



Department of Agribusiness Management  
Faculty of Agricultural Sciences  
Sabaragamuwa University of Sri Lanka

# AFOQ

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Research | Ideas | Experiences | News & Events




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# AGRI FOOD REMEDIES FOR CRIPPLED ECONOMY



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## Editorial Brief

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### Agri Food Remedies for Crippled Economy

Sri Lanka, island nation is experiencing a multidimensional crisis, compounded by food insecurity, threatened livelihoods, shortage of essential medical items and rising protection concerns. Covid-19 pandemic, along with irrational decision of the government pushed country deep into economic crisis. The significant reduction in agricultural production in Sri Lanka, compounded by the unavailability of fertilizer and sky rocketed prices of agrochemicals, rising prices of fuel and basic food items, have made food unaffordable for a segment of the population, and the government has forecasted food shortages during the coming months.

The cover story of AFQ magazine dedicated to open spaces for academics, researchers and undergraduates to pen on remedial measures or promising solutions which agriculture in general and food industry specifically can mitigate the challenges of economic crisis. Insights of the articles eyeing to provide research-based outcomes which may help in decision making,

policy development and practical applications. Our effort is open creative writing space for academia, researchers and students. AFQ magazine moving smoothly while catering to the national demands through evidence-based solutions, mitigation measures and ideas. Very special thanks go to the coordinator of the current issue, Ms. Ruwini Banadra, for her enthusiasm and dedication on compiling rich collection of articles on cover story. Further, I wish to convey sincere gratitude to Mr. Indika Bandara for his great support on magazine design, of course his talent shapes this magazine into an international style. Moreover, special thanks go to Mr. Buddhika Chameera of AHEAD Faculty Development grant, Mr. Udesh Kumara and Mr. D.P. Wijessoriya of Department of Agribusiness Management for their continuous assistance through out the journey. Finally, let me congratulate to all contributors for this volume, your efforts will be a great decision support asset.

Prof. Achini De Silva  
Editor

# Agri Food Remedies for Crippled Economy

# Agri - Food Remedies for Crippled Economy - Practical Solutions



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In this era, the agri-food sector has faced different challenges. Due to the economic crisis, the need for food consumption has declined because of the low buying power of the people. There is a demand for food, but people cannot afford enough food for their consumption. The fertilizer ban enforced by the Sri Lankan government in 2021 distracted the yield of the farmers to a low level. Despite only making up 7% of the nation's GDP, agriculture nevertheless employs roughly 27% of the workforce, particularly in rural areas. The actors of value chains always trying to pursue and develop their incomes by neglecting social needs. Other villagers in some areas of Sri Lanka are fed up with the wildlife pestilence attacks towards their cultivation. In the scenario of Sri Lanka, as remedies, people can grow an efficient amount of vegetables and fruits in their home gardens in advance and the social service programs should be motivated to facilitate families towards growing those crops at their household level. As a need assessment, after implementing this kind of project, families can eat organic foods as well. Along the process of the supply chain, most of the time agricultural products will waste and as a solution, we can introduce a new concept to prevent and reduce this wastage of food. In Europe countries, people have the practice of exchanging excess food within the needed people that concept also can implement in Sri Lankan society. The starting step can be taken by the social actors or

celebrities imitated by the fans. Food processing innovations can use for introduction as a limitation of food wastage.

According to the Sri Lankan situation, the country has the highest child malnutrition index score. According to the World Food Program (WFP, Status Report and June 2022) status report, food inflation will reach 57% by mid-June. The burden of these economic shocks breathed ultimately passed on to the people, affecting members of society at big, from the richest to the poorest. A study conducted by the United Nations Children's Fund/United Nations Development Program (UNICEF/UNDP) shows that 71% of households surveyed, representing all districts in Sri Lanka, have lost all or part of their income.

Children have started feeling the effects of this economic crisis. Sri Lanka's population consists of 6,214,692 children under the age of 18. UNICEF has stated that Sri Lanka's economic crisis is a child crisis, with 1.7 children in the country bearing the brunt of the crisis (UNICEF, June 2022). In addition, a UNICEF representative in Sri Lanka told ABC Network that although Sri Lanka has one of the highest child malnutrition rates in South Asia, the economic crisis will exacerbate the child malnutrition crisis. I explained that it was only according to UNICEF statistics, 7 out of 10 households in Sri Lanka have reduced their food intake to mitigate the crisis, with those who eat 3 meals a day reducing theirs to 2 meals

a day and those who eat 2 meals a day is now reduced to one meal (UNICEF, June 2022). As a solution for this case, the government can boost the "Threeposha" program after identifying the needed school children who come under low BMI index value.

In Sri Lanka, agricultural and farming conditions are almost improved. However, farmers were unable to produce the necessary amount of harvest. Inadequate farming methods also force people to leave rural regions and contribute to global warming, deforestation, wildlife attacks, and soil erosion. Due to this and other factors, Sri Lanka has failed to provide its citizens with a sufficient supply of food, leading to food insecurity in the interim. By providing enough funding for the sector, food assistance programs should be improved in advance and the agricultural economy developed. The entire manufacturing team at the corporation is unable to deliver their products for the secondary foods to the final consumers while experiencing environmental problems.

Social support services should be encouraged to assist families in cultivating those products at the household level. As a remedy, people can cultivate an adequate amount of fruits and vegetables in advance in their home gardens. Following the implementation of these programs, households will be able to eat organic food as well, based on necessity. The majority of the time, agricultural products waste along the supply chain. As a response, we can bring innovative concepts to stop and lower this food loss. The practice of sharing surplus food with those in need is common in European nations; Sri Lankan culture can adopt this idea. The social actors can take the first step. Food processing innovations can use for introduction as a limitation of food wastage.

We can use waste vegetables and fruits to make products like animal feed and composites. There should be a pricing system for the ripened fruits to enable them to be sold for secondary production. Village-level markets and manufacturers should be encouraged to increase the fair profit margin between the partners in supply chains.

In this economic crisis, it's hard to import things, so we have to manufacture those with our own capacity. The government can enhance the programs, such as providing glasses of green porridge to schoolchildren. It is a highly practical and capable program that can be done with the available resources in the village areas. Green leaves can easily be found in the villages, and it

is a cost-effective way of providing healthy, nutrient-rich food for schoolchildren.

Also, the government has to take care of the infant industries in its situation where they are involved in food manufacturing and export agriculture. This is the situation where we fail to boost imports. Therefore, it is needed to safeguard the existing companies in the economy. As solutions, they should be encouraged by the relaxing of tax schemes, rebuilding infrastructure, and technological support. If farmers cannot grow without chemical fertilizers, they should be given knowledge about how to make organic fertilizer within their capacities and the benefits of using that fertilizer.

In the opposite case, poor post-harvest handling practices can cause significant food damage and waste. In this crippled economic situation, we have a scarcity of resources and we have to take care of the existing resources within our capacity. There is a trend of separating farmers from cultivation and shifting them into other industries. Farmers should be saved by providing benefits to them, such as harvest insurance programs.



# Innovations of Traditional Bakery and Confectionary Industry: Silver Line in Turbulent Waters



**B**read products are not such a vital staple as rice, nearly every village and town would have at least one bakery supplying bread for curries and snacks to families and workers.

Main raw material, wheat flour shortages and escalating prices, the increasing cost of power, unavailability of cooking gas and energy and cost of production and distribution was greatly influencing the determination of the final finished product pricing. Most of the small bakeries were converted from firewood to electric power during the last decade worsened the situation.

Will the finished product, especially bread and biscuits, pricing be affordable and acceptable to the consumer? This is yet to be seen and identified in the future since the income levels of consumers have not increased proportionately in relation to the cost of living. As far as the baking industry (bakery and biscuit industry) in Sri Lanka it is time for a major change to re-invent the industry and prepare its human resource asset base to face the challenges in the future.

Local biscuit manufacturers such as leading brands like Munchie, Maliban, etc., reached their maximum highs by catering to both regional and international markets. Locally manufactured biscuit range, expand the customer profiles through a

diverse range of delicacies. Biscuits became a common delicacy among households, and kids and youth were key customer segments.

Recent economic crisis fueled by the COVID-19 pandemic crippled the confectionary industry and prices were untouchable to regular consumers. Sales dropped sharply and biscuits were dropped from common tea-time menus of the local people.

Village based bakery industry disappeared with the arrival of modern biscuit manufacturers and their lavish items. In recent decades, the village-based confectionary industry surged into villages and rural towns, produced a limited number of products and the distribution channels were only stretched into tiny village market hubs.



A turbulent economy opens a golden opportunity for local bakeries and the confectionary industry. Not only the village consumers but the urban consumers were also moved from lavish biscuit delicacies to price concern more healthy traditional options.

New product innovation based on changing eating habits of consumers, developing cost-effective recipes while maintaining the quality of the finished product, and reduction in overhead costs (production, administration and marketing costs) will be some of the key factors that the personnel in the baking industry will have to carry systematically and face the challenges. Manufacturing baked products at cost-effective rates and priced at an affordable rate to consumers will be the key factor to remaining in business successfully. With these major changes taking place, will the baking industry survive and continue to manufacture traditional baked products at affordable prices for consumers in Sri Lanka?

Our approach is to showcase the successful interventions of the local baker, catering to a diverse consumer range. His innovative products, along with reasonable pricing attract loads of consumers to his business.



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# IDENTIFICATION AND UTILIZATION OF THE UNTAPPED GENETIC DIVERSITY OF TRADITIONAL MAIZE ACCESSIONS IN SRI LANKA FOR FUTURE BREEDING PROGRAMS



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## **Maize cultivation and their challenges in Sri Lanka**

Maize is the second most important crop in Sri Lanka, accounting for 5.6% of the island's total grain area. It is mainly grown in the dry zone as a rain-fed crop in the Maha season, and 80% of the total planted lands are restricted to Anuradhapura, Ampara, Badulla, Matale, Moneragala, Kurunegala and Batticaloa districts. Maize is the main source of rural livelihood in these areas and is mainly used as green cobs and meals for human consumption, as feed for animals and as input for the food industries. In 2020, the maize production was 313,000 tons on a 23,000-28,000 ha acreage. However, the annual demand for maize increased to 600,000 tons, of which about 42 % is covered by local production, while the rest is imported.

Currently, maize growers face several limitations and challenges due to the unavailability of planting materials, inputs such as inorganic fertilizers, and effective pesticides. Hybrid maize varieties have been used extensively by most commercial farmers because they can meet grower needs and consumer expectations by providing a high yield per unit area relative to cost through the efficient use of nutrients. However, this demand for commercial seeds mainly depends on imported hybrid seeds, which eventually leads to an increase in production costs. To increase local production by minimizing production costs, high-yielding cultivars need to be identified in terms of enhanced photosynthetic biomass traits.

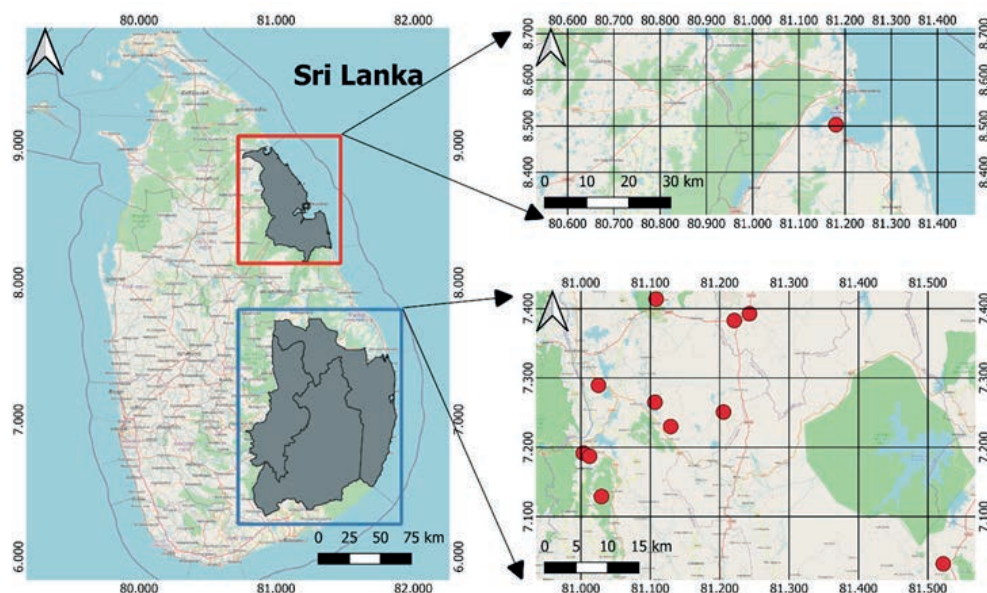
In addition, the fall armyworm *Spodoptera frugiperda* (J.E. Smith), known locally as Sena dalambuwa, became the key factor reported in 2018 which limits the local maize production. The pest was more difficult to control due to its high reproductive rate, polyphagous nature, and long-distance migration. The larval stages can attack and feed from seedling emergence to cob formation, resulting in a reduction in a photosynthetic active area and a significant reduction in yield. As a result, farmers adapted to the frequent use of synthetic pesticides such as organophosphates and neonicotinoids to control the pest. Nonetheless, the use of chemical pesticides could lead to the rapid development of resistant populations, environmental contamination and public health problems. Therefore, strategies other than chemical pesticides are needed to control armyworms in an environmentally friendly and sustainable manner.

In addition, maize is a major component of poultry and maize straw has been used as animal feed, which can best be classified as non-leguminous forage crops. However, the animal industry mainly depends on the foreign market for the import of concentrated feed, maize and other materials. This led to a continuous flow of foreign exchange to other countries and increased production costs. Therefore, it is important to formulate animal feeds with nutrient-dense local maize varieties and to replace concentrated imported feeds with the use of desirable signature feeds such as maize fodder and silage.



## Our approach

As a team from the South Eastern University of Sri Lanka, we have been working tirelessly over the last 2.5 years to fill the knowledge gap by studying traditional maize accessions grown by the local farmers in the maximize-growing areas in Sri Lanka. Visiting maize-growing areas across the island, we collected 29 traditional maize accessions and extensively assessed their potential to develop new maize varieties that can overcome the above-mentioned challenges and constraints to ensure food security and sustainable maize production in the country.



**Figure 1.** The geographical location of traditional maize accession collected areas in Sri Lanka. The areas were mainly confined to Badulla, Moneragala, Ampara and Trincomalee districts.

Host plant resistance is a key component of Integrated Pest Management (IPM), which involves the use of resistant plant varieties, alone or in combination with other tactics, to reduce the impact of herbivores on crop yield and quality. We rigorously evaluated collected maize accessions under artificial and natural infestations of fall armyworm and their antibiosis mechanisms under in-vitro, cage and field conditions and identified two traditional maize accessions with partial resistance traits, termed SEU18 and SEU21, in terms of canopy and cob visual damage assessments.

Meanwhile, the collected accessions were subjected to rapid and detailed screening for physiological traits such as photosynthetic rate, canopy architectural chlorophyll fluorescence and biomass accumulation capacity, which revealed that the accessions from SEU02, SEU09, and SEU14 possessed superior characteristics of aforementioned plant traits.

Collected SEU17 was identified as a nutrient-rich forage variety that can be used as a forage crop as silage due to its high protein, fiber and energy content, as well as an optimal dry matter concentration in the cob milking stages, and is acceptable for forage fermentation. The properties were reconfirmed after feeding trials with rabbits in comparison to concentrated feed.

The accessions of SEU02, SEU22 and SEU31 were identified as superior in terms of kernel nutritional parameters such as proximate composition, carbohydrates and energy. Thus, these varieties can be used as developing nutrient-rich food and feed.

Today, our research progressing to selected accessions from the above experiments, after detailed analysis, are planted for seed propagation at the faculty farm compound in Malwatte, Ampara, for pure line development to future breeding programs to develop hybrid varieties by introgression of desirable traits. In addition, we expect to market our final products to farmers and meanwhile distribute selected accessions among farmers and eventually maintain food security in Sri Lanka.

# KIDNEY CUBE

A timely medicinal product from medicinal plant extracts



**D.I.P. KULARATHNA**

Department of Agribusiness Management  
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The current economic crisis in Sri Lanka has mainly affected a large number of sectors, including the education sector, the medical sector, the industrial sector and the financial sector. The current crisis has significantly affected the medical field. Considering that, there is a significant shortage of medicines

23 May 2022 (Reuters) Sri Lanka imports more than 80% of its medical supplies and the current economic crisis has resulted in significant shortages of essential medicines as foreign exchange reserves run out and the health care system is at risk of collapse. Doctors say drug shortages caused by the economic crisis could accelerate the impact on lives as hospitals are forced to postpone life-saving procedures on patients.

Chronic kidney disease (CKD) and kidney disorders are common kidney-related cases in Sri Lanka and the shortage of medicines caused by the economic crisis has had a major impact on these diseases. Among them, there is a notable shortage of 1 alpha CCF and Tamsulosin-like medicines given to patients with kidney disorders.

Traditional medicine can be expected to increase significantly under the current crisis conditions in the country. The main aim of this article is to popularize medicinal products produced using underutilized plants as an alternative to the existing shortage of essential medicines.

KIDNEY CUBE is a brand new medicinal product idea made using an extract from an underutilized medicinal plant with high medicinal properties according to indigenous medicine.

