gut Waste as Alternative Protein Source

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### **Abstract**

*Catla catla*, a popular freshwater fish in South Asia, confronts escalating feed costs, primarily from imported fishmeal. Local fishmeal, sourced from fish waste, presents a cheaper but inferior alternative. To tackle this issue, the study investigates utilizing gut wastes from sea cucumber processing in Sri Lanka as feed for *Catla catla* farming. Sea cucumber waste, rich in protein, offers a promising alternative while addressing environmental concerns related to waste disposal. This study attempted to replace the fish meal with dried powder prepared from *Holothuria scabra* gut waste in different ratios, such as fish meal: dried sea cucumber gut powder 1:0, 1:1 and 0:1. Fish feed was prepared using fishmeal and sea cucumber gut waste for feeding *Catla catla* fry to the fingerling stage over 45 days in triplicate experiments. Growth and survival rates were estimated at the end of the experiment. The proximate composition of ingredients and the feeds was analyzed. Differences in parameters were compared using ANOVA at a 5% significance level. The survival rate was 100% for all treatments. The growth parameters such as standard length, total length and body weight were significantly higher (ANOVA,  $p < 0.05$ ) in the feed prepared with fishmeal and sea cucumber gut waste powder at a 1:1 ratio and were selected as the best feed ration Fry to juvenile stage of *Catla catla*. This study demonstrated that unused intestinal wastes of sea cucumbers have added value as a fish feed ingredient and can subsequently help manage waste disposal during sea cucumber processing.

**Keywords:** *Catla catla*, Alternative feed, Sea cucumber gut powder, Fry to fingerling feed

## Evaluation of Drought Tolerance in Selected Fodder Grass Species for the Dry Zone in Sri Lanka

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### ***Abstract***

Attempts to identify potential drought tolerance fodder species are limited in Sri Lanka. This study investigated drought tolerance in CO3, CO4, Super Napier, and *Brachiaria brizantha* under 100%, 40%, and 25% irrigation levels in the dry zone part of Sri Lanka. Fodder grasses were established in plots with three replicates for each grass type inside nine poly tunnels. After continuous irrigation for 21 days, they were cut at 5cm height from the ground level which was followed by continuous irrigation for 11 days as per the protocol. Half of the grasses from each type was transferred to pots from the plots and irrigated continuously for 11 days and followed by the first drought imposed for 15 days till the appearance of wilt then irrigated for 2 days. The second drought was imposed for another 30 days and followed by irrigation for 2 days. The grasses were harvested and DM% was determined separately. The multivariate analysis revealed that the mean DM% between irrigation levels were significantly different ( $p < 0.05$ ). Considering the DM% of different fodder types, a significant difference was observed among the tested fodder types ( $p < 0.05$ ) with the highest mean DM% for *Brachiaria brizantha* under 25% irrigation level and plot conditions. The method of cultivation also significantly affected the mean DM % distinguishing between pot and plot cultivation ( $p < 0.05$ ). By considering the drought tolerance and DM% among the four fodder types under plot conditions, it is concluded that *Brachiaria brizantha* was the suitable fodder grass species for dry zone in Sri Lanka and can be recommended for drought-prone regions for sustainable livestock production in Sri Lanka.

***Keywords: Drought tolerance, Fodder grass, Dry matter, Irrigation***

## **Impact of Human – Monkey Conflict in Ampara District**

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### ***Abstract***

Primates and humans often come into conflict with each other, especially when it comes to food. Crop raiding by primates is a major problem, causing significant damage to crops and leading to the death of the primates themselves. To assess the impacts of human-monkey conflicts on local communities and monkey populations in the Ampara District. This study was conducted in six villages including Ampara, Damana, Lahugala, Pothuvil, Uhana, and Mahaoya in the Ampara district of Eastern Province, Sri Lanka. The data was collected from 120 respondents in total from the six villages. The data was gathered using a face-to-face interview approach with a pre-tested questionnaire. Monkeys caused significant damage to crops in the study area, affecting a total of 20 different crop species. The Toque macaque (*Macaca sinica*) and tufted grey langur (*Semnopithecus priam*) species had the highest impact on crop damage. Cash crops and fruits were particularly vulnerable to monkey damage. Although most damage occurred during the fruiting season, monkeys damaged crops throughout the year. Local deterrent methods were reported to be effective by 59.9% of the respondents. However, these methods negatively impacted the education, health, and economy of the respondents' children. According to my findings, the increase in monkey population, people planting them in forest clearings, the proximity of human villages to forests, and attacks on people by monkeys have contributed to the human monkey conflict in Ampara district. People living in villages with higher monkey populations and those whose farmlands were far from their homes reported greater crop damage. This highlights the urgent need to implement effective conservation measures to mitigate this conflict.

***Keywords: Conflict, Conservation, Crop damage, Human-Monkey, Mitigation, Sri Lanka***

## Prevalence of Gastrointestinal Parasites Infections in Goats and Sheep in Addalaichenai DS Division of Sri Lanka

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### **Abstract**

Gastrointestinal parasites (GIP) are considered a common problem in goats and sheep production worldwide. This study investigated the prevalence of GIPs infection in goats and sheep and associated risk factors in Addalaichenai DS division. Goats (n=95) and sheep (n=83) were sampled randomly (apparently). Faecal samples were collected directly from rectum and analyzed using a simple flotation method. Nematode eggs were counted and graded using the McMaster techniques to determine degree of infection. The results showed that the overall prevalence of parasites in goats and sheep was 93.7% and 86.7% respectively. Parasitic species in goats were identified as *Eimeria* spp. (77.90%), *Nematodirus* spp. (78.90%), *Strongyloides papillosus* (65.30%), *Moniezia* spp. (14.7%), *Strongyles* spp. (33.7%) and *Trichuris* spp. (1.10%) whereas in sheep they were 71.10%, 63.90%, 60.20%, 15.7%, 37.30% and 0% respectively. The age of goats and sheep was significantly associated with *strongyles* spp. and *Eimeria* spp. (P<0.05) respectively. No significant association of sex of goats and sheep with GIPs was found. The association of *Nematodirus* spp. was significantly lower in sheep than goats (p<0.05). Number of eggs per gram of faeces (EPG) of nematode parasites showed that mild cases were high in goats and severe cases were high in sheep. From the study, it is concluded that the higher prevalence of *Eimeria* spp. and *Nematodirus* spp. in goats and sheep was found in the study area, however, the prevalence of *Nematodirus* spp. was lower in sheep than goats. Farmers should be educated to manage goats and sheep especially at adult age to protect from the infection of *Eimeria* spp. and *Nematodirus* spp.

**Keywords:** *Gastrointestinal parasites, Prevalence, Disease management, Farmer awareness*

# Assessing Factors Affecting Chick Quality in Broiler Parent Stock Farms in The Western Province of Sri Lanka: A Comparison Parameter Between Nest Eggs and Floor Eggs

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## ***Abstract***

Poultry, as one of the most significant livestock subsectors, provides affordable, high-quality animal protein in the form of eggs and meat. This study aimed to investigate the differences in hatchability, fertility, and chick quality between nest eggs and floor eggs in the Ross 308 broiler breed at Marist Brothers Poultry broiler farm. The experiment, conducted at a hatchery, employed a Complete Randomized Design (CRD). A total of 640 eggs and each group consisted of 320 nest eggs and 320 floor eggs from Ross 308 male x Ross 308 female breeders (39 weeks of age) were collected for the experiment. Criteria for assessing egg quality included measuring the shape index and initial egg weight. Chick quality parameters were evaluated using the Pasgar score method. Data analysis was performed using the independent sample t test. The results revealed significant differences ( $p < 0.05$ ) in hatchability, fertility, and initial weight between the two types of eggs. Nest eggs exhibited higher fertility (89%), hatchability (86%), and chick quality than floor eggs. However, no significant differences ( $p > 0.05$ ) were observed in the egg shape index and Pasgar score between the two egg types. Additionally, specific Pasgar score components, including reflex, leg, and beak, showed no significant differences ( $p > 0.05$ ) and the navel and belly were significantly different between nest eggs and floor eggs. In conclusion, nest eggs exhibit higher hatchability, fertility, and chick quality rates compared to floor eggs. The aforementioned numerical statistics were identified as the most successful output of the research.

***Keywords: Fertility, Floor eggs, Hatchability, Nest eggs***

# Utilization of IoT-Based Devices for the Implementation of Smart Farming Concept in Greenhouse Environments

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## ***Abstract***

Given the current problem of global food shortages, which are escalating due to climate change, the use of smart greenhouse systems is becoming increasingly important. These controlled environments allow for precise control of the microclimate, resulting in higher crop yields per square meter compared to traditional outdoor farming. This project aimed to improve existing manual systems by developing a smart greenhouse monitoring system using IoT technologies using low-cost IoT devices powered by solar energy. The system enables continuous monitoring of the natural environmental parameters in the greenhouse and integrates various sensors such as DHT11, YL-69, BH1750, MQ135, MQ2 and MQ4 sensors with microcontrollers such as Arduino Uno and NodeMCU ESP8266. The system's architecture enables continuous data transmission into the IoT cloud platform, with a SIM900A GSM module sending messages to the user when adverse conditions occur. Thorough testing confirmed accurate measurements of temperature (DHT11), humidity (DHT11), soil moisture (YL-69), light intensity (BH1750) and air quality parameters (MQ135, MQ2 and MQ4) and there were significant differences between units, particularly in temperature and humidity as indicated by the mean absolute error values, and soil moisture was different compared to manual readings ( $\pm 8\%$ ), proving this system accuracy and reliability for on-farm and off-farm monitoring. Innovative features include the use of solar energy and the development of an IoT monitoring system. Future research could also focus on system optimization, additional sensor integration, mobile application development, and integration of real-time actuator feedback and these efforts would contribute to advances in smart greenhouse monitoring and IoT technologies.

***Keywords: Arduino, Automation, IoT, NodeMCU, Sensor integration, Smart greenhouse systems***

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## **Socio-Economic Status of Small and Medium-Scale Poultry Farmers in Muttur DS Division of Trincomalee**

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### ***Abstract***

Poultry farming is an important source of income for most rural villagers. However, current farming practices are mostly unregulated in Eastern Sri Lanka. Before developing and implementing state development programs, a study of the socio-economic situation of small and medium-sized poultry producers is necessary. The research was conducted in Muttur DS Department, Trincomalee District from 08/10/2023 to 12/10/2023. The poultry producers were selected methodically at random. The main purpose of poultry farming is to increase the productivity of the chicken industry to increase family income in rural and peri-urban areas. Backyard farmers in this area grew food primarily for their families and for economic reasons. The 55 farmers were interviewed using a systematic questionnaire. The study's data were coded, entered into a computer, and statistically analyzed using Statistical Packages for Social Science (SPSS), version 25. The independent variable in the study is monthly income while the dependent variables are education, age, occupation, experience, etc. Household size, costs and scale of farming. There is a significant difference ( $p = 0.037$ ) between the monthly income and cost of poultry farming and the level of management, with most of them being Muslims and a larger proportion up to O/L. In addition, most farms are medium-sized farms with evenly distributed poultry farming. 25% of farms were run by men while 75% of farms were run by women and since then women in this region have become interested in poultry farming. The results of this study can be a baseline for future development plans.

***Keywords: Muttur, Poultry farming, Socio-economic, Small and medium scale***

## **Effective Sex Reversal of Nile Tilapia (*Oreochromis niloticus*) using Oral Administration of 17- $\alpha$ -Methyltestosterone in Different Concentrations**

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### ***Abstract***

In Tilapia farming, early reproduction and slow growth of females pose significant challenges. Various methods exist for achieving this, aiming to address the aforementioned constraints in Tilapia farming by ensuring a predominance of faster-growing male fish. The research aimed to enhance sex reversal efficiency in Tilapia by elevating hormone concentration and altering feeding duration. Three-day-old Tilapia fry was fed 17- $\alpha$ -methyltestosterone mixed feed at 90mg/kg and 120mg/kg concentrations for 20 and 30 days. Four treatments were implemented, each with three replicates. Sex reversal percentages and growth parameters were assessed and compared using ANOVA with Minitab Version 18.0, providing insights into optimizing hormonal sex reversal techniques for Tilapia farming. The experiment of 120mg/kg feed fed for 30 days produced significantly higher males (94.99 $\pm$ 1.67%,  $p < 0.05$ , ANOVA) and showed significantly lower growth rates (28.42 $\pm$ 0.18g weight and 9.67 $\pm$ 0.01 cm total length at 90 days of age) than other treatments. Therefore, by considering the growth parameters (32.37 $\pm$ 0.01g weight, 11.90 $\pm$ 0.03cm total length at 90 days of age) and sex reversal efficiencies (93.33 $\pm$ 0.01%), the experiment of 120mg/kg feed fed 20 days was selected as the best concentration for sex reversal in Tilapia. Although this experiment did not achieve complete sex reversal, it improved the sex reversal percentages compared to past studies. Also, feeding only for 20 days with 120mg/kg reduces the environmental impacts of hormone accumulation in the environment compared to 30 days of feeding which is currently in use.

