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# HARVEST

Research

Recommendations

Ideas

Experiences

News & Events

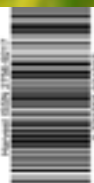
Vol. 01, Issue 01, June 2020

**POWER  
OF TEA  
Vs.  
COVID  
Pg. 30 19**

**Partially Burnt  
Rice Husk  
— for —  
CADMIUM  
STRESS  
IN  
Pg. 17 RICE**

**COVID-19**  
IMPACT ON  
AGRICULTURAL  
LIVELIHOOD  
Pg. 34

DEPARTMENT OF EXPORT AGRICULTURE  
UVA WELLASSA UNIVERSITY OF SRI LANKA



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FLAVOURS OF OUR  
HARVEST - NEW IDEAS,  
RECOMMENDATIONS  
AND  
EXPERIENCES



# message

## FROM THE VICE CHANCELLOR

Prof. J. L. Ratnasekera

*It gives me immense pleasure to issue this congratulatory note at the launching of the magazine Harvest, published by the Department of Export Agriculture, Faculty of Animal Science & Export Agriculture, Uva Wellassa University. I firmly believe that a publication of this nature helps an institution in numerous ways.*

*It serves as a vehicle to disseminate novel findings and other forms of scholarly and creative communications of the institutional members to a wider audience. Further, it paves the way for the institution to showcase its achievements and significant events to the outside community. In addition, it creates an opportunity for the writers to sharpen their written communication skills in their early career writings. Hence, I am confident that the magazine Harvest will produce its golden harvest in the near future.*

*I take this opportunity to appreciate this commendable initiative and to congratulate the group of committed staff members and the undergraduates of the Department of Export Agriculture for their dedicated effort. I wish and look forward to the great success of the magazine Harvest.*







# FROM THE DEAN

Faculty of Animal Science & Export Agriculture

**Prof. H.M.S.K. Herath**

*I warmly welcome you to the first issue of 'Harvest' which is to be published biannually by Department of Export Agriculture, Faculty of Animal Science and Export Agriculture, Uva Wellassa University of Sri Lanka. It is of course an effort made to achieve a goal which we intended to accomplish over few years.*

*'Harvest' will be a platform that provides opportunities for all academic staff, students and alumni of the Department of Export Agriculture to bring their thoughts in a scientific, semi-scientific and classical ways to share with an intended audience. Thus, the newsletter itself is a forum where new research findings of the staff and undergraduates, new creative ideas, and information related to current issues in agriculture are communicated. Having such a media is timely important for the Department of Export Agriculture given its accumulated information over more than one decade to share with interested parties.*

*We thoroughly believe that our undergraduates should be equipped with skills, values and positive attitudes in addition to providing knowledge in their four years time of stay in Uva Wellassa University. Thus, engaging in extracurricular activities is a way which naturally enhances the skills of students. 'Harvest' will open avenues for the undergraduates of the Department of Export Agriculture under the scopes of given three degree programmes to develop their creative and writing skills. We have also been adding new, cutting-edge elements to the curricular of undergraduate programmes right from the beginning, including technological and essential entrepreneurial skills. Annually, a great number of new products are developed through undergraduate research project at the final year. The 'Harvest' can afford them the opportunity to send their products into the marketplace by providing necessary promotions. Certainly, details related to all these products can be communicated.*

*With the stated mission of the Faculty of Animal Science and Export Agriculture, we focus on excelling in teaching and learning, and research with a strong emphasis on value addition to the national livestock, agricultural crops and aquatic resources using*





*modern, scientific and technological approaches. We also envision that if it is to increase foreign exchange earnings obtained for agricultural and related products, learning and research must be excelled with a strong emphasis on value addition to local agricultural resources through modern innovative, scientific and technological approaches. Thus, the faculty strives to achieve the mission by creating conducive environment for teaching and learning. The 'Harvest' will undoubtedly be a very good opportunity for the whole faculty to endorse our theme of value addition through practical experience. Therefore, I take this opportunity to invite all above stakeholders to make the best use of 'Harvest' to transfer our technologies making a significant contribution to the development of the country.*

*I look forward to keeping the 'Harvest' upgraded with meaningful and quality-based write-ups always brought by our students, staff and alumni.  
Thank you.*

## FROM THE HEAD

Department of Export Agriculture

**Dr. A. M. W. K. Senevirathna**

*'HARVEST' is the maiden Magazine of the Department of Export Agriculture, Faculty of Animal Science and Export Agriculture of Uva Wellassa University of Sri Lanka which intends to publish biannually. It is an outcome of the AHEAD ELTA ELSE DP Project won by the Department of Export Agriculture. HARVEST was initiated with the aim of improving the writing and communicating skills of the undergraduates of the three degree programmes being conducted by the Department. It includes research highlights, innovations, timely important articles, creative writing, messages and product promotions of students which were aligned under the guidance of the Academia of the Department. I can assure that it will certainly be supportive in showcasing the students' talents in creativity & communication and improving such skills in life-long learning. I congratulate the Editorial Board and the contributors for their enthusiasm, hard work and dedication that has resulted in publication of the magazine 'HARVEST'.*

*I wish the success of this magazine and its continuity.*

# News & Events

## Workshop on Curriculum Mapping for Student Centered Learning (SCL)

Two-day residential workshop was successfully held at the National Holiday Resort, Bandarawela on 12th and 13th December 2019 for the staff members of the Department of Export Agriculture with the aim of mapping the curriculum of the Export Agriculture degree programme for SCL and constructively aligning the ILO's, teaching, learning and assessment strategies of each course module. Dr. Chalinda Beneragama, Director, SDC, Senior Lecturer, Department of Crop Science, Faculty of Agriculture, University of Peradeniya was the resource person. The following aspects were discussed at the workshop.

Know your clients and Graduate Profile

Teaching "Skills" and "Attitudes"

Deciding appropriate Student Centered Teaching, Learning and Assessment methods and how to align them constructively.

Setting up ILOs

What to, When to, How to assess "Students"

At the end of each session, the participants re-visited their course modules for necessary changes/ amendments. Participants were actively participated with several group activities followed by effective discussions. The workshop was funded by the World Bank through AHEAD (Accelerating Higher Education Expansion and Development)-ELTA-ELSE (Enriching Learning, Teaching, Assessment and English Language Skills Enhancement) Development Project.



Dr. Chandima Ranawana

ACTIVITY COORDINATOR

AHEAD-ELTA-ELSE DEVELOPMENT PROJECT





# Agnovator

wings to new ideas

“Agnovator 2019” is an innovative product development competition which initiated to commemorate 100 month's togetherness of Department of Export Agriculture. The purpose of this event is to provide an opportunity to showcase creative ideas of students of the Department and pave the path to potential entrepreneurial ventures. Further, this event is the first step towards developing an innovative and creative generation in the Department of Export Agriculture. In the light of the facts that stronger link between alumni is important to the Department's future endeavours, the contest is opened for both undergraduates and graduates of the Department.

The Department of Export Agriculture and EAG Agro Club collaboratively organized Agnaovator 2019. The event was co-coordinated by Dr. Dayani Gunathilaka, Dr. Chatura Wijetunga and Ms. Chaturika Baanagala. The Technical Evaluation (First round evaluation) was held on November 12, 2019. Aprico Butter, Thebu Leaves Biscuit, Blue Moringa Tea, Healthy Flakes, Aloe Vera Jam, Green Milk powder, Coconut Water Jelly, Green Tea Butter, Kesel Muwa Sausages, Flavored Butterfly Pea RTD, Moringa Nutri-Cookies, Palmyrah Sugar Free Cookies, Flavored Coconut Water, Rambutan Jam, Tamarind Cube are some of the food products presented at the technical evaluation.

Acreage Mart' Android App, Dream Catcher, Mesh Vibrating System, Refuse Tea Compost Cubs, Tea Tower are some of the other products (non-food) successfully gone through the first round of the evaluation process.

Altogether, 38 competitive products were presented for the technical evaluation. Technical evaluation was conducted as three parallel sessions mainly for food related products and other products. Each session was evaluated by three panel of expertise, including members from the Faculty of Animal Science and Export Agriculture and the Faculty of Science and Technology. Novelty of the product or concept, commercial potential, technical feasibility and economic feasibility were the main criteria considered in the technical evaluation. This concept was seeded under the leadership of the former Head of the Department, Dr. P.E.Kaliyadasa. Several different supportive activities such as Agri Food Fiesta, car wash and selling of food items were held to raise fund for the event.

As the next step of this competition, organizers expect to hold “Marketing Day” where the opportunity is given for all the presenters to sell their unique products. After successful completion of 2nd phase of evaluation on marketing day, three best products will be selected. On behalf of the Department, we wish every success to all the new product developers to contest in the 2nd round of evaluation. Recognizing the significant importance of this event to the development of the Department, this event will be organized annually.

Dr. Dayani Gunathilaka, Dr. Chatura Sewwandi  
Wijetunga & Ms. Chaturika Baanagala  
Coordiantors of Agnovator





# Programme Review 2019

## BScHons (Export Agriculture)

As per the Programme Review 2019, BScHons (Export Agriculture) received an 'A' grade. Programme review evaluates the effectiveness of Faculty's or Institute's processes for managing and assuring quality of study programmes, student learning experience and standards of awards within a programme of study. The evaluation was conducted by three eminent Senior Academic staff members nominated by the Quality Assurance and Accreditation Council (QAAC), University Grant Commission of Sri Lanka, during November 11 – 14, 2019. The whole assessment comprised eight criteria: (1) Programme Management, (2) Human and Physical Resources, (3) Programme Design and Development, (4) Course/Module Design and Development, (5) Teaching and Learning, (6) Learning Environment, Student Support and Progression, (7) Student Assessment and Awards, (8) Innovative and Healthy Practices.



## හරිත සමුහය

### - Green Battles -

"Green Battles" is the online awareness program which is conducted by UWU Agro Club in collaboration with the Department of Export Agriculture, Uva Wellassa University of Sri Lanka. The main objective of this programme is to provide technical advice to farmers who are interested in agriculture, with a focus on the following areas such as;

home gardening  
compost production  
biogas production  
improved crop varieties  
new cultivation methods  
(hydroponics, aeroponics gardening)  
new plant propagation  
methods  
integrated weed control  
integrated pest control  
plant disease control  
post-harvest technology  
food preservation  
organic agriculture

*During the last two years, we were able to develop a UWU Agro Club successfully step by step. In the near future, we have planned to do a lot of social work and awareness programs to lead the farmers who are interested in modern agriculture.*

"UWU Agro Club" is the Society of Department of Export Agriculture, Faculty of Animal Science and Export Agriculture of Uva Wellassa University of Sri Lanka.

The term "Department of Export Agriculture" shall include the degree programs of Animal Science, Aquatic Resource Technology, Export Agriculture, Palm & Latex Technology and Value Addition and Tea Technology and Value Addition of the Faculty of Animal Science & Export Agriculture.

**As a society we have to achieve special targets as follow;**

To enhance the awareness and knowledge on crop production, processing and marketing among farmers, schools and the society,

To carry out workshops, seminars, trainings and events including food festivals, practical sessions and camps to achieve the above objective,

To introduce various new products related to agriculture sector with an emphasis on exportation,

To establish and maintain a sales unit of agricultural commodities within the university premises.