Due to the action of the medicinal compounds present in this product, the product provides a significant level of benefits to the user. Neeramullia plants extract is the main medicinal compound contained in this kidney cube

*Hygrophila auriculata* (Neeramullia plants)

Neeramullia can be considered a very valuable plant to avoid the kidney-related disorders

Latin Name: *Hygrophila auriculata* (Schum.) Hiene Syn.,

*Hygrophila Spinosa* T. Anders., *Asteracantha longifolia* (Linn.) Nees. (Acanthaceae)

Sanskrit/Indian name: Kokilaksha, Ikshura, Ikshuraka, Chulli, Talimakhana

Sri lankan name: Neeramullia, katu ikiriya

When considering kidney cube compared to other medicinal compounds, the main thing is the cube is mostly suitable for consumption because it is mainly an herbal product and another thing is this plant is an underutilized plant that grows commonly in watery areas marshes places and plains.

Due to the action of the medicinal compounds present in this product, The kidney cube provides a significant level of benefits to the user.

As made from all-natural ingredients, this product is sure to provide solutions to many major health-related problems.

Hygrophila extractor consists of vast Therapeutic constituents. The seeds contain large amounts of tenacious mucilage and potassium salts, which are responsible for the diuretic property of the seeds. The ethanol extract of the plant is spasmolytic and hypotensive (Indian Medicinal Plants-An Illustrated Dictionary, C.P.Khare. 318. 2007).

The leaves and roots of Hygrophila have diuretic properties.

Why KIDNEY CUBE product is more suitable?  
The main therapeutic benefits of using this medicinal product are that it acts as a clear cure for a number of physical ailments like a potent remedy for kidney stones and also stimulates the male genital system and is beneficial in the treatment of sexual debility, premature ejaculation and erectile failure.

This medicinal product idea also is useful in ailments of the urinogenital tract, like dysuria, urinary calculi and cystitis.

Here, side effects and allergies caused by 1 alpha CCF and Tamsulosin-like medicines and other drugs as well as digestive disorders, especially itching and rashes, hypercalcemia, gastrointestinal pain/discomfort and hyperphosphatemia can be significantly prevented by using this herbal production. Further, drowsy reactions, difficulty in falling asleep or staying asleep, weakness, back pain, diarrhea, runny or stuffy nose and pain or pressure in the face including sore throat, cough, fever, chills, or other symptoms of infection. These problems can be avoided to a significant extent by using this medicinal product.

The above-mentioned side effects and other obstacles can be avoided by using this Kidney Cube. Likewise, this is a great strategy to avoid some people showing less interest in taking medicine. By using many common but underutilized medicinal plants in Sri Lanka, the demand for those products will increase. In the same way, the exchange rate in the country can clearly be affected by the mass production of these products with relevant standards.





## Home Gardens of

# Central Highlands

'Intimate, multi-story combinations of various trees and crops, sometimes in association with domestic animals, around homesteads' is defined as a home garden. As a traditional, subsistence farming system carried out with low inputs, traditions and low technology applications, home gardening produces multiple outputs ensuring livelihood and nutritional security. Basically, the maintenance of huge biological diversity is the key to home gardening and home gardening plays an important role to enhance the quality of life and social and economic welfare of people. It is considered a sustainable practice since the system structure, ecological functions and ability to accomplish the socio-economic needs of people. As a production system, several perennial food crops, vegetables, fruit, tuber crops, herbs, medicinal plants, spice crops, timber crops, ornamental plants, fodder and grass are included and do not invest a considerable amount of money for the cultivation since input materials are supplied by the consumption of day to day life. The Kandyan fruit forest garden is one of the popular home gardening concepts practiced in the mid-country region of Sri Lanka including Kandy, Badulla, Matale, Kegalle, Kurunegala and Rathnapura districts. Transformation through generations, some evolutions in home gardening can be observed with lifestyle changes and urbanization.



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In the home garden, there is a multi-tiered canopy structure. This was made by the mixture of species with different vertical layers. Each layer has a specific function and layers of plants occupy both horizontal and vertical space to grow. With the wide range of species, resource consumption is highly effective. As the main layers of a home garden are the herbaceous layer and are tree layer, one or two intermediate layers can be identified. The contents of layers differ from region to region. In relevant to the central highlands of Sri Lanka, layer distribution is as follows.

Level	Name of the layer	Example
1	Ground layer	<b>Ginger</b> - medicinal values, spice, Food flavor, micro income generator <b>Turmeric</b> - medicinal values, food flavor, spice, cosmetics, micro income generator <b>Anthurium</b> - esthetic value, ornamental plant <b>Vegetables</b> – Tomato, cabbage, chilies, Carrot food crop, micro income generator <b>Yam</b> - Katu ala, sweet potato food crop, micro income generator <b>Grass and fodder</b> - animal feed, soil reconditioning
2	lower layer	<b>Passion</b> - fruit, leafy vegetable <b>Betel vine</b> - chewing betel, traditional customs, micro income generator
3	Lower middle layer	<b>Avocado</b> - fruit, medicinal, cosmetics uses, micro income generator <b>Rambutan</b> - fruit, micro income generator <b>Papaw</b> - fruit, medicinal, cosmetics uses, micro income generator <b>Citrus</b> - fruit, medicinal, cosmetics uses, micro income generator
4	Upper middle layer	<b>Arecanut</b> - micro income generator, chew with betel, medicine <b>Bamboo</b> - ornamental plant, miscellaneous uses <b>Nutmeg</b> - medicine, spice, flavoring, micro income generator <b>Clove</b> - medicine, spice, flavoring, micro income generator
5	Canopy layer	<b>Jak fruit</b> - food crop, timber, shade tree, micro income generator <b>kapok</b> - timber, shade tree <b>Turpentine</b> - timber, shade tree

Table 01- Multiple layers of the home garden

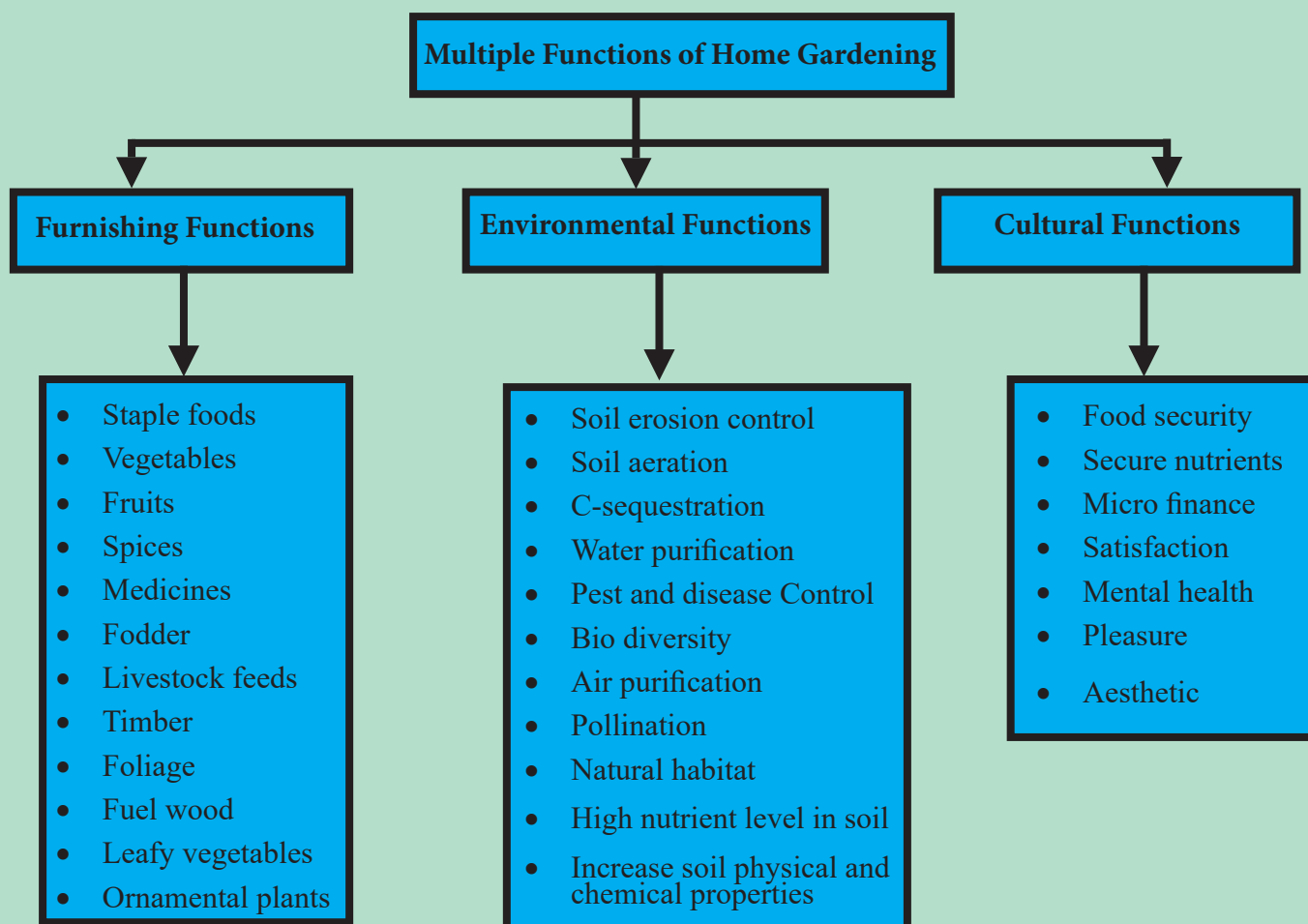


Figure 01- Multiple Functions of Home Gardening

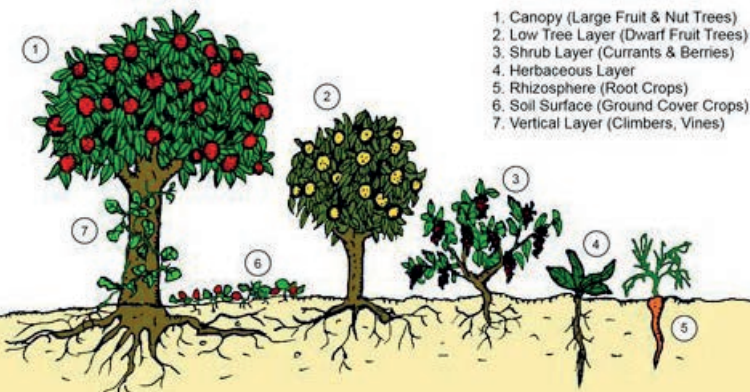
In central highlands, most families are depending on vegetable farming as the main income source. So there is a high potential to involve in home gardening as an extra income source or to fulfill the demand for the day-to-day meal. 17.7% and 5.3% are recorded as the home garden cover of Badulla and Nuwara-Eliya districts respectively.

By considering the involvement in the activities both male and female engagement differ. Sometimes the activities such as land preparation drain construction, organic fertilizer applications and pruning are mainly dominated by males. Weeding, watering, harvesting and some other management practices are dominated by women. However, the involvement of women and children is higher and more frequent compared with men since they are able to manage the garden while involving in household activities. So home gardening highly contributes to the diverse needs for a balanced diet, ensuring nutrition, food quality and also income security.

Although home gardening secures the food quality and the income of the home, it enriches the soil and the biodiversity. Because in home gardening there is a number of different plant species in a limited space. Multiple cropping techniques are one of the best ways to improve soil nutrients; for example, the cultivation of legumes increases the available nitrogen in the soil. Under multiple cropping, the root system spread throughout the soil rather than mono-cropping. So it increases soil aeration and reduces the bulk density of the soil. Crop rotation that normally functions in home gardening increases soil's physical and chemical properties. Reducing soil erosion and increasing micro and macro fauna are also major benefits of home gardening. Considering all of these positive factors, home gardening can be used as a benchmark for sustainable farming practices.



The Seven Layers of a Forest Garden



# Nature-Based Solutions to Mitigate the Food Crisis: Problem-based Teaching and Learning



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**N**ature-based solutions (NBS) are increasingly seen as important to reduce the global food crisis as well as to protect ecosystems. Nature-based solutions are the ones inspired and supported by nature, which are cost-effective, simultaneously providing environmental, social, and economic benefits, and helping build resilience (as per the European Union Research and Innovation policy agenda). Some solutions can be practiced as intrinsic nature-based solutions, while others are merely inspired by natural processes. Such solutions bring more and more diverse, nature and natural features and processes. Nature-based solutions can deliver triple benefits, supporting agricultural production and resilience, mitigating food crises, and enhancing nature and biodiversity. Hence, they offer a promising contribution on how to enhance the availability and quality of food for human consumption, while simultaneously striving to preserve food security in the country. They can be implemented in two ways; either developing new food products or process improvements.

The following table indicated the NBS developed by the Undergraduates following BSc in Food Business Management under the Department of Agribusiness Management to alleviate the current food crisis in Sri Lanka. This process took place as a problem-based teaching and learning method in which real-world problems were used to promote student learning of concepts and principles. This helped students to enhance their critical thinking, problem-solving, and communication skills in addition to the course material. Problem-based teaching and learning, which can be also applied to any educational setting, create a base for group collaboration, locating and assessing sources of information, and lifelong learning.



Jack fruit flour noodles



Arrowroot flour



Preserve fresh fruits in bee honey



Seaweed protein supplements



Breadfruit flour



Canistel Macaroni



Cassava Flour



Coconut milk powder tea



Hybrid rice variety produced by Alhaal male seeds crossed with normal Alhaal seeds named "Haritha"



Velvet Apple Flour





National bee keeping center



Three Corner Nutrie



Cozy Crock Pac



Natural smart packing material using corn proteins zein



Food preserve by using a natural refrigerator



Crops transportation bags from waste things of banana tree



Sea-weed-based food packaging



Transparent cooling clay packet ( for curd product)

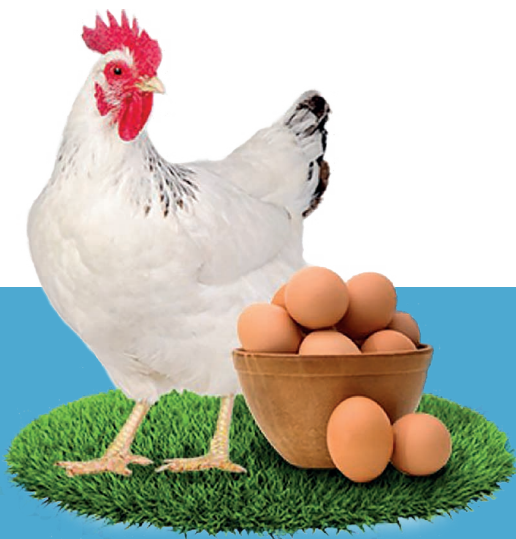


Cinnamon-coated dry coconut leaves basket



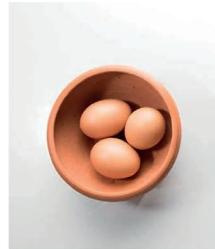
Package made from chicken feathers

# Online Portal for Selling Livestock Products



DEPARTMENT OF LIVESTOCK PRODUCTION

HOME MY ACCOUNT SHOP



ගුණාත්මක බිත්තර මිලදී ගැනීමට



නැවුම් කුකුළු මස් මිලදී ගැනීමට



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The Department of Livestock production is always searching for opportunities to improve the existing workflow and trying to acclimate with the concept of 'Smart University.' The concept of a 'Smart University' requires technical innovation.

The Department of Livestock production identified a possible technological advancement in its order-taking process for livestock products (Broiler Chicken meat and Eggs).

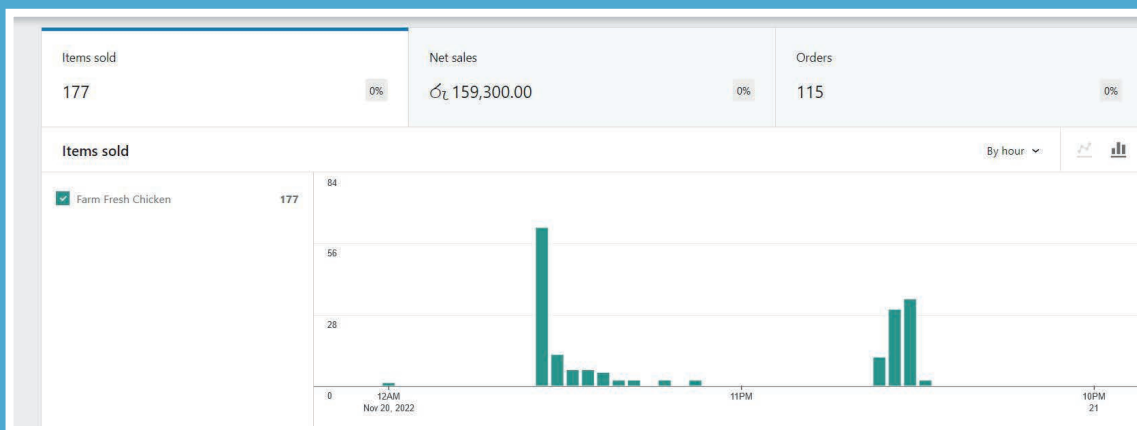
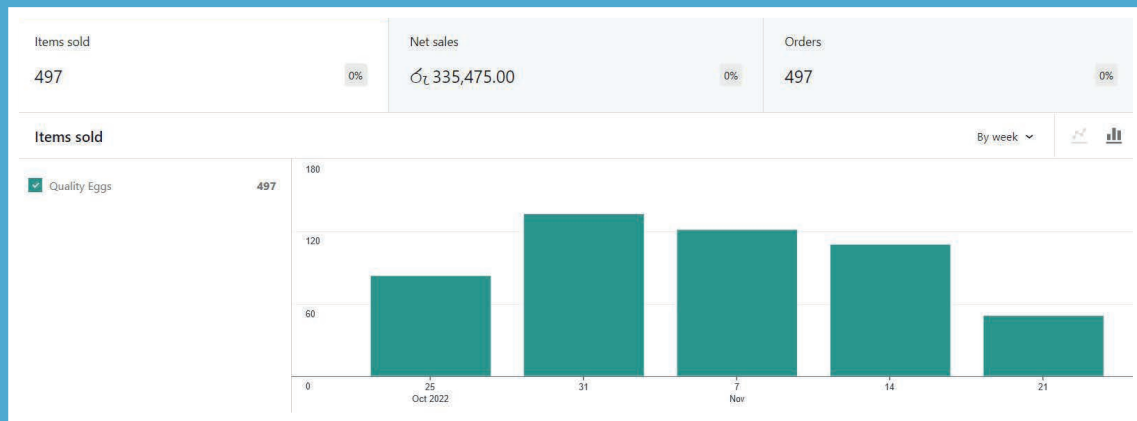
The order-taking process was 100% manual, and the Department had to assign a member to take orders over the phone. Given the nature of the process, the process was tedious and hindered the productivity of the Department's work routine.