***Keywords: 17-  $\alpha$  -Methyltestosterone, Mono-sex Culture, Oral Administration, Tilapia***

# **A Comparative Study of Feed Conversion Ratio (FCR) of Optimum Saline Tilapia (*Oreochromis spp*) Cage Culture in Batticaloa Lagoon, Sri Lanka**

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## ***Abstract***

Aquaculture is essential for seafood demand, with tilapia facing challenges in high-saline environments. Saline tilapia thrives in these conditions, enabling cage culture in Batticaloa Lagoon. The research aims to identify the best feed for this practice, addressing a gap in guidance. The goal is to determine the optimal feed based on the Feed Conversion Ratio (FCR), addressing a critical gap in aquaculture practice in the region. Field surveys collected data on feed, culture practices, water quality, and growth parameters of tilapia. Statistical analyses were performed using SPSS v27. Farmers in Batticaloa Lagoon utilized both fry and fingerling varieties, stocking at rates of 4 or 5 fish/m<sup>3</sup>. Multi-response patterns were observed in stocking strategies, with preferences for all-male or mixed varieties. Feed preferences varied; some prepared their own feed, while others used commercial options. Feeding frequency averaged three times daily, and both floating and stationary cage types were utilized. Weight gain correlated with feed intake, but only one farm achieved the optimal FCR. Mesh types and sizes were consistent across all farms. Farm locations served multiple purposes, with water parameters generally suitable for saline tilapia. Profitability analysis highlighted challenges, especially for farmers with less than 5 years of experience in tilapia cage culture. Regression analysis showed that multiple factors did not significantly influence FCR ( $p < 0.05$ ). Despite this, the comparative study on FCR in saline tilapia cage cultures in Batticaloa Lagoon offers insights for stocking, feeding, cage construction, and water condition optimization.

***Keywords: Cage culture, FCR, Feed types, Saline, Tilapia***

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## **Feasibility analysis for the cage culture of saline tilapia (*Oreochromis spp*) in the Southern Part of Batticaloa Lagoon, Sri Lanka**

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### ***Abstract***

Aquaculture meets growing seafood demand, with saline tilapia suited for brackish waters, fostering sustainable practices. The study aims to analyze factors contributing to the successful cage culture of Saline Tilapia in Batticaloa Lagoon and seeks to conduct a feasibility analysis and offer suggestions for further development to assist in its success. A technical feasibility analysis evaluates water quality parameters crucial for tilapia cage culture. Socio-economic feasibility involves a survey of 40 nearby farmers in Southern Batticaloa Lagoon. Legal feasibility assesses the permit acquisition process, while financial feasibility considers cost and revenue estimations. The collected data were analyzed using SPSS version 27. In the southern region of Batticaloa Lagoon, aquaculture is male-dominated with farmers aged 40-50 and low educational qualifications. Technical feasibility analysis indicates favourable conditions for saline tilapia cage culture with optimal pH, salinity, and water depth. Socio-economic factors highlight economic challenges but also opportunities, with all farmers expressing a desire to transition to tilapia cage culture. Environmental awareness is high, and financially, most farmers believe in the profitability of tilapia cage culture, though challenges exist. Ongoing monitoring and support are recommended for sustainable success. The study concludes with a financial viability assessment of saline tilapia cage culture in the southern Batticaloa Lagoon, emphasizing its potential benefits and addressing identified challenges.

***Keywords: Batticaloa Lagoon, Culture feasibility, Saline Tilapia, Sustainable aquaculture***

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## Assessment of Poultry Farm Management Practices on Welfare Perspectives

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### **Abstract**

Animal welfare is ensuring the well-being of animals, humane treatments, proper care and state of the animal (physical and mental health). This assessment was the well-being of a laying hen flock under an intensive farm in Kundasale, Mid country of Sri Lanka. The five freedom elements and Welfare indicators (Behaviors, Environmental conditions and Farm production) were used to assess the overall welfare of the farm. Values of welfare measures (feeding, drinking, resting, walking, dust bathing, foraging, excretion and flapping) and the Five Freedom Assessment F1: Freedom from hunger, thirst and malnutrition, F2: Freedom from Discomfort, F3: Freedom from pain, diseases and injuries, F4: Freedom to display most normal pattern of behavior, and F5: Freedom from fear and distress, obtained through observations. Data revealed significant differences in variables related to welfare categories such as Five Freedom Assessment, Behavior (feeding, drinking, resting, walking, dust bathing, foraging, excretion and flapping) significant differences were observed for the variables related to welfare indicators. The results demonstrated that in Kundasale, the farm category as a “Normal farm”, because this overall welfare score was 44.73%, (40%-60% range was the Normal farm category). The intensive broiler breeder farm is moderate to satisfy the conditions of animal welfare. The results of this assessment contributed to enhancing flock welfare standards and improvements in the poultry farming practices of this farm.

**Keywords:** Behaviors, Farm production, Five Freedom Assessment, Welfare status

## **A Study on the Performance of Broiler Reared Under Different Litter Materials**

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### ***Abstract***

Poultry products are viewed as fundamental food items providing animal protein at a relatively low cost in Sri Lanka. The demand for chicken meat and eggs in the country is satisfied through local supply. Kandy district is an area where poultry farms are run on a large and small scale. Among them Karandagolla poultry breeder farm is more contributes to poultry production. On the other hand, if farm conditions are more acceptable can be reached good poultry performances and production. So, in poultry houses litter is used to keep the birds comfortable, absorb moisture, remove droppings, and keep the floor dry enough to provide some insulation underfoot and it also provides the birds with a suitable environment for feeding watering and other maintenance. The objectives of the study is to evaluate the performance of Cobb 500 broiler parent reared under different litter materials and determine a suitable litter material for Cobb 500 broiler production. The finding of this study could be useful in choosing the best litter with more performance. The study used four treatments as different litter materials (wood shavings, rice husk, sand, and chopped straw) with two replications in each treatment sample. The study found that the most suitable litter material among the four types (wood shavings, Rice husk, sand, chopped straw) was rice husk. This study can be extended to include the economic aspects of the materials in the future.

***Keywords: Broiler performance, Broiler production, Cobb 500 broiler, Litter materials, Rice husk***

# **A Study on The Human- Wildlife Conflict in Ampara District**

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## ***Abstract***

Global population growth drives widespread deforestation as people clear natural forests for expanding settlements. This forces wild animals to encroach on human habitats in search of food, water, and other necessities. Human Wildlife Conflict (HWC) rises, notably in Ampara district, due to habitat loss. This study aimed to understand the basis of the HWC in the Ampara district. Six Divisional Secretarial Divisions (DSD) belonging to the Ampara district, were selected based on the largest population and amount of cultivated land. Where sample number was derived using Morgan table. A total of 120 farmers were recruited for data collection with 20 randomly selected farmers each from one DSD. According to results, peacocks (30.8%), wild elephants (28%) and monkeys (26.3%) did the most damage to the farmlands. They have damaged paddy cultivation (21.8%), green gram cultivation (17%), cowpea cultivation (14.3%) maize (9.1%) and banana (7.9%). However, it was confirmed that compensation money will not be received for those crop damages. Moreover, there is great frustration among the farmers regarding the intervention of the related institutions to drive away the wild animals. Although various methods are used to repel wild animals, the success of those methods is very low. Certain methods cause harm to human and animals. A lot of physical property has also been damaged. The main reasons for wild animals to come to farmlands and villages are proximity to forest, increased wild animals' population and availability of food from home gardens.

***Keywords: Divisional secretarial division, Human wildlife conflict***

## Investigation of Ectoparasites in Goats and Sheep Farming Systems in Addalaichenai DS Division

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### **Abstract**

The ectoparasites can affect productivity, hide quality and be a source of secondary infection in goats and sheep. This study investigated the prevalence of ectoparasites infestation in goats and sheep in Addalaichenai DS division in Sri Lanka. Goats (n=95) and sheep (n=83) were sampled and ectoparasites were collected from identified body regions. The data were analysed using Chi-Square test. The results showed that 89.33% of sampled animals were infested with one or more ectoparasites. The ectoparasites in goats were *Haemaphysalis longicornis*, *Ctenocephalides felis*, *Linognathus stenopsis* and *Bovicola ovis* with a prevalence of 65.25%, 6.31%, 65.26% and 0% respectively whereas the prevalence in sheep were 60.24%, 0%, 4.81% and 44.57% respectively. The association of age and sex of goats and sheep with ectoparasites infestation was not significant ( $p < 0.05$ ). The presence of *Haemaphysalis longicornis*, *Linognathus stenopsis* in different body regions of goats and sheep was significantly different ( $p < 0.05$ ), however, the presence of *Bovicola ovis* in sheep and *Ctenocephalides felis* in goats in different body regions was not significantly different ( $p < 0.05$ ). The comparison of the infestation in goats and sheep showed that the association of *Ctenocephalides felis*, *Linognathus stenopsis* and *Bovicola ovis* was significantly different, however, the association of *Haemaphysalis longicornis* was not significantly different ( $p < 0.05$ ). It is concluded that *Haemaphysalis longicornis* was highly prevalent in goats and sheep, whereas, *Linognathus stenopsis* highly prevalent in goats only which could affect the wellbeing and productivity of goats and sheep in the study area. Farmer education on the management of the highly prevalent ectoparasites are recommended in the study area.

**Keywords:** *Body regions, Ectoparasites, Farmer education, Prevalence, Small ruminant*



**TRACK: CROP SCIENCE AND TECHNOLOGY  
(CST)**

## Study the Growth and Yield Performance of Lentil (*Lens culinaris*) Under the Sri Lankan Conditions

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### **Abstract**

Red lentils (*Lens culinaris*) are the most commonly consumed legume, with a daily per capita consumption of around 770 grams per month. However, overall consumption depends heavily on lentil imports due to challenges in growing the crop in the country. The aim of this study is to identify the barriers to lentil cultivation in Sri Lanka using edible seeds from market stocks. The selected unbroken seeds from the market were tested for their germination percentage under different potting media and their growth performance was examined on the same media. The results showed differences in germination percentage (ranging from 60% to 90%) between different starting materials and survival rate differed between seeds and growth medium. Challenges were observed during growth to flowering due to high susceptibility to fungal diseases and climatic conditions. The number of leaves per plant 9 days after transplantation showed significant differences ( $F = 40401$ ,  $p = 0.017$ ) between the tested media, although no significant differences were observed after 20 days of transplantation ( $F = 2.326$ ,  $p = 0.115$ ). The use of sand media with liquid fertilizer (Albert solution) proved successful and resulted in a significantly higher plant survival rate compared to other media tested. Plant height showed significant differences between the three media tested 9 days after transplantation ( $F = 5.970$ ,  $p = 0.005$ ), while no significant differences were observed 20 days after transplantation ( $F = 0.987$ ,  $p = 0.385$ ). These preliminary studies suggest that germinating tiny seedlings is challenging in local conditions, but subsequent cultivation is not too difficult. However, further studies are needed to provide comprehensive cultivation practices for growing red lentils under local conditions.

**Keywords:** Cultivation barriers, Germination, Growing media, Red lentil

# Evaluating Antagonistic Fungal Isolates and Natural Antifungal Extracts as Biocontrol Agents Against the Causal Organism of Cabbage Ring Spot Disease in The Wet Uplands of Sri Lanka

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## **Abstract**

Cabbage ring spot disease poses a significant threat to cabbage cultivation in Nuwara Eliya and is traditionally controlled using environmentally harmful chemical fungicides. In search of environmentally friendly alternatives, this study aimed to identify the causative agent of the disease, potential antagonists and plant extracts with antifungal properties. The isolated pathogen *Alternaria tenussima* was comprehensively confirmed by morphological and molecular methods, including a pathogenicity test. Twelve fungal isolates were involved in in vitro experiments, seven of which exhibited antagonistic effects against *Alternaria* spp. showed. Notably, isolate 7 (I7) showed the highest inhibition. Transition to in vivo conditions revealed significant differences between the fungal isolates and application methods. Further investigations investigated the antifungal potential of the nanoemulsion formulations with plant extracts, particularly cloves (*Syzygium aromaticum*), cloves in combination with jasmine (*Jasminum* spp) and nutmeg (*Myristica fragrans*). Among these formulations, combinations of clove with jasmine and pure clove showed significant inhibition of pathogen growth, especially at lower concentrations (50µL/10mL solidified PDA). While this study lays the foundation, further investigation, including gene sequencing, is imperative to confirm the identity of antagonistic fungal strains. Furthermore, field evaluations are crucial to assess the field effectiveness of both antagonistic fungi and plant extract formulations under field growing conditions and to recommend sustainable agricultural solutions to cabbage ring spot diseases.

**Keywords:** *Alternaria tenussima*, *Antagonistic microbes*, *Bio fungicides*, *Cabbage ring spot disease*, *Plant extracts*

# Development of A Semiochemical-Based Strategy for the Management of Coconut White Fly (*Aleurodicus cocois*)

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## ***Abstract***

In Sri Lanka, the coconut industry, vital for the national economy, faces a significant threat from the recently invaded pest, Coconut White-Fly (*Aleurodicus cocois*). The pest's resistance to traditional pesticides and the tall nature of the palm has highlighted the need for sustainable management strategies. Therefore, it is important to find an alternative to chemical pesticides with a systemic nature, which underlines the urgency of adopting sustainable management strategies. This study aims to develop and evaluate a plant semiochemical-based management strategy for the Coconut White-Fly, employing trunk injection as a systemic alternative to chemical pesticides. The approach seeks to provide a sustainable solution, reducing pest populations without harming the ecosystem. Plant extracts from *Strychnos nux-Vomica* (Goda kaduru) seeds and leaves, neem, mint, and clove oil were formulated and tested for effectiveness. Four successful formulations were prepared and tested through direct spraying. Building on the mortality success, these formulations were further incorporated with systemic carrier materials like urea, NaCl, KCl, and citric acid, then evaluated through trunk injection methods. Field experiments revealed significantly ( $p < 0.005$ ) higher mortality percentages (68%, 95.85%, 93.27%, and 94.66%) for formulations 1 to 4 compared to the untreated control. Trunk-injected palms exhibited a reduction in the whitefly population over time, though continuous monitoring was hindered by weather conditions, emphasizing the need for repeated applications for a successful conclusion.