## නිකුත්වලා

"Taksalava" seminar series was held on Welikemulla Maha Vidyalaya, Badulla in 2019. In there, our main objective was improving their O/L exam results compare to the previous year. Mainly we focused on Mathematics and Science subjects. Meanwhile, we provided efficient solutions for all the difficult subject matters based on student requirements.

Let us know if you have any questions regarding your present agricultural activities. We want to develop a modern agriculture system as well as develop agricultural products through value addition.

[uwuagroclub@gmail.com](mailto:uwuagroclub@gmail.com)



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UWU AGRO CLUB



# UWU AGRO CLUB

## AGRO FOOD FIESTA

Agro Food Fiesta is fund raising program which organized by the UWU Agro Club in 2019. It was a delightful night for the University. Although it was a remarkable Food festival in our Department history.





# Annual Academic Sessions 2020

A Platform to Showcase Research



Research is one of the key aspects which paves the way to create new knowledge. Further, research findings should disseminate effectively to reach the target audience so that they can utilize that knowledge for the sustenance and wellbeing of humanity. In this endeavour, researchers need to learn how to communicate their findings more efficiently and effectively to the target group.

Having understood the necessity of scientific communication, the Department of Export Agriculture organized an Academic Session for the first time on 05th February 2020 for the final year undergraduates of 2014/2015 Batch as a collaborative task with the financial assistance received by the World Bank through AHEAD (Accelerating Higher Education Expansion and Development)-ELTA-ELSE (Enriching Learning, Teaching, Assessment and English Language Skills Enhancement) Development Project. The main aim of this session was to create a conducive platform for the undergraduates to learn, practice and improve their scientific communication skills. Another objective of the academic session was to motivate the students to continue their research studies further on to employment in entrepreneurial nature. This experience for sure will motivate and help them to continue and contribute their interest in research and to make their representation in national and international scientific sessions.

Prof. J.L. Ratnasekera, Vice Chancellor of Uva Wellassa University attended the event as the Chief Guest. The Academic Session was commenced with the lighting of the oil lamp followed by the National and University Anthems. Prof. H.M.S.K. Herath, Head Department of Export Agriculture welcomed the gathering giving an overview to the Academic Session 2020. Prof. J.L. Ratnasekera,




Vice Chancellor and Prof. S.C. Jayamanne, Dean, Faculty of Animal Science and Export Agriculture addressed the gathering with blessing for a successful event. The keynote speech was delivered by Prof. D.P.S.T.G. Attanayaka from the Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka. Finally, Dr. L.M.H.R. Alwis, Coordinator, Academic Session 2020 delivered Vote of Thanks closing the inauguration.

Following the inauguration, the Technical sessions were conducted under seven tracks namely; Agribusiness Management, Agricultural Economics, Crop Production Technology I and II, Food Technology I and II and Processing Technology. Altogether, 108 students presented the findings of their final year research projects. Each track was evaluated by a panel of expertise from the Faculty of Animal Science and Export Agriculture, other Faculties in the Uva Wellassa University and external institutes.

At the closing ceremony, Dr. R.M.S.D. Rathnayake, Lecturer at the Department of Export Agriculture made a scientific presentation highlighting the key findings of her doctoral study. Twenty-nine (29) presenters received Merits awards for their excellence in research presentations. The event was successfully completed with the concluding remarks delivered by Dr. M.G.P.P. Mahindaratne, Coordinator of the AHEAD ELTA-ELSE-DP.

**Dr. Wasantha Senevirathna**  
**Dr. Dayani Gunathilake**  
**Dr. Chatura Sewwandi Wijetunga**  
Research Coordinators



The background of the slide is a dark grey color with a repeating pattern of white line-art icons representing various fast-food items. These include french fries in a container with a star, burgers, pizza slices, tacos, soft drinks in cups with straws, and chicken wings.

# DO YOU LIKE BLACK FOODS



People around the world are now more interested in black hued dishes as they are relatively rare and unique. Black food has become a new food trend. Most of the time this inky black color is given by activated charcoal. This super black color is common with ice cream, lemonades, pizza and cocktails in the other countries of the world. It says activated charcoal gives food an earthy, smoky taste and black coloring that gives the food an exotic, fashionable appearance, even it doesn't really do much with flavor.

Activated charcoal is typically made from bamboo or coconut shell by heating to extremely high temperatures until they are carbonized. The resulting ash is processed with steam or hot air at equally high temperatures for the activation of carbonized mass which creates a micro porous structure. Simply you can imagine it as a sponge with many tiny pores. These little pores endow the activated charcoal with its powerful adsorption properties.

Before it has been in the food culture activated charcoal is a potent detoxifier and used to prevent poisons and lethal overdose of drugs from being absorbed by the body. In addition it has many natural health benefits for its anti-aging benefits, as a way to lose weight and lower cholesterol, draw poisons out of wounds and minimize gastrointestinal distress. In this way Ayurvedic practitioners used activated charcoal for teeth whitening and cleansing toxic mold spores from the body since ancient time.

As similarly as its super black color it seems bit Halloween with few concerns as it is really good at adsorption or soaking up all types of molecules. We cannot put blame as it isn't so good at picking out what is toxic and what isn't.

Can you believe it adsorb calcium, potassium and other vitamins that found in your food. Activated charcoal prevents the digestive tract from absorbing nutrients and eliminate them as waste alongside the charcoal. In extreme cases, this result in malnutrition.

Surprisingly it has found that if you are drinking or eating activated charcoal and you also are on any prescription medication, even birth control pills, the activate charcoal is likely to adsorb the drug and make them ineffective.

But simply you can use activated charcoal while travelling where water may make you sick. Activated charcoal can be used to solve your digestive issues and can alleviate gas and bloating. In domestic level you can purify your drinking water as tap water can contain toxins, chemicals and odors. It would be really helpful for rural people to draw purified water for drinking. Even though it is not good to eat or drink all the time you can take it when you feel bad with your body.

In small quantities, activated charcoal is perfectly safe to consume. Although activated charcoal able to trap chemicals in the body and flush them out scientific investigations are needed as it is difficult to predict how it will impact each individual person and ingesting too much could have significant implication.

**It's not going to kill you, but don't overdo it.**

**Thanuja Dharmarathna**

Lecturer





# FLOWERING TREES ADDING COLOUR TO UWU







*Cassia spectabilis* (Kaha kona)



*Delonix regia* (Mai mara)



*Erythrina variegata* (Erabadu)



*Tabebuia rosea* (Robarosia)

Uva Wellassa University (UWU) is situated in Badulla district which lies in mid altitudes of Uva province. Uva province is known for having the highest diversity of natural vegetation which in turn shares its flora and fauna with the UWU landscape.

University covers an area of 59 acres surrounded by high mountain range which creates a picturesque scenery that allures visitors from all around the country.

In tropical climates of Badulla a wide range of trees are grown contributing to a higher biodiversity where the university premises can be known as an assemblage of such tree species. Trees are grown in their natural habitats or specifically established and valued for their colorful flowers, leaves, different branch arrangements and shape of the crowns. Trees are also established for functional purposes in landscapes such as for avenue planting and to provide shade.

Some of these trees are native while others are introduced from countries like America, Australia, Africa and neighboring India. Flowering trees at UWU bloom with vivid colors once or twice a year persisting few weeks to months decorating roadsides and the university premises.

Starting at the entrance of the university *Tabebuia rosea* or Robarosia trees are placed besides the road which lay carpets of pink for a short period, during their time of bloom. Robarosia is well known for their trumpet-shaped, pale pink flowers which are produced in clusters that densely pack its branches. It is a medium to tall tree with branches that grows vertically upward. It's an evergreen tree with olive-green compound leaves which is considered deciduous during dry seasons.

Some locals call Robarosia as Sri Lankan Sakura tree. Since it looks like Sakura tree once it is at full bloom. Luckily UWU is the only university in Sri Lanka where you can see actual Sakura (Japanese cherry blossom) flowers, which occurred recently during last March 2019. It belongs to genus *Prunus* and it is a small deciduous tree which is a very famous site seen in Japan and many other countries as well. Since we received the plants from Japan and it bloomed in UWU suggesting that Sakura can thrive in the prevailing conditions in Badulla.

Apart from that, there are many small trees found in university premises. Among them *Bauhinia purpurea* (Butterfly tree/Orchid tree/ Dam-pethan) is popular for their purple, slightly fragrant large



orchid-like blooms. Their leaves are bi-lobed, each lobe is kidney shaped which is used to recognize this tree species since it resembles a butterfly.

Between different dashes of pink and purple, *Jacaranda mimosifolia* (Jacaranda) is beautiful when it is at bloom. It is a small tree with bell-shaped, lavender purple flowers produced in clusters. During the flowering season flowers snow down and creates a lavender carpet around the tree which is absolutely a breath taking site.

University always look lively and joyful with the vibrant reds and yellows covering the trees. It is obvious that trees bloom at less or more similar times but never seems to completely disappear. *Cassia spectabilis* (Kaha kona) and *Cassia fistula* (Ehela pokuru wel mal) both trees belongs to the bean family are observed in higher numbers in the university premises compared to other flowering trees. Both are medium size trees, with wide spreading branches that produces yellow flowers at the tip of each branch. Kaha kona produces flowers which stick upward looking like fireworks at a distance while Ehela produces flowers which hangs down like drizzling gold showers. These trees bloom and the flowers stay for a longer time giving energy for many who walks in to the university premises.

Red and scarlet flowers which blooms specially during the months of April and May bring more awe to the university. There are several trees of *Delonix regia* (Mai mara) in the university that produce eye catching bunches of scarlet flowers which are even beautiful individually. It is a tall tree with a wide spreading umbrella like canopy. In Mai mara tree the leaves are also holding some beauty with the twice-divided compound leaves which looks like feathers of a bird. Mai mara received its name knowing for its flowering time in the month of May but it can flower from February to May with a longer flowering period. It is very popular as an ornamental tree and an avenue tree in Sri Lanka. Few *Erythrina variegata* (Erabadu) trees are scattered in the university landscape which produces showy scarlet flower bunches which blooms at end of March and beginning of April to announce the traditional Sinhala and Tamil New Year to all in and around the university. The university plan and the landscape itself is a single ecosystem which is built on a green concept bestowed with many more beautiful trees and plants that truly makes it look like heaven on earth.



*Bauhinia purpurea*  
(Butterfly tree/Orchid tree /Dam-pethan)



*Prunus serrulata* (Japanese cherry blossom)

*Cassia fistula* (Ehela pokuru wel mal)



*Jacaranda mimosifolia* (Jacaranda)





# Research Briefs

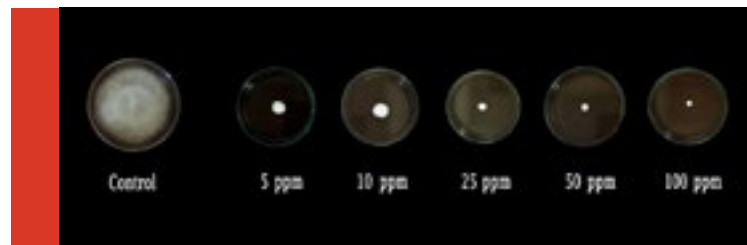


# Bio Efficacy of Commercially Available Fungicides against Rubber White Root Disease Causing Agent *Rigidoporus microporus*

*Hevea brasiliensis* is the most economically important member of the genus *Hevea*. Among the diseases of Rubber, White Root Disease (WRD) is the most destructive disease ever recorded and it infects the root system seriously which eventually causes die back and death conditions to the plant. Causative agent of the WRD of rubber is the fungus; *Rigidoporus microporus*. Usually, the impact of *R. microporus* is minimized using Integrated Disease Management (IDM) practices such as cultural, biological and chemical control measures. Among these practices, chemical fungicides are widely used and it is the most widely adaptive measure and hexaconazole and tebuconazole are the recommended active agents for the control of WRD of Rubber by the Rubber Research Institute of Sri Lanka (RRISL).