It was a heavy burden on the Department. The Department could have used the service of the designated assignee for order-taking for a different purpose if the Department had an automated system for taking and recording orders.

Considering this, with the guidance of the Head of the Department and ideas from staff members, an online portal has been designed and developed for taking orders for livestock products.

The web portal was designed keeping in mind the user-friendliness of the system. Since not all users have sound technical knowledge when it comes to online ordering, the first hurdle was to make it simple and convenient.

Once the system was designed, a couple of demonstration videos were prepared to make the users aware of registering themselves on the system, placing an order, etc.



The system is built on WordPress Content Management System (C.M.S.), linked to WooCommerce, an eCommerce plugin that works seamlessly with the WordPress ecosystem. It is available at the following link:  
<https://shop.dlpsusl.com/>

Once all these were in place, the web portal was officially launched on 7<sup>th</sup> October 2022. The Vice-Chancellor of Sabaragamuwa University of Sri Lanka, Senior Professor R.M.U.S.K. Rathnayake, launched the portal and is the first user registered on the system.

After the initial launch, the portal started taking orders on 25<sup>th</sup> October. From 25<sup>th</sup> October to the time of the writing, we have been selling quality Chicken Eggs and Chicken Meat through this portal.

Placing an order on the system takes less than a minute, and anyone with a smartphone or a computer can easily place the order. Also, this initiative completely eradicated the need for a designated assignee to take orders manually, which was a heavy burden to the Department.

Further, It was a new, innovative initiative for the whole university community. Also, it was a progressive landmark of the development process of the university under the theme of “Way forward for a smart university” and an outstanding achievement of the Department of Livestock Production

# Food Retailing Solutions to Combat Access and Availability of Food



The food retailing industry is one of the largest and most important industries in the marketplace; it made a bridge between consumers and manufacturers and recorded formidable growth in the recent years before the pandemic and financial crisis with the potential to grow due to increased demand from the emerging middle-class with disposable income. However, the lockdown as well as important restrictions due to curbing the outflow of foreign currency on import simultaneously affected the entire retail supply chain from farm produce to final consumer demand. It led to a temporary shortage of essential food items and introduced unexpected stress in the food system increasing pressure on domestic food commodities, causing a steady rise in food prices and limiting the purchasing power of the household. According to World Food Program, it is estimated that around 6.3 million people would face food insecurity forcing them either to reduce their meals or eat less, cheaper, less nutritious food, and this situation could deteriorate even further (WFO, 2022).



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This difficulty in encountering food leads to insufficient food at all times (availability), and an inability to physical and economic access to food (accessibility). Today new food access and retail models are continuously emerging since the retail sector has worked diligently to find ways of bringing healthy and fresh food to their customers. However, this evolution is not possible without effective planning and managing their supply chain dimensions which are directly related to creating a competitive advantage in the food industry by improving food availability, stability and access to food (Aji, 2020).

Sri Lanka's food retail sector is dominated by large-scale supermarket chains such as Cargills, Keels, Arpico, Lanka Sathosa, Laugf, and Glomrak which are the current market giants with several other medium and small-scale supermarkets operating and positioning themselves as the leaders in their respective areas. One of the key features of the supermarket chain is that they provide access to consumers by using everything in one place. In addition, there are a lot of single-owned traditional retail outlets owned by single people as a family livelihood which are generally located in front of their houses in semi-urban and rural areas facing significant competition from modern retail outlets that continue to expand their operations in rural and semi-urban areas.

The following figure presents the players in the supply chain and their relationship, interconnecting both upstream and downstream levels separately to a supermarket chain and traditional small and medium brick-and-mortar outlets. Traditionally, the retail supply chain is made up of hundreds of farmers, manufacturers, wholesalers and other entities involved directly and indirectly in delivering products to final consumers. However, modern trade (supermarket chains) with more control over their supply chain can find more solutions to combat access and availability of food rather than the traditional retailers' presence of complex supply chains with much intermediary involvement.

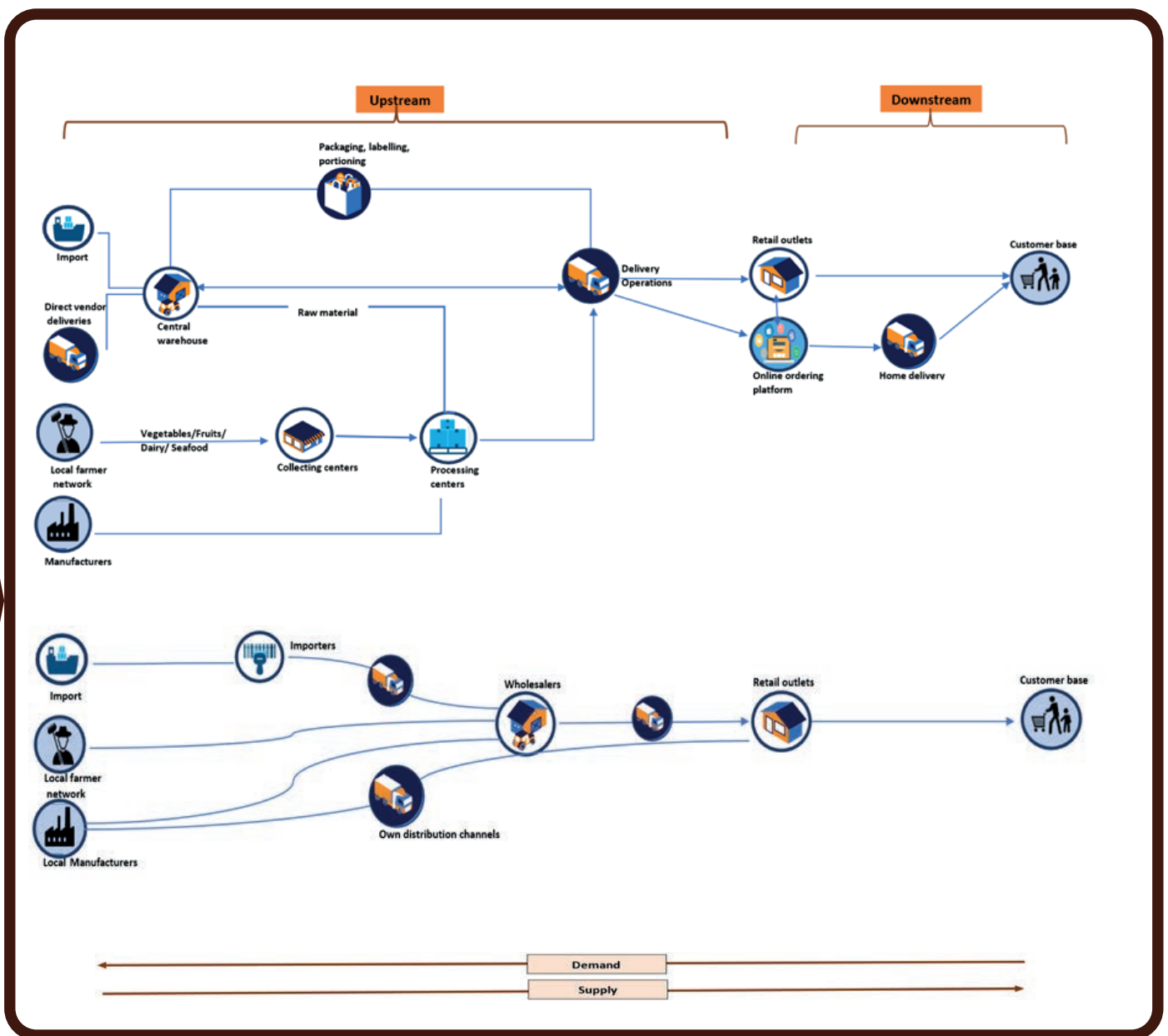


Figure 1: Retail Supply Chains

Recent advancements in logistics and technology have made many possibilities to find solutions to the above food insecurity issue at the local retail level emerging with new models of interaction between key involved actors throughout the chain. Today, to respond to the incline in on-shelf availability and replenishment speed, retailers closely work with their suppliers, distributors, and manufacturers to secure an adequate supply of demanding essential food items. They also reevaluate their orders to line up with consumer demand and revise their purchasing plans for food products from non-discretionary to discretionary with a high demand and direct locations where they are especially needed or brisk. Therefore, retailers tend to maintain POS data systems to advance forecasting actual preference allowing for improved planning stores and warehousing to ensure the right product is at the right store at the right time.

Further modern retail chains tend to allocate investment in local agriculture, manufacturing, and procurement which enables the development of lean processes, inventory optimization, end-to-end logistics, managing customer relationships, and delivery which facilitate continued sourcing produce by expanding the supply chain interactions and increasing distribution to improve the availability of products for consumers. For example, inadequate logistics, transportation, handling practices, structural barriers in the supply chain and a wide range of middlemen between producer and consumer lacked the negotiation power and led the product to waste. In order to address these inefficiencies, modern retailers like Cargills, and Keels began to purchase directly from their farmer networks, supported by their collection centres with modern storage and transport facilities giving them access to the mass market, bypassing the middlemen and reducing waste and producer income, increased delivery speed resulting in lower retail price for consumers. They also select suppliers with established reputations and recognition in the market and maintain “backup” sources for some essential food items to arrange purchases if they are not available from the current distributors.



Also, combatting the issue of access to food which is determined by factors like spatial accessibility, affordability and quality of food, retailers try to expertise in areas like food distribution and coverage. As a result, the modern retailing experience facilitates consumer access to high-quality, affordable products, in selected outlets at strategic locations 24\*7 and segments their outlets based on cater market segment characteristics, their buying behaviors and purchasing power. For example, in retail outlets in urban areas customers are provided with more expensive canned and processed food items while outlets in the rural area fill their shelves with essential food items than luxurious and branded ones. Backward integration is another technique large retail chains to obtain control over their supply chain to improve food availability and access. For example, Cargills and Keels are two market giants in the retail industry integration into manufacturing food and beverage that produce their brands in dairy, confectionery, beverage and processed meat, etc. providing a significant cost benefit to their customers by eliminating intermediary involvement.

# Innovation and Product Development on Diversifying the Beverage Landscape: A Case of Ceylon Cinnamon



**I**nnovation ensures the novelty of the world and provides answers to critical questions that secure the fast movement of the human kind towards the ultimate advancement. Innovation generates novel and creative products, which never existed before. Its demarcates???? (is it “demarcates???) a broad topic covering many knowledge streams and industries. Beverage industry is one of the highly innovative industries in the world enabling the catering to the global thirst in a creative manner.

Electronic and high-tech companies lead the world’s most innovative companies but beverage companies contributed significant innovative advancements to the industry in year 2022. Carbonated and sugar concentrates had a massive growing demand since late 1900s. Nowadays, the beverage consumers are not limited to enjoy the taste but pack of tangible and intangible benefits are expected. The quality of the beverage, health, taste, packaging and the sustainability of the environment are key concerns of the modern consumers.

## The Global Status

The global food and beverages market expand from \$5,818.25 billion in 2021 to \$6,327.35 billion in 2022 at a considerable growth of 8.7% despite the COVID-19 pandemic and the Russia and Ukraine war. Both the global events made massive disruptions to the industry in consumer and the producer ends. The food and beverages market is expected to grow to \$7,942.08 billion in 2026 at a compound annual growth rate of 5.8% highlighting the immense opportunities for innovations.

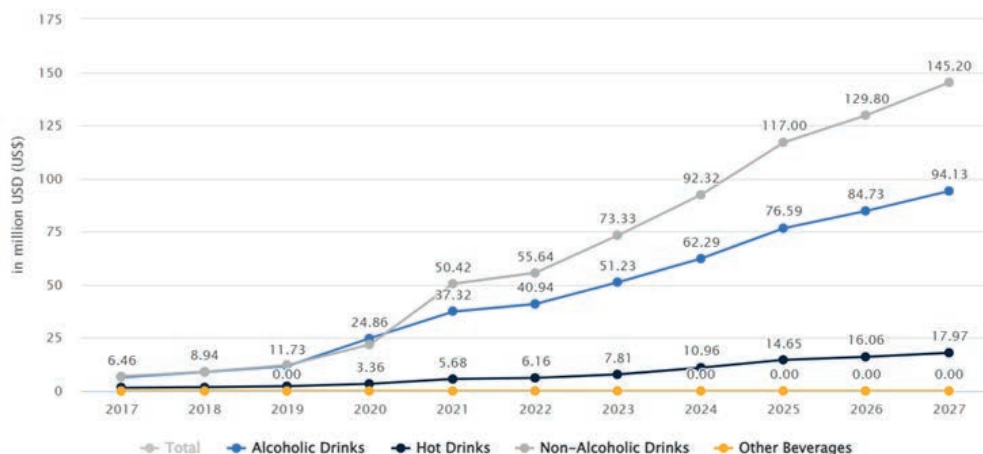
## The Local Status

High sugar content and artificial beverages have identified as a common threat to human health including non-communicable disease. A growing demand towards the health and low sugar market was boosting during the past years. Obviously, the COVID-19 pandemic has alarmed the world to re-think the beverage consumption behavior. Digital marketing also plays a significant role in beverage industry and Sri Lanka has projected to reach sales online US\$102.70m in 2022. Further, the online market volume projected to be grown to US\$257.30m by 2027

## Ceylon Cinnamon

“Ceylon” can be identified as a one of the oldest beverage brands in the world beverage industry which roots up to colonial era. But the diversification of the products to cater the global needs remains minimal to untapped levels. Since Ceylon Tea has a global recognition, we have a comparative advantage to capture the global market. Ceylon cinnamon is a native and great ingredient containing full of health benefits including antidiabetic, antioxidant etc. But the level of value addition remains under an unsatisfactory level with massive bulk export as “bale”. According to Statista website data, Sri Lanka has projected a potential growth in nonalcoholic beverages segment.

Identifying the correct market gap “Ceylon Cinnamon Beverage Development Laboratory” took the initiative to develop a high-end value-added product from Ceylon cinnamon which is known to Sri Lanka as “just a spice”. Ceylon cinnamon leaf tea is one of the ground-shaking innovations developed by the laboratory with freeze-dried cinnamon extracts which is recognized







locally and globally (Patent - PCT WO2021/124240 A1, LK P 20905). The growing interest in the health concerning naturally extracted beverage segment captured with the product and it has a significant level of consumer attraction. A high level of value addition improves the sustainability of the value chains by distributing solid returns and creating avenues to earn dollars back to the country.

The International Food Information Council's Food and Health Survey in 2022 expresses that 52% of Americans will be following diets in 2022. Fer (it should be "For,) the conscious consumers are moving towards replacing their diets with beverage. Specifically, 16–35-year age consumers are willing to consume meal replacement applications.