***Keywords: Alternative pesticides, Coconut White-Fly, Plant semiochemicals, Sustainable pest management, Trunk injection***

## Exploration of Leaf Photosynthetic Traits in Selected Lowland Elite Rice Varieties

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### **Abstract**

Photosynthesis serves as the primary source of dry matter production, determining biomass and grain yield in rice. The objectives of this research were to compare leaf photosynthetic traits among six elite rice varieties released by the Department of Agriculture in Sri Lanka and to identify the best-performing variety. A pot experiment was conducted with six rice varieties grown in soil media, arranged in a completely randomized block design, and replicated five times in a plant net house facility. The collected data included chlorophyll content, quantum yield efficiencies, stomatal conductance, and relative water content in rice leaves. The results revealed significant variation in chlorophyll content, with the highest value observed in BW 367 (37.0) and the lowest recorded in BG-310 (29.1) compared to the control variety AT-362. Chlorophyll fluorescence measurements of 0.74 were recorded in BW-360, while the lowest was found in BG-360 (0.67) compared to the control variety AT-362 (0.73). In the 11th week after planting, stomatal conductance showed significance, exhibited highest value was observed in BW-367 (570.38), and the lowest in BG-403 (189.99). Comparing relative water content among the six varieties revealed significant differences between treatments ( $P < 0.05$ ), with the highest value measured in BG-360 (89.66%) and the lowest in BG 379-2 (62.66%). According to these findings, BG 360 and BW 367 exhibited superior performance compared to the control variety AT-362 under net house conditions.

**Keywords:** *Chlorophyll content, Fluorescence, Photosynthetic parameters, Relative water content, Rice (Oryza sativa), Stomatal conductance*

# DNA Profiling of Selected Inbred Maize Germplasms Using SSR Markers Related to Canopy Architecture and Photosynthetic Traits

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## **Abstract**

Inbred maize (*Zea mays* L.) lines play a crucial role in the production of novel hybrid maize varieties. However, the dispersion of alleles related canopy architecture and photosynthetic traits due to the inbred depression process is poorly understood. This research aims to examine the genetic diversity of four maize inbred accessions: *SEU2-S1*, *SEU2-S2*, *SEU10-S3*, *SEU16-S3*, and compare them with the elite cultivar, *cv. Bhadra*. Standard protocols were employed to extract genomic DNA from immature maize seedling leaves. PCR was then performed using the following SSR markers: *phi065*, *phi116*, *umc1066*, *umc1222*, *umc1231*, *umc1545*, and *bnlg155*. The data were analyzed using GenAlex and DARwin software. Based on the results obtained, 35 alleles were amplified, with the highest observed (6.0) and effective (5.556) alleles found in the *phi116* marker. This marker also showed the highest gene diversity and PIC values (0.820 and 0.794, respectively), while the lowest values were recorded in *umc1545* (0.640 and 0.563, respectively). Among all the SSR primers used, *phi065*, *umc1231*, *umc1066*, and *bnlg155* resulted in expected heterozygosity values of 0.8, 0.78, 0.8, and 0.76, respectively. Accordingly, the most genetic diversity parameters were found to be linked with the leaf area index and cob traits, while chlorophyll content and quantum yield efficiency were moderately diverse among maize accessions. Moreover, the cluster analysis identified two major genetic groups with a mean similarity of 0.764. These results elucidate the importance of genetic diversity when working with inbred lines in maize.

**Keywords:** Cluster analysis, Genetic diversity, Maize accessions, Maize breeding, Polymorphic Information Content, SSR markers

## **Evaluation of Root and Shoot Morphology of Four Rice Crosses of F<sub>3</sub> Generation in Lower Catena Soil Conditions**

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### ***Abstract***

Rice (*Oryza sativa* L.) is the staple food of over 21 million people of Sri Lanka and it is mainly cultivated as a wetland crop in Sri Lanka. Regarding grain yield in rice, more attention is paid to traits of above-ground plants. However, without well well-grown fully functional underground portion, plants cannot perform well. This study attempted to evaluate the root and shoot morphology of the F<sub>3</sub> generation of four rice crosses under lower catena soil conditions, and to identify better root characteristics of root improvement in future breeding programs. In this study, progeny lines, which include 320 lines derived from four rice crosses, along with their respective parent plants and standard checks were tested in Randomized Complete Block Design (RCBD) with 02 replicates. SAS and SPSS statistical software used to compare the tested crosses data were analysed. Cross 2 (Ld 20-14-12 x Ld 20-15-14) and cross 4 (Ld 20-15-14 x Ld 20-22-04) were recorded better morphological mean performance in root volume, root width, number of roots, root dry weight, number of tillers, flag leaf length and width, number of panicles, total panicle weight and seeds per panicle when compared with their respective parents under lower catena soil conditions. So, cross 2 and cross 4 have more potential to develop rice lines with better root structure in future rice breeding programs. Overall comparison between the four crosses recorded a higher Genotypic Coefficient of Variance (GCV%) and phenotypic Coefficient of Variance (PCV%) for root morphology. Cross 1, cross 2, cross 3 and cross 4 recorded significant positive correlations for important root-related characteristics and other morphological characteristics.

***Keywords: Genotypic Coefficient of Variance, Morphology, Phenotypic Coefficient of Variance, Rice Crosses***

## Comparison of Growth and Yield Traits of Six Selected Rice Varieties in Shade Net-House Conditions

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### **Abstract**

Tropical rice varieties require high light intensities to achieve their potential grain yield. However, in the Sri Lankan context, there is a limited amount of research focusing on the effects of light on commercial rice varieties. The main objectives of the experiment were to investigate the effect of varieties on the growth and yield attributes of six rice varieties under 50% shaded conditions. A pot experiment was conducted in a plant shade (50%) house to evaluate the growth and yield performance of elite rice cultivars, namely, Bg360, Bg310, Bg403, Bg379/2, Bw367. According to the results, the maximum plant height was observed in Bw367 at the 13th week after planting (77.5cm), surpassing AT362 (70.4cm), while Bg360 recorded the lowest (58.3cm). The flowering days were substantially delayed in the control variety AT362 (83 days) and further delayed in Bg379/2 (109.7 days). The highest number of tillers were produced in Bg360 (8.6/plant) compared to AT362 (7.5/plant), while Bw367 recorded the lowest number of tillers (6.3). Furthermore, the highest number of panicles per plant was produced in Bg379/2 (4.4) compared to AT362 (3.9), with Bg310 having the lowest mean value (3.2). Bw367 recorded the highest grains per panicle (192.8), while AT362 recorded (107.2), and Bg360 recorded the lowest (83.0) respectively. The highest panicle fresh and dry weight was recorded in Bw367 (3.66g, 1.28g respectively) compared to AT362 (2.54g, 0.67g respectively), while the lowest was in Bg360 (2.12g, 0.54g respectively). Therefore, the results indicate that commercial rice varieties grown under shade conditions perform sub-optimally, and farmers need to consider the light requirements of plants before selecting varieties

**Keywords:** Biomass, Growth traits, Rice variety, Shade-net house, Yield Traits



# Identification and evaluation of semiochemicals of tea stems and LiveWood Termite *Glyptotermes dilatatus* Bugnion and Popoff (Isoptera: Kalotermitidae)

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## Abstract

The *Glyptotermes dilatatus*, commonly known as the low country live wood termite, predominantly inhabits decayed wood resulting from fungal infection in pruned stems of the tea plant, *Camellia sinensis*. This study explores the response of *G. dilatatus* to rotted and healthy tea stems of the TRI 4042 cultivar, as well as the initial colonies of termite alates. Additionally, an interim study identifies and evaluates the body extracts of *G. dilatatus*, aligning with the primary research objective. The total chemical composition of initial colonies of *C. sinensis* and *Gliricidia sepium* is compared with that of rotted and healthy tea stems (TRI4042). Utilizing a choice chamber bioassay, the impact of different parts of the tea plant on termite behavior is assessed. Results demonstrate that rotted stem pieces of TRI 4042 are more attractive to alates, with a mean percentage response of  $10.83 \pm 1.32$ , compared to  $4.16 \pm 1.70$  for healthy stem pieces. The analysis of volatile extracts from rotted stems using GC-MS identifies 20 compounds, with four being common in all replicates. Furthermore, termite initial colonies exhibit 42 compounds, with 20 additional compounds compared to healthy and rotted stem pieces. Specific compounds, such as Phenol, 3,5-bis (1,1-dimethylethyl)- C<sub>14</sub> H<sub>22</sub> O, are common in rotted stem pieces and termite initial colonies. In termite alates body extractions, volatile compounds such as n-Hexane, 1-Hexene, 5-methyl, and Eugenol are identified. The specific studies are required to identify the behaviorally responsive compounds and their use for developing management practices.

**Keywords:** Choice chamber bioassay, *Glyptotermes dilatatus*, Termite behavior, Termite initial colonies, Termite body extracts, Tea stems volatiles

## Impact of Harvesting Dates on Seed Germination in the AT-362 Rice Variety

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### ***Abstract***

Rice variety, AT-362 is one of the popular commercial cultivars in the Ampara district of Sri Lanka due to its increased yield potentials and drought-resistant traits. However, the seed germination percentage is relatively lower compared to its counterpart commercial elites. Therefore, investigating the harvesting dates of the previous cropping cycle may be an integral for improving seed germination in the subsequent farming. The objective of this investigation was to identify how the harvesting dates influence the seed germination of AT-362 rice variety. Six different dates were used for treatment, commencing from seeds after the 50% heading stage, and harvested rice at 20 days (T1), 25 days (T2), 30 days (T3), 35 days (T4, control treatment), 40 days (T5), and 45 days (T6) were used. The treatments were arranged in field plots with an RCBD design supplemented with three replications (3m × 6m each plot). The direct broadcasting method was applied, with each plot receiving 225g of paddy seeds. Subsequently, after booting stages, panicles were harvested in each plot, and the seeds were dried using sunlight to achieve a moisture content of 13%. Thereafter, seed germination and viability tests were performed. Our results indicated a highly significant difference between rice harvest dates and germination parameters ( $P < 0.01$ ) among the treatments. Increased germination rates of seeds (>85%) were recorded for the paddy seeds harvested between 30-40 days compared to the other tested dates. Therefore, according to the findings, 30-40 days after the booting stage is ideal to maintain optimum seed germination percentages.

***Keywords: Germination Rates, Seed dormancy, Seed germination, Seed viability***

# Development of Management Strategy for Black Sooty Mold Fungus on Coconut Leaf After Whitefly Damage

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## **Abstract**

Coconut (*Cocos nucifera* L), an important plantation crop in Sri Lanka, faces productivity problems due to various biotic factors, with whitefly damage posing a significant threat as it promotes the growth of black sooty mold. The mold culture on the leaf surface reduced photosynthesis and thus reduced yield. Therefore, it is necessary to control the formation of mold after the whitefly has settled on the fronds. This study addresses the limitations of chemical pesticides and explores eco-friendly alternatives to mitigate the impact of black sooty mold fungus in field conditions. Fungicide agents and plant extracts were compared, and antifungal compounds from plant materials such as clove leaf, turmeric leaf, garlic, pandan leaf, *Senna alata*, Jasmine leaf and holy basil were identified. Black mold was isolated, cultured, and confirmed in the laboratory. Two nano formulations were created based on preliminary observations: one with 5% jasmine and 1% geraniol, and the other utilizing 5% clove oil. Laboratory experiments applied these formulations at 10% concentrations in Potato Dextrose Agar (PDA) media to culture black sooty mold fungus, comparing the results with a control as a completely randomized design with 6 replicates. Results indicated no mold growth on plates treated with both formulations, while control plates exhibited mold growth after two days. Continuous observation revealed inhibition of mold growth for up to two months with formulation two, whereas formulation one exhibited mold initiation after three weeks. Further experiments conducted with both the formulations were incorporated with whitefly toxic compounds were treated to the infested palm through trunk injection. Treated palms exhibited delayed reduction in mold growth on new fronds, with no reduction observed on existing molds. Continuous monitoring and repeated application through further research are essential for conclusive results.

**Keywords:** *Antifungal compounds, Black sooty mold fungus, Coconut, Whitefly damage*

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## Screening of 37 Rice Varieties for Submergence Tolerance Ability Under Artificial Condition

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### ***Abstract***

Rice cultivation in Sri Lanka faces significant challenges due to susceptibility to flooding and wet conditions, affecting crop yield. To address this issue, a comprehensive study was conducted with the primary focus was to assess the survival and recovery capacities of 37 rice varieties, including 30 IRRI entries and 7 global check varieties (2 susceptible and 5 tolerant), under controlled artificial field conditions simulating submergence. The methodology involved the collection and preparation of seeds, followed by nursery cultivation in nursery trays with Randomized Complete Block Design (RCBD) with three replicates. The submerged conditions were carefully regulated for 14 days, mimicking flooding scenarios in the Lowland Wet Zone under Control Conditions. The data obtained were analyzed using the Standard Evaluation System for Rice by IRRI (2002), categorizing entries based on survival rates. The experimental design followed a Randomized Complete Block Design (RCBD) with three replicates. This research offers valuable insights into identifying potential rice varieties (Local Test Entry, Local Check, IRRI156, IR19A7712, IR19A8982, Local Test Entry, IRRI123, IR19A7886, Local Check, IR19A7994, Local Check, IR19A7963, IR19A7974, IR19A8596, IR19A7710, IR19A7798, Local Test Entry, Local Test Entry, Local Test Entry, Local Test Entry, Local Check, Local Test Entry, Local Check, Local Test Entry, IR19A9000, Local Test Entry, Local Test Entry, Local Check, Local Test Entry, Bg 364, Bg 372, NP 14-7-5, Bg 360, Bg 379/2, IR19A8767, IR19A7983, IR42) with enhanced flood tolerance, providing crucial information for further breeding and development programs. The findings contribute significantly to addressing the challenges of unpredictable flooding in rice cultivation, offering pathways for improved resilience and sustainable production in flood-prone regions.