During the recent past Plant Pathology and Microbiology Department of the RRISL received several complains about the bio efficacy of different commercial fungicides hence, this study was an attempt to explore the bio efficacy level of commercially available seven (07) fungicides namely Folicur, Orius, Ceypetco, Heyleys, Century, Hero and Agstar which contains hexaconazole and tebuconazole as it's main active ingredient.

The effectiveness of the above two (02) chemical compounds in controlling the *R. microporus* isolate was evaluated under *In-vitro* conditions at the Plant Pathology and Microbiology Laboratory, RRISL. WRD infected root samples were collected from the Dartonfield Estate, RRISL and pure *R. microporus* was isolated on Malt Extract Agar (MEA) and confirmed by comparing morphological and microscopic characteristics. Fungicide screening test was conducted for the above seven (07) commercial products and the efficacy of mycelial growth inhibition was evaluated using Poisoned Food Technique (PFT) at five dosage levels; 5, 10, 25, 50, 100 ppm. Fungicides which can achieved EC100 at its lowest level is treated as the best effective fungicide and only the Folicur (tebuconazole 250 EW) product achieved EC100 at the lowest 5ppm level. However, Orius (tebuconazole 250 EW), Ceypetco (tebuconazole 250 EW) and Heyleys (hexaconazole 50 g/l) also achieved EC100 at 25 ppm concentration while Century (hexaconazole 50 g/l) achieved EC100 at 100 ppm level and able to prove its



efficiency in controlling *R. microporus*. But, Hero (hexaconazole 50 g/l) and Agstar (hexaconazole 50 g/l) products did not achieved EC100 within the tested concentration range under laboratory conditions and were failed as effective fungicides in controlling WRD. Hence, the study revealed Folicur, Orius, Ceypetco, Heyleys and Century products can be used as effective trade products in controlling WRD chemically.

*This study was conducted under the supervision of Dr. T.H.P.S. Fernando, Senior Plant Pathologist, Rubber Research Institute of Sri Lanka, Prof. K.G. Premathilake, Uva Wellassa University and Ms. P.D.P.M.D Silva, Lecturer, Uva Wellassa University.*

**Shamalie Madhushanki**  
Palm & Latex Technology and Value  
Addition Degree Programme



# Effect of Gamma Irradiation on Microbiological and Physicochemical Properties of Dehydrated Carrot and Waraka



Dehydrated fruits and vegetables are fuelling growth in sales and cater to the rising consumer need. Dehydrated ripe Jackfruit (waraka) (*Artocarpus heterophyllus* L.) and carrot (*Daucus carota* L.) have a demand in local and export market due to their health benefits and the use as raw materials for further processing in food industry. But, there is a possibility of spoiling dehydrated fruits and vegetables with several types of food pathogens such as *Escherichia coli*, coliform bacteria, yeast and molds. Because of that, there is a high risk for safety of consumption and shelf life. Therefore, dehydrated fruits and vegetables are needed effective and safe technique to reduce the microbial load while preserving the all other quality attributes.

Collected dehydrated waraka and carrot samples were irradiated at doses of 0, 2, 4, 6, 8 and 10 kGy by industrial Co-60 gamma irradiator at a rate of 5.3 of Gy per min. Water activity, moisture content, total phenolic content, antioxidant content, beta carotene content, total plate count, yeast and mold count, total coliform count, fecal coliform count and *E. coli* counts were checked. Physicochemical parameters, except the beta carotene content show no any significant difference with gamma radiation doses and all other microbial parameters show a drastic reduction of the microbial count with incremental of gamma doses. It can be concluded that the most preferable radiation doses for preserving the physical and nutritional quality and microbial safety of dehydrated waraka and dehydrated carrot were 2 kGy and 4 kGy.

This study was carried out to evaluate the effect of different gamma radiation doses on physicochemical parameters and microbial quality of dehydrated waraka and carrot to suppress the microbial load while preserving all other quality attributes.

*This research was conducted at Sri Lanka Gamma Center, Atomic Energy Authority Board, under the supervision of Dr. Janaka Wijesinghe, Senior Lecture, Uva Wellassa University and Mrs. Roshani Ranasinghe, Microbiologist, Sri Lanka Gamma Center.*



**Chamila Madushani**  
Export Agriculture Degree Programme,  
Specialized in Food Processing Technology





Heavy metal contamination, particularly Cadmium (Cd) has become a serious issue with the potential risk of transferring Cd to human food chain. Long-term exposure of Cd can lead to several health issues especially on kidneys as well as the skeletal and respiratory systems. Cd can accumulate in paddy soil due to continuous usage of synthetic fertilizers and other agrochemicals. It is directly absorbed through plant root systems causing several functional changes in rice plants such as growth inhibition and development retardation as well as the death of the plants. Amelioration of the Cd stress has become a challenging issue in Asian countries. Practicability and effectiveness of different remediation measures are questionable. Exploration of effective remedial measures to ameliorate Cd stress is an urgent need due to its negative effects on both human and plants.

## Partially-burnt Rice Husk Amendment Ameliorates Cadmium Stress in Rice

**Gayangi Weerakkodi**  
Export Agriculture Degree Programme

*This study was conducted under the supervision of Dr. S.R.W.M.C.J.K. Ranawana, Senior Lecturer, Uva Wellassa University and Dr. N.U. Jayawardana, Senior Lecturer, University of Peradeniya.*

At this backdrop, novel treatments were experimented in Uva Wellassa University premises during August to December 2019. The efficacy of using some soil amendments and floating aquatic plants in ameliorating Cd stress in rice was evaluated under controlled environmental conditions using rice variety Bg 250. Water lettuce (*Pistia stratiotes*), duckweed (*Lemna minor*), partially burnt rice husk (RH) and rice straw (RS) were used as the amelioration treatments under two soil Cd contamination levels (5 and 8 ppm). Soil amendments were separately incorporated to Cd treated soil and mixed well at two levels (soil: RH or soil: RS, 1:1 and 2:1 v/v). The aquatic plants were introduced to Cd treated pots upon transplanting of rice.



Interestingly, partially-burnt rice husk treated plants showed significantly higher performances in every parameter (Plant height, number of tillers, root length, root volume, root dry weight, shoot dry weight and seed dry weight) than the other treatments under both Cd contamination levels. Although, aquatic plants are used in water bodies as a remedial measure, its applicability for paddy fields is unknown. According to this study, the aquatic plants reduced the growth and yield of rice possibly due to competition for resources making it less feasible for ameliorating Cd stress in rice. Thus, partially-burnt rice husk can be identified as a potential soil amendment to ameliorate Cd stress in rice based on vegetative and reproductive growth performances. Future studies may be applicable under field conditions to identify the exact dosage and frequency of application. Moreover, modification of paddy-husk to enhance the adsorption power (E.g. Alkaline treatments) needs to be investigated.

# Measures to Minimize Solid Losses in Coconut Milk Powder Manufacturing Process

Coconut (*Cocos nucifera* L.) is an important multipurpose perennial crop of palm family Arecaceae (Palmae) and this tree is often referred to as the “tree of life” because of its many uses. Coconut milk prepared by aqueous extraction of grated mature coconut endosperm (kernel) is used as a culinary ingredient in traditional cuisines around the world. Preparation of coconut milk in day-to-day cooking is laborious. Further, coconut milk is perishable owing to its rich nutrient content and high water activity. Coconut milk powder is becoming a popular choice among busy housewives owing to its improved keeping quality and convenience in usage. Commercially, coconut milk powder is manufactured by spray drying the coconut milk after mixing with additives. This process is controlled based on the total solid content of coconut milk. A Sri Lankan coconut milk powder manufacturing plant equipped with spray drying technique experienced about 4% solid loss incurring an annual monetary loss of about Rs.23 million.

A case study was undertaken to identify the solid losing points, to quantify the solid loss at each identified point and to determine measures to be taken to minimize solid loss during coconut milk powder manufacturing process of this plant. At the milk reception section, solid losses occur

during transferring of coconut milk and due to the solid remaining in bowzers and Coconut milk Buffer Storage Tanks. Solid loss occurred at this section was found to be 2803 kg/run and this accounted for 92% of total solid loss in the plant. Conductivity drain plate was identified as the main loss point and solid loss occurred at this point (1612 kg/run) accounted for 57% of solid loss at milk reception section. Solid loss due to inaccurate moisture analysis (703 kg/run) and transferring loss (423 kg/run) contributed to 21% and 14% of solid loss at this section, respectively. It was found that solid loss occurred at conductivity drain plate could be reduced by 94% by reducing its set point from 4 mS/cm to 0.7 mS/cm. Further, plunging the compartments of bowzers after half unloading, training on correct methods of plunging and total solid analysis using moisture analyzer, standardizing the required sample quantity and defining the sampling points can be recommended to reduce solid loss in commercial scale coconut milk powder manufacturing processes.

**Sandarekha Kodithuwakku**

Palm & Latex Technology and Value Addition Degree Programme

*This case study was conducted under the supervision of Dr. G.A.A.R.Perera, Senior Lecturer, Uva Wellassa University and Mr. K.J. Gamage, Production Manager, Production Group 2, Nestle Lanka PLC.*





# Browning Reactions of Food

Browning is a chemical reaction that can occur due to the handling, processing and storage of food commodities and it leads to change the color, flavor, aroma, nutritional value and etc. Browning is discussed as the enzymatic and non-enzymatic browning.

**Enzymatic Browning** is the result of Polyphenol Oxidase enzyme and can be observed in fresh cut fruits like Apricots, Pears, Banana, Grapes, Apple, Potato, Mushrooms like commodities. Those brown pigments impact on human health as an antioxidant and reduce the occurrence of cancer cells and reduce the bacterial infections. Availability of Oxygen, concentration of polyphenol oxidase and polyphenolic compound, optimum pH value and presence of iron or copper knife affects the rate of browning reaction. Enzymatic browning can be controlled by practicing blanching or heat treatment, changing pH of the commodity, dipping in antioxidant solutions, using modified atmosphere packaging or edible coating, storing in the refrigerator, using stainless steel equipment and by a combination of these effects.

In **Non-enzymatic Browning** a number of chemical reactions are involved and produce the brown pigmentation in food without activity of enzymes. The two

main forms of non - enzymatic browning are Caramelization and Maillard reaction. Maillard reaction takes place between amine group of free acid and the carbonyl group of a reducing sugar with the high carbohydrates and high protein content of food. Due to this process acrylamide gets created which cause cancers. Mainly in potato products like potato chips, french fries and coffee tend to generate acrylamide in high temperature. Some factors lead to occurrence of Maillard reaction and formation of acrylamide such as, cooking method like frying or roasting, boiling and steaming, soaking raw potato slices in water before frying or roasting.