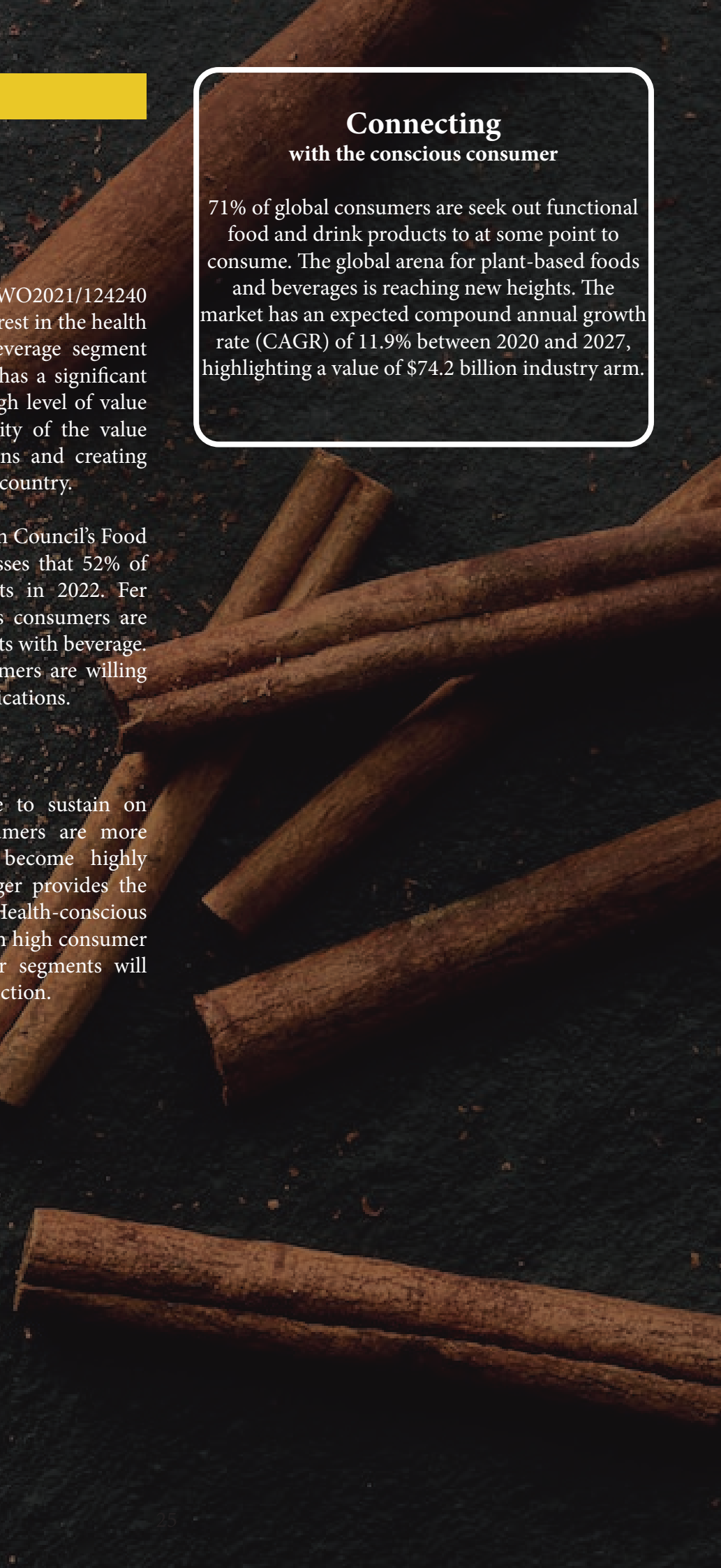
### **The Future of Beverage Industry**

Beverage industry has no future to sustain on unhealthy beverages since consumers are more educated and the market has become highly dynamic. Single beverage no longer provides the satisfaction to all the customers. Health-conscious natural beverage segment rises with high consumer demand. The following consumer segments will grow according to the market projection.

- Plant-based dairy drinks
- Protein-based sports drinks
- Meal replacement
- Energy drinks
- Low-No Alcoholic Beverages
- Kombucha
- Vitamin drinks

## **Connecting with the conscious consumer**

71% of global consumers are seek out functional food and drink products to at some point to consume. The global arena for plant-based foods and beverages is reaching new heights. The market has an expected compound annual growth rate (CAGR) of 11.9% between 2020 and 2027, highlighting a value of \$74.2 billion industry arm.



# Research Based product development to cater the future beverage trends



## Ceylon Cinnamon Cola



Diina-Ola  
the premium cinnamon cola



## Funding Acknowledgement

The product development was funded by AHEAD World Bank grant. (AHEAD) operation is organized in two components: first is a Program Component that supports the national Higher Education Development Program. The second is a Systems Strengthening, Capacity Building and Technical Assistance Component. (RIC) programs will be developed and implemented for universities undertaking innovation activities of direct relevance for industrial and service sector development.

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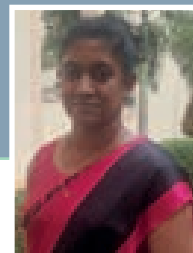
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# Giant Freshwater Prawns in Village Menu



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**G**iant Freshwater Prawn (GFP), *Macrobrachium rosenbergii*, is the main candidate for aquaculture inland waters due to its high market value and market demand. Mainly, the harvests of giant freshwater prawns are going to high-end restaurants and hotels in Sri Lanka or are exported. The main exporting destinations are Thailand and China. Our prawns are having unique value as they are mostly live products rather than frozen, large in size and are considered organic because of their natural production, all of which provide a premium in price.

The usual selling price of 1 kg of finfish was 180-170/=LKR and increased up to 650-750/- LKR gradually with the high demand. Further, the freshwater prawns' price was recorded as 1200-1500/-LKR. per 1 kg of prawns.

However, the COVID-19 pandemic situation and the current economic crisis and petrol and diesel shortage created a gap between the demand and

supply of food, access to food supplies, and availability of food; especially, with a higher price increase of the main protein sources such as chicken, eggs and seafood, the issue with the travel and unavailability of local and foreign tourists in the hotels, there was a pause to buy freshwater prawns from the fishermen which lead to change fishermen's regular customer segment (tourist hotels) and sell their freshwater prawns harvest to village customers at lower rates of 900-700/-LKR per 1 kg.

Usually, inland fish production from the reservoirs is predominantly consumed by the local communities, providing a significant proportion of protein requirements; and with the current scenario, low-weight and damaged freshwater prawns also contributed to fulfilling the food security, providing much-needed protein for the local communities, adjacent to the reservoirs and nearby while providing substantial income, which may contribute significantly to rural livelihoods, poverty reduction and provide a stimulus to the local economy.

# Can Vertical Gardening Enhance Food Security in Sri Lanka?



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## What is vertical gardening?

Vertical Gardening is a unique form of urban gardening that is ideal for small spaces and may be used to decorate walls and rooftops in a variety of ways. The possibilities of growing plants in a vertical setting are expanded by this alternative gardening method. Vertical gardens liven up plain walls and serve as a focal point to guide the eye around a room, making them the ideal option for greening courtyards and balconies. When there is not enough area for a traditional garden or pot, green walls are a fantastic way to add plants to a balcony or patio. There is less amount of horizontal space available for outdoor gardening due to intensive urbanization. Green walls are not only incredibly attractive, but they also serve to enliven up the atmosphere. To extend gardens upward, gardeners and designers have used items like pergolas, hanging baskets, arches, and wires throughout history. The vertical garden fills a modern-day need, to provide space-saving options for gardening.



## Factors should consider when doing vertical gardening

- **Type of crop**

Knowing a plant's growth pattern, size, and behaviour on a vertical surface is crucial information for selecting the proper species combinations, which will maintain healthy levels of plant competition. It makes sense to choose the correct plant for the right location in any garden, but perhaps even more so in a vertical garden. The best plants for vertical gardens are low-growing, dense, and compact. Should select species that are suitable for the wall aspect on which they will grow. A sunny wall, for instance, will need a selection of fairly drought-tolerant plants, whereas a shady spot – perhaps under a pergola or verandah – will require a selection of shade lovers, such as ferns. When choosing what to plant where keep in mind that the bottom of the unit will retain more moisture than the top. The choice of plants is dependent on several variables, including aesthetic preferences and the plant's capacity to grow in a soilless, vertical setting.

- **Supporters**

When deciding on the type of support to use for the vertically growing plants, one should think about wind exposure and sunlight, plant size, and maintenance requirements. There are many different kinds of supporters available. There are gazebos, wire cages, netting, bamboo poles, and other structures in addition to trellises, tripods, arches, and pergolas. Even gutters, PVC pipes, and 2-liter plastic soda bottles have been creatively used by certain gardeners.

- **Sunlight**

Depending on where we place the plants, as they develop higher, they can prevent plants behind or below them from receiving sunlight. If we need to shade understorey plants, we should place vertical structures like tepees and arbors there; otherwise, if they don't get enough sun, they might suffer. Some plants love shade or can tolerate semi-shade so take advantage of these spaces by planting vegetables like lettuce or spinach, especially in the warmer months.

- **Irrigation and plant nutrition**

Plants require irrigation to survive. Plants need a consistent supply of water and nutrients to grow properly on vertical surfaces. Useful irrigation methods include bottle irrigation and regular watering with watering cans and similar implements can be used. Nitrogen, phosphorus, and potassium, three vital plant nutrients, should be provided in amounts that correspond to the plants' needs and those that are taken out of the growing medium with the harvest. Utilizing compost, vermicompost, or other organic fertilizer sources is a smart way to accomplish this. In locations with a lack of water, the use of treated or partially treated greywater and reclaimed water can also be a cost-effective alternative water and nutrient supply.

- **Purpose**

The goal of vertical gardening is to increase productivity levels at agricultural production sites in urban and suburban areas, where available space is an agricultural constraint. There are many different design solutions available. The design of a vertical garden is determined by the materials that are accessible, the available space, local preferences, as well as the users' creativity and imagination. Vegetables, fruits, and herbs are examples of food crops, while non-food crops can also be planted (e.g. ornamental plants, and medicinal plants).

## Types of vertical gardening structures

We may use a wide variety of supports and structures to grow plants vertically, so there is a lot of potential for creativity. Building vertical growing systems in the ground or using containers are both options. Additionally, it's not simply restricted to garden plots. Furthermore, vertical garden systems can stand on a patio or deck, swing from balconies, or hang from walls.

## Climbing plant support systems

Vertical growing structures called climbing supports are used to trellis vining plants. Most gardeners only think about adding uninteresting stakes or structures as their plants get bigger and out of pure interest. Climbing plant support systems can, however, be more than just useful, they can also be aesthetically pleasing.

- **Trellises**

The most well-known sort of plant support system is probably a trellis structure, which is available in a wide range of sizes and shapes (from a small fan trellis to a larger structure). However, a trellis is typically a flat structure that is either freestanding or attached to another object, such as a planter, a wall, or a fence.

- **Arbor**

An arbor is a structure that is frequently seen over a pathway or at the entrance to a garden. Depending on the design, they might have a square or an arched top, and their height and width can vary. Latticework is frequently found on the sides of arbors, making it ideal for climbing plants.

- **Teepees**

Teepees are entertaining and simple to build vertical gardening structures. They can be made from anything as easy as a few yard-gathered twigs joined at the top with twine. Alternatively, teepees can be made out of materials like strong garden stakes, metal, or wood to create more long-lasting structures.

- **Pergolas**

Pergolas, which are larger than arbors, are long-lasting constructions frequently used to provide shade for patio, deck, or garden areas. The only real distinction between an arbor and a pergola is frequently its size. Large pergolas are ideal for adding privacy to a sitting area and for converting small garden spaces into rooms.

- **Arches**

An arch in the garden can be an arbor, a pergola, or it can stand alone as a piece of architecture. In the garden, large arches are frequently used to make tunnels or shady walkways. By growing smaller crops underneath little arches and training vines over them, we can double the amount of room that vegetables can grow.

- **Obelisks**

Obelisks are typically found in formal gardens and are pyramid-shaped vertical rising structures with four sides. Obelisks generally come in both round and square shapes. Any form of material, such as wood, metal, or plastic, can be used to create them or even created from natural materials like grapevines and twigs.



# Vertical container garden systems

- **Tower gardens**

In simple terms, a tower garden is a term for tall or stacked container gardens. Tower gardens can be any tall structure made of wood, plastic, metal fencing, or both.

- **Hanging gardens**

Any number of pots or baskets can be hung from a hook on a fence, balcony, or deck to create a hanging garden. Or they could be more elaborate items like flower pots mounted on a railing, attached to a wall, fence, or other vertical hanging objects.

- **Living wall systems**

Growing a huge variety of plants on living walls has become increasingly popular. These vertical gardening systems are especially ideal for those who have small growing spaces. Anyone can start by creating a few wall pockets, or if they have enough room, they can create a larger living wall. A living wall system is made up of vertical modules, planted blankets, or pre-vegetated panels that are connected vertically to a structural wall or frame. These panels can be made of plastic, synthetic fabric or expanded polystyrene, and support a great diversity of plant species ( eg: a lush mixture of ferns, perennials, ground covers, and edible plants). Pre-vegetated panels, vertical modules, or planted blankets (vegetated mat wall) made of plastic, expanded polystyrene, and synthetic fabric and fixed to the structural framework or a wall made of a steel framework typically require more maintenance, such as fertilizer and water, than green facade systems that are planted into the ground.

- **Freestanding vertical gardens**

A self-contained growing system that is not rooted in the ground is a freestanding vertical garden. These growth methods create vertical gardens that don't even need a garden space by creatively utilizing pots and planters. For growing in locations like a deck, patio, or even on a rooftop, freestanding gardens are ideal! There are so many creative ways to use vertical gardening systems to decorate our growing area. Therefore, be sure to spend some time considering the vertical growing techniques you could utilize to create a stunning garden.





## Importance of vertical gardening to ensure food security in Sri Lanka

Several international organizations, notably the United Nations Food and Agriculture Organization (FAO), as well as Sri Lankan academics, professionals, and specialists have made alarming revelations about an imminent food shortage in Sri Lanka. These organizations warn of an upcoming worldwide food crisis that could have an effect on practically every nation in the world, adding fuel to the fire. The fact that world food scarcity would conflict with food imports is the most upsetting one for Sri Lanka because it depends so largely on some basic food imports. Regardless of the amount of space, experts and those involved in agriculture and food production continue to encourage the general population to cultivate food-related plants in their home gardens. The majority of electronic media institutions have also launched several programs to promote home gardening among the general public. In that case, vertical gardening is an ideal solution for small spaces.

Even if there is no food shortage, vertical gardening can solve many issues. It can help with economic growth, environmental problems, pollution, and contaminated food. Additionally, it can increase access to nutritious meals, which can result in a sustainable system. Furthermore, they advise everyone with even a small amount of space to start home gardening to meet the challenge of the upcoming food crisis. Typically, it can be further explained as a mixed cropping system that mostly grows fruits and vegetables for domestic consumption. On a little plot of land, we can cultivate commercially viable crops like medicinal plants, herbs, or ornamental plants. Families can grow their organic food growing vegetables and other plants that are needed for daily consumption in the home. Those that recognize the advantages of organic food, which is often expensive in the grocery market, would greatly benefit from this. Growing organic fruit and vegetables can be profitable, especially for low-income people. The most obvious financial advantage of home gardening is the ability to reduce grocery expenses. If the producers are careful and make sensible decisions, they can make extra money by selling the extra yield in addition to saving money at the market. The idea is best suited for Sri Lankans today because they are under tremendous pressure from many different sources, especially due to inflation and the skyrocketing cost of living. Spending time in an outside garden can significantly improve both physical and mental health. Even a short stroll can be relaxing to reduce anxiety. Spending time in the garden can be pleasant in every way.



# Preventing the Food Crisis from Snowballing into a Hunger Crisis



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Sri Lanka is experiencing a multi-dimensional food crisis, compounded by food insecurity, acute shortages, threatened livelihoods and escalating prices. The significant decrease in agricultural production has restricted access to, and reduced households' capacity to afford, nutritious food. This has led families to opt for less nutritious, less expensive foods, reducing the portion sizes of meals and sometimes even skipping meals entirely. The health impacts of this can be especially damaging for vulnerable groups like pregnant women, those under medication, and children, whose immediate and long-term physical and cognitive developments will be adversely impacted. Against this backdrop, this article seeks to illustrate methods that can be employed to mitigate the risks of the looming food crisis.

Identifying staple food crops that have a short cultivation duration, lower cost of cultivation and require minimal human intervention can provide immediate solutions to the present food crisis. A

good example of such a crop would be finger millet (*Eleusine Coracana*). Commonly known as 'Kurakkan' or 'Kurahan' in Sinhala and 'Kezhvaraku' in Tamil, it is a staple grain that has been traditionally grown in Sri Lanka for centuries. There are many special characteristics associated with finger millet that make it an ideal crop to be cultivated, especially at a time of food shortage. Finger millet can be cultivated and can survive even in adverse environmental and soil conditions. It is a rain-fed crop, requires no fertilizer, and like other varieties of millet is also resistant to pests and diseases. It gives a yield in a relatively short period of about 4-5 months. Finger millet has a shelf-life of several years without reducing its nutritious value and quality.

The above reasons make finger millet an excellent alternative to rice and wheat-based products in fighting hunger as well as fulfilling nutrient requirements. In terms of its nutritious value, it



contains 65-75% carbohydrates, 5-8% protein, 15-20% dietary fiber and 2.5-3.5% minerals like Calcium, Potassium and Magnesium. It has the highest Calcium content among all cereals which is 344mg/100g. 'Kurakkan thalapa', 'Kurakkan roti', 'Kurakkan pittu' and 'Kurakkan kanda' are some of the popular foods made using finger millet. As such, finger millet is considered one of the most nutritious cereals. It is gluten-free and is a filling food that gives you energy and does not make you feel hungry for extended hours. Switching from unhealthy wheat flour-based foods to finger millet-based nutritious foods is a healthy and economical step to take at a time of food insecurity.

Sri Lanka also has a rich variety of indigenous fruits and vegetables such as jackfruit, breadfruit, *kithul*, etc., traditionally consumed for centuries. Additionally, there are around 200 varieties of indigenous potatoes and yams growing in different geographical locations across Sri Lanka. Most of these potato varieties are easy to cultivate and can survive even in harsh environments. Since they are rich in calories and carbohydrates, they are a healthy, low-cost alternative to fulfilling your carbohydrate requirements. Some examples of traditional yams are, *Kirisambalala*, *Kekatiyaala*, *Nelumala*, *Yakuala* and *Kindala* to name a few. Many of these potatoes can even be used to produce flour, which can then be used to prepare other foods. Thereby policies must be formulated to promote indigenous foods and encourage and support indigenous food entrepreneurship.