***Keywords: Rice Varieties, Submergence tolerance, Survival percentage***

## Development of an Organic Liquid Plant Growth Booster Formulation

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### ***Abstract***

Organic fertilizers, derived from plant, animal, or mineral sources, play a pivotal role in sustainable agriculture by enhancing soil fertility and contributing to a positive ecosystem. Unlike synthetic fertilizers, known for rapid nutrient release and potential environmental harm, organic fertilizers release nutrients gradually, meeting plant requirements while reducing leaching. Aligning with ecological farming principles, organic fertilizers minimize the carbon footprint in agriculture. However, current organic liquid fertilizers exhibit limited boosting ability compared to chemical growth boosters, affecting flower and yield outcomes. This study aims to develop an organic liquid fertilizer with growth and yield-boosting capabilities along with pest control properties. The fertilizer, fermented and prepared using banana, papaya, woodapple fruits and peels, moringa tender leaves and flowers, neem tender leaves, wild sunflower leaves, molasses, and old compost as an inoculum, resulted in two formulations: raw liquid fertilizer and nano emulsion liquid fertilizer. Testing these formulations on okra plants under six treatments, in comparison with Albert Solution® chemical liquid fertilizer, revealed significant differences in plant height, number of leaves, and yield ( $P < 0.005$ ). The highest yield was observed in treatments cultivated in topsoil + liquid fertilizer, while lower yields were recorded in liquid fertilizer + sand media. However, consistently higher yields were obtained in topsoil and compost-treated plants with organic liquid fertilizer. The days of flowering onset were influenced by the liquid organic fertilizer, with the nano emulsion formulation showing an average flowering onset of 53 days. However, these preliminary results suggest a possible positive effect on plant growth and yield increase, but further experiments are required for conclusive results.

***Keywords: Growth booster, Nano formulation, Organic liquid fertilizer, Slow-release nutrients***

# Assessment of Growth, Photosynthetic, and Biomass Characteristics in Selected Fodder Grass Varieties Under Varied Water Conditions

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## ***Abstract***

Fodder species play a crucial role in maintaining ecological balance and sustaining the cattle industry. However, water availability tends to impact fodder production. The objective of this research was to compare the growth and yield attributes of selected fodder varieties under varied water conditions. The experiment was conducted in semi-automated polytunnel facilities. Four fodder varieties (Factor 1) were utilized: CO3 (V1), CO4 (V2), Super Napier (V3), and *Brachiaria brizantha* (V4), with different water levels (Factor 2): 100% (25.0 l/day), 40% (10.0 l/day), and 25% (5.0 l/day) supplied throughout the growing season, each with thirty-six replicates. Each polytunnel was divided into four beds (12'x8') with four fodder species. Photosynthetic, growth, and yield data were analyzed. Results indicated that, among the fodder varieties, when supplemented with 40% water, CO3 exhibited the highest leaf length of 120cm, followed by CO4 (106.2cm), and Super Napier (76cm), respectively. Regarding photosynthetic traits, although not statistically significant, the 25% water-supplemented plots exhibited an increase in quantum yield efficiencies of photosynthesis (0.73) in CO4 grass, followed by Super Napier and CO3 (0.72). Similarly, stomatal conductance increased in CO3 (382 mmol mol), followed by Super Napier (372.0) and CO4 (300), while chlorophyll content was higher in the 100% water-treated plots in Super Napier fodder (47.7). The highest fresh and dry weights were produced in the 40% water-treated plots. Accordingly, Super Napier produced the highest (1756 g), followed by CO4 (1421g) and CO3 (906g) species, respectively. Overall, the 40% water supply (10 l/day) proved sufficient for producing increased biomass among the tested fodder grasses

***Keywords: Dry weight, Fodder varieties, Fresh weight, Water deficit***

# Evaluation of Phenotype Characteristics and Ethylene Content of Selected Rice Varieties Under Two Ecological Zones in Sri Lanka

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## ***Abstract***

Rice, an important staple crop in Asia, exhibits a significant relationship between phenotypic traits and yield performance depending on ecological zones and submergence conditions. In Rathnapura, IR19A8790 stands out in the number of plant rows, while IR19A7712 lags behind in the same feature. In contrast, in Horana, IR19A7668 outperforms the number of plant rows, while IR19A9132 does not do as well. Rathnapura has a spectrum of varieties, with IR19A8982 and 30 others showing superior performance at 50% flowering, reflecting Horana's varieties including IR19A7798, IR19A7885, IR19A8596, IR19A8762, IR19A8982, IR19A8989, IR19A9000, IR19A9140, IR19A9153, IR19A7679, IR19A7963, IR19A8597, IR19A8784, IR19A8975 and IR19A8997. Rathnapura's IR19A7798 and IR19A9003 are distinguished by plant height, IR19A8994 by panicle number, IR19A9132 by panicle weight, IR19A8992 by 100-seed weight, and IR19A8574 by panicle seed number. Horana's IR19A8791 is characterized by plant height, IR19A7710 by the number of panicles, IR19A7972 by the weight of panicles, IR19A7972 by the weight of 100 seeds and IR19A7983 by the number of panicle seeds. The best performing varieties are IR19A8589, IR19A9150, IR19A7868, IR19A9128, IR19A7990 in Rathnapura and IR19A8592, IR19A8582, IR19A8589, IR19A8584, IR19A8588 in Horana. This research investigates ethylene dynamics in plant responses under stress conditions using live plant samples and a headspace extraction method. Despite careful execution, challenges were encountered in detecting ethylene content using GCMS analysis due to factors such as sample exposure time, GCMS instrument sensitivity, and solvent selection and need re-evaluation for conclusion.

***Keywords: Ethylene analysis, GCMS analysis, Phenotypic traits, Rice varieties, Submerge tolerance***

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## **Evaluation on Performance of Seed Treatments Techniques in Withstand Submergence Conditions of Rice (*Oryza sativa L.*) Varieties**

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### ***Abstract***

Rice (*Oryza sativa L.*) is wetland crop that is the major food source in Sri Lanka. However, rice crop performance is decrease due to the flood-prone areas and submergence affect poor rates of germination, which has a substantial impact on direct rice seed. Hence, the present study was carried out to evaluate & development of the performance of seed treatments techniques in withstand submergence conditions. Here, four rice varieties were coated with Alginate and Sodium Lauryl Sulphate (SLS) and primed with Gibberellic Acid, Ascorbic Acid & Calcium Chloride (CaCl<sub>2</sub>). Five-days-old seedlings were completely submerged 1m height in tank for 6,12, and 14 days which arranged in Randomized Complete Block Design (RCBD) with three replicates. The results showed that the germination, morphological characteristics of rice plants were significantly ( $p<0.05$ ) affected by the treatments. The germination indicates were significantly higher in Ld 368 and Bw 372 non treated seeds compared to coated & primed seeds. The highest survival percentage (100%) showed by Ld 376 & Bw 372 with CaCl<sub>2</sub> and Ld 368 with SLS survival percentage at 10<sup>th</sup> day recovery. The highest Shoot Elongation recorded Gibberellic Acid 80 ppm seeds under 14 Days submergence conditions. Vigor Index was higher in Ascorbic Acid 50 ppm treatment rather than the non-treated seeds, whereas Alginate & CaCl<sub>2</sub> observed the highest root shoot ratio among the Seed treatment agents seeds under 6 & 12Days submergence conditions. Thereby, seeds treatments with four rice varieties enabled successful to withstand complete submergence compared to control treatments.

***Keywords: Artificial seed coating, Direct seeded rice, Local varieties, Priming, Submergence***



## **Evaluation of Root and Shoot Morphology of Four Rice Crosses of F<sub>3</sub> Generation in Upper Catena Soil Conditions**

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### ***Abstract***

Rice is the most important agricultural crop and staple food in Sri Lanka. With the growing population and changing climatic conditions, it is necessary to grow with increased yield potential. The objectives of this research were to identify F<sub>3</sub> crosses exhibiting superior root and shoot morphology, suitable for enhancing performance, and select superior plants for F<sub>4</sub> generation evaluation in breeding programs aimed at root improvement in upper catena conditions. A total of 150 progeny lines, comprising four rice crosses, relevant parents and standard tests were tested in a randomized complete block design with two replications. Data were analyzed using IBM SPSS statistical software. In the tested four crosses were recorded higher phenotypic coefficient of variance and genotypic coefficient of variance values for the number of tillers, number of effective tillers, root volume, root length, root width, number of roots, root dry weight, number of panicles, total panicle weight and seeds per panicle. (Cross 3) Ld 20-11-3/ Ld 21-6-18-2 cross showed better mean performance for plant height, culm height, flag leaf length, flag leaf width, root volume, root length, panicle length, no of panicles, total panicle weight, seeds per panicle. (Cross 4) Ld 20-15-14/ Ld 20-22-4 cross showed better mean performance for, no of tillers, no of effective tillers, root width, no of roots, and root dry weight. Among the four rice crosses, crosses 3 and 4 showed better growth, yield performance and root performance, therefore crosses 3 and 4 have the potential to develop rice lines with better root structure in future rice breeding programs.

***Keywords: Crosses, Genotypic Coefficient of variance, Morphological characteristics, Phenotypic coefficient of variance***

## **Analysis of Leaf Morphological and Anatomical Features of Selected Six Rice Varieties**

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### ***Abstract***

A pot experiment was conducted at faculty of Technology, South Eastern University of Sri Lanka in the net house from August to December, 2023. The aim of the research was the investigation of leaf morphological and anatomical characters of selected six rice varieties in the low country dry zone. The performance of BG 360, BG 310, BG 403, BG 379-2, and BW 367 were compared with control variety AT 362. The experiment was laid out with Complete Randomized Design (CRD) with five replications. The data were recorded in the vegetative phase, started from 3<sup>rd</sup> to 13<sup>th</sup> Week After Planting. The results revealed that showed considerable variations during the experiment. Among the leaf morphological parameters, the highest number of leaves was produced in BG-403 and BG 379-2 compared to the control variety, leaf length and leaf width were found from control variety AT 362 which was statistically similar with BG 379-2 and BW 367 rice variety, and the highest flag leaf length and width were recorded from BG 379-2 and BW 367 which was statistically similar with control variety. Meanwhile, the anatomical features of tested rice varieties, the highest number of major and minor veins per mm was observed from BG 360 and the highest number of stomata was observed from BG 379-2 compared with control variety. The results concluded that BG 379-2, BW 367, and BG 360 exhibit better leaf morpho-anatomical performance among the tested rice varieties for low country dry zone.

***Keywords: Anatomical features, Morphological characters, Rice (Oryza sativa L.)***

# Development of a Novel Anther Culture Protocol and Comparison of Four Commercial Potato Cultivars Under *In Vitro* Conditions

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## ***Abstract***

Haploid cell cultures play a crucial role in potatoes (*Solanum tuberosum* L.). However, in Sri Lanka, no protocol has been developed for obtaining potatoes through haploid anther cultures. Therefore, the objectives of this study were to establish a protocol for another culture that facilitates callus development and to identify the most responsive potato cultivar. Four potato varieties (Factor 1) were used: Granola (V1), SBM (V2), SGM (V3), and SEM (V4), with different stages of flower buds (Factor 2): Premature (S1), Mature (S2), and post-mature (S3). They were arranged as a two-factor factorial using a completely randomized design with thirty-six replicates. Surface sterilization of explants was performed following standard procedures. The culture media were prepared (1.0L) with MS nutrients, including 0.2mg/l of 2-4D and 0.5mg/l BA as supplements. The explants (5 anthers/petri dish) were introduced and incubated at 24±2 °C, 75% humidity for three weeks. Uncontaminated Petri dishes were placed at 25±2 °C, 75% RH, and 16h/8h photoperiod with 3000 lux of light for three weeks. Data were then recorded. The results indicated that Variety 2 (SBM) consistently exhibited lower callus percentage, fewer calluses, lower contamination, and higher non-responsiveness and browning compared to the other varieties. In contrast, Variety 3 (SGM) demonstrated the highest callus percentage, suggesting potential characteristics for mitigating tissue browning. Overall, the study emphasizes the importance of optimizing culture conditions to enhance the success and reliability of another culture experiments in potatoes. Further investigations and refinement of the culture protocols may lead to improved outcomes and contribute to the development of enhanced potato cultivars.

***Keywords: Anther culture, Browning, Contamination, Callus, Flower buds***

# Impact of Inbreeding on Growth and Leaf Anatomical Traits in Selected Elite Traditional Maize (*Zea mays* L.) Accessions of Sri Lanka

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## **Abstract**

Inbred maize lines (*Zea mays* L.) play a crucial role in creating novel hybrids. However, there is a lack of understanding regarding the growth and leaf anatomical traits of the inbred collection derived from elite traditional maize germplasms in Sri Lanka. The objective of this study was to quantitatively estimate the variations in growth and leaf morphological characteristics attributed to inbreeding depression within the selected maize germplasm. Three elite maize accessions, namely SEU2, SEU10, and SEU16 seeds of S1, S2, and S3, were established in the plant-net house facilities in soil media, and the plant response was compared with the variety *cv. Bhadra*, which served as the control. The results of our study indicated that significant variations among the tested maize accessions in terms of traits related to seed germination, growth, and leaf morphology. Our findings showed that the number of days taken to tasseling (56–62 days) and silking (64–68 days), plant height (75–125 cm), number of leaves (17–20), flag leaf width (2.2–3 cm), and length (21–38 cm), as well as stem girth (4.3–4.7 cm), exhibited significant variations. Furthermore, variations were also observed in leaf vein density (17.5–18.8 in 2mm width) and stomatal density (215–232 in 10x10 magnification) among the selected maize accessions. Based on our analysis, plant height, leaf length, and width declined progressively, while stem girth did not vary. Flowering dates increased and had a negative impact. In contrast, leaf stomatal density and leaf vein increased significantly with the inbreeding process compared to the variety *cv. Bhadra*.