Food browning negatively affects on the food quality such as shelf life, organoleptic properties and positively affects on the flavor, colour of the coffee, cocoa like commodities.

**Nawodanie Silva**

Export Agriculture Degree Programme,  
Specialized in Food Processing  
Technology



# I met him alive

Bill Gates' teacher he never had.

We have a common belief that we need to master any selected field of study meanwhile performing various other duties which ultimately add the dazzling array of colors to our future profiles. Under the spotlight of that sort of nature, it's an utmost responsibility to keep you in the correct tract because you are the magnificent creation of the nature of your own kind. Do mind that the memory is the most significant tool in you. You keep on pumping the information into your mind and wonder how much of it can be burst out with a productive shape or are they just productive information to a malfunctioned brain?

Once I was reading my undergraduate research at a well-known company in Sri Lanka, I was directed to a project engineer who is well educated, dedicated and above all smart who recommended me to visit him every evening in his busy but carefully organized, little office room with the questions I amassed in the particular day. He hardly looked at me eye to eye but never withdraw his paid attention for a second for any possible reason. He was the calm sailor in the thundering ocean. I was begging for his glimpse but it was directed at his computer screen and he was rushing through the key board sending some important company emails. After clamshelling the office laptop, he answered all of my questions one by one with an amazing approach. He disintegrated all of my waywardly entangled questions into a single, simple chain in which each and every chain block was connecting with an end to end. We time travelled until we find the root tips of the questions. Surprisingly, some of them were taught at the primary school. How amazing it was! A person with a gigantic brain in which all facts and details are packed in a systematic order like a mini library where the splendid array of labeled books was stacked on colossal antique book shelves. What a freak! We must have had the tea first, he suggested but I was breathless. How could it be possible for a person to master a memory skill? How mysterious to witness a person with an immense explanation caliber? Am I gifted with such a skill? I questioned myself several times and I could feel my blood popping inside my veins like it is in the pack of hungry wolves behind a fresh blood trace.

Time passes and vanishes but history exists. New hopes and dreams pierce the marrows of bones and new cells of blood immerge in the same person. They are stronger, more energetic and tenaciously oriented towards the same goal. How is it possible for a person to memorize almost everything? I have been cruising through techniques, the techniques of mastering the capacity of the brain in which the information of any kind can be stored, effectively utilized and clearly expressed whenever it is needed. There I found Feynman, the American physicist, the supreme version of my project engineer, dead but still alive in the golden history of groundbreaking theories of particle physics and well known for his Feynman Technique.

Richard Feynman (1918-1988), a Nobel Prize winner in 1965 for his outstanding work of helping the scientists understanding the interaction between the light and matter was a pioneer physicist of all time at his field of quantum electrodynamics. His findings could have cleared the untrodden paths to nanotechnology, quantum computing and particle physics which can only clearly be understood by the specialists at the relevant fields. But what's astounding here is his unparalleled ability of explaining the highly complex scientific knowledge in simple language and illustrations aiming the students without having any previous insight on so-called particle physics or deep sciences. Brilliant! "The greatest teacher I never had" proves Bill Gates after inspired by Feynman's pedagogy. Yes of course, even Albert Einstein must have been surprised after attending Feynman's first talk as a graduate student.

Is the science so difficult or is it the weight of the language which make us far apart from the naturally occurring incidents? Or are we incompetent of explaining and disintegrating the complex phenomena in simple language? To solve this gigantic controversy, Feynman says "In order to talk to each other, we have to have words, and that's all right. It's a good idea to try to see the difference, and it's a good idea to know when we are teaching the tools of science, such as words, and when we are teaching science itself". Here comes the question! Are we hiding ourselves behind a huge jargon?



# Found him dead,

Found a book, *Genius: The life and Science of Richard Feynman*, in which the Feynman technique, the breakdown of his personal thought process, has been immaculately disclosed by James Gleick. "He worked for weeks at disassembling each branch of physics, oiling the parts, and putting them back together, looking all the while for raw edges and inconsistencies. He tried to find out the essential kernels of each subject" Gleick writes.

Proving the fact, Feynman at Princeton University, started to make records and line up a connection between what he did know and what he did not meanwhile compiling a comprehensive note book of subjects on which the disassembled and translated knowledge was recorded and turned into nice illustrations. After all, the disassembled knowledge was reassembled and delivered during his lectures in very simple language inculcated with the simple but practical examples from day to day life.

The concept of Feynman Technique is not a big deal with few basic thumb rules which is presented right below.

1. Identify the subject: Record everything you already know about each branch of a particular field of study and add additional knowledge once you turn into new source of information.

2. Pretend teaching it to a child: Get a piece of blank paper and write the topic that you'll need to teach. Try to write everything you know about the topic and explain using a very simple language which can easily be understood by a child. Or else, you can actually speak like you are delivering a lecture. There you need to be careful with the span of attention of the audience. Because you would better to get the concept out of the story before the attention fades. Don't be stagnated with a complex jargon or lexicon of dense vocabulary nevertheless science is full of complexed terminologies. Illustrations and diagrams would simplify the understanding.

3. Identify your knowledge gaps: Meanwhile you are pretending teaching you may feel that you can't find the clear picture out of your memory which indicates you that you should go back to your note and have to recall and understand

the missing parts. Sometimes, you may need to refer new sources of knowledge to make you really enlightened. This is the point where the real learning happens.

4. Organize + simplify + tell a story: Try to make your answer reassembled with you newly gained pieces of knowledge to spin a tale using a concise explanation bringing the most important insights about the topic. Read your explanations as a story or pretend that you are in the lecture room while explaining the story to your students where you may find that you are stumbling with the indication of incomplete thoughts. Use simple sentences to strengthen your understanding.

*"All things are made of atoms-little particles that move around in perpetual motion, attracting each other when they are a little distance apart, but repelling upon being squeezed into one another"*

Richard Feynman (1918-1988)

Above all, one quality of Feynman, a person loitering around the avenues of creative outlets believing the interaction of arts with science, made me more impressed with the exception of his startling technique and empowered a dramatical influence to find the forbidden silver lining within me.

***"Connect with others regardless! Not only the knowledge that we need to share but the believes and thoughts which influence ourselves. We can't be flocked together. Your participation in this society is needed. Simplify your thoughts and enlighten the society with a clear message"***  
the enigmatic project engineer greeted me on my departure from the research institute.

Still I'm questioning myself whenever I find the reflection of me in a neatly dressed formal wear on partly desilvered wall mirror. Am I gifted? I can still feel my blood popping inside my veins, much stronger than it used to be.

Chathura Bandara

Demonstrator

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## Home Gardening Revolution

The year 2020 is one of the most inconvenient periods where the people around the world are going through a hard time. COVID 19 could control the whole economy of the world, human health as well as the day to day lifestyle of human beings around the world.

As a nation, we have faced the pandemic situation which occurred due to coronavirus successfully. The credit must go to all the professionals of health sector, security forces, the government and the civilians who have performed their responsibility well.

We could control the pandemic situation but in the future, we have to face another challenge. That will be the world food crisis. As advised by the government and the agricultural officers, most of the civilians in Sri Lanka started home gardening to face this challenge. Home gardening will be a good answer for the upcoming food crisis because it will be sufficient enough at least for domestic consumption.


However, if there is an excess, the produce can be sold to get an extra income. Other than the economic benefits, home gardening can directly reduce the food mile to zero, which is the distance of food being transported from the time of its making until it reaches the consumer. When the food mile gets zero people can consume more healthy, nutritious, and really fresh fruits and vegetables at a low cost. The "Saubhagya" project which has been introduced by the government has provided the required expertise and the raw materials at a low cost.

As I believe, COVID 19 crisis have done a great revolution in the agriculture field by making most of the civilians as farmers.

**Sandamini Divyanjalee**  
Tea Technology & Value Addition  
Degree Programme







# Dechlorination of Water Using Activated Carbon Produced From Spent Tea Leaves

Water disinfection refers to the removal, deactivation or killing of pathogenic microorganisms present in water that causes water-borne diseases. Therefore water disinfection is an important process that protects people contracting from water-borne diseases such as diarrhea, cholera, typhoid, amoebiasis and schistosomiasis etc. The common method of water disinfection is, use of chlorine which has historically made the greatest contribution in prevention of waterborne diseases around the world.

However, the high levels of chlorine residuals and chlorination by-products can be harmful to human health and it also causes various problems in the industrial operations. Therefore de-chlorination is a must, in order to remove or lessen the amount of chlorine residuals present in the disinfected water before releasing it to human consumption. Among several methods of dechlorination, use of activated carbon is considered as one of the most simple and convenient methods.

Activated carbons are non-hazardous, processed, carbonaceous products, having a porous structure and a large internal surface area. It has ability to remove chlorine and chloramines very effectively by adsorption. Wide variety of carbonization materials can be used to produce activated carbon such as coal, but many producers seek renewable resources due to escalating environmental awareness and economic benefits.

In recent years, production of activated carbon using agricultural by-products such as date nuts, pineapple waste, paddy husk, coconut husk and bamboo waste have gained higher attention and thus it became a global trend. Availability of agricultural by-products in large quantities at low prices and renewable & biodegradable nature of the materials, which make them eco-friendly are some of the reasons for the increasing demand for activated carbon.

Agricultural by-products are rich in carbon due



to the presence of basic components such as cellulose, hemicellulose, lignin, lipids, proteins, simple sugars, starch and other various functional groups which positively affect adsorption capability of various pollutants. Activated carbon produced from agricultural by-products has low ash content and reasonable hardness. Therefore agricultural by-products can be used as a promising alternative material to produce activated carbon. Moreover, it can also contribute in reducing environment pollution by turning waste materials into useful value added absorbents.

Spent tea leaves (STL) are another type of agricultural waste material which is a by-product of instant and concentrated tea manufacturing. Large quantities of STL are removed from each production, approximately 150,000 kg (with moisture). But except for minor usage as a compost material, STL do not have a significant commercial value and usually discarded as solid waste. STL contain a high carbon content due to the chemical nature of cell wall which consists of cellulose, hemicellulose, lignin, tannins and structural proteins and thus it is considered as a highly effective precursor to produce activated carbon that can be used for water treatments.

Activated carbon produced from STL with sulfuric ( $H_2SO_4$ ) treatment gives a very low yield compared to commercially available precursors such as coconut shell. But, on a positive note, STL has a large surface area which increase the amount of binding sites that help to increase the adsorption capacity. Iodine number is used as the fundamental parameter to characterize the performance of activated carbon. Accordingly, the activated carbon made of STL has a relatively higher iodine number (343.6) which suggests that it has better adsorption ability. Furthermore, the high total

pore content, about 10% micro pore fraction, also significantly increases the adsorption capacity.

The activated carbon produced from STL with  $H_2SO_4$  treatment has the capacity to completely (100%) remove chlorine residuals in the water. According to studies, if the presence of chlorine residuals is less than 500 ppm, it does not require retention time to completely remove chlorine residuals and if there is 1000 ppm of chlorine residuals, it will only take 30 minutes retention time to remove all chlorine residuals in the water. It has light reduction of removal efficiency with increasing number of filtering with the same active carbon, but this problem can be solved by increasing the retention time. By increasing the retention time, we can effectively use the same column of activated carbon over and over again to completely remove the chlorine residuals. However, before using the activated carbon, it is advised to be treated with pure, hot water to eliminate possibility of adding sulphate ion to the filtered water.