A promising approach to ensuring household food security is the concept of 'Home gardening'. A sustainable home gardening model is an efficient means of addressing crisis and post-crisis situations. Instead of growing ornamental plants, cultivating essential food crops will not only offer you all the benefits of engaging in gardening, but also make available non-toxic nutritious products to prepare a balanced, wholesome meal for the family. This phenomenon is known as 'Edible landscaping'. Edible

landscaping combines traditional landscaping with micro-farming techniques and incorporates fruit-bearing plants, vegetables, culinary herbs and even edible flowers as a design feature in cultivation plots.

Another approach that revolves around the concept of home gardening is 'Collective home gardening'. Here, around 5-10 neighboring households collectively decide among themselves which food crops to cultivate. Each household may grow up to 5 different crops. The harvest is then distributed among all families. Collective home gardening can help increase food production as well as contribute to a high diversity of foods. This may be termed a 'self-sufficient food production unit' for a small community. Home gardening helps develop agricultural knowledge, attitudes and skills and paves the way to create an agri-based community.

Price hikes and food shortages lead to changes in people's dietary patterns. Diets that are taken during food and hunger crises are known as survival diets. During a food crisis, dietary diversification becomes low and people tend to depend more on starchy staple foods. In addition to hunger, micronutrient deficiency also known as 'hidden hunger' too will be prevalent. Hence a transformation of the dietary patterns of people is urgently required to happen. Several factors need to be considered in this regard. One such factor is familiarity with food. It is unlikely that people would opt for foods that are unfamiliar to them even during a food crisis. Edible plants such as *Monara Kudumbiya*, *Kuppameniya*, *Wal Koththamalli*, *Gira Pala* which are often mistaken as weeds, can be incorporated into our meals in the form of *melluma*, *sambolaya* or a curry. Hence it is important to raise awareness among people about such edible plants that may be found in their home gardens, forests or near and in water bodies.

Another equally important factor is the palatability of foods. Many of us are unaware of how to prepare diverse palatable dishes using the fruits and vegetables we consume regularly. Raw fruits such as star fruit, guava, mango, sour sap, etc. can be used to make delicious curries. This will in turn add variety to our daily meals.

While nature provides ample solutions to tackle the ongoing food crisis, small but significant changes to our attitudes, behaviours and dietary patterns can go a long way in helping achieve food and nutrient security at a time like this.



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# Blue Olives

## A Hidden Fruit in Sri Lanka



### What are blue olives?

Blue is a rare color found in natural food. That is why blue olive becomes an interesting topic these days. Locally known as Nil Veralu (in Sinhala), blue olive is a type of Ceylon olive (*Elaeocarpus serratus*) indigenous to Sri Lanka. *Elaeocarpus serratus* is a tropical flowering plant in the family *Elaeocarpaceae*.

The blue olive, also called Rudraksha, is almost perfectly spherical in shape with bright blue edible skin. Blue olives have a brown seed inside the fruit and the seed has a hard outer shell that is slow for germination and can take up to 2 years.

Blue olives grow in the west and center of Sri Lanka in medium-sized trees with leaves similar to the avocado; however, this is an underutilized species in Sri Lanka. Blue olives are more common in Kandy District and the fruits can be seen in January and February every year. This tropical fruit is found across the Indian Subcontinent, Indo-China, and South East Asia.

### What does blue olive taste like?

The blue olive has a firm, textured green flesh that resembles avocado. When unripe, it is astringent; when mature, it has a slightly sour flavor. Blue olive, especially one referred to as young blue olive by the locals, is used in pickles, boiled or eaten fresh, and sprinkled in chili and salt.

### Nutritional content of blue olives

Due to the blue olive's great nutritional value in terms of vitamins, minerals, fiber, and antioxidants, it has also been traditionally utilized for medical purposes in Sri Lanka. The Ceylon olives possess anti-inflammatory, antibiotic, anti-anxiety, analgesic, antidepressant, and antihypertensive properties.

### Amazing facts on blue olives

- Fights cancer
- Boosts heart health
- Fosters bone and teeth
- Protects eyes
- Health hair growth
- Helps brain function
- Aids digestion
- Strengthens the immune system

### Cultural References of Blue Olives

Blue olives are very religiously significant in many of the neighboring nations, where many people think that blue olives are equivalent to good fortune. The beads in prayer necklaces are made from the seeds of several blue olives types in various Hindu and Buddhist traditions.

# THE FOURTH TURNING: Cleaning, Fixing & Repairing A Mysterious book that speaks the future!



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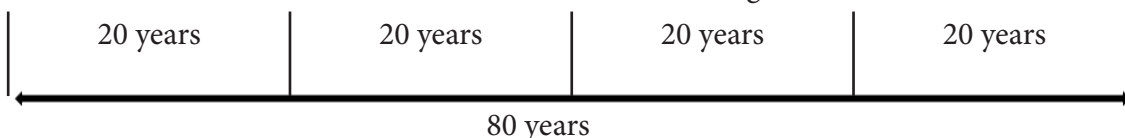
## News Headlines of a few months ago:

<p><b>“A loaf of bread to be sold at Rs.300”</b> - Hirunews.lk Saturday, 03 September 2022</p>	<p><b>“VAT to be increased from 12% to 15%”</b> - Hirunews.lk Tuesday, 30 August 2022</p>
<p><b>“Inflation increases to 66.7% in July”</b> - Hirunews.lk Monday, 22 August 2022</p>	<p><b>“LP Gas price may increase by Rs.50”</b> - Newsfirst.lk Jul 10, 2022</p>

“Crisis” A reduction in production and demand, an increase in unemployment, and corporate bankruptcies are signs of the country’s economy’s sharp decline. High levels of poverty will inevitably result from this. All the crises may not be a global pandemic, but we know something was coming up for decades. When trying to figure out what is happening next and what is going on all over the

globe, our minds opened up towards “THE FOURTH TURNING BOOK”: that is just a mind blower! A book about how and when history repeats itself and this is what the book says:

History repeats itself in 80-year blocks, known as “saeculum” but let’s just call them history blocks. Within these 80 years of history blocks, we have 4 turnings, each turning running for 20 years. Simply, we call it “generations”.



Turning is like seasons, like spring, summer, and falling winter. Throughout our history, we have had these 80-year blocks, which have been remarkably similar to each other.

- a. The first turning is a high/ upbeat era: The period of conformity
- b. The second turning is an awakening/ passionate era: the beginning of social justice
- c. The third turning is an unraveling of a downcast era: Things get messy
- d. The fourth turning is sucking:

The 4<sup>th</sup> turning is an era of upheaval, that we are in right now!! So, let's take a look at our "saeculum", the history block that we are in the crisis.

**Table 1. Sri Lanka History Block from 1946 to 2028**

<b>1946 - 1964 High Era</b>	<b>1964 - 1984 Awakening Era</b>	<b>1984 - 2008 Unraveling Era</b>	<b>2008 - 2028 Crisis Era</b>
<p>On Feb 04, 1948, Ceylon gains independents.</p> <p>Tea, rubber, and coconuts, performed well on international markets and accounted for about 90% of foreign exchange revenues.</p> <p>Senanayake's administration promoted private enterprise and worked to boost agricultural output.</p> <p>The Central Bank Ceylon was set up at the beginning of this period in 1950.</p> <p>The 1950s to boost paddy production and expand the peasant sector</p> <p>Most even distribution of wealth.</p>	<p>During this time, agricultural development takes place.</p> <p>Average yields per acre increased as well, rising from 38.39 bushels in 1964 to 51.3 bushels in 1970 before slightly declining to 45 bushels in 1974.</p> <p>By using more fertilizer and better agricultural techniques, higher yields of paddy were achieved.</p> <p>Sri Lanka has been severely impacted by inflation since the end of 1972.</p>	<p>An unprecedented anti-Tamil pogrom occurred in Colombo in July 1983.</p> <p>By the end of 1989, the government had militarily crushed the violent rebellion of the Sinhala youth, but the JVP had remained active in politics.</p> <p>But the LTTE and the government troops have still been at war in the Tamil separatist conflict.</p>	<p>In March, Sri Lanka's inflation rate climbed to 18.7 percent, up from 15.1 percent in February – its highest level since October 2008.</p> <p>In provinces where agriculture is still a major economic activity, growth was slower as a result of the agriculture sector's muted performance.</p> <p>In February 2022, inflation increased to 17.5% mostly as a result of significant food inflation of 24.7 % which occurred in the context of growing global commodity prices, changes in gasoline prices, and partial monetization of the fiscal deficit.</p>

The fascinating fact about this book is it was written during the last 3<sup>rd</sup> turning and published in 1997. However, the book has predicted the present. In this 4<sup>th</sup> turning what's happening now is right on schedule. Now it is our turn to save the country. So where do we fit into all this? What's our role? It depends on when we were born. Each generation, each cohort tends to embody a specific archetype - an archetype that will move society towards the next high. Each generation's archetype is the characteristic that will define the generation's in's prime in midlife.

- a. The boomer archetype is the prophet:
- b. Generation x is the nomad generation
- c. Millennials are the hero generation
- d. Generation Z

**Table 2. Cohorts with Archetypes.**

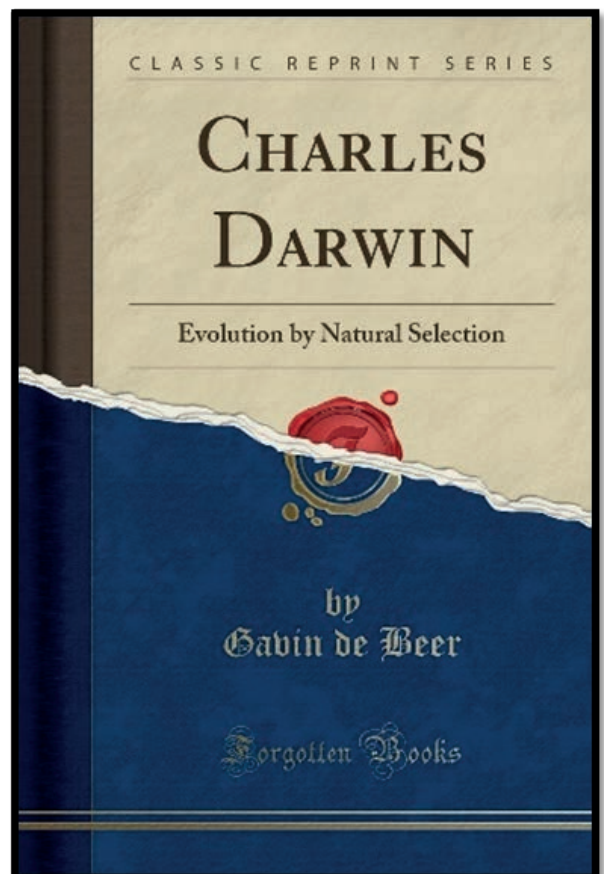
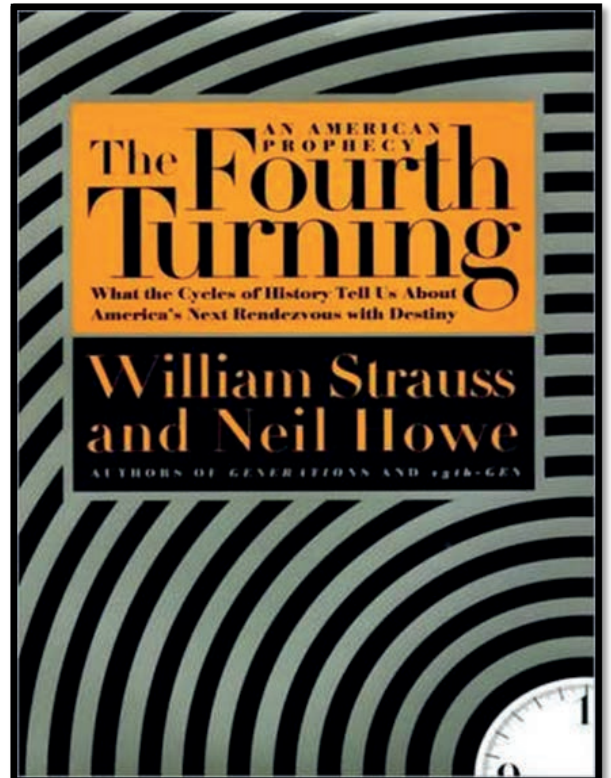
1946 - 1964 High Era BOOMERS Ex: Bill Gates Steve Jobs	1964 - 1984 Awakening Era GEN - X Ex: Ellon Mask	1984 - 2008 Unraveling Era MILLENNIALS Ex: Malala Yousuf	2008 - 2028 Crisis Era GEN - Z ????
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We don't know what generation Z will do, but it will be an artist generation. Every 80 years prior something big comes along and changes everything and now we are at the end of our history block. Right in the middle of our crisis, we are in the process of changing our world and country again. The author of the 4th turning tells us that these crises are like forest fires: unpleasant but necessary. They clean the woods for new growth. As we work towards our next high, this crisis will tilt the playing field away from the old and towards the young, but victory is not guaranteed.

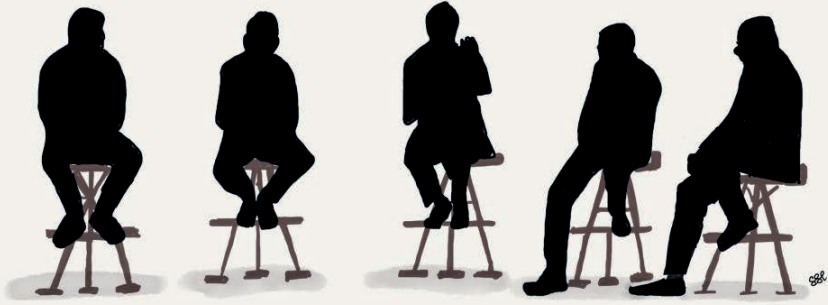
Each of us needs to rise to the occasion. During this crisis, we will need to develop and fortify our virtues as we pursue a greener pasture. How can we contribute to helping end the crisis as our cohort is generation X, the repair generation, the one stuck with fixing the messes and cleaning up the debris left by others?

Cleaning!  
Fixing!  
Repair!

There is another mysterious book too. It is Charles Darwin's "NATURAL SELECTION". According to the "Natural Selection" theory, more individuals are produced in each generation that can survive. Individuals with heritable traits better suited to the environment will survive. Thus, the economic crisis is the environment that is about to select only some sort of people who will be responsible for the future generation!!



**Figure 1. The books tuned our mind**



# 17, DEC 2022 | 4 – 6 PM PANEL DISCUSSION



## Building Resilience in Tropical Agroecosystems (BRITAE) in Changing Climate

The panel discussion is organized by the International Project BRITAE which is a consortium of nine Higher Educational Institutions from Sri Lanka, Estonia, Lithuania, and United Kingdom; The BRITAE project is funded by the EU program ERASMUS+, for Capacity Building in the field of Higher Education. The BRITAE project aims at developing joint curricula modules on building resilience in tropical agro ecosystems in Sri Lankan universities to increase their capacity to modernize and enhance the quality and relevance of education of students to meet the challenges of the global market needs while ensuring international cooperation. The panel discussion aims to share the results of the research conducted by the project and project outcomes in Building Resilience in Tropical Agroecosystems pertaining to Sociology, engineering, food security, agribusinesses etc. for building disaster resilience in changing climate.

### Themes

- ✓ Disaster Risk Reduction and Management
- ✓ Engineering aspects of building resilience in changing climate
- ✓ Building resilience in tropical agroecosystems in changing climate
- ✓ Social aspects of building resilience in changing climate
- ✓ Business aspects in agriculture in changing climate
- ✓ Ensuring food security in changing climate

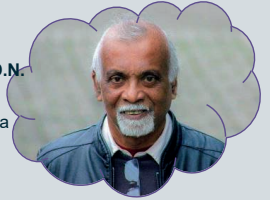
Date - 17<sup>th</sup> December 2022 | Time 4.00 - 6.00 pm

Physical Venue - Main Hall, Earls Regency

Mode Hybrid

Narrator:

**Emeritus Prof: K.D.N. Weerasinghe**  
University of Ruhuna



**Prof. Ranjith Dissanayake**  
University of Peradeniya

**Prof. Dilanthi Amaratunga**  
University of Huddersfield



**Prof: G.Y. Jayasinghe**  
University of Ruhuna

**Prof. Nishara Fernando**  
University of Colombo



**Prof: S.B. Navaratne**  
University of Sri Jayewardenepura

**Prof. D.A.M. De silva**  
Sabaragamuwa University of Sri Lanka



## The Kandy Conference



**International Conference on Sustainable Built Environment 2022**

**"Building Sustainable Nations"**

December 16<sup>th</sup> - 18<sup>th</sup>, 2022

Earl's Regency Hotel, Kandy, Sri Lanka



Lead

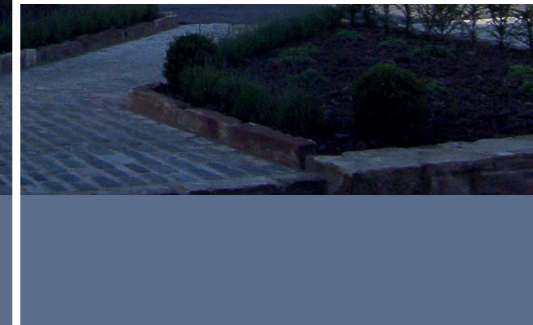


Project Partners





# Edinburgh's Countryside Retreat: **Lessons from Swanston Farm**



Swanston is an Agro tourism destination located in Edinburgh, United Kingdom. The farm operates for nearly 700 acres mainly with 02 permanent employees and a handful of part-time employees. The farm offers the following services for its visitors.