**Keywords:** *Leaf vein density, Maize inbred lines, Stomatal density, Tasseling date*

## Evaluation of Suitable Local Nutrient Mixtures for Micro Propagation of Potato (*Solanum tuberosum*)

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### **Abstract**

Micropropagation is widely used for potatoes (*Solanum tuberosum* L.) as a viable option for propagation. This research investigates alternative media for *in vitro* methods to propagate potatoes. Three treatments were investigated. The MS medium, serving as the control, was composed of 1 mg/l BAP (6-Benzylaminopurine), 0.1 mg/l NAA (Naphthalene acetic acid), 30 g/l sugar, 0.1 g/l Myo-inositol, and 1 g/l charcoal, while the other two treatments, Albert's solution and a novel media (Kodi mix, KM), were supplemented at the rates of 2 g/l to the above media. All three treatments were replicated five times, employing a completely randomized block design (CRD). Surface-sterilized potato shoots with one node were introduced into different types of media for regeneration. Growth and developmental data were collected at 3, 4, and 5 weeks of *in vitro* culture. Subsequently, sterilized sand and coir dust in a 1:1 ratio were utilized for plant acclimatization, and the health of the plants was assessed. Our results indicated that Albert's solution (28/plant) improved root development (number + length), while KM displayed the lowest numbers (13/plant). However, shoot length, number of roots, leaves, and internode showed significant differences among treatments in the MS treatment, while KM promoted marginally. Moreover, treatment with Albert's solution produced the highest number of healthy plants at 83.6%, followed by MS at 79.6%, and KM at 51.1%, respectively, at the post-acclimatization stage. Hence, we conclude that both Albert's and MS media promote the overall performance of potato tissue-cultured plantlets, while the novel Kodi mix medium promotes the shoot growth and development marginally and minimal root development in potato tissue-cultured plantlets.

**Keywords:** *Albert's solution, Cost -effective, Kodi mix fertilizer, Micropropagation, Murashige and Skoog (MS)*

## **Evaluation of Root and Shoots Performance of F3 Progeny Lines of Four- Rice Crosses Under Iron Toxicity Conditions**

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### ***Abstract***

Iron toxicity plays a crucial role in determining rice yield, particularly in the wet zone (WZ) of Sri Lanka. This scenario causes a substantial impact on above-ground biomass, limits grain yield, and leads to poor root growth of rice. Therefore, identifying iron toxicity-resistant varieties is essential for sustaining rice production. The objectives of this research were to determine the F3 progeny lines derived from four rice crosses. To evaluate the root and shoot performance of F3 progeny lines derived from four rice crosses under iron toxicity conditions to identify variations in root morphology and growth patterns. Four rice crosses and their parents were tested in Randomized Complete Block Design (RCBD) with 02 blocks. Data were analysis, using ANOVA and Duncan multiple range test was derived from SAS statistical software. Cross 2 showed better performance for plant height ( 127.95cm) and culm height (100.33), flag leaf length (30.71cm) and width (1.1cm) , number of tillers ( 8.88/plant), number of effective tillers (7.09/plant), Number of unproductive tillers ( 0.83), root volume ( 72.73cm<sup>3</sup>), root length (22.90cm), root width (6.55cm), number of roots ( 115.4/plant), root dry weight (24.76g/plant), panicle length (23.49cm), number (7.09), weight (7.10g/panicle), seeds (124.92) showed better mean performance. All the crosses recorded positive heterosis and heterobeltiosis for important yield related characteristics and morphological characteristics. Among the four crosses, cross 2 and cross 3 showed better growth and yield performance when compared with their respective parental lines. Therefore Ld20-14-12/Ld20-15-14 and Ld20-11-03/Ld21-06-18-12 have the potential to develop rice lines with better root structure in the future rice breeding programs.

***Keywords: F3 progeny, Heterosis, Iron toxicity***

## Characterizing the Plant Volatiles in Susceptible and Resistant Rice Varieties against Rice Field Rats

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### ***Abstract***

Rice field rats (*Rattus rattus*) pose a significant threat as destructive pests in rice-growing countries worldwide, affecting economies and livelihoods. Despite the development of various biological, chemical and physical management methods, concerns remain regarding their predictability, with previous studies indicating varying levels of damage between rice varieties. Therefore, understanding the factors that influence susceptibility and resistance is crucial for developing sustainable rat management systems. Plant volatiles are known for their role in pest and disease resistance. This study examines differences in volatile compounds emitted during two crucial developmental stages, the vegetative phase and the beginning of flowering (budding phase), in five rice varieties: BG 360, BG 310, BG 379-2, BG 403 and BW 367. Volatile profiles during these phases were collected using dynamic headspace collection and solvent extraction methods and analyzed by GC-MS. The results suggest different volatile profiles within varieties at both stages, with significant differences observed between varieties. Furthermore, the concentrations of volatiles emitted varied depending on the cultivar and growth stage. Notably, PCA analysis revealed a separate clustering of volatiles at the booting stage of the resistant BG 310 and the susceptible BG 403, while other cultivars showed an intermediate clustering. This suggests a possible link between the susceptibility and resistance of rats and the volatile compounds released during the booting stage of rice. Further behavioural studies are required to gain conclusive findings.

***Keywords: GC-MS analysis, Plant resistance, Rice field rats, Rice varieties, Volatile compounds***

# Enhancing *In-Vitro* Shoot Multiplication and Elongation in *Aglaonema unyamanee* Tricolour Using Thidiazuron

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## Abstract

*Aglaonema unyamanee* Tricolour is a monocotyledonous foliage plant with high economic value, mainly propagated through vegetative stem cuttings. Thidiazuron (TDZ) is a synthetic plant growth regulator contributes to enhance micropropagation cycle via shoot multiplication and elongation in aroid plants. However, for *Aglaonema*, the effect of TDZ is unknown. As such, unravelling the TDZ is vital for ornamental plant industry. The objective of this research was to determine the best hormone concentration of TDZ for shoot proliferation and elongation of *Aglaonema*. The explants were derived from matured healthy mother plants and obtained inter-nodal segments (1cm long), then were surface sterilized and introduced into full-strength MS media. The cultures were incubated at  $26 \pm 2^\circ\text{C}$  under 16 h daily illuminations with white fluorescent light. After one month, newly developed clean shoots were taken to transfer into treatment media. Here, five concentration of TDZ viz 0.0mg/L (T1, Control), 1.0mg/L (T2) 1.5mg/L (T3), 2.0mg/L (T4) and 2.5mg/L ( T5 ) were introduced. Then the cultures were incubated at  $26 \pm 2^\circ\text{C}$  under 16 h daily illuminations with white fluorescent light. Our results indicated that, a concentration of 1.50 mg/l of TDZ resulted in the highest shoot length (24mm), while a concentration of 2.5 mg/l led to the highest number of shoots per explant (18) after a 2-week period. The shoot bud production increased with the TDZ concentration, 3.6/plant with 2.5 mg/l, while lowest (1.0) in without TDZ. These initial findings demonstrate that the use of TDZ can effectively enhance both the multiplication and elongation of shoots in *Aglaonema* Tricolour, However, further research is needed based on subculturing practices.

**Keywords:** *Aglaonema unyamanee*, Micropropagation, MS media, Thidiazuron



## Development of a Suitable *In vitro* Protocol for *Nymphaea* Leaf Culture

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### **Abstract**

*Nymphaea* is commercially important aquatic plants propagated through cross pollinated seeds cause trait variations in the offsprings, the morphological features of flowers are different from one plant to another and cause major problem by commercial producers and vendors. Therefore, multiplication through micropropagation is a viable option. Hence, this research focused on establishing a robust *in vitro* protocol for *Nymphaea* leaf culture. The young leaves of *Nymphaea* were excised from a single mother plant and cut into (5mm x5mm) pieces were used as explants. Then five sterilization methods (Factor 1) viz: 0.2% of HgCl<sub>2</sub> (T1), 0.1% of HgCl<sub>2</sub> (T2), 5% NaOCl (T3), 10% NaOCl with Tween20 (T4), 10% NaOCl (T5) were employed. Then two types of media (Factor 2), namely 1/2MS (M1), comprising 50 ml of A stock, 2.5 ml of B stock, 5 ml of C stock, along with glycine, pyridoxine, nicotinic acid, thiamine, BAP, 2,4-D, Myo-inositol, and sugar, consistent and favorable results were observed across various sterilization techniques. Conversely, media 2 (M2), with a similar composition but supplemented with BA, NAA, and kinetin were employed. The data collected over the course of 12 weeks, the results indicate that T4 consistently exhibits the lowest contamination percentage of leaf across both media formulations, while T3 consistently demonstrates higher contamination rates. Furthermore, media 1 consistently yields superior results in terms of tissue culture initiation compared to media 2. By identifying optimal sterilization techniques and media formulations, this study provides valuable insights for enhancing mass propagation.

**Keywords:** 2,4-D, Glycine, *In vitro* protocol, Myo inositol, Nicotinic acid, Pyridoxine, Surface sterilization,

**TRACK: FOOD SCIENCE AND TECHNOLOGY  
(FST)**

# **Study on the Use of Stabilized Rice Bran for the Formulation of Healthy Foods and Evaluation of the Nutritional and Functional Properties of Developed Products**

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## ***Abstract***

Rice is a member of the grass family and it is considered as man's main staple food. Rice bran is the outer layer of rice grains, and it is a by-product of rice milling. The burger bun, muffin and cracker were developed by incorporating the stabilized rice bran. Rice bran incorporated products were evaluated for physical, physiochemical parameters and sensory evaluation. At-362 variety rice bran had highest ash, moisture, fibre, and fat content and also At-313 variety had highest protein and carbohydrate percentages. The At-362 variety is most suitable for non-communicable patients who require formulated healthy food products. However, there were significant differences between the At-362 variety and At-313 variety. Rice bran incorporated cracker was shown the highest ash and fibre content. And also rice bran incorporated burger bun was shown the highest protein and moisture content. As well as highest fat and carbohydrate percentage were shown the muffins. Crackers had less moisture content and a higher shelf life. However, there were significant differences between the rice bran-incorporated products. Therefore, all selected products were accepted. The sensory evaluation was carried out using 9-point hedonic scale testing for appearance, taste, texture, colour, odour, mouthfeel and overall acceptability. Based on the sensory evaluation, muffin had the highest mean score for overall acceptability. Cracker and Burger bun high mean scores for overall acceptability. However, there were no significant differences between the other products. Therefore, all selected products were accepted. However, healthy cracker, muffins and burger bun can be prepared using stabilized rice bran.

***Keywords: Physical, Physiochemical, Rice bran, Sensory evaluation***

# Compatibility of Flour of Cassava, Sweet Potato, Jackfruit and Breadfruit for Partial Replacement of Wheat Flour in Dinner Bun Production

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## **Abstract**

This study explores the potential of utilizing composite flours derived from Cassava (*Manihot esculentav*), Sweet potato (*Ipomoea batatas*), Jackfruit (*Artocarpus heterophyllus Lam*), and Breadfruit (*Artocarpus altilis*) in dinner bun production by partially replacing wheat flour. Composite flour, offers tailored functional properties and nutritional benefits. The study involves characterizing the flour properties, determining optimal composition ratios, and assessing consumer acceptance. Cassava, Sweet potato, Jackfruit, and Breadfruit were processed into flour and used for dinner bun production. Several treatments of dinner bun samples were prepared by incorporating four types of composite flour of Cassava, Sweet potato, Jackfruit, and Breadfruit with flours of soybean and wheat, each having three treatments (T1, T2, and T3). According to the sensory evaluation the best composite flour samples were selected (Composite flour of Cassava T1, Sweet potato T1, Jackfruit T1, and Breadfruit T3) for this combination, proximate chemical analyses were performed. Proximate analysis revealed for each selected composite flour type: cassava (moisture:0.81±0.04%, protein: 0.091±0.030%, ash: 1.48±0.17%, fat: 1.71±0.00%, fiber: 0.02±0.00%), sweet potato (moisture: 0.80±0.03%, protein: 2.157±0.136%, ash: 1.47±0.07%, fat: 3.12±0.05%, fiber: 0.21±0.01%), jackfruit (moisture: 0.81±0.04%, protein: 0.004±0.002%, ash: 1.53±0.13%, fat: 3.52±0.06%, fiber: 0.02±0.00%), and breadfruit (moisture: 0.81±0.03%, protein: 0.567±0.009%, ash: 1.51±0.04%, fat: 4.14±0.05%, fiber: 0.04±0.00%). The initiative aligns with the Food and Agriculture Organization's composite flour program, aiming to utilize locally available materials for bakery products.

**Keywords:** *Breadfruit, Cassava, Composite flour, Jackfruit, Sweet potato, Soybean flour, Wheat flour*

## Optimization of Processing of Starfruit (*Averrhoa carambola*) Cider

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### ***Abstract***

Fruits are generally considered to be highly nutritious. They are excellent sources of essential vitamins, minerals, fibre and antioxidants. Fruit based cider is an excellent solution for extending the shelf life of fruits. The main objective of this study to optimize of processing of starfruit (*Averrhoa carambola*) cider and to evaluate qualities of the fermented starfruit cider. The cider was prepared with different fermented temperature conditions with three (03) replicates and stored in tightly closed brown coloured glass bottles. Physiochemical properties, sensory attributes and microbial count were analysed at once a week. The data were analysed using SPSS software and they were interpreted at 0.05 significance level. There were significantly differences between treatments of pH value, TSS, alcohol, ABV (sig<0.05). The PH was increased, while the TSS and ABV were decreased by week. Significant changes in the alcohol were observed. Furthermore, the SG, titratable acidity and volume were constant throughout the aging. Considering the quality performances, T3 had the highest scores for overall acceptability and it had lowest total plate count in two weeks' fermentation compared to other treatments. Based on the evaluation, T3 was best sample under fermented temperature condition.