According to SLS standards, the maximum amount of chlorine residuals that is accepted to present in portable water is given as 1 ppm. Therefore by using the same column of this activated carbon, a large quantity of water can be de-chlorinated effectively. The cost for acquiring spent tea leaves for the production of activate carbon is very low (about Rs. 50.00 per kg) and it requires only 500 °C ignition temperature. Therefore the total production cost is comparatively low compared to other current production methods. Hence, considering all the facts provided, it can be inferred that activated carbon produced from STL with  $H_2SO_4$  treatment as a very effective, ecofriendly and economical alternative for de-chlorination of water.

**Sadini Ekanayake**  
Demonstrator



# Prevention of Non-Communicable Diseases Through a Better Lifestyle

Ravinika Senarathne

Export Agriculture Degree Programme,  
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Non-Communicable diseases (NCDs) are diseases that is not transmissible directly from one person to another. There are many examples such as diabetics, cardiovascular diseases, cancers and high blood pressure. Most of these diseases are associated with lifestyle, food patterns, environmental factors and genetic factors. A healthy lifestyle is one which helps to improve people's health and wellbeing. It improves critical health indicators such as weight, blood sugar, blood pressure, and blood cholesterol and minimize the probability of getting NCD. It is high time to pay attention on your life style and dietary patterns to live a long, healthy and happy life.

One of the best agents in fighting against NCDs are essential polyunsaturated fatty acids. Essential fatty acids and their metabolites omega-6 and omega-3 fatty acids protect against atherosclerosis and heart diseases. Omega-6 and omega-3 fatty acids are precursors to important prostaglandins that tend to lower blood pressure and reduce platelet aggregation. Lack of essential fatty acids in the diet, especially when combined with high intake of alcohol and saturated fat lowers tissue levels of these protective prostaglandins. Also eating saturated fat raises levels of LDL (Low Density Lipoprotein) cholesterol and concurrently it lowers HDL (High Density Lipoprotein) cholesterol and increase the tendency for platelet aggregation. Some of the food sources of essential fatty acids are fish and shellfish, olive oil, soya oil, pumpkin seeds, sunflower seeds, leafy vegetables and walnuts. At the same time, intake of saturated fats should be limited as much as possible. It will be a great choice if you replace saturated fats and oils in your diet with substitutes having high levels of unsaturated fatty acids. Try to enrich your diet with Lean meat, fish, leafy vegetables, nuts, and unsaturated oils.

Dietary fibers play vital role in preventing NCDs. Studies have shown that soluble fibers are capable of increasing the rate of bile extraction and reducing serum total and LDL cholesterol. High fiber diet as well as a diet high in whole grain cereals lower the cardiovascular diseases. The recommended daily intake of dietary fiber for heart protection is at least 25 g for women and 38 g for men. A daily intake of 400 g to 500 g of food such as berries, green leafy vegetables and legumes provide an adequate amount of potassium and fibers.

Another best precaution is to opt for low-carb diets, but enrich them with proteins. Avoiding empty calories is a must in this life style changes. Whole grain cereals are the best option to fulfil carbohydrate requirement.

Apart from food commodities salt, potassium, calcium and alcohol are the other critical parameters in NCDs. In about one third cases of hypertension, blood pressure can be significantly lowered by limiting sodium intake, most of which comes from salt added to processed foods such as bread, cheese, canned soups and salty snacks. Sodium increases blood pressure because it holds excess fluid in blood. High Sodium intake is a much stronger risk factor when combined with low potassium intake. Therefore, high potassium / low sodium foods such as potatoes, green vegetables, orange juice, apricots and banana can be beneficial. Low dietary intake of calcium is associated with a higher risk of hypertension and increasing intake of calcium from supplements or calcium rich foods such as low-fat milk products, sesame seeds, anchovies and dark green vegetables are good alternatives to avoid such risk factors.

Having spices and condiments such as turmeric, coriander, garlic, ginger, pepper and onion will also be beneficial in boosting your metabolism and they will also help to control blood cholesterol level.

Cutting off alcohol consumption as much as possible will help your body to fight with factors causing cardiovascular diseases and lung cancers. Replacing carbonated drinks with herbal drinks and unsweetened fruit juices will also be a better way to uplift your health.

Having an active life is a crucial factor. Most of us have sedentary life styles with 8-5 office jobs mostly work in sitting. Having exercises for at least 30 minutes per day will boost your health in a great way. Walking, swimming and cycling are few of the best cardio exercises. Using staircases instead of escalators will give you fair amount of work out during the day itself.

Governments are spending a huge sum of money every year to treat patients suffering from NCDs and this is a great loss to our economy as well. So, as citizens, it is our responsibility to maintain our health in good conditions, and also to introduce healthy food patterns to our younger generation to make better and healthier future.



# LET'S EAT WITH PACKAGING



## ***AN EDIBLE FILM PREPARED WITH COCONUT PROTEIN***

**Madara Jayasinghe**  
Demonstrator

Most of food products are covered by a packaging to separate it from surrounding environment. There are different types of food packaging materials such as polythene, plastics, cardboards, metals, woods, glass etc. Most of them are synthetic and harmful. But, do you have any experience on eating foods with its package? Yes...! Why not? Nowadays we can eat cakes, buns, apples like foods with its package. But how? The answer is an "Edible film".

Edible films are thin layers of material which can be consumed and provides a barrier to moisture, oxygen and solute movement for the food. Those films have produced exclusively from renewable, edible ingredients and degrade more readily than polymeric materials. Polysaccharides, proteins and lipids are commonly utilized biopolymers for biodegradable packaging development. In addition to the polymer, the plasticizer also plays a major role in film forming solution. It can overcome the film brittleness caused by strong intermolecular forces between polymer chains and it provides flexibility and extensibility. The most commonly used plasticizers for the preparation of edible films are Glycerol, Poly Ethylene Glycol (PEG), Sorbitol etc.

Protein based edible films are most attractive as well as other biopolymers. Proteins can provide excellent starting materials for the preparation of films and coatings according to its inherent properties as a polymer. In addition, those edible films can be function as carriers for antimicrobial and antioxidant agents. But the problem is that, protein based edible films have low mechanical properties such as tensile strength and elongation at break compare with other polysaccharide and synthetic films due to hydrophilic nature of the proteins and it limits applications of protein films in food packaging industry. But it has higher degradable ability than other synthetic films and, decomposition of protein-based films can release nitrogen to the soil as fertilizer.

There are different plant proteins such as Soy protein, Wheat proteins, Mung bean proteins and Peanut protein that can be used for edible film preparation. Those protein based edible films can be used for several food applications such as cake, chocolate, sweets, buns, fruits instead of polythene wrapping.

But, why these coconut protein...??? The Coconut (*Cocos nucifera*) is a most important crop which is native to the south pacific region. Sri Lanka also consume more coconut during our day to day life.

It is high in several nutrients such as saturated fat, fiber, protein, carbohydrate and minerals etc. Coconut protein also has a potential anti-diabetic activity due to the presence of a large proportion of arginine. The edible packaging film with coconut proteins can provide the amino acids to the food product.

As we know, Virgin Coconut Oil (VCO) residue is a valuable by product separated from the wet extraction process of VCO production. It is a fat free residue and a rich source of dietary fiber. It is a skim milk flour of coconut and it can be substituted in to wheat flour up to 25% to 30% for bakery product development. However, that coconut skim milk and solid residues contain 29.9% and 16.0% of the total protein content in whole coconut respectively. Therefore, why we are not using this coconut protein to prepare edible films as a value addition ...?

Preparation of protein based edible films is not a difficult task. Even you can try it by your own. There are two main methods that can be used. Those are solvent casting and extrusion methods. Before that, we have to extract the coconut protein powder by using classical method of alkaline extraction and acid precipitation. Simply, the defatted dried coconut flour is mixed well with distilled water and next pH can be adjusted up to 8.5. Then the mixture should press by hydraulic press machine and the pH of solution should adjust again to 3.9. Then we can separate the precipitate by centrifuging the solution and the supernatant should discard. Finally, the sediment is freeze dried for several hours and to obtain the coconut protein powder, the freeze-dried sediment should be grounded and sieved through 800  $\mu\text{m}$  mesh for further usage.

For the film preparation, extracted coconut protein powder is dissolved in distilled water and the pH should adjusted to 8.5. Then the solution should be heated under 80  $^{\circ}\text{C}$  for about 10 min with occasional stirring and a mixture of Glycerol and PEG can be added to the hot solution as plasticizers. Then, about 20 ml of homogenized hot solution can be poured in to petri dishes and dry in an oven for about 3 hours under 65  $^{\circ}\text{C}$  temperature. The dried films should be cooled for about 48

hours to easy peel off from the petri dishes. Not only a petri dish, we can use any kind of tray to film fabrication with our interest.

Coconut protein-based films normally have yellowish colour and discontinuous slightly rough surfaces. It may be due to incomplete solubility of coconut protein and unfolded protein chains in alkaline pH values. The interaction of pH, Protein ratio and the plasticizer amounts significantly affect on most of the properties in the edible film such as moisture content, swelling index, light transmission, thickness etc. Normally, the thickness of the film below to 0.25 mm is accepted for food application and thickness below 0.10 mm can affect to limit the physical properties and practical applications in food packaging industry. If we check down the biodegradability, the composting test can be used to evaluates the tendency of film components to break down through microorganisms compare with polythene materials. We can realize that the coconut protein based edible films are degraded rapidly and those are suitable for returned to the environment without causing any damage. If we want to keep these edible films for about several weeks together with food, we can use antifungal and antibacterial agents when film forming.

Now you know, the Coconut protein films fabricated under above conditions is suitable for used as an edible film in food packaging industry. But it's very important to improve the mechanical properties, shelf life and sensory quality of edible films as well prior to commercial food application. Then we can make a beautiful green world nearby day, without any harmful polythene packages in our surroundings.





# Sustainable Intensification of Agriculture

Isuru Priyadarshana (MPhil Candidate / Research Assistant)

At once, sustainable and intensification may seem as two words that do not automatically go together. It is the first thought that, to put them together is to produce an oxymoron.

However, sustainable agricultural intensification is a trending topic in the world. It is defined as a process or system where agricultural yields are increased without adverse environmental impact and without the conversion of additional non-agricultural land.

Intensification gives the idea of maximizing production through the application of pesticides and fertilizers, and livestock kept in confined spaces. Isn't it because of decades of intensification that we have the environmental problems in the kinds of habitat loss, greenhouse gas emissions, polluted water courses and the like? If we want to reverse these trends and build a sustainable agriculture, then surely, we need to reverse intensification, not pretending it can be sustainable.

The problem is, if we simply extensify farming, production will be reduced. But with a rapidly growing global population, that is not a possible option. It is true that we can help to slow the growth in demand for food by reducing waste and by changing our diet. But this is unlikely to happen fast enough to halt the growing demand for food. Ideally, the global area utilized for agriculture should be reduced in order to allow the habitat recreation and species recovery. And to do so, higher levels of production are required with reduced environmental damage on existing farms. Hence, sustainable intensification.