- Find our highland cows' activities

Swanston Farm is a working farm, and on its 300 acres of hilly terrain, they have their herd of Highland Cows that live freely. If visitors to Swanston Farm are willing to take a short hike up the hill, they can see the farm's Highland cows. Also, they permit capturing photographs of the cattle.

- Gift shop

The shop sells Highland cow-related souvenirs.





- Dining services – Brasserie

Their family-friendly Brasserie is the ideal spot to unwind, with panoramic views of Edinburgh, the Pentland Hills, and the Firth of Forth. Open seven days a week for breakfast, lunch (which includes a children’s menu), hot drinks, cakes, and traybakes, they have something for every appetite in addition to their renowned homemade scones. Swanston Brasserie can accommodate every occasion of an individual and is also available for weddings and special events, including gorgeous balcony dining.

- Stay in- holiday cottages

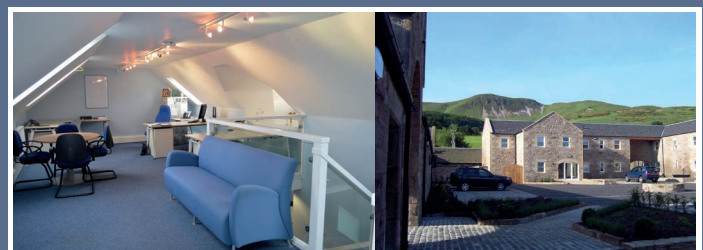
Their cozy 4-star self-catering vacation cottages, which are conveniently located on the outskirts of Edinburgh, are tucked away in the tranquil courtyard of a former farm steading.

- Ride – the Equestrian

Horse owners have full access to riding in the countryside from their private livery yard, as well as stunning city views. Their 700-acre farm serves as the starting point for many rural trails, and with a small herd grazing in spacious fields, visitors’ horses and ponies will enjoy the peaceful outdoor lifestyle here.

- Work – open plan office spaces

Within a few minutes from Edinburgh Airport, Edinburgh City Center, and the City Bypass are high-quality converted agricultural steading structures that are soaked in light. Their open-plan offices also enjoy free parking and beautiful views of the surrounding countryside.



- Mountain biking

Swanston Farm's 300 acres of the hill offer a variety of mild to severe terrain for mountain bikers to explore, enabling them to also take in the scenery and the wildlife. The 300 acres of the hill include a variety of natural terrain and man-made paths. Mountain cyclists may enjoy year-round riding around and beyond Swanston Farm because of its proximity and accessibility, which provides immediate access to the expansive Pentland Hills Regional Park.



- Trekking

Even kids and bicycles can easily meander or take a brief dog walk around the farm thanks to its flat tracks and woodland walks, which also make it accessible to pedestrians. If visitors are looking for a more difficult hike, there are hillside pathways that take them past Swanston Village's old thatched cottages and rapidly up into the hill above the Farm, where they can immediately see a breathtaking view of Edinburgh, the Lothians, and the Firth of Forth.



- Golf course

Golf courses with 18 holes and shorter distances, practice areas, and beautiful landscapes are available for players of all skill levels.



- Wedding services



Originally designed to be a crop farm, but now with the high demand, the farm has been converted into an Agro-tourism destination. Also, by offering the above services to their visitors, the farm earns a premium than they had been earning with crop cultivation.

Their success story delivers an important lesson for Sri-Lankan farmers as well. Sri Lanka being a world-renowned tourism destination with its unique climatic and environmental conditions, has the potential to attract more tourists through Agro-tourism. For example, a farmer in Rajarata can add an arm for his Chena cultivation with a few more tree houses and enter into Agro tourism. Moreover, by initiating U-pick-up-like services, even the local customers can be attracted.

This is crucial since the crop production or livestock production yet alone proved not enough for the economic development. By incorporating Agro tourism-based activities as listed above, the farmers and the farming communities can earn the following benefits.

- Increased Seasonal flexibility
- Direct marketing opportunities
- Increased sales
- Income diversification and risk reduction
- Increased resilience to economic shocks

## Acknowledgment

This article was shaped using insights from the BRITAE project's UK Visit (September 2022). The tour to the Swanston farm had been organized by the University of Huddersfield, led by Professor Dilanthi Amaratunga.

(Image courtesy: <https://swanston.co.uk> )



(BRITAE Team: Sabaragamuwa University of Sri-Lanka)

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කෘෂි විද්‍යා පීඨය  
ශ්‍රී ලංකා සබරගමුව විශ්වවිද්‍යාලය

ශ්‍රී ලංකාව, 1948 වසරේ නිදහස ලබා ගත් පසු අත් විදින දුරුණුතම ආර්ථික කඩා වැටීමට මේ වන විට මුහුණ දෙමින් සිටියි. එහි අවාසනාවන්ත ප්‍රතිපලයක් ලෙස, 2019 වසරේ ලෝක ආහාර සුරක්ෂිත දර්ශකයෙහි 66 වන ස්ථානයෙහි සිටි ශ්‍රී ලංකාව අද සිටින්නේ 79 වන ස්ථානයේ ය. ලෝක ආහාර වැඩි සටහන පෙන්වා දෙන පරිදි, ශ්‍රී ලංකාවේ මිලියන 6.3 කට වඩා වැඩි පිරිසක් ආහාර අනාරක්ෂිතභාවයෙන් දැඩි ලෙස පීඩා විඳිති. එසේම මිලියන 5.3 ක පිරිසක් ප්‍රමාණවත් ලෙස ආහාර නොගැනීම හෝ ආහාර වේල ගණන සීමා කිරීම සිදු කරන බවද සමීක්ෂණ වලින් හෙළිවී ඇත. සීඝ්‍රයෙන් ඉහළ යන ආර්ථික උද්ධමනය සහ ආහාර හිඟතාව මෙම තත්ත්වය තවත් දුරුණු තත්ත්වයකට ඇද දමා ඇති බවක් පෙනී යයි. එක්සත් ජාතීන්ගේ ළමා අරමුදල පෙන්වා දෙන පරිදි, ළමා මන්දපෝෂණය සීඝ්‍රයෙන් හිස ඔසවමින් පවතින අතර ළමා මන්දපෝෂණයෙන් දුරුණුතම ලෙස පීඩා විඳින රටවල් 10 අතර ශ්‍රී ලංකාව ද සිටි ම කණගාටුවට කරුණකි. ප්‍රෝටීන මන්දපෝෂණයට පෙර සිට ම හඳුනාගත් ලාහදායී ම විසඳුම ලෙස ප්‍රචලිත වී ඇත්තේ කුකුළු මස් සහ බිත්තර පරිභෝජනය වුව ද පවතින තත්ත්වයන් යටතේ කුකුළු ආහාර සහ ආහාර සංසිද්ධිවල අනපේක්ෂිත මිළ ඉහළ යාම සහ නිෂ්පාදන වියදම් ඉහළ යාම හේතුවෙන් මිළ ඉහළ ගිය කිකිලි බිත්තර සහ කුකුළු මස් මිළදී ගැනීමට පාරිභෝගිකයා තුළ ඇත්තේ දැඩි අකමැත්තකි. මෙවන් පසුබිමක කුකුළු ගොවිපොල මහතන් මෙන් ම පාරිභෝගිකයා ද ආර්ථිකමය අතින් ඉතා අවාසනාවන්ත තත්ත්වයකට ඇද වැටෙමින් පවතී. මෙවන් ආර්ථිකමය රාමුවකට කොටුවීම වෙනුවට මේ සඳහා ඇති වෙනත් විකල්පයක් වෙත ඔබේ අවධානය යොමු කිරීම මෙම ලිපියෙහි අරමුණ යි.

වර්තමාන පාරිභෝගිකයින් සඳහා මස් සහ බිත්තර සැපයීම වෙනුවෙන් වඩාත් ප්‍රචලිත සහ ප්‍රමුඛ දායකත්වයක් ලබා දෙනුයේ ගෘහාශ්‍රිත කුකුළු ප්‍රභේදයන් ය. මේ සඳහා තාරාවන්, පාත්තයන්, කළුකුම්, වටුවන් සහ ගිනි කුකුළන් වැනි අනෙකුත් පක්ෂි විශේෂයන් යොදා ගත හැකි වුවද, සමස්තයක් ලෙස ඒ සඳහා ලෝකය පුරා මෙන් ම ලංකාවේ ද පැහැදිලිවම ඇත්තේ ඉතා අඩු අවධානයකි. මේ සඳහා විවිධ කරුණු බලපෑ හැකි නමුදු පවතින ආර්ථිකමය වටපිටාව තුළ එවැනි පක්ෂි විශේෂ සඳහා අවධානය යොමු කිරීම කාලීන අවශ්‍යතාවක් වනු නොඅනුමානය.

කුකුළන් හැරුණකොට ඉහත සඳහන් කළ අනෙකුත් පක්ෂි විශේෂ අතුරින් තාරාවන් (*Anas platyrhynchos domesticus*) යනු ශ්‍රී ලංකාවේ දෙවැනියට වැඩිම ගහන සහත්වයක් ඇති සහ බහුලව ම ඇතිකරන පක්ෂි විශේෂය යි. ගෘහාශ්‍රිත කරන ලද තාරාවන් කැලෑ තාරාවුන් ගෙන් පැවැත එන බව අතීතයේ සඳහන් ය. තාරාවන් ගෘහාශ්‍රිතකරනය මෙයට වසර 2200 කට පමණ පෙර වීනයෙහි සිදු කරන ලද බව පැවසේ. ජන ලේඛන හා සංඛ්‍යා ලේඛන දෙපාර්තමේන්තුවේ 2015 සහ 2021 ඉදිරිපත් කරන ලද දත්ත වලට අනුව එම වර්ෂ වල ලංකාවේ තාරා ගහනය පිලිවෙලින් 11,590ක් සහ 19,835ක් වේ වර්තමාන මිලියන 41.97 ක් වූ ගෘහාශ්‍රිත කුකුළු ගහනය හා සැසඳූ කළ එම සංඛ්‍යාව නොසැලකිය හැකි තරමයි ලොව පුරා විවිධ තාරා ප්‍රභේද විසිරී සිටියද ලංකාවෙහි දැකිය හැකි ප්‍රභේද ඉතා අල්පය. වෙලෝව් (Velovi), පෙට්‍රොක් (Petrock), කාකි කැමිබෙල් (Khaki

Campbell), මස්කව් (Muscovy), සහ විග්‍රෝ (Vigro) නැමති ප්‍රභේද මේ අතර විශේෂය.

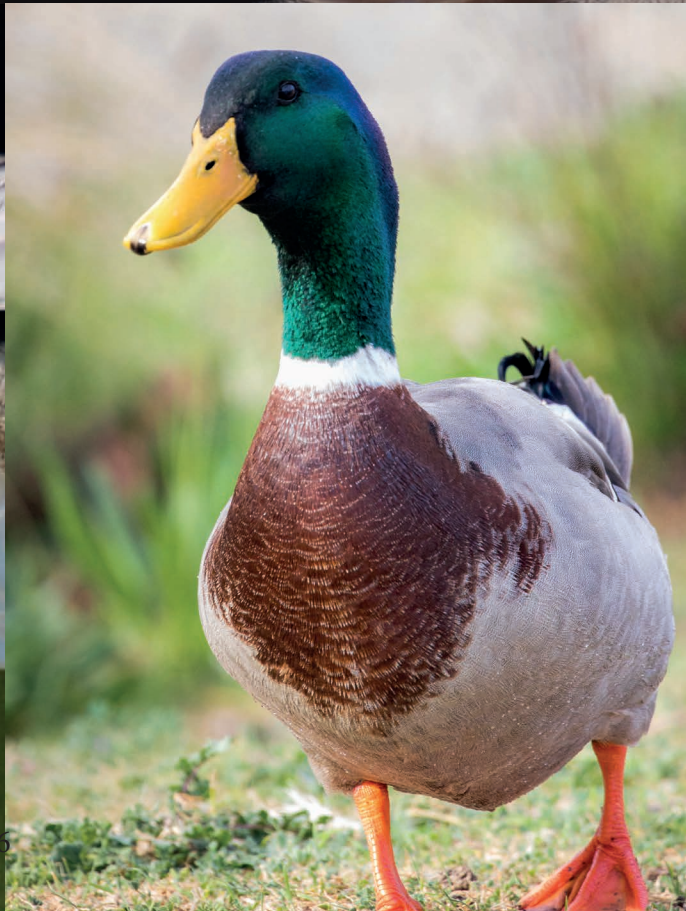
තාරාවන් ඇති කිරීම සඳහා අවශ්‍ය මූලික දැනුම ලබා ගත හැකි ක්‍රමවේදයන් සීමිත වීම, තාරාවුන් ප්‍රභේද බහුල නොවීම, සාම්ප්‍රදායික ආහාර රටාවකට ඇති දැඩි නැඹුරුව සහ තාරාවුන් සඳහා ම විශේෂිත ලෙස සැකසූ ආහාර වෙළඳ පොළෙහි නොමැති වීම වැනි හේතූන් නිසා තාරා පාලනය ශ්‍රී ලංකාව තුළ ජනප්‍රිය නොවුවද තාරා පාලනයෙහි ඇති වාසි බොහෝ ය.

කිකිලියන්ගේ බිත්තර නිෂ්පාදන ධාරිතාවය හා සැසඳුව කල සමහර තාරාවෝ ප්‍රභේද වැඩි බිත්තර ප්‍රමාණයක් නිෂ්පාදනය කරති. බිත්තර සඳහා ඇතිකරන තාරාවුන් ප්‍රභේද කි.ග්‍රෑම් 2 ක් පමණ බරෙන් යුක්ත වන අතර මාස 6 ක් හෝ 7ක් වන විට බිත්තර දැමීම ආරම්භ කරනු ලැබේ. උපරිම තත්වයන් යටතේ වාර්ෂිකව බිත්තර 200 ත් 300ත් අතර ප්‍රමාණයක් අවුරුදු 3ත් 10ත් අතර කාල පරාසයක් තුළ නිපදවීමට මොවුන් සමත් ය.

එසේම බිත්තරයක සාමාන්‍ය බර සැලකූ කල තාරා බිත්තරයක් ග්‍රෑම් 65 ත් 70 ත් අතර බරකින් යුක්ත ය. මධ්‍යම ප්‍රමාණයේ කිකිලි බිත්තරයක සාමාන්‍ය බර ග්‍රෑම් 50ක් පමණ වේ. එබැවින් සාමාන්‍ය කිකිලි බිත්තරයකට වඩා තාරා බිත්තරයක් 30% ත් 50% ත් අතර ගුණයකින් විශාල වන බැවින් බිත්තරයක පෝෂ්‍ය ගුණය අතින් සලකා බැලූ කල තාරා බිත්තර ඉහළ පෝෂණ ගුණයකින් යුක්ත බව කිව හැකි ය. තාරා බිත්තර වල ඇති සුදු මදය කිකිලි බිත්තර වල සුදු මදයට වඩා ඝනකමින් සහ දුසුච්ඡතාව අතින් ඉහළ බැවින් ගුණාත්මක බවින් ද පිරිපුන් ය. තාරා බිත්තර කිකිලි බිත්තර හා සමානව ම ප්‍රෝටීන් බහුල ආහාරයකි. බර අනුව සැලකූ කළ තාරා බිත්තර ග්‍රෑම් 100 ක ඇති ප්‍රෝටීන ප්‍රමාණය ග්‍රෑම් 12.8 කි. තාරා බිත්තර ශක්ති ජනක ආහාරයක් වනවා සේම යකඩ, විටමින් සහ කැල්සියම් බහුල ආහාරයකි. එසේම කිකිලි බිත්තර සමග හෝ ඒ වෙනුවට ආදේශකයක් ලෙස මේවා පහසුවෙන් භාවිත කිරීමට හැකියාවක් ද ඇත. සමහර අවස්ථාවන්හි දී එම බිත්තරවල රසය කිකිලි බිත්තරවල රසයට වඩා වෙනස් වීමට හැකි වුව ද කුළු බඩු භාවිතය මගින් එම රසය මගහැර ආහාරය වඩාත් රසවත් ලෙස පිලියෙල කර ගැනීමට පුළුවන. තාරා බිත්තර වල මේදය ප්‍රතිශතය සප්තස්ව ඉහළ අගයක් ගන්නා අතර එහි කොලෙස්ටරෝල් ප්‍රමාණය (මිලි ග්‍රෑම් 619) කිකිලි බිත්තරයක ඇති ප්‍රමාණයට (මිලි ග්‍රෑම් 180) වඩා ඉහළ ය. හදවත් රෝගීන් සහ දියවැඩියාව සහිත රෝගීන් තාරා බිත්තර අනුභවයේදී සැලකිලිමත් වීම වැදගත් වුවද නිරෝගී පුද්ගලයින් සඳහා එය තීරණාත්මක සාධකයක් නොවන බව බොහෝ පාරිභෝග කයෝ නොදනිති. තාරා බිත්තර වල කහ මදයෙහි අඩංගු කෝලින් (Choline) නැමති සංඝටකය අක්මාවෙහි මේද ප්‍රමාණය තුලනය කරන අතර කොලෙස්ටරෝල් අවශෝෂණය යාමනය කරයි. කොලෙස්ටරෝල් පරිවෘත්තීය ක්‍රියාවලිය සඳහාද කෝලින් උපකාරී වන

අතර එමගින් රුධිර ගත කොලෙස්ටරෝල් ප්‍රමාණය ඉහළ යාම වළක්වා ගනී නිදැලි ක්‍රමය යටතේ ඇතිකරන ජලජමය ආහාර ආහාරයට ගන්නා තාරාවන්ගෙන් ලබා ගන්නා බිත්තර වල අසංතෘප්ත මේද අම්ල බහුලව ඇති අතර ඔමේගා-3 මේද අම්ල ද බහුල යි එමගින්ද රුධිර ගත කොලෙස්ටරෝල් ප්‍රමාණය පාලනය කර හෘද රෝග තත්වයන් ඇති වීමේ අවදානම අවම කෙරේ. කිකිලි බිත්තර වලට (මි.මි. 0.3) වඩා තාරා බිත්තර කටුව (මි.මි. 0.5) ඝණකමකින් යුක්ත ය. එමගින් බිත්තර ප්‍රවාහනයේදී බිත්තර කටුව බිඳී යාම නිසා සිදුවන හානි අවම කර ගැනීමට හැකි වන අතර බිත්තරය සෞඛ්‍ය ආරක්ෂිතව පාරිභෝගිකයා අතට පත් කිරීමට හැකියාවක්ද ලැබේ.