***Keywords: Alcohol levels, Fermented temperature, Optimization, Physiochemical properties, Starfruit cider***

## Effect of Brewing Time and Temperature on Microbial Load in Ceylon Black Tea

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### ***Abstract***

Tea is one of the most popular beverages consumed worldwide. However, during the production process, made tea can get contaminated with microorganisms. This study was conducted to measure the microbial contamination in made tea samples and the respective tea brew samples brewed using a set of selected time temperature combinations. Contaminated black tea samples were used for the analysis. Samples were analyzed for its microbial load before brewing and after brewing at 70°C, 85°C, 100°C for 3, 5, 6 minutes. The Total Plate Count (TPC), Yeast and Mould Count and Total Coliform Count was done following (ISO 4833 -1:2013), (ISO 21527-2:2008) and (ISO 4831:2006) methods. The study found that the TPC, Yeast and Mould Count and Total coliform counts were  $7.9 \times 10^5 \pm 1.2 \times 10^5$  CFU g<sup>-1</sup>,  $5.1 \times 10^3 \pm 1.5 \times 10^3$  CFU g<sup>-1</sup>, and >1100 MPN<sup>-g</sup> in contaminated made tea samples before brewing. All brewing conditions reduced TPC in tea by more than 99.8%, with the exception of 3 minutes at 70°C, where a reduction of 97.1 % was recorded. Similar behavior was observed in Yeast and Mould count as more than 98.0% reduction was occurred by all brewing conditions. The reduction of microbial load by brewing was significant at 95% confidence level (P<0.05). Total Coliform was reduced to <0.3 MPN<sup>-g</sup> in all brewed samples regardless of the time and temperature. Furthermore, there was no considerable difference in reduction of microbial load between times of brewing or temperatures. The study reveals that microbial load in made tea is reduced to a considerable level in brewing.

***Keywords: Brewing temperature, Brewing time, Total plate count, Yeast and Mould Count***

## **Investigation of Edible Starch – Based Coating for the Preservation of Breadfruit During Minimal Processing**

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### ***Abstract***

Breadfruit (*Artocarpus altilis*) is a tropical fruit and it is a nutrient dense fruit rich in carbohydrates, fiber, vitamins and minerals. Edible coating is a versatile tool in the food industry to improve food quality and extend shelf life. The aim of this study is to investigate the edible starch based edible coating for the preservation of breadfruit during minimal processing. The samples were cut and different starch based coated breadfruit samples were prepared. Furthermore, the coated breadfruit samples were stored refrigerated conditions (4 °C) and the qualities were determined once in two (02) days. Physical, physicochemical and textural properties and sensory attributes were determined. The data were analysed using SPSS Software and they were interpreted at the 0.05 significance level. The physical properties and physicochemical properties of the sample were significant difference. When comparing fresh sample, physical properties of storage samples are decreased and when comparing the salt content of fresh sample, the salt content of the storage sample is significantly lower. However, the textural properties of the sample were significantly not difference with fresh sample. There are no considerable changes in Hardness and springiness of all starch coated samples. The Corn coated breadfruit samples can be kept for a minimum 12 days without significantly changing their qualities.

***Keywords: Breadfruit, Edible – Starch Based Coating, Minimal Processing, Preservation***

## Development of Frozen Yoghurt Incorporating Mango (*Mangifera indica*) Var. Alphonso

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### **Abstract**

Frozen yogurt is a frozen product containing the same basic ingredients as ice cream, but contains live bacterial cultures. Mango fruit are rich in nutrients as carbohydrates, fatty acids, vitamins, and minerals as well as non-nutrient compounds including organic acids, dietary fiber, polyphenols and carotenoids. Pairing frozen yoghurt with mango var. *Alphonso*, improve tasty and nutritious qualities, and opens up exciting possibilities. The main objective of this study was to develop a mango (var. *Alphonso*) incorporated frozen yogurt as a healthier substitute for ice cream, with specific focuses on establishing a preparation methodology, assessing sensory acceptability, and evaluating storage stability. Three treatments with varying percentage of mango pulp and yoghurt 50:50(T1), 75:25(T2), 25:75(T3) was used to prepare the samples. Treatment T3 has selected as the best sample based on five-point hedonic scale of sensory evaluation. The final product prepared and stored at  $-10 \pm 1^{\circ}\text{C}$ . Then evaluated frozen yoghurt through physical, chemical, microbial properties and assessing acceptability and stability weekly during storage period. After the 5 weeks mean of pH was  $4.19 \pm 0.029$ . Longitudinal assessment indicated a progressive decrease in pH over the storage period, indicative of ongoing fermentation processes. Mean of brix, overrun percentage and weight were 23.5,  $0.20 \pm 0.01$  and  $66.62 \pm 0.34$  respectively. Sensory evaluation consistently yielded positive scores, particularly highlighting taste/ flavor, appearance/color, and texture/mouth feel. Microbial analysis confirmed the product's safety, with no detection of coliform, yeast, or mold. The Alphonso mango frozen yogurt as a promising and healthy alternative to ice cream, possessing favorable attributes and considerable market potential.

**Keywords:** *Alphonso Mango, Brix value, Frozen Yogurt, Healthier Alternative*



# Effect of Different Heat Treatments on Oxalic Acid Content, Physicochemical and Sensory Characteristics of Bottled Star Fruit (*Averrhoa carambola*) in its own Juice

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## **Abstract**

*Averrhoa carambola*, commonly known as star fruit, is a highly valued tropical fruit due to its unique flavor, high in vitamin, antioxidant, and dietary fiber content, which appeals to consumers who are health-conscious. The purpose of this study was to assess the sensory qualities and physicochemical properties of bottled star fruit (*Averrhoa carambola*) in its natural juice. Standardized processes were followed in the collection, processing, and bottling of fresh star fruits. Analysis was done on the physicochemical characteristics, such as pH, titratable acidity, brix value and ascorbic acid content in both fresh and processed product. A trained panel was evaluated the sensory aspects of the product using a nine-point hedonic scale to rate its general acceptability. The fresh and bottled star fruit reported pH of 3.87 and 3.93, titratable acidity of 0.40 mg/100ml and 0.36 mg/100ml (as citric acid) and brix value of 10 and 09 respectively. Ascorbic acid content was recorded as  $6.42 \pm 1.28$  mg/100ml and  $3.21 \pm 1.28$  mg/100ml in fresh and bottled star fruit respectively. Processing with pasteurization until  $70 \pm 02^{\circ}\text{C}$ , 3 min, exhausting  $80 \pm 02^{\circ}\text{C}$ , 05 min) and sterilization ( $100 \pm 02^{\circ}\text{C}$ , 25 min, 01 bar) were changed physicochemical characteristics of bottled star fruit compared to fresh fruit and no much alterations happened while the storage period. The panelists' positive reactions to the product were revealed by the sensory evaluation, which gave it moderate (07) marks for acceptance overall as well as for look, flavour, and aroma.

**Keywords:** *Calcium oxalate, Heat treatments, Maturity stages, Oxalic acid, Star fruit*

## Optimizing Conditions for the Production of Jackfruit Rind Candy: A Comprehensive Study

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### ***Abstract***

Candy is a confectionary product that is widely used for the impression of all ages of consumers in the world. Nowadays, candy is a major multibillion dollars confectionary industry with a wide range of qualities. Normally, jackfruit rind is disposed of as waste. But it can be used for by-product utilization in the food industry. This study is aimed at optimizing the optimum temperature, time period, and sugar content for producing the best candy using ripe jackfruit rind pulp. Twelve (12) candy samples were prepared for the experiment using different conditions. Physiochemical properties and packaging quality were assessed throughout a one-month storage period and sensory attributes were determined in end of storage. Results showed that soft candies had higher moisture than hard candies. There were no considerable changes in pH and brix candies during the storage period. Packaging quality revealed significant differences. Microbial results were showed that T11 had zero total plate count and yeast and mold counts. Based on sensory evaluation, the T11 treatment had the highest mean score for overall acceptability.

***Keywords: Candy, Cooking temperature, Jackfruit rind, Natural pectin, Processing time, Sugar level***

## **Evaluation of Different Edible Coatings for Their Efficacy and Reducing Chilling Injury in Mangoes**

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### ***Abstract***

The evaluation of different edible coatings for mitigating chilling injury in mangoes represents a crucial step in addressing postharvest losses and ensuring the prolonged quality of this tropical fruit. This research involves determining the effectiveness of edible coatings against chilling injury in mangoes. For each coating material, dedicated coating solutions were prepared with the desired concentration. The coated mangoes were stored at a chilling temperature for a month and quality was determined once a week during the storage. The quality parameters and physiological changes were meticulously recorded for each coating type. Furthermore, microbial stability and sensory attributes were evaluated and data were analysed and compared with the control treatment at the 0.05 level. The coating rate of mangoes were lower than that of controlled mangoes. In this research, the chilling injury rate was found to be lower in coating mangoes than in controlled mangoes and coating mangoes were found to have longer storage than controlled mangoes.

***Keywords: Chilling injury, Corn starch coating, Potato starch coating, Quality parameters, Tapioca starch coating***

## Development of Bio Degradable Packaging Materials from Banana Peels

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### **Abstract**

This study focused on the development of eco-friendly biodegradable packaging materials using banana peels, examining both fiber-based and flexible types. The fiber sheet was prepared with HCl, NaOH, Banana peel fiber, Glycerol, Rice husk, Paper pulp, Straw powder, and Gelatin. The mixture was poured into molds, and dried at  $130 \pm 2^\circ\text{C}$  for 30 minutes. The flexible sheet was prepared with banana peel pulp, Ash plantation flour, Glycerol, Vinegar and Water. Mixture was boiled for 30 minutes, and thickened slurry spread on oil paper as thin layer followed by sun-drying for 2-3 days. Water absorption, moisture content, thickness, grammage and biodegradability of the synthesized fiber sheet and flexible sheets were determined. The mean grammage, thickness, moisture content, water absorption of fiber sheet was recorded as  $14.12 \pm 1.40\text{g/m}^2$ ,  $0.49 \pm 0.08\text{mm}$ ,  $1.70 \pm 1.93\%$  Whereas  $1.39 \pm 0.31\text{g/m}^2$ , and  $0.12 \pm 0.02\text{mm}$ ,  $0.54 \pm 0.20\%$  in flexible sheet. The results showed the both type of materials was insoluble in room temperature for 24 hours after being dipped in water, methanol, citric acid, acetic acid, ammonia, acetone, chloroform, and sulfuric acid. Total degradability was observed with both types of packing materials after 30 days of being buried in soil. Ongoing advancements in material properties and production processes position banana peel-based packaging as a viable and eco-friendly option for a sustainable future.

**Keywords:** *Banana peel, Biodegradable, Flexible packaging materials Packaging material*

## **A Study on Consumer Purchasing Behaviour on Spicy Products Special Reference to Matara District**

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### ***Abstract***

Spices carry important medicinal properties and are widely used in alternative medicine and pharmacology. A large number of factors can affect the consumption of spicy products by individuals. The current study focuses on identifying the determinants that affect the purchasing decisions of consumers in Matara District, their awareness of the spicy products available, and prospective demand trends. A semi-structured questionnaire survey was conducted based on the DS division. The randomly selected sample of 384 consumers of spicy products in the Matara district to gather data across eight dimensions. The most of the consumers are Female and 18-29 years old. The 29.69% consumers have 25000-49999 income level. Based on output, the quality, nutritional value and price have a significant positive influence on purchasing decisions, while the impact of other factors was not statistically significant at 0.05. Further, there is a preference hierarchy among consumers, with chilli pieces being the most preferred. The investigation into Freelan's spicy product line reveals high consumer awareness, with most of participants acknowledging familiarity with the brand. The main avenues through which people learn about Freelan products are Freelan Outlets and supermarkets. This research provides valuable insights for marketers and producers of spicy products, emphasizing the importance of focusing on competitive pricing strategies and brand development to align with consumer preferences and enhance market share in the Matara district.

***Keywords: Consumer Awareness, Matara District, Purchasing Decisions, Regression Analysis, Spice Consumption, Spices***

## Suitability of Utilizing of Used Rice Bran Oil to Produce Hard Soap and Liquid Soap

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### ***Abstract***

Waste cooking oil is utilized for re-cooking to enhance commercial efficiency, but its nutritional value has decreased and can cause severe health problems. The cis forms of fatty acids contained in rice bran oil are converted into harmful transform after exposure to high temperatures repeatedly. This study was designed to prepare hard and liquid soap using varying percentages of used rice bran oil, coconut oil, castor oil, NaOH, glycerin, sodium silicate, calcium carbonate, EDTA, SLES, dyes, and fragrance. In the prepared hard soap were found to be the values ranges of TFM of 25.10 to 69.56%, total alkaline content of 2.69 to 1.85%, pH of 11.45 to 8.901, moisture content of 8.901 to 14.863%, and foamability of 7.50 to 17.5cm. The formula containing used rice bran oil at 38.8%, Coconut oil at 14.82%, and Castor oil at 6.50% presented the best results in hard soap. The prepared liquid soap resulted the values ranges of TFM of 36.03 to 67.99%, Total alkaline content of 1.33 to 2.18%, pH of 12.57 to 9.25, and foamability of 13.0 to 18.33 cm. The best formula was obtained from liquid soap treatment containing used rice bran oil of 50.00%, Coconut oil of 11.50%, and castor oil of 5.00%. The tested results showed that the hard soap can be categorized into Type 01 soap according to the SLS standards. It can be concluded that the used rice bran oil can be used as an alternative raw material for soap manufacturing.