There is one input that can help us deliver this, and that is the daily updating knowledge. It is the application of knowledge that can resolve the paradox of getting more from less. This might be knowledge of the new technologies. For example, installing G.P.S. devices in tractors can help farmers target fertilizers and pesticides to those parts of the field that most need them. The use of robots holds out the prospect of targeting at plant level, and at the same time reducing the need for heavy machinery, which causes soil compaction. In other words, precision agriculture is a way of achieving sustainable agricultural intensification. And also, vertical farming which is the practice of growing crops in vertically stacked layers is another technique. It often incorporates controlled-environment agriculture, which aims to optimize plant growth, and soilless farming techniques such as hydroponics, aquaponics, and aeroponics.

And there is a knowledge of plant breeding, whether through genetic modification, gene editing or conventional means, which can provide crops with disease resistance and high yields. But the knowledge required for sustainable intensification is not only to be found at the cutting edge of the high-tech scientific advance. Researchers and farmers have been rediscovering the use of cover crops to prevent runoff and loss of nutrients from soil with the time. They are looking again to legumes such as Sunn hemp, which fix nitrogen in the soil, thereby reducing the need for artificial fertilizer. Also, biodynamic preparations are being used as growth promoters.

So, by intensifying the application of knowledge in these ways, being smart in our farming, we might yet feed a growing planet and bring natural value back to our farms.



# Tea against COVID 19



Vidarshani Ellepola

Lecturer

Tea is one of the most popular beverages in the world, only second to water. This unique beverage is made out of tender leaves of the plant *Cammelia sinensis* L. and found in the market with different levels of oxidation, such as black tea, green tea and oolong tea. Tea is unique in flavor and contains numerous health benefits which directly contribute in boosting human immunity. These beneficial effects towards human immunity became much discussed over the past months due to the prevailing outbreak of novel corona virus SARS-CoV-2 or popularly known as COVID-19. Many claim that, consuming tea has the potential to alleviate the symptoms of COVID-19. Even though rigorous studies are required to scientifically confirm the efficacy of such a claim, research done related to the diseases of the same family as corona, does not disappoint.

The world is no stranger to the virus belonging to the corona family. Some of the well-known cases are, Severe Acute Respiratory Syndrome Corona virus (SARS-CoV) which hit the world in 2003, then Middle East respiratory syndrome (MERS)-related coronavirus, or EMC/2012, which is another species of corona virus that hit the world in 2012. But so far the effects of COVID-19 has been unprecedented due its high infectious rates. The tiny virus managed to cripple even the strongest economies around the globe. Desperate to control and contain the spread of the virus many countries took drastic measures including complete lock down of the country. While some countries are emerging victorious over the battle with the virus, some are still in the depths of misery.

However, the world is desperately looking for measures to come out of this nightmare. Amidst, this situation many governments, even began to look into the potential traditional and native medicines to cure the virus. Going with this flow, the president of Madagascar, Mr. Andry Rajoelina came forth with a herbal tonic made out of native ingredients, claiming it has the potential to cure the disease. Despite the heavy criticism he received from the World Health Organization (WHO) and the scientific community due to lack of evidence to claim the efficacy of the tonic, many countries are still looking into natural solutions to alleviate the symptoms of the novel corona virus. Tea is one such functional beverage that was much discussed especially by international media due its potent therapeutic value.





Can tea truly mitigate the symptoms of COVID 19? To answer this question one has to first look at the chemical composition of tea. According to scientific literature, there are number of chemicals present in tea. Among these chemicals are Polyphenols and Caffeine which are considered as the major chemical constituents. Whereas Proteins, Amino acids, Carbohydrate, Organic acids, Vitamin, Fatty acids, Aroma compounds and Minerals are considered as the minor constituents. Many of these compounds have their own benefits with regard to improving human health. The beneficial effects of green Tea, oolong Tea, and black Tea are well-known for many years. Although, all types of Tea are prepared from *Camellia sinensis* L., the difference lies in the process of preparation. Therefore, there is a variation among these tea types in terms of their chemical constituents. Hence, different chemical compositions might have varying health benefits.

Among all the chemicals present in tea, polyphenols are interesting class of molecules that render plethora of benefits to human body. Tea polyphenols are much known for its anti-HIV effect, anti-carcinogenic, anti-oxidative, anti-mutagenic, anti-diabetic and cholesterol lowering activities. Therefore, consuming tea undoubtedly has a significant impact on boosting human immunity. Apart from these benefits, according to recent researches tea polyphenols also seemed to be a highly potent candidate in COVID-19 treatment trials. Even though the world is yet to come up with a definite cure for the corona virus, High-throughput screening and drug repurposing have suggested some potentially beneficial compounds against COVID-19. Many natural molecules, their products, and molecules inspired by natural compounds have now entered in different stages of drug design, including clinical trials. Research done by V. K Bhardwaj and group, published on Journal of Biomolecular Structure and Dynamics, provide some interesting insights into how chemical constituents of tea can be beneficial towards alleviating Covid-19. The group of researchers, have screened 65 potential bioactive molecules of Tea against COVID-19. They have further compared these molecules with existing three potential repurposed drugs (Atazanavir, Darunavir, and Lopinavir). The study concludes that Oolonghomobisflavan-A, one of the most abundant polymerized polyphenols present in tea, as a more potent inhibitor of the Mpro which is a key COVID-19 enzyme. The enzyme Mpro plays a pivotal role in mediating viral replication and transcription, making it an attractive drug target for this virus than previously suggested repurposed anti-HIV drugs.

Can tea truly help in bringing this notorious virus under control? Only robust and continuous research can bring a definite answer to that. But I must admit, the prospects definitely seems positive.



# NANOTECHNOLOGY VS COVID-19

Nanotechnology is a branch of science that deals with extremely small structures. It is defined as the study and use of structures between 1 nm – 100 nm in size of at least in one dimension. The term “Nanotechnology” itself is quite revealing of the nature of this particular branch of science. In Greek, the word “Nano” means “Dwarf”. Hence the study of smaller things is termed as “Nanotechnology”. With the novel corona pandemic, the world is now desperately looking for scientific solutions to mitigate the impact of the pandemic on its people and also on the economies of the countries. Can nanotechnology be our way out of the misery? This article discusses Nano-technological interventions to deal with the novel corona virus.

The world at present is despondent over the impact of the highly infectious novel coronavirus virus (COVID-19/ 2019-nCoV) outbreak. Corona virus is an infectious disease that causes severe damages to the respiratory system. Interestingly, the term “Corona” means the “crown”. As the name suggests, the virus has taken the crown over all other infectious diseases in a nick of a time. According to the World Health Organization (WHO) timeline, the virus was first reported in Wuhan, China on 31st December 2019. At the time of writing this article, more than 213 countries have been affected while having, over 9714860 infected cases globally and a spiking global death toll of 491856 (Worldwide, June 26,2020). WHO has defined four transmission scenarios for COVID-19 infection. Namely, no cases, Sporadic cases, Clusters of cases and Community transmission and Sri Lanka is categorized under clusters of cases scenario up to date. The countries under this category are experiencing cases, clustered in time, geographic location, and/or by common exposure. According to WHO records on June 26,2020, total confirmed cases in Sri Lanka are 2010, with 11 total deaths.

While affecting a plethora of people, the economies all over the world have also dropped drastically. For the time being, the public health organizations of all countries have been systematically organized to protect their citizens against the corona virus threat. The World Health Organization also announced “an international public health emergency” due to the novel coronavirus. Therefore, protective measures must be implemented further with the help of

experts in different fields as the case is extremely serious.

The technology at the nanoscale has its potential to introduce new effective medical solutions. Simply COVID-19 virus is in the form of spheres with an average diameter of 125 nm, with lipid based viral envelopes and positive sense single stranded RNA genomes. For the prevention of this viral infection, nano fiber-based respiratory filters/ nano based face masks can be used. The nano fiber face mask will be 99.99% efficient when compared with the standard N95 face mask. Apart from nanofibers, Titanium dioxide (TiO<sub>2</sub>) nano particles, Zinc Oxide (ZnO) nano particles and nanocellulose can be used as filters in personal protection equipment at low cost. Metal nano particles such as Silver (Ag) and Gold (Au) can be used in various disinfection solutions. These nanoparticles especially Ag nanoparticles with antiviral property can be used to introduce sanitizers or in disinfection solutions.

There is a big potential to use nano polymers or nano coatings in the clothing, hospital bed sheets or in bed covers to protect the patients and workers from COVID-19.

Other than prevention, early detection, measures for proper monitoring and targeting should be in place in order to manage the COVID-19 outbreak. This applies not only for the affected but also for the healthy essential workers and that will reduce the risk of further spread.

Early detection can be achieved using nano sensors which will give a quick response for COVID-19. Vaccines also can be introduced for COVID-19 using different nanomaterials. Various researchers have already started their experiments using nanoparticles for targeted and sustained drug delivery.

Hence nanotechnologists all over the world carrying out their social responsibilities to tackle the ongoing havoc and nanotechnology will revolve many health care problems in near future. Hence one can simply say that the time is right for the army of dwarfs to take over the crown. Will nanotechnologists be able to get the virus under control? Only time will tell.

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**Lakmini Lochana**  
Lecturer