මස් පිණිස ඇති කරන බොහෝ තාරා ප්‍රභේද කි.ග්‍රෑම් 4 ත් 5.5 ත් අතර බර ප්‍රමාණයකින් යුක්ත වන අතර සති 7 ක් හෝ 8 ක් වන විට මස් පිණිස භාවිත කළ හැකි ය. මස්කව් (Muscovy) නැමති තාරා විශේෂය සති 10 ක් හෝ 12 ක් පමණ වන විට මස් පිණිස යොදා ගැනීමට පුළුවන. අනෙකුත් මස් වර්ග හා සැසඳූ කල තාරා මස් සඳහා ලංකාවේ ජනයා අතර ඉල්ලුමක් නොතිබුන ද අනෙකුත් ආසියාතික, ඇමෙරිකානු, යුරෝපීය රටවල සහ ඕස්ට්‍රේලියාව යන රටවල තාරා මස් සඳහා ඇත්තේ අධික ඉල්ලුමකි. තාරා මස් වල රසය සහ පෝෂණ ගුණය මේ සඳහා හේතු වී ඇති බව නොරහසකි. තාරා මස් වල ප්‍රෝටීන ප්‍රමාණය 20.8% ක් පමණ වන අතර කුකුළු මස් වල එම අගය 19.5% ක් පමණ වේ. එපමණක් නොව තාරා මස් අත්‍යවශ්‍ය ඇමයිනෝ අම්ල සඳහා කදිම ප්‍රභවයකි. සම සහිත තාරා මස් වල ඇති මේද ප්‍රමාණය 39.3% ක් පමණ වන අතර මෙම අධික මේද ප්‍රමාණය නිසා එහි භෞතරසායනික ගුණාංග වලට යම් බලපෑමක් ඇති කළහැකි මෙන් ම කල් තබා ගැනීම සම්බන්ධයෙන් ද ගැටලු ඇති කිරීමට වැඩි ප්‍රවණතාවක් පවතී.



තාරාවන් ඇති කිරීම නිදැලි ක්‍රමය, අඩ සියුම් ක්‍රමය සහ සියුම් ක්‍රමය යන ක්‍රම තුනම භාවිත කර සිදු කළ හැක. මුත් වර්තමාන ආර්ථික තත්ත්වයන් සලකා බලන විට නිදැලි ක්‍රමය ගොවි මහතුන්ගේ වඩාත් පහසුවක් ලබා දෙනු ඇත. තාරාවන් වී වගාව ආශ්‍රිත ව ඇති කිරීම විනය, ජපානය, විශේෂභාවය, නාසිලන්තය වැනි ආසියාතික රටවල බහුලව සිදු කෙරෙන අප රටෙහි එවැනි වටිනා සංකල්පයක් ක්‍රියාත්මක කිරීමට ගොවිමහතන් ඉදිරිපත් නොවීම කණගාටුවට කරුණකි. මෙවැනි ක්‍රම භාවිතා කරන්නේ නම් අපගේ ප්‍රධාන ආහාරය වන සහල් නිෂ්පාදන වියදම් අවම කිරීමට හැකි වනවාක් මෙන් ම සත්ව නිෂ්පාදනයේ සාන්ද්‍ර ආහාර සඳහා වැයවෙන පිරිවැයද අවම කරගත හැකිවනු ඇත. තාරාවන් ගේ මළ ද්‍රව්‍ය වී වගාව සඳහා ස්භාවිකව ම එකතුවන බැවින් මිනිස් ශ්‍රමය සහ රසායනික පොහොර සඳහා දැරීමට සිදු වන වියදම් අවම වන අතර කුඹුරෙහි සහ ඒ අවට පහසුවෙන් ලබා ගත හැකි තෘණ වර්ග, ජලජ පැලෑටි වර්ග, කුඩා මිරිදිය මත්ස්‍යයින් සහ කෘමීන් වර්ග තාරාවන්ගේ දෛනික ආහාරය අවශ්‍යතාවයන් සපුරනු ඇත. මෙම සමෝධානිත ක්‍රමය යටතේ ගොයම් පැළ සිටුවා සතියකට හෝ දෙකකට පසු තාරා පැටවුන් හඳුන්වා දීම වඩාත් සුදුසුය. විලෝපිකයින්ගෙන් තාරාවුන් ආරක්ෂා කර ගැනීම සඳහා විදුලි වැටක් හෝ සුදුසු අන්දමේ ශක්තිමත් වැටක් කුඹුර වටකර සකස් කිරීම අවශ්‍ය ය. තාරාවන් සඳහා රාත්‍රී කාලය ගත කිරීම පහසුවන සේ කුඩා කුඩුවක් සැපයීම වැදගත් ය. වර්ග මීටර් 1000 කට සතුන් 15 ක් හෝ 20 ක් හෝ සිටීම ප්‍රමාණවත් ය. මෙම තාරාවන් ගොයම කිරී වදින තෙක් කුඹුරෙහි තැබිය හැකි අතර ගොයම් කැපු පසු නැවත කුඹුරට දැමීමට පුළුවන. ගොයම් පැළ වලට හානි කරනු ලබන ගොළු බෙල්ලන්, පණුවන්, කෘමීන් සහ මදුරු කිටයින් තාරාවන් විසින් කා දමන බැවින් ගොයම් පැළ ආරක්ෂා වන අතර ඔවුන්ගේ හොට සහ පාද මගින් පස බුරුල් කෙරෙන බැවින් පසෙහි වාතාශ්‍රය සහ පෝෂ්‍ය ගුණය වැඩි දියුණු වේ. මෙම ක්‍රමය මගින් ගොවි මහතාට රසායනික පොහොර සහ කෘමිනාශක සඳහා දැරීමට යන පිරිවැය අවම කරගත හැකිවාක් මෙන් ම තාරාවන්ගෙන් ලැබෙන මස් සහ බිත්තර කාබනික නිෂ්පාදන ලෙසට වෙළඳ පොළෙහි ඉතා පහසුවෙන් වැඩි මිලකට අලෙවි කරගත හැකිවනු ඇත.

මෙසේ වී සහ තාරාවන් සමෝධානිත ක්‍රමයට ඇති කළ හැකිවාක් මෙන් ම වී වගාව, මිරිදිය මසුන් සහ තාරාවන් සමෝධානිත ක්‍රමය යටතේ ඇති කිරීමට ද පුළුවන. මෙහිදී තාරාවන් දහවල් කාලයේ දී කුඹුරෙහි සහ පොකුණෙහි ගත කරන අතර රාත්‍රී කාලය පොකුණට උඩින් සාදන ලද කුඩුවෙහි ගත කරනු ඇත. මෙහිදී තාරාවන්ගේ මළ ද්‍රව්‍ය නිසා ගොයම් පැළ මෙන්ම මත්ස්‍ය වර්ධනයද හොඳින් සිදුවේ. මෙහිදී ද තාරාවන් විලෝපිකයින් ගෙන් ආරක්ෂා කර ගැනීම පිණිස ශක්තිමත් වැටක් ගැසීම අවශ්‍යවේ. මේ සඳහා වර්ග මීටර් 60 ක පමණ පොකුණක් තිබීම ප්‍රමාණවත් ය.



අනෙක් ප්‍රචලිත සමෝධානිත ක්‍රමය වනුයේ වී වගාව, තාරාවන් සහ ඇසොල්ලා (Azoll) නැමති නයිට්‍රජන් තිර කිරීමෙහි හැකියාව ඇති ජලජ පැලෑටි වර්ගය සමග වගා කිරීම ය. මෙමගින් ද රසායනික පොහොර සහ කෘමිනාශක සඳහා ගොවිමහතන්ට දැරීමට සිදුවන පිරිවැය ඉතිරිවන අතර ඇසොල්ලා පැලෑටිය අවසානයේ සත්ව ආහාරයක් ලෙස ද යොදා ගැනීමට පුළුවන. මෙවැනි සමෝධානිත ක්‍රම මගින් කාබනික වී වගාව මෙන්ම කාබනික සත්ව නිෂ්පාදනයද සෞඛ්‍ය සම්මිපන්න ලෙස වෙළඳ පොළට එදිරිපත් කිරීමට ශ්‍රී ලාංකේය ගොවිමහතන්ට හැකිවනු ඇත.

නිදැලි ක්‍රමය සඳහා වැඩි ඉඩ ප්‍රමාණයක් අවැසි වුව ද අත් හැර දමනු ලැබූ වගුරු බිම් සහ දිය කඩිති ද තාරා පාලනය සඳහා යොදා ගත හැකි යි තාරාවුන්ගේ රෝග වලට ඔරොත්තු දීමේ හැකියාව කුකුළන්ට වඩා ඉහළ වන බැවින් රෝග මර්ධනය සහ ප්‍රතිකාර සඳහා අධික වියදම් දැරීමට ගොවිමහතන්ට සිදු නොවේ.

පවතින ආර්ථික වට පිටාව තුළට රසායනික පොහොර සහ කෘමිනාශක සඳහා යන පිරිවැය කපා හරින අර්ථවත් විසඳුමක් ලෙස තාරා පාලනය හැඳින්වීමට පුළුවනි එපමක් නොවට රසායනික පොහොර සහ කෘමිනාශක නිසා වර්තමානයෙහි ඇතිවී තිබෙන පාරිසරික ගැටලු සහ සෞඛ්‍ය ගැටලු නිශේධනය කිරීමට තාරා පාලනය මහඟු අත්වැලක් වනු නො අනුමාන ය. සාන්ද්‍ර ආහාර සඳහා දැරීමට සිදුවන අධික පිරිවැය ද මිළ අධික ආහාර සංඝටක සෙවීමට වැයවන ශ්‍රමය සහ වටිනා කාලයද මෙමගින් ඉතිරි කර ගැනීමට හැකි වනු ඇති එපමණක් නොව සෞඛ්‍ය සම්පන්න ළමා කැළක් බිහි කිරීමටද එය මහෝපකාරී වනු ඇත.

# How to Empower Your Business through Cyber Marketing During a Crippled Economy



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Since the dawn of the twenty-first century, computers have been used for more than just data collection, storage, and processing; the advent of the internet has fundamentally changed how they are used. The massive development of internet applications gradually has an impact on a wide range of fields, such as education, business, marketing, communication, management, and entertainment, and ultimately it affects every one of our daily lives. People who use the internet are now expanding rapidly as well.

## What is Cyber-Marketing?

The concept of cyber marketing is strongly entrenched in the practice of promoting goods and services over the internet through a number of techniques, including display advertising, email marketing, viral marketing, search engine marketing, blog marketing, content marketing, and video marketing. Cyber marketing is somewhat more expensive than traditional methods of advertising and offers the chance to interact with a group of customers that use technology.

Cybermarketing is the process of marketing goods and services to the targeted segment via computers linked to the internet. It incorporates all online advertisement methods, including emails, websites, web banners, forums, and social media. Cyber marketing Techniques can be divided into two parts Social Media Marketing and Search Engine Marketing.

## What are the Cyber Marketing Techniques?

- Social Media Marketing
- Search Engine Marketing (SEM)
- Content Marketing
- Email Marketing
- Remarketing
- Video Marketing
- Marketing on Forums and Community platforms

## Cyber marketing during the crippled economy

Even during a crippled economy, people think cyber marketing is also useless but it is not what we see. Since customers spend less during this era of inflation, digital marketers are hesitant to invest money in marketing.



However, as evidenced by the data, this is not the case, and this creates greater room in an advertising and marketing field that is suddenly less competitive. Consumers spend more time on media to gather news about the economy, and marketers should be there with ads in those moments — and they will have to pay more to sustain that presence.

Less competition and a larger audience share equal opportunities. Marketers may take advantage of this opportunity by running limited-time, quantifiable incentives that fast increase new customer acquisitions, allowing them to grow their customer database and first-party data, and then utilize email marketing to nurture and create loyalty.

Coupons, rebates, contests, freebies, and games are just a few examples of how digital marketers may capitalize on the inflationary time by spending more, not less, and having a favorable impact.

### Benefits for your business using Cyber Marketing

Businesses may use internet marketing to give material to their clients in a tailored and cost-effective manner. With all of the advantages that internet marketing can provide for a company, creating a professional internet marketing strategy may attract more people to the product or brand, allowing the company to flourish.

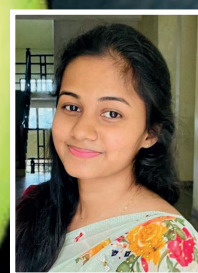
One of the most significant advantages of cyber marketing is its tremendous ease. The internet is incredibly easy to use, with customers utilizing it to reach markets all around the world. As a result, purchasing items across borders now lowers the cost of transportation. Another advantage of internet marketing is its minimal running costs. cyber marketing is less expensive than traditional ways of advertising such as commercials in newspapers, on television, and on the radio. Online marketing allows you to simply obtain a free listing in a variety of company directories. The capacity to assess and track results is a feature of cyber marketing that is rarely present in traditional marketing. Your company can use many techniques for tracking the success of your advertising initiatives using web marketing. You may use these tools to not only assess and track the development of your marketing effort but also to depict it in detailed visuals.

Marketing your products and services online allows you to target demographic populations. This helps

you to focus your efforts on the people to whom you actually want to sell your products or services. One of the most significant benefits of global marketing for a company is the opportunity to sell your products and services abroad. With a few months of active SEO, you may gain millions of views and reach global audiences. You may now connect to the internet from anywhere in the globe.



# Hidden Treasure: Home Garden Avocado Cultivation



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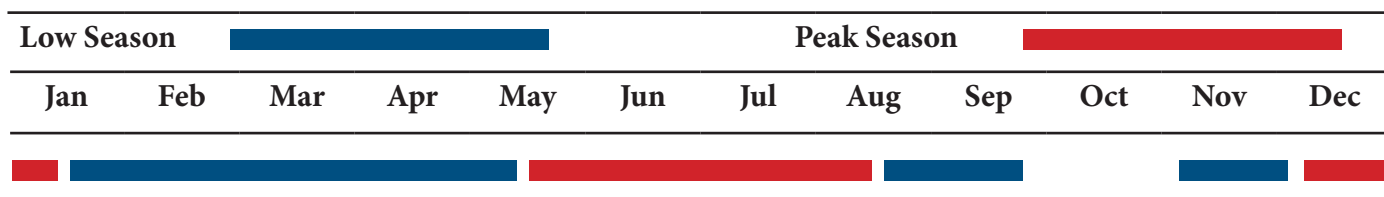
**A**vocado (*Persea Americana*) is one of the popular fruit crops in Sri Lanka as well as around the globe with remarkably high nutritional content and with a very appealing taste. Avocados are called 'alligator pear' in Sinhala and the fruit contains a single large seed that spouts very easily if kept moist. Avocado consists of proteins and 9 essential amino acids with a high level of oil content. Due to its important nutritional advantages for human health, avocado is being distributed widely and is becoming more and more popular on a global scale day by day.

The world avocado market is exponentially growing and Mexico still leads the avocado market in the world. North America and Europe can be considered the leading importers of avocados. Considering the European Union, the major market for avocados has been and remains in France, where it has been for many years. Germany, Italy, Spain, and the United Kingdom are all expanding rapidly as well. The Netherlands, the biggest importer of avocados in Europe, provides the majority of these nations with at least a portion of their supply (Center for the Promotion of Imports of Developing Countries).