***Keywords: Laundry soap, Raw material for soap, Used rice bran oil, Waste cooking oil***

## **Determination of Antioxidative Ability of Clove, Nutmeg and Cinnamon Essential Oils on the Oxidative Stability of Coconut Oil**

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### ***Abstract***

Coconut Oil in many forms such as Virgin Coconut Oil (V.C.O), White Coconut Oil (W.C.O) and Refined, Bleached, and Deodorized (RBD) Coconut oil. Lipid oxidation is a primary factor influencing the rancidity of coconut oil. Considering the hazardous effect of synthetic antioxidant where natural antioxidant is successive alternative. Three coconut oil types were treated with cinnamon, clove, and nutmeg essential oil separately with concentration of 0.5g/L stored at (30 °C±1) to be tested across 8 weeks with 2-weeks interval. Peroxide value (PV) (AOAC 965.33), Iodine value (IV) (AOAC 993.20) and Free Fatty Acid (FFA) value (AOAC 940.28) of control and treated samples were analyzed. Control sample of RBD resulted in PV, IV and FFA value as 2.62±1.15, 9.54±0.22 and 0.07±0.01 respectively. Control sample of WCO and VCO did not recorded peroxide value. IV and FFA value of VCO were as 5.71±0.24 and 0.45±0.11. While WCO received 7.64±0.32 and 0.64±0.18 for IV and FFA value. Nutmeg oil treated VCO and WCO has recorded lowest IV as 5.37±0.34, 7.24±0.24 and shown lowest FFA for clove treated oil as 0.30±0.19 and 0.429±0.13. Treated RBD sample resulted with significant lowest peroxide value with cinnamon 2.07±1.06. RBD with Clove resulted lowest IV 9.09±0.27. RBD with Nutmeg resulted lowest FFA value 0.04±0.01. All treated samples of RBD, VCO and WCO depicted significantly (p<0.05) lower concentration of PV, IV and FFA value compared to the control samples. Research has indicated that the essential oil of clove, nutmeg, and cinnamon could be used favorably to delay the oxidation process of coconut oil.

***Keywords: Coconut, FFA, Oxidation, RBD, VCO, WCO***

# Study on the Variations in Characteristics of Cassava Starch During the Chemical and Physical Modification Process Within Selected Locally Grown Varieties

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## **Abstract**

The study was carried out to improve functional properties of native starch by hydrothermal modification and cross-linking modifications. The starch was extracted from different varieties of cassava (Swarna, Kirikawadi, MU51, Shani, JS1, 565) and extracted cassava was dried at 55°C. The physical characteristics were analyzed of both native starch and modified starch. The highest starch yield was observed in MU51 variety (15.25%) and had more export potential. The hydrothermal modification was carried out for MU51 and Shani varieties. The modified starch had a significant reduction in solubility with native starch ( $0.22\pm 0.65\%$ ,  $0.83\pm 0.08\%$ ) ( $p < 0.05$ ). The swelling power ( $253.83\pm 0.014\%$ ,  $214.08\pm 0.26\%$ ) and water absorption capacity ( $113.77\pm 0.67\%$ ,  $100.09\pm 0.75\%$ ) of the modified starch was significantly higher than the native starch. The dual-modified starches had the highest Gelatinization Temperature ( $68.00\pm 0.00^\circ\text{C}$ ,  $70.00\pm 0.00^\circ\text{C}$ ) than native starches ( $P < 0.05$ ). The hydrothermal modified starches had a significant reduction in viscosity with native starch. The crosslinking modification was carried out for the MU51 variety with different concentrations of cross-linking agents (STMP/STPP) (0%, 6%, and 12%). The solubility of cross-linked cassava starch with 12% concentration ( $4.37\pm 0.28\%$ ) was higher than native starch ( $p < 0.05$ ). The swelling power of cross-linked cassava starch with 12% concentration ( $222.94\pm 0.54\%$ ) was higher than other samples ( $p < 0.05$ ). The native starch had the lowest GT value ( $67.00\pm 0.00^\circ\text{C}$ ) than cross-linked cassava starch ( $p < 0.05$ ). The cross-linked starch with 12% concentration had the highest FC value (1.96%) ( $p < 0.05$ ) and a notable decrease in viscosity when compared to native starch. The hydrothermal and cross-linked modified starch suitable for the harsh conditions in food processing technology than native starch.

**Keywords:** *Cassava starch, Cross-linking modification, Hydrothermal modification*

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## **Development of A Soya-Based Instant Soup Mix using Locally Available Raw Materials**

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### ***Abstract***

Instant foods are top-rated in the modern food market due to the busy lifestyles, industrialization and population increase. The study was carried with a view to develop a soy-based instant soup mixture using a combination of soya fine grits, pumpkin powder, and cornstarch. Soya fine grits are a significant by-product of soy nugget processing, and it contains protein, carbohydrate, dietary fiber, total sugar, and total fat (43.3, 38, 15.6, 3.3, and 0.2%, respectively). During this study, both proximate analysis (moisture, ash, and crude fiber) and sensory qualities (taste, aroma, texture, color, and overall acceptability) of the prepared instant soup powder were analyzed. And also, shelf life, water activity, pH value, and the moisture content of the developed soup mixture were analyzed for the 45-days storage period. The sample, which contained fine soya grits (19.56%), pumpkin powder (26.10%), cornstarch (32.60%), spices (black pepper, garlic powder, onion powder, sugar, maltodextrin, salt, yeast extract), dried carrots (3.03%), and leeks (3.03%) was selected as the most preferred instant dried soup powder by the sensory evaluation. According to the proximate analysis, there were 6.42% moisture, 10.56% ash, and 4.003% crude fiber, while its water absorption index was 8.598 g/g, and pH value was 6.76, at 4.25-minute cooking time. Results revealed that soup powder's moisture content increased to 6.89%, pH decreased to 6.57, and water activity increased to 0.598 levels during the 45-day storage period.

***Keywords: Ash, Cooking Time, Crude Fiber, Moisture, pH Value, Sensory Qualities, Shelf Life, Water Absorption Index, Water Activity***

## Development of Pineapple Smoothie

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### ***Abstract***

A pineapple smoothie with coconut sprouts and coconut milk is a well-balanced combination of tropical flavors and healthy nutrients. The main objective of this study is to create a delicious smoothie drink by combining pineapple with coconut sprouts and coconut milk. Good quality pineapple and coconut sprouts in different four types of ratios were made with the other ingredients. The pulp of pineapple and coconut sprouts was blended well and other ingredients were mixed well and the smoothie was made and it was filled into clean cans, sealed and then retort sterilized at 120 °C and 1.5 bar for 20 minutes. The produced smoothie was evaluated for physicochemical analysis, sensory attributes and microbial analysis (Total plat count) for one month stored and the data were analyzed and interpreted at the 0.05 significance level. No significant quality changes were observed during storage. Based on the evaluation of the four samples, the highest pH is from T1 and the lowest pH is from T4, the highest brix value is T4 and lowest brix value is T1, there is no difference in moisture values and fat values. However, based on the sensory evaluation, T2 had the highest mean score for overall acceptability. This study successfully introduces a novel smoothie utilizing coconut sprout, a byproduct of the coconut industry.

***Keywords: Coconut sports smoothie, Physicochemical analysis, Sensory evaluation, Sterilization, Total plat count***

# GAP Analysis Between Current Good Manufacturing Practices and Post-corrective Action at a Dairy Processing Plant

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## ***Abstract***

The Good Manufacturing Practice (GMP) in the dairy industry is the foundation to control the food safety hazards associated with the industry, which in turn ensure public health. The objective of this study is to determine whether microbiological risks were present in the factory and products before the pre-project, analyze GMP gaps using SLS 143 and close those. In the microbiological risk assessment (*Escherichia coli*, yeast & molds, coliform, and total plate count) for swab and product samples, 7 out of 16 test results were found to be satisfactory and 9 were unsatisfactory in the pre-project. A GMP checklist based on SLS 143 was then used to conduct an independent audit, which revealed flaws in primary production (40%), design and facilities (45%), control of operation (25%), maintenance and sanitation (44%), personal hygiene (40%), transportation (20%), product information and consumer awareness (40%), and training (50%) among other areas. Overall, the audit results revealed that 40% of them did not comply with SLS 143, while 60% of them did. Root cause analysis was conducted for the non-conformances, using the fishbone diagram, brainstorming diagram, 5Y technique, flow diagram, and mind map. Corrective action was taken for 32% of the gaps that were discovered. These actions included developing an appropriate waste management procedure, enforcing personal hygiene protocol and providing adequate training on food safety practices, etc. The results of the microbiological tests that were conducted to reevaluate the microbial hazards were all satisfactory. Moreover, chi-square analysis verified a significant difference ( $\chi^2=12.522$ ,  $df=1$ ,  $p<0.001$ ) between the microbiology results obtained before and after the project. Research effectively addressed deficiencies discovered in a dairy plant with GMP implementation and certification. The industry must consistently uphold GMP standards to ensure dairy product safety and suitability.

***Keywords: Correction, GMP, Hygiene, Root cause analysis, Safety***

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## Development of Fruit Mincemeat Based on Palmyrah Fruit Leather with the Addition of Dried Fruits

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### ***Abstract***

The fruits of the plant palmyra (*Borrassus flabellifer* L.) provides health and immunity. This fruit is often wasted during peak season due to low usage among consumers and industries. To increase the usage of palmyra fruit, developing value addition techniques are ideal. Making palmyra fruit leather (PFL) and adding additional dried fruits to the fruit mincemeat was the aim of this study. The pulp was manually extracted, and eight treatments were prepared by adding different percentages of citric acid and sugar to reduce the bitterness of the palmyra fruit pulp. The PFL was prepared by spreading it on a stainless-steel plate and drying it at 60 °C for 6 hours. The dried PFL was peeled off the plate and cut into small pieces. PFL pieces and dried fruits such as mango, banana, date and raisin were mixed to create the fruit mincemeat. The sensory evaluations were performed on all samples by 12 trained panellists using hedonic scale. PFL 3 received the significantly higher rating for sensory attributes and identified as the best formulations for the fruit mincemeat. The proximate and mineral composition, as well as microbial characteristics of PFL3, were analysed using the AOAC method. The total plant count was analysed and found absent in fruit mincemeat. Palmyra fruit mincemeat demonstrated excellent sensory qualities and nutritional value, indicating that it is a product rich in minerals and nutrients. This product could potentially market with attractive packaging to increase its market share in both locally and globally

***Keywords: Bitterness, Dried fruits, Mincemeat, Palmyra fruit Leather, Palmyra fruit***

## To Investigate the Effect of Nano Edible Coating on Shelf Life of Guava

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### **Abstract**

Guava (*Psidium guajava*) is one of the popular fruits in Sri Lanka. Due to high perishability postharvest losses are high as 40 %. Study was designed to formulate nano edible coat using varying quantities of bee wax (0.005 %, 0.001 %, 0.015 %), nutmeg essential oil (50 µl, 100 µL, 150 µL), with aloe vera, coconut oil and Tween 20. The nano emulsions were prepared with an ultrasonic cell crusher (Labtrone, China) at 20KHz for 20 minutes. The experiment consists with three treatments with positive (Coated guava + KMnO<sub>4</sub> 1g sachet) and negative control (Uncoated guava). Guava samples were placed in perforated corrugated boxes and stored under (25±2 °C). Physical (colour, firmness, weight loss, marketability) physiochemical (brix value, total ascorbic acid content, total acidity) and sensory properties (5-point hedonics scale) were evaluated with 3 days intervals. The data were analysed with one-way ANOVA (p=0.05). The result revealed that Treatment 2 (0.001% bee wax+ 100µL nutmeg essential oil) had the lowest brix value (6.00±0.00) was significantly difference from the positive and negative controls (p>0.05). Lowest marketable percentage was observed in the negative control group, that was significantly different (0.83±0.05%) from the coated guava (p>0.05). Lowest weight loss (0.23±0.02g) of Treatment 02 was significantly different between the two controls (p>0.05). Treatment 02 was exhibited the maximum firmness value (717±186g), the lowest pH value (4.12±0.02), the lowest acidity (6.00±0.64 mg/100g) and ascorbic acid content (1.18±0.36 mg/100g). It has recorded highest score for all the sensory attributes during 15 days of storage period at 25±2 °C.

**Keywords:** *Edible coating, Nano technology, Nutmeg oil, Post harvesting management, Shelf life*

## **Creation of A Dairy-Free and Lactose-Free Beverage: Harnessing the Richness of Coconut Milk Infused with Roasted Barley**

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### ***Abstract***

A well-liked and adaptable non-dairy substitute that has become very popular in recent years is coconut milk beverages. The main objective of this study is to optimize the roasting process of barley and formulate a dairy-free and lactose-free beverage. Ready-to-serve beverages were prepared with the incorporation of roasted barley. To the mixture in different ratios and roasted barley powder and other ingredients, including xanthan gum for stabilization, sugar, coco powder and chocolate flavour were added. The mixture was then filled into clean, sterilized glass bottles and sealed manually. Afterward, sealed bottles were sterilized. Prepared samples were kept at room temperature (29 °C) for a one-month period and analysed. The produced beverages were evaluated for physiochemical and sensory parameters, yeast and mold count and total plate count stored once a week using the sensory evaluation for different treatments was carried out using 9-point hedonic scale testing for taste, texture, colour, odour, flavour, and overall acceptability. The data were analysed using SPSS software at the 0.05 significant level. No significant quality changes of beverage samples were observed during storage. Based on the sensory evaluation, the beverage at 230°C, 40 min and 228g:6g had the highest mean score for overall acceptability and there was no microbial count detected at one-month storage. The study concludes that the optimized roasting process of barley, combined with specific ratios of coconut milk, results in a stable, nutritionally rich, and well-accepted dairy-free beverage with sustained quality over a one-month storage period.