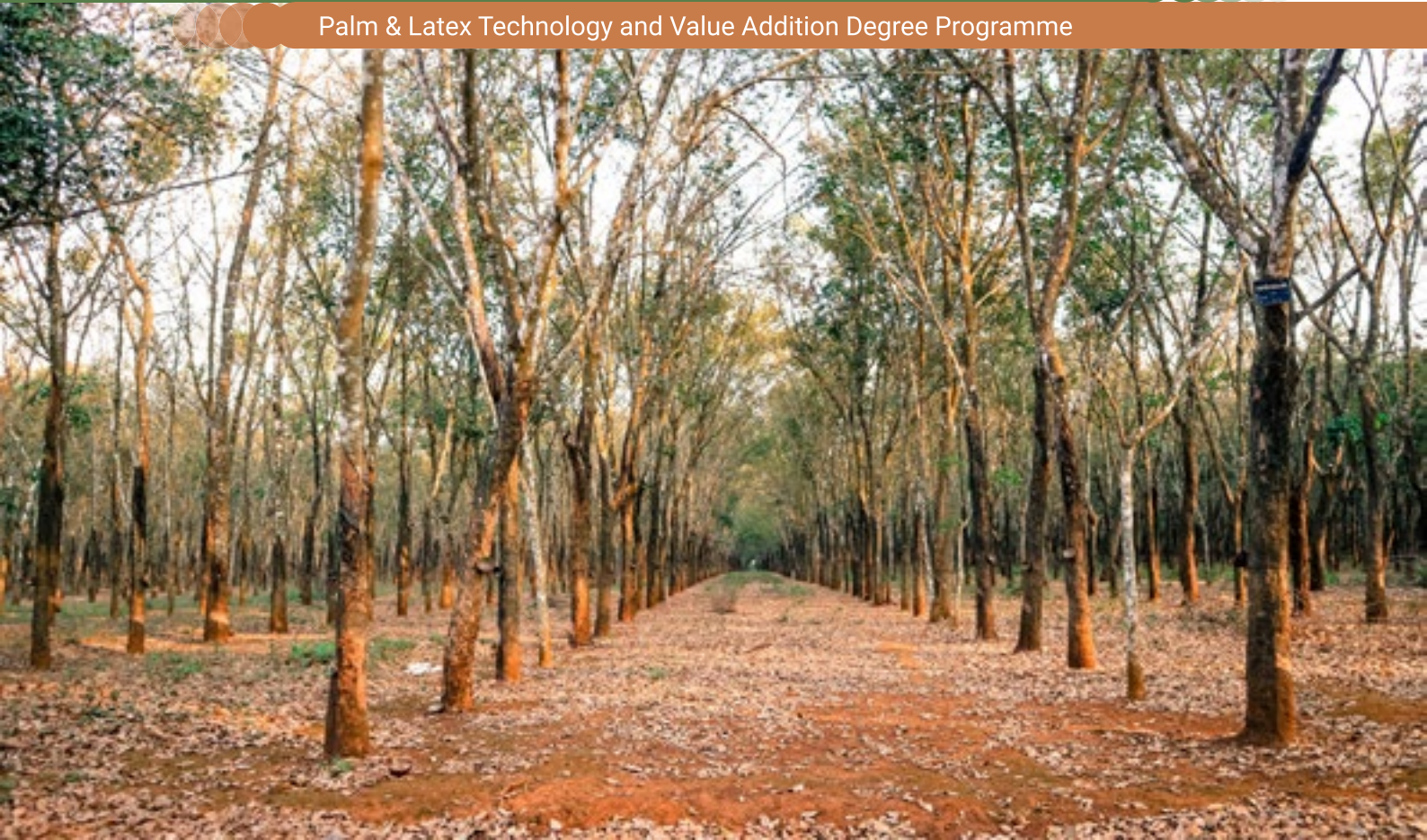


# How COVID-19 Put Hands on Rubber Industry

Sri Lanka is enriched with a vast array of export products. The Rubber industry plays a vital role among them. The country is one of the leading producers in the global rubber based market, especially in the European Union. Such products include medical grade gloves, household gloves, boots, tyres and mattress etc. However, the demand for those products shows a dramatic fluctuation in the period of pandemic. Covid-19 made gloves an essential item in day to day life and especially, the officers in the medical field tend to use them frequently. Even though the demand for the gloves were increased the demand for the other rubber products especially for the solid tyres and automotive were diminished severely. EU countries are the main purchasers of solid tires. Covid-19 outbreak shocked the EU economy and society thus limited the imports and shipments. The importation of raw materials got restricted due to the holding of shipments and quarantine procedures and thereby rubber product manufacturing was affected in a bad manner. However, price of the rubber products has not shown a sharp decline. When considering other rubber related products, tyres of agricultural vehicles, boots and agricultural gloves etc. will show a growing need in the near future. Despite the fact that rubber harvesting in smallholdings got affected slightly by Covid-19, however latex exploitation in large scale rubber estates was not affected badly. The market for personal protective equipment is strong and will be maintained in time until Covid-19 is not a pandemic anymore. In particular, gloves and other wearable made of rubber would be a good area to concentrate on for the Sri Lankan rubber industry.

Nirmani Sulakshana | Udara Wadugodapitiya | Sandarekha Kodithuwakku

Palm & Latex Technology and Value Addition Degree Programme





# How the Agricultural livelihoods impacted by COVID-19 ?

Sulochana  
Senevirathne

Export Agriculture  
Degree Programme,  
Specialized in  
Entrepreneurial  
Agriculture

COVID-19 has claimed a tremendous influence on the economy of the entire world, impacting both lives and livelihoods. This global pandemic situation has a huge impact on agriculture in different ways such as supply related impacts, demand related impacts, labor-related impacts, and food security and safety impacts. Labour is the key component in agriculture value chains from farm to fork. COVID-19 creates a major labor market shock, creating significant impacts in terms of unemployment and underemployment especially for informal workers. Estimates of the Department of Census and Statistics (DCS) indicate that in the 4<sup>th</sup> quarter of 2019, employment in the Agriculture sector is 27%. The Labour Force Survey 2018 results revealed that 88% of agricultural employment comprises informal sector employment. Workers from informal workers are excluded from labor laws and do not have secure employment contracts, and therefore usually do not enjoy workers' benefits, social protection, or workers' representation. Informality is especially widespread in agriculture and rural sectors. Informal workers in the agriculture sector are at risk of losing their jobs due to the COVID-19 pandemic, even though Agriculture is considered as an essential industry. The crisis has severely affected farm incomes. This has disrupted livelihoods, supply chains and cash flow of the poorest families especially becoming a burden to everyday wage earners.

By referring to various studies it is clear that the Agriculture is relatively little affected by the COVID-19 outbreak in Sri Lanka and could able to continue without much difficulty since the Agriculture sector in Sri Lanka which is loosely incorporated with global supply chains. According to an e-survey conducted on "COVID 19 & Beyond-The impact on the Labour Market of Sri Lanka" by the Department of Labour indicates that compared to the other industries, "agriculture, forestry, and fishing industry" indicates the highest percentages for both the 'in operation with under capacity' and 'in full operation' categories of businesses, indicating a higher level of resilience during this period (72.73 % and 14.55% respectively). Further, it indicates that the 'Agriculture, forestry, and fishing' industry has recorded the lowest percentage of 'not in work' status as 13.13% compared to other industries.

Migrant workers who cannot be substitute within a short period in the Agriculture sector are also highly affected due to the lockdown period. Therefore, in such a catastrophic situation, their livelihood is very much at risk. In developing countries, the majority of females engage in the informal sector. In Sri Lanka also, the female-majority are working in the informal sector (The Labour Force Survey-2018) and 29.7% are working in the agriculture sector (Department of Census and Statistics, 2017). So they also at risk of income losses in the current situation.

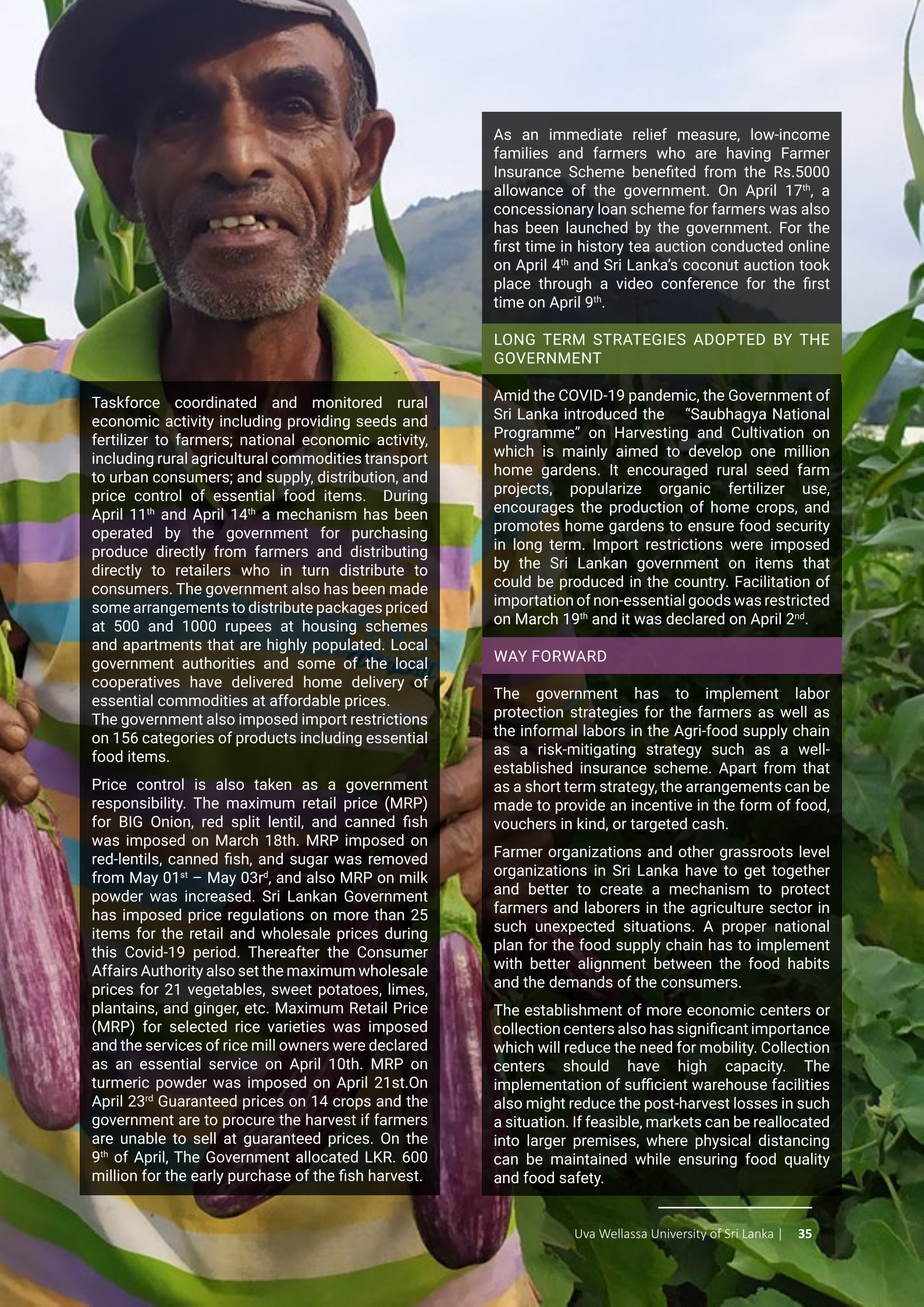
The government has taken various steps to control the spread of the virus in Sri Lanka such as national wide curfews, restrictions on the movement of people, Import restrictions, and allowing to adopt work from home practices, etc.. Up to some degree, Agri-food supply chains have disrupted due to such control measures. On the other hand, the demand for agricultural commodities also has been significantly increased as consumers bought some goods in excess. Sri Lankan government adopts different short term and long term strategies to overcome these risks. Different online platforms also have emerged and some large scale leading retail chains have been increased their online platforms.

## SHORT TERM STRATEGIES ADOPTED BY THE GOVERNMENT

Sri Lankan Government allowed farmers and fishermen to engage in their farming and fishing activities without any restrictions during this period. Movement restrictions are not imposed by the Sri Lankan Government on the fertilizers and the Cabinet of Ministers has approved the purchases of chemical fertilizer from the beginning of April. Sri Lankan Government has approved an import of \$760 million fertilizers. Agencies also have distributed free fertilizers as per pre-existing policy. However some uncertainties in imposing and lifting curfew made some difficulties with delay in supply chains, storage of perishable agricultural commodities, and wastage.

As a short term strategy, the government is directly involved in food supply chain activities.





As an immediate relief measure, low-income families and farmers who are having Farmer Insurance Scheme benefited from the Rs.5000 allowance of the government. On April 17<sup>th</sup>, a concessionary loan scheme for farmers was also has been launched by the government. For the first time in history tea auction conducted online on April 4<sup>th</sup> and Sri Lanka's coconut auction took place through a video conference for the first time on April 9<sup>th</sup>.

#### LONG TERM STRATEGIES ADOPTED BY THE GOVERNMENT

Taskforce coordinated and monitored rural economic activity including providing seeds and fertilizer to farmers; national economic activity, including rural agricultural commodities transport to urban consumers; and supply, distribution, and price control of essential food items. During April 11<sup>th</sup> and April 14<sup>th</sup> a mechanism has been operated by the government for purchasing produce directly from farmers and distributing directly to retailers who in turn distribute to consumers. The government also has been made some arrangements to distribute packages priced at 500 and 1000 rupees at housing schemes and apartments that are highly populated. Local government authorities and some of the local cooperatives have delivered home delivery of essential commodities at affordable prices. The government also imposed import restrictions on 156 categories of products including essential food items.

Price control is also taken as a government responsibility. The maximum retail price (MRP) for BIG Onion, red split lentil, and canned fish was imposed on March 18<sup>th</sup>. MRP imposed on red-lentils, canned fish, and sugar was removed from May 01<sup>st</sup> – May 03<sup>rd</sup>, and also MRP on milk powder was increased. Sri Lankan Government has imposed price regulations on more than 25 items for the retail and wholesale prices during this Covid-19 period. Thereafter the Consumer Affairs Authority also set the maximum wholesale prices for 21 vegetables, sweet potatoes, limes, plantains, and ginger, etc. Maximum Retail Price (MRP) for selected rice varieties was imposed and the services of rice mill owners were declared as an essential service on April 10<sup>th</sup>. MRP on turmeric powder was imposed on April 21<sup>st</sup>. On April 23<sup>rd</sup> Guaranteed prices on 14 crops and the government are to procure the harvest if farmers are unable to sell at guaranteed prices. On the 9<sup>th</sup> of April, The Government allocated LKR. 600 million for the early purchase of the fish harvest.

Amid the COVID-19 pandemic, the Government of Sri Lanka introduced the "Saubhagya National Programme" on Harvesting and Cultivation on which is mainly aimed to develop one million home gardens. It encouraged rural seed farm projects, popularize organic fertilizer use, encourages the production of home crops, and promotes home gardens to ensure food security in long term. Import restrictions were imposed by the Sri Lankan government on items that could be produced in the country. Facilitation of importation of non-essential goods was restricted on March 19<sup>th</sup> and it was declared on April 2<sup>nd</sup>.

#### WAY FORWARD

The government has to implement labor protection strategies for the farmers as well as the informal labors in the Agri-food supply chain as a risk-mitigating strategy such as a well-established insurance scheme. Apart from that as a short term strategy, the arrangements can be made to provide an incentive in the form of food, vouchers in kind, or targeted cash.

Farmer organizations and other grassroots level organizations in Sri Lanka have to get together and better to create a mechanism to protect farmers and laborers in the agriculture sector in such unexpected situations. A proper national plan for the food supply chain has to implement with better alignment between the food habits and the demands of the consumers.

The establishment of more economic centers or collection centers also has significant importance which will reduce the need for mobility. Collection centers should have high capacity. The implementation of sufficient warehouse facilities also might reduce the post-harvest losses in such a situation. If feasible, markets can be reallocated into larger premises, where physical distancing can be maintained while ensuring food quality and food safety.



# COVID -19

## and SRI LANKA'S FOOD SECTOR

Parami Wijerathne  
Sachintha Gamage  
Kavindya Attanayake

Export Agriculture  
Degree Programme

The whole world is in a critical situation due to COVID-19 pandemic and we cannot escape this pandemic and its consequences. So, we must understand and act accordingly to face this situation successfully.

Sri Lanka is self-sufficient in the rice production which is the staple food of Sri Lankan people. Apart from that domestic demand of important food such as meat, fish, eggs, fruits and vegetables is filled mainly through the domestic supply, but the country relies on imports for many essential commodities. The country's requirement of wheat, lentils, 87% of sugar, 50% of powdered milk and other milk products such as cheese are imported. With the COVID- 19 induced disruption, there may be significant challenges related to supply of these essentials and food security. Sri Lanka's key agricultural exports are spices, tea, fresh vegetables, and fruits. Covid-19 outbreak can have significant effects on earnings from foreign exports too.

Farming is practiced all over the world as an essential activity and the farmers have to cope up with this new challenge. Every component of food supply chain might be affected due to Covid 19 pandemic. When compared to other sectors, agriculture is the least affected sector by the economic struggle. Also, through the "saubhagya" scheme, home gardening has been encouraged all to better equip the country to face potential future crisis such as covid-19 pandemic.

Livestock sector also has faced many difficulties during this time. Less access to animal feed and medicine, diminished capacity of processing companies due to logistical constraints, labor scarcity, closure of markets and reduced income are the major problems faced by the sector. According to All Island Poultry Association in Sri Lanka, around 5000 broiler and layer farmers have been significantly affected by the pandemic. Before the lockdown the price of chicken egg fell drastically. It was a heavy loss for farmers.

The Department of Animal Production and Health have imposed restrictions on import of live animals and animal products. The Department decided that imports are still possible subjected to clearance, and assessment will be done on a case by case basis before granting import permission.

Considering all these factors, we must understand the situation properly and follow the preventive measures to safeguard food sector for a better future as responsible citizens of the country.



# Grad Briefs

*I am immensely proud to say that I am a graduate of Uva Wellassa University (UWU) and currently a Senior Lecturer in Agricultural Economics in the Faculty of Animal Science and Export Agriculture, Uva Wellassa University.*

*In 2019, I successfully completed my PhD degree at Griffith University, Australia. I have published my research work in 'A' rank Economics and Agricultural Economics journals. I am a recipient of a number of awards and scholarships both at National and International levels. Also, I have taught at Griffith Business School, Griffith University, Australia while adding international teaching experiences to my academic career.*

*I must say that UWU was the foundation for who I am today. My studies at UWU prepared me for these opportunities that came along. I grew in knowledge and confidence day by day thanks to the amazing lectures taught by remarkably smart.*

## **Dr. Shashika D. Rathnayaka**

BSc in Export Agriculture (UWU),  
MSc in Agric. Economics(PGIA, UOP), PhD (Griffith, Australia)  
Senior Lecturer in Agricultural Economics of Uva Wellassa University

*I am grateful for everything  
that UWU has  
given me...*



**Kumarasiri Perera**  
**Senior Tea Taster**

HVA Foods PLC

*"Ceylon Tea Industry has more than 150 years older history. Entering and surviving in the Tea Industry is a challenging task. I strongly believe that Tea Technology & Value Addition Degree Programme and UWU culture paved the path for me to enter and success in the Tea Industry. Today I am an active tea Taster."*



**Prabha Dhananjani**  
**Liyanapathirana**

**PhD Candidate** at Auburn University, USA

*"I graduated from Uva Wellassa University in 2013, with a bachelor's degree in Export Agriculture. Since graduating, I have received my master's degree in Agricultural science from Tennessee State University (USA) and I am currently matriculated in Auburn University's (USA) Plant Pathology Ph.D. program with the future aspiration of joining the academic sector. The undergraduate*

*education I received within the Export Agriculture Department at UWU served as a solid foundation from which I am building my graduate education and research career. The rigorous course work, diverse research opportunities, and the excellent faculty provided me with quality education and offered the skills needed to successfully navigate my way through graduate programs and professional positions."*



**Sadeeka Jayasinghe**  
**Senior Lecturer in Crop Science**

Uva Wellassa University of Sri Lanka

*"I was fortunate enough graduate from Uva Wellassa University (UWU), for which I am extremely grateful. When I commenced my undergraduate career, I had the chance to be exposed to a wide spectrum of agricultural fields, all of which tended to reinforce and strengthen my intense interest in the agricultural sector. I also had the opportunity to study a number of subjects offered by the Department of Export Agriculture and they were both enjoyable and enlightening, giving me a new and different perspective on the world in which we live. I am grateful to express my heartfelt*

*appreciation to all the staff members of the UWU family for the impetus they have given me in my academic life, which has helped me to have a rewarding career at UWU as a Senior Lecturer at the present."*



**Erandi Ruwanpura**  
**Assistant Divisional Secretary**

Sri Lanka Administrative Service

*"The achievement of my career reflects value of UWU. Not only knowledge but also, skills, attitudes, and social experience are the essence of the undergraduateship that has sharpened the present status of my life. For instances, creeper training experience during undergraduate education enhanced the willingness to accept more challenges. Moreover, Broad General studies, law basics, Psychology, and Sociology streams inspired me to search for new knowledge on par with highly competitive world. As a result, I was able to become a SLAS officer. Thus, I strongly believe the blessings of mother UWU that lead us to reach our goals. I convey my best wishes to future graduates of UWU to become all-rounders that our nation needs."*

# ING THE HARVEST

# REAPING





**Viraj Madusanka**  
**Entrepreneur** (Lollicup Teas),  
**Assistant Superintendent**  
 Maskeliya Plantations PLC

*"Being a proud product of Uva Wellassa University, as an entrepreneur running my own business in the tea sector, I have managed to share and disseminate the fruitful knowledge laid experience reaped by Tea Technology and Value Addition degree program, which also propped up myself in getting inclined to my present career as an entrepreneur with self-confidence and as an Assistant Superintendent in Sri Lanka's leading tea plantation company."*



**Sandun Gunathilake**  
**Assistant Production Engineer**  
 Samson Rubber Industries  
 (Pvt) Ltd (DSI Tyres & Tubes)

*"I completed the BScHons in Palm & Latex Technology and Value Addition and joined the Rubber Industry immediately after the completion of my degree. At my company, we use the best ingredients to*

*convert the inferior to the superior quality products. Furthermore, we mold the unshaped compounds into desired shapes, strengths, and qualities, which are required by our trusted customers worldwide. BScHons in Palm & Latex Technology and Value Addition degree program has strengthened us with in-detailed theoretical & technological knowledge and industrial exposures in well recognized organizations, which further molded me to be the best fit for the high-tech industries."*



**Nipun Wisnaghalage**  
**Senior Executive**  
 Tea Department  
 Heritage Teas (Pvt) Ltd  
**Tea Blogger**  
[www.teawithnipun.com](http://www.teawithnipun.com)

*"Even though I was born in front of Geragama tea factory, the real tea exposure was received from TTVA degree program. World recognized multidisciplinary education system followed by the university was really helpful to gain all-round competencies to become a complete tea professional. Surrounding Lush green tea fields and blue misty hills has created UWU a real paradise to study on tea aspects. Entrepreneurial skills obtained from the degree program made me so comfortable during my*

*3 years of stay in China as a tea master. It's a great pleasure to say that all my success is due to the head start I received from the mother UWU."*



**Ishara Wijesinghe**  
**Lecturer in Rubber Processing & Tech. and Polymer/Rubber**  
 Uva Wellassa University  
 of Sri Lanka

*"I joined Uva Wellassa University for my higher education in 2010 as a student of the 2nd intake of BScHons in Palm & Latex Technology and Value Addition degree programme. The strong theoretical background and practical exposure in wider scope of the degree programme improved my knowledge, way of thinking, and skills. Further, I was able to improve ethics, communication skills, and social values through Broad General Education which is unique to UWU. I completed my MSc degree in Polymer Science and Technology at the University of Sri Jayewardenepura in 2019. My BSc degree helped me to perform well in the master's degree and ultimately achieve a GPA of 4.0 out of 4.0. Finally, I am grateful to my University for gifting me a wonderful future."*

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