***Keywords: Beverage, Dairy-free, Lactose-free, Physiochemical analysis, Sensory evaluation, Yeast and mold count***

## Determination of Physical and Engineering Properties of Ceylon Nutmeg (*Myristica fragrance*)

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### **Abstract**

The physical and engineering properties of Nutmeg are important for developing harvesting and different process equipment, for its mass handling and storage. The study was undertaken to determine the physical and engineering properties of Ceylon Nutmeg. Samples were collected from the districts of Kegalle, Kandy, and Matale. Three locations from each district were chosen based on high availability. Length, breadth, and thickness of the Kernel were measured with Vernier caliper (Mitutoyo, Japan) and, size, sphericity, unit volume, projected area, and surface area were calculated using formulae. All the data was analyzed statistically. The highest average values of length, breadth, and thickness were found in the Kandy district (31.17±2.9mm, 24.51 ± 2.18mm, 22.70 ± 1.80mm) and the lowest values were found in Kegalle(28.01±1.65mm,22.34±1.25mm,20.10±1.43mm) (p<0.05). The diameter or equivalent size (25.86±2.03mm), sphericity (0.83±0.04mm), unit volume (9246.64±2076.34cc), projected area (529.64±80.48mm<sup>2</sup>), and surface area (2116.82±321.67mm<sup>2</sup>) found in samples taken from the Kandy district and were reported to have the highest value for engineering properties. Results indicate that there were significant differences in these properties between different districts for engineering properties. The technical data obtained in this study may be useful in the design of machines for the handling and processing of nutmeg seeds.

**Keywords:** *Ceylon Nutmeg, Engineering properties, Physical properties, Projected area, Sphericity, Unit volume*

# The Impact of Packaging Materials on paddy (AT362) Quality Preservation and shelf-life extension: An IOT-Enabled Study

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## ***Abstract***

This study investigates the efficacy of various packaging materials for paddy preservation, integrating IoT technology for internal environmental monitoring. NodeMCU boards were utilized to monitor internal environmental conditions, with wires extending from the NodeMCU to the packaging materials containing paddy. Over two months, manual assessments of seed qualities were conducted. Initial assessments and monthly measurements provided data for analysis. Python scripting and SPSS software were employed for data analysis. ANOVA tests were conducted to examine differences among the packaging materials and across different time intervals for variable parameters. For the material factor, the p-value exceeded 0.05, indicating a lack of significant differences among the packaging materials. However, for the time factor, the p-value was below 0.05, signifying statistical significance. This detailed examination revealed significant changes over time, providing a nuanced understanding of how these variables evolve during the course of the study. The significance level was maintained at 0.05 throughout the analyses, ensuring robust and reliable results. These detailed findings highlight the nuanced changes in properties with respect to packaging materials. Tin, while ensuring a stable humidity environment, showed unexpected consequences on insect multiplication. Polypropylene and jute bags, closely mirroring external conditions, demonstrated distinctive effects on bulk density and other physical properties. The study's results provide valuable insights for selecting packaging materials for paddy preservation, offering a comprehensive approach to understanding the dynamic changes in the internal environment of paddy packaging.

***Keywords: Analysis, Environmental monitoring, IoT technology, Packaging materials, Paddy preservation, Python scripting***



# Development and Quality Evaluation of Plant-Based Burger Patties

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## ***Abstract***

Substitution of meat-by-meat analogues and plant-based meat products can present beneficial results in both personal and societal aspects. When considering the cost-effectiveness, religious beliefs and ethics, plant-based meat substitutes will be an exciting option for Sri Lankan consumers. Plant-based burger patties are among the most popular meat substitutes in the international market. The main objective of this study was to develop four different types of plant-based burger patties using young jackfruit, mushrooms and vegetables. Three young jackfruit and oyster mushroom based and young jackfruit-based burger patties were developed by changing the binding agents. Three mushroom based burger patties were developed using oyster, button and abalone mushrooms. Three vegetables-based burger patties were developed using different percentages of carrot, pumpkin and cabbage. The burger patties were vacuum packed and stored under frozen conditions. After thawing and pan frying, sensory properties of the developed burger patties including appearance, color, odor, taste, texture, mouth feel and overall acceptability were evaluated using a five-point hedonic scale and the most preferred burger patty from each category were selected. Cooking characteristics of the burger patties including cooking yield, cooking loss, moisture retention (MR), reduction of thickness (RT) and reduction of diameter (RD) were evaluated. Young jackfruit and mushroom based burger patty had the highest cooking yield (98.5%) and the lowest cooking loss (1.86%). Vegetables based burger patty and young jackfruit and mushroom based burger patty had the lowest RD and RT, respectively. Mushroom based burger patty had the highest MR. The results of this study indicate the possibility of using young jackfruit, mushrooms and vegetables as main raw materials in successfully developing plant-based burger patties.

***Keywords: Burger patties, Mushrooms, Plant-based diet, Vegetables, Young jackfruit***

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# **Analysis of The Catechin and Caffeine Content in Fresh Tea Leaves from Fifteen Distinct Tea Cultivars and The Processing of Catechin Enriched Specialty Tea**

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## ***Abstract***

Tea made from tender shoots of *Camellia sinensis* (L). O. Kuntze is the most consumed beverage in the world next to water due to its unique taste, aroma, and beneficial health properties. Tea has the potential to function as an antioxidant due to the various forms of catechins and their derivatives. Caffeine is an important secondary metabolite found in tea. The chemical composition of tea varies and largely depends on climatic conditions, genotype, horticultural practices, soil, growth altitude, plucking season, sorting, grading, processing, extraction, storage, and drying. The objective of the current study was to determine the amount of catechin and caffeine content in freeze-dried leaves from fifteen distinct tea cultivars grown in identical agronomic and environmental conditions. The catechin, epicatechin (EC), epicatechin gallate (ECG), epigallocatechin (EGC), epigallocatechin gallate (EGCG), caffeine, and gallic acid of 15 tea cultivars were analyzed by using High Performance Liquid Chromatography according to ISO 14502–2:2005 method. TRI 3055 had the highest catechin content (21.45%) and EGCG content (13.671%) of the 15 cultivars. The most common individual catechin present in all tea cultivars is EGCG content. Out of 15 cultivars, TRI 4052 had the highest caffeine content (3.476%). TRI 3055 might be used in upcoming breeding projects because of its high catechin content.

***Keywords: Caffeine, Catechin, HPLC, Tea Cultivars, Specialty tea***

# **Development of Production Technology for Different Yam-Based Flakes and Allied Production and Evaluation of Their Physicochemical and Nutritional Properties**

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## ***Abstract***

This research focuses on the popularize the consumption of commercial and traditional yams through developing a yam flakes product as a preservation method and formulating allied products. Investigated production technology for yam-based flakes. Three varieties of yams, Potato, Higurala, and Dandila (Purple yams) were made into flakes by dehydrator, freeze-drying, hot air pump-drying and vacuum-drying in this report. Samples prepared by vacuum drying and freeze drying were in good condition. However, the cost of freeze-drying was high. Therefore, potato flakes, Dandila (purple yam) flakes, and Higurala flakes were dried by vacuum drying. Finally, were made flakes by the vacuum dry method. They were made soup mixture, pittu mixture, sausages, string hoppers, and breakfast mixture by yam flakes. The Higurala flakes having high moisture content than Dandila and potato flakes. Potato flakes having high ash content than dandila and Higurala flakes. Dandila flakes having high protein content than Higurala and potato flakes. Dandila flakes having high fiber content than potato and Higurala flakes, and Dandila flakes having high fat content than potato and Higurala flakes and Potato flakes having high carbohydrate content than Dandila and Higurala flakes. Higurala flakes having high water activity percentage than Dandila and potato flakes and potato flakes having high rehydrate ratio percentage than Dandila and Higurala flakes.

***Keywords: Dandila, Flakes, Higurala, Potato, Yam***

## **Determination of the Effect of Essential Oil Extract from Clove (*Syzygium aromaticum*) Leaves and Buds on the Thermal Stability of the Coconut Oil**

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### ***Abstract***

Coconut oil is used in deep fat frying to make delicious foods. The oxidation process during deep fat frying produces chemical compounds that affect oil flavor, nutrition, rancidity, shelf life of fried food and oil, reusability, and most significantly, human health. In this study different ingredients were used to reduce oxidation in oil. Four treatments: pure coconut oil, coconut oil + vit. E, coconut oil + clove buds, and coconut oil + clove leaves. Each treatment was deep-fried and then kept refrigerated, room temperature with lid, and room temperature without lid conditions. Free fatty acid (FFA), Peroxide Value (PV), Iodine Value (IV) and Saponification Value (SV) were tested in both before deep-fry and after 30 days of storage conditions. Initial values of FFA, PV, IV and SV were acceptable and 0.78 %, 1.6 meq/kg, 8.2 g/100g and 249.22 mg KOH/g respectively. In the comparison of oxidation, coconut oil at room temperature without a lid was high (5.87±0.29% (FFA), 7.85±0.91 meq/kg (PV), 6.13±0.31g/100g (IV), 451.56±0.26 KOH/g (SV)) and coconut oil + clove bud oil under refrigeration was low (1.19±0.14% (FFA), 3.99±0.02meq/kg (PV), 8.04±0.45 g/100g (IV) and 281.29±0.02 KOH/g (SV)). From the findings, addition of clove buds' oil to coconut oil affected the oxidative stability during deep fat frying.

***Keywords: Free fatty acid value, Hydrolysis, Iodine value, Oxidation, Polymerization, Peroxide value, Saponification value***

## Development of Herbal Tea Using Powdered Pumpkin Seeds (*Cucurbita maxima*)

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### **Abstract**

Pumpkin seeds are an excellent source of essential nutrients. The pumpkin seeds are generally thrown away after the flesh is consumed. By creating value-added products like herbal tea blends, pumpkin seed consumption can be increased. The *Cucurbita maxima* variety of pumpkin was chosen for this study because it is commonly grown in Sri Lanka. The samples were collected from the open market in the Gampaha district. The optimal time required for drying of pumpkin seed was determined by measuring the moisture content of the pumpkin seeds at one hour interval while dehydrating at 70°C. The dried pumpkin seeds were made into five treatments and roasted at 130°C, 140°C, 150°C, 160°C, and 170°C for 15 minutes. Then the roasted pumpkin seeds were ground to form powdered pumpkin seed (PPS). Moisture content (MC), ash content (AC), acid insoluble ash (AIA) content and pH content of PPS samples were determined. PPS samples with tea bag and without tea bags for brewed for 5 minutes. A sensory evaluation using seven points hedonic scale was conducted to determine the odor, color, taste, appearance, and overall acceptability of the brewed PPS with and without tea bags. PPS sample roasted at 170°C resulted the lowest MC, AC and AIA value as 1.97±0.02%, 4.24±0.35% and 0.28±0.02% respectively and highest pH content 6.94±0.02. PPS roasted at 170°C without tea bag obtained significantly higher scores for color, odor, taste, appearance and overall acceptability. The findings showed that roasted powder at 170°C can be used To make herbal tea.

**Keywords:** *Cucurbita maxima*, Herbal tea, Pumpkin seed powder, Roasting temperatures

## **Development of Ice Cream Added with Jackfruit (*Artocarpus heterophyllus*) and Sugarcane Syrup**

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### ***Abstract***

The jackfruit (*Artocarpus heterophyllus* Lam.) is one of the important tropical fruits cultivated in the worldwide. The objective of this study was to optimize the amount of jackfruit pulp added to the ice cream while taking account of consumer demand and nutritional value. Well-ripened jackfruits were blended with 5% water and heated to 70°C to create jackfruit pulp. The ice cream composites were made by combining fresh milk and jackfruit pulp in the following ratios: 10:90 (T2), 15:85 (T3), 20:80 (T4), and control sample. The physical and chemical characteristics (pH, moisture content, titratable acidity, Ash, protein, and fat), sensory attributes and yeast and mold were ascertained. There was a significant difference in the Moisture content, pH and titratable acidity value of the ice cream between the treatments. The moisture content ranged from 64.19±1.22 % to 54.28±0.13%, pH ranged from 6.75±0.01 to 6.47±0.01 and titratable acidity from 0.23 to 0.13. Additionally, the highest overrun percentage was observed in 15% jackfruit pulp incorporated ice cream. Yeast and mould count were absent in all the treatments. Based on the sensory evaluation, ice cream with 15% jackfruit pulp incorporated ice cream was recorded the highest score for taste, flavor, mouth feel, appearance and overall acceptability. In conclusion, 15% jackfruit pulp and 85% fresh milk work better as ingredients for ice cream preparation.

***Keywords: Ice-Cream, Jackfruit pulp, Sugarcane syrup***

# Analysis of Total Polyphenol Content of Fresh Tea Leaves and Black Tea from Fifteen Distinct Tea Cultivars

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## ***Abstract***

The most popular beverage in the world is tea, which is made from *Camellia sinensis* (L). O. Kuntze. Polyphenols are abundant in tea leaves. The antioxidative property of tea polyphenols has been partially attributed to the potential health benefits of tea consumption. The objectives of this study are to determine the total polyphenol content of fresh leaves from 15 different tea cultivars and black tea prepared using the same cultivars. The tea leaves were collected from tea estate managed by TRISL, which were then freeze dried. The total polyphenol of the freeze-dried tea samples was analyzed by spectrophotometer using folin-ciocalteu method. Using a miniature manufacturing process, fresh leaves were turned into black tea. Then the total polyphenol content of the black was analyzed. The presence of more than 18% of polyphenol content in the processed black tea were considered the best samples. The sensory evaluation using 5-point hedonic scale was conducted for the black tea produced from cultivars TRI 3041, TRI 3055, TRI 4049 and TRI 4042 by using thirty untrained panelists. According to the results total polyphenolic content was significantly ( $p < 0.05$ ) high in fresh leaf of TRI 3035 (26.739%) and for black tea TRI 3041(23.189%). The sensory evaluation revealed that there were significant differences ( $p < 0.05$ ) in the sensory attributes among the black teas that were prepared, and the cultivar TRI 3055 was chosen as the best by the sensory panel. Thus, TRI 3055 demonstrated the best outcomes based on sensory evaluation and polyphenol content. The TRI 3055 cultivar may be utilized in the future to boost the polyphenols content in black tea and to raise human immunity.

***Keywords: Black tea, Cultivars, Miniature process, Total Polyphenol Content***

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