With the prevailing economic crisis and food inflation in Sri Lanka, it is a well-understood need to consumption of diversified vegetables and fruit varieties to fulfill the micronutrient requirements. Thanking the ideal climatic and environmental conditions, Sri Lanka is a country with a wide range of tropical and temperate fruit varieties including Avocadoes. The main Avocado varieties grown in Sri Lanka are Pollock, Hass, Booth 7, Tower II, Fuerte, and Simmonds. Avocadoes are mainly grown in the wet zone of the low, mid, and hill country areas like Kandy, Kegalle, and Matale districts mostly as a home gardening crop. Apart from the wet zone, avocado is becoming popular in the intermediate zone as a home garden crop. The highest average avocado production from home gardens is recorded in the Central Province (243.76 kg/HH/year). The total production of Avocados in 2019 was recorded as 16,641t and exported value of Avocadoes was estimated as 44,139 (Rs '000) (Ministry of Foreign Affairs, 2021). Further, there is very little information available and studies conducted on Avocado cultivation in Sri Lanka. It is well-noted fact that, though Avocado has a high economic value, commercial cultivation is very

limited in Sri Lanka and the productivity level is also considered at a lower level. Table 1 shows the availability of Avocados in Sri Lanka and table 2 indicates the production and exportation data along with the price levels from 2016-2020.

### Availability of Avocados in Sri Lanka



Source: *Tropical Fruits of Sri Lanka (DOA: 2017)*

### Production and Exportation of Avocados

Year	Production			Export			Prices		
	Extend (ha)	Production ('000 fruits)	Production (t)	Quantity (t)	Value (Rs 000)	FOB value (Rs/Kg)	Farmgate (RRs)	Retail (Rs)	Wholesale (Rs)
2016	2,588	62,953	20,774	14	1,776	125.48	10.89	48.01	47.53
2017	2,923	30,606	20,774	31	9,508	305.34	15.13	47.45	43.93
2018	3,213	50,542	16,679	40	16,543	416.07	13.10	52.40	63.38
2019	3,453	49,881	16,461	108	44,139	409.47	20.79	52.32	54.20
2020	3,783	58,406	19,274	56	35,337	634.72	16.85	61.95	50.82

Source: *AgStat reports 2015,2016,2017,2018,2019,2020*

### Avocado as a home gardening crop

Home gardens can be defined as a farming system with multiple farming components, such as annual and perennial crops, livestock, and occasionally fish, on an area of land around the family home. Ensuring food security is the key role of the home garden while offering households options to generate revenue and employment. Further home gardens can be considered as climatic ecosystem and it helps to maintain diversity in the environment. Avocado is also can be considered a fruit crop that is mainly cultivated in the home garden. According to a study finding of the “Hector Kobbekaduwa Research Institute”, the major contributor to household (HH) fruit production is Avocado in the Central Province and the Uva province. Further, the Avocado contributes to ensuring the food and nutritional needs of the household by supplying essential nutrients to

humans. However, its contribution as an income supplementary is negligible.

### Nutritional value of Avocado

Avocado consumption has skyrocketed during the past two decades mainly due to its nutritional value of it. Avocados are high in nutritional value with the following benefits.

- Excellent source of nutrients
- Avocados help to promote a healthy body weight
- The avocado safeguards the eyes
- Avocado aids nutrient absorption
- Avocado is good for heart health
- Avocados are high in fiber
- Avocados have more potassium than bananas
- Avocados span the nutritional spectrum

## Postharvest issues in Avocado

The avocado is a climacteric fruit with a short shelf life and rapid postharvest respiration. There are 5–50% postharvest losses of avocados worldwide, according to the studies. In Sri Lanka, Avocado faces huge postharvest losses due to inappropriate harvesting practices, packing operations, postharvest treatments, temperature management, inappropriate transportation, and storage conditions. According to a study by Annon (2011), there is no organized marketing process or postharvest handling system for avocados in Sri Lanka and the postharvest losses are occurring mostly during transport and storage, accounting for about 30 % of the total production in the country. Further, according to a study by Sarananda (2005), step-wise post-harvest losses of produce throughout the harvesting chain can be shown in the following table 3.



% of postharvest loss throughout the harvesting chain				
Producer	Collector	Wholesaler	Retailer	Total
2	12	5	22	41

Further, avocado fruit is highly susceptible for diseases such as stem rot and anthracnose.

## Marketing and Consumption of Avocadoes

In Sri Lanka, there is no properly arranged, organized marketing system for the Avocado. As in the common method, the collectors collect fruits from the home gardens and sell them directly to the whole sellers or to the retailers. The fruit is available in almost all markets, especially areas like roadside fruit stalls. The fruit goods are arranged at these markets in a very orderly and appealing way, which is an outstanding sight. The fruits are piled neatly in shallow or deep baskets, with each fruit facing in a different direction. The pile ends in a pyramid shape. Alternative pyramids of avocado, mangosteen, avocado, mango, avocado, papaya, etc., provide the “green grocer” in these markets with a recognizable identity. Further, the highly susceptible nature of the fruit leads to postharvest losses of Avocadoes. In Sri Lanka, proper packaging and handling practices also cannot be seen. Therefore, quality maintenance and proper grading cannot be assured along the supply chains.

Unfortunately, the knowledge of the average consumer with regard to the nutritional value of Avocados is still very poor. As a result, local consumers tend to buy fruits in small quantities. The Sri Lankans frequently consume avocado fruit, although mostly as a dessert fruit that is usually served with sugar.

## The potential of the Sri Lankan Avocado Sector to Grow

Avocado is considered the highest potential fruit crop for commercial cultivation in view of local demand and global demand. Though Avocado has a high economic value, commercial cultivation is very limited in Sri Lanka. Huge opportunities present for commercial cultivation in the areas like Kandy and Matale as these areas are having ideal climatic conditions for Avocado cultivation. Further, the cost of cultivation of avocado is very less because the farmers do not need to pay special attention to the cultivation and do not follow any special management practices. Moreover, with the economic crisis and with the fertilizer issues most of the large-scale growers of tea and rubber running their businesses with a low level of profitability. On the other hand, there is an increasing tendency towards Avocado consumption in the world. Therefore, shifting to Avocado cultivation with the intention of exportation will generate a large sum of money for the nation while ensuring the domestic requirements.

### **Value addition**

Since the short life cycle of the avocado fruit, it is very much useful to produce value-added products from the fruit. The most common value-added product from the avocado is avocado juice which is more popular among consumers. However, in Sri Lanka, the range of value addition to the avocados can be seen to a very limited extent. Avocado oil, briquettes, powder, and frozen halves are some of the common types of value-added products that couldn't easily be found in the Sri Lankan context.

### **Way forward**

Despite all the potential for cultivating avocados as a commercial crop, there are some challenges that prevent widespread production like low productivity, high level of post-harvest losses, lack of awareness of the consumers on nutritional benefits, lack of organized marketing mechanisms, etc. To overcome the major constraints new production technologies like introducing productive varieties should be carried out. Well-organized marketing mechanisms with information dissemination along the value chain are also identified as essential facts. Large commercial cultivation of Avocados will pave the path for export earnings and meet the local demand which is essential in such times of economic crisis. Further, the value-addition also needs to be increased with the novel knowledge.



# Quality Drinking Water - Positive Intervention on CKDu ???

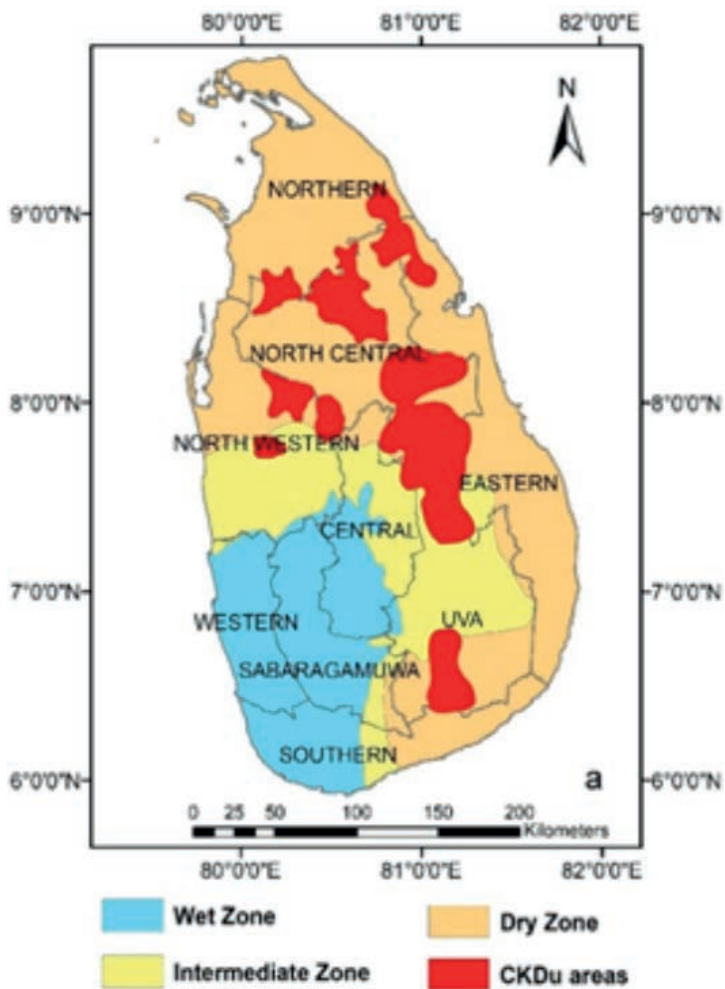


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**F**ood and water consumption are essential components of life. Water is much more essential to the body than food. Our body needs to consume a significant amount of water each day to function properly to maintain health since it constantly excretes water through sweat and urination and needs to replenish the lost fluids. Food consumption also contributes to 20% of total water intake per day. The rest is dependent on drinking water and water-based beverages.

A sufficient amount of water consumption helps to break down food, and dissolve vitamins, minerals, and other nutrients from our food and it delivers these vitamin components to the rest of our body as well as lubricates and cushions the joints, spinal cord, and tissues. Our kidneys are also important for filtering out waste through urination. Adequate water intake helps the kidneys work more efficiently and helps to prevent kidney stones. Therefore maintaining an adequate amount of water in the body is vitally important to our life to have a healthy stool and avoid constipation.

In Sri Lanka, the main drinking water source is groundwater and it plays a vital role in water supply for various purposes viz. drinking, industrial and agricultural. 80% of groundwater sources are utilized for domestic, commercial, and other industrial purposes due to the increasing demand for groundwater daily. The majority of rural people in Sri Lanka heavily depend on dug and tube wells since groundwater is the safest drinking water source that can be self-managed. Therefore, the quality of the groundwater deteriorates rapidly due to geological and anthropogenic activities. Naturally, hydrogeochemical properties of groundwater determine the quality of groundwater, which is highly influenced by geological formations, sub-surface geochemical processes, the quality of recharged water, and anthropogenic activities such as residues, pollutants from industrial sites, and contaminants of pesticides and other agrochemicals applied on agricultural lands reach groundwater by leaching, and move to offsite water bodies by direct runoff, soil erosion, and spray drift. Thus it has been revealed that contamination of this groundwater due to various causes may ultimately result in the availability of poor drinking water, reduction in the number



of water sources, high cost for water purification, high cost for alternative water supplies and most importantly potential for human health problems.

In the recent past, the demand for water consumption has increased drastically within the country due to the rapid growth of populations, urbanization, and the development of agricultural and industrial activities. With the increased demand, significant pressure has been put on groundwater resources, leading to overexploitation, which has caused the depletion and deterioration of water quality, thereby making it unfit for domestic use. As nearly 75% of the entire population of Sri Lanka lives in close association with the physical environment, obtaining their food and water from the immediate vicinity, any imbalance in the local environment concerning minerals and human health could lead to health problems.

Among these environment-related health problems, the endemic occurrence of a Chronic Kidney Disease (CKDu) with an uncertain etiology was recognized in the Dry Zone districts of Sri Lanka. The disease appears in several isolated clusters in the dry-zone regions, particularly around the north-central region,

where the annual rainfall is about 1000 mm/a. However, the disease has not been recorded in the wet zone of the country, where the annual rainfall is higher than 2500 mm/a.

This disease is common among male paddy farming communities in the dry zone in the age group of 40 to 60 years. Although several arguments were put forward for the outbreak of CKDu in Sri Lanka, none of these indicated the clear possible causative factors for the disease. Due to its spatial distribution, CKDu is widely believed to be associated with some kind of unknown toxin, infectious agents, dehydration, or possibly a synergetic effect of several factors.

However, CKDu is more prevalent in the rural dry-zone regions where the majority of people use groundwater as their primary source of drinking water. The groundwater chemistry in the dry zone was mainly governed by water-rock interactions. Meanwhile, the high ambient temperature enhanced mineral dissolution and increased the hardness of the water. However, the presence of permanent hardness in the CKDu areas suggested that this may have a considerable impact on the higher prevalence of the disease in the CKDu prevalence area. According to the research carried out, their results suggested the synergetic toxicological impact of high fluoride and hardness on the onset of CKDu in the dry zone of Sri Lanka. Moreover, the water quality was directly determined by the Fluoride concentrations in the groundwater, highlighting that the underlying geology is responsible for the groundwater quality in the region. With the careful inspection of the aforementioned facts, it could be assumed that the long-term use of quality-degraded groundwater may be the primary causative factor for the presence of CKDu in the dry zone in Sri Lanka. Therefore, the assurance of a safe drinking water supply would be a positive intervention for the mitigation of the disease.



# Value of Fish Consumption for Protein Fulfillment in Human Health



**T**he consumption of fish as food has been essential in supplying both humans and other animals with essential nutrients. In addition to being a healthy food source, fish has a high nutritional value that enhances health. The daily ingestion of fish contributes to the prevention of heart issues.



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Important micro and macro nutrients like moisture, proteins, lipids, minerals, and vitamins are what give fish, and meat their implied nutritional worth. The macro and micronutrients found in fish make it superior to any other protein sources. Fish is frequently referred to as “rich food for poor people” because it supplies important elements, including proteins and lipids with significant biological values. The main components of fish that define its nutritional value are its protein and fat content. Fish has a high nutritional value and offers high-quality protein as well as a wide range of vitamins and minerals, including phosphorus, magnesium, and vitamins A and D. Fish is a superior source of animal protein to other sources due to the micro and macronutrients it contains. In addition to serving as a food source, fish protects people from a number of ailments that exist today. Fish have a protein content of 15–25% of their total live weight. The essential amino acids are present in fish protein, which raises the nutritional value of a varied diet overall. About 50–60% of the daily protein requirements for an adult individual can be satisfied by a portion of 140gm fish.

60% of people living in underdeveloped nations rely on fish for more than 30% of their animal protein needs. Fish is a considerably more affordable source of protein per unit than other nutritional sources like chicken, mutton, hog, beef, etc. All of the essential amino acids, including cysteine and methionine, which are missing from plant protein, are present in fish. Compared to other types of animal proteins like chicken, beef, etc., fish has a larger satiety impact. According to some reports, fish muscle is easier to digest than other animal proteins because it has lower-level connective tissue. Fish proteins, with an amino acid content of 85–95%, are highly digestible. Building and mending muscle tissues, boosting immunity, and enhancing blood quality are all primarily accomplished by fish protein. Fish, a potential source of animal protein, can help prevent protein-calorie malnutrition, according to Mohanty (2015). (PCM). The protein immunoglobins aid in the regulation of the electrolyte and water balance in the human system as well as serve as a significant line of defense against bacterial and viral infections. The protein found in fish helps the body’s regulatory systems stay in balance.



# Is Bulk Cooking a Good Option to Adopt in Our Daily Routine?



**B**ulk cooking is a technique for preparing meals that entails cooking a large quantity of food at once and preserving it for later use. This concept is widespread in most developed countries and allows individuals to balance a busy schedule with a nutritious home-cooked supper. The bulk cooking idea begins with a meal plan that covers all of the essential nutritional needs of a household for a week or more. The next stage in the process is to create a shopping list that includes all of the meal plan's ingredients in required amounts for a period. After the meal has been produced in bulk, it should be frozen and stored in airtight containers. It enables you to quickly defrost and consume your preferred meal from the refrigerator.

All of the major food groups must be represented in the items used to prepare the meal plan. In this method, a variety of ingredients, flavors, and textures are used to stimulate the appetite. To minimize food waste, the family portion size should be assessed beforehand, and a shopping list should be created based on the portion size. The family's nutritional needs can be planned for by avoiding foods that are heavy in fat, sugar, and sodium. This approach allows for the guaranteed use of vegetables, lean meat, fish, eggs, and nuts as opposed to fatty meat, butter, cream, and lard.

Everyone can make a plan for bulk cooking by taking into account their available time, the number of family members, the amount of freezer

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space, the amount of kitchen space and equipment, their financial situation, and the types of ingredients they can use.

In many ways, bulk cooking saves time. With a prepared shopping list, grocery shopping only needs to be done once a week. Only purchasing the food items that are truly necessary helps cut down on wastage and shopping time. Additionally, it saves time on meal preparation, which only takes two or three hours out of your entire week. The use of large quantities of ingredients at once in several dishes will reduce food waste because they won't have to be stored in refrigerators for an extended period before being thrown out. An additional benefit of this approach is that even the least confident cook in the household can prepare dinner and put it on the table without hesitation.

Having a pre-made shopping list helps you save money because you're less likely to buy things you don't need. It is also more cost-effective to buy goods in bulk at the market and to plan your meals around the seasonal foods that are readily available. Even though there is less time for cooking or little inspiration, bulk cooking

makes the foods readily available in the kitchen. As a result, people are less likely to default to takeout and ready-made options.

This idea saves both time and money and provides you with nutritious meals that meet all of your family's nutritional needs. Instead of cooking what is on hand in the kitchen, meal planning before the bulk cooking will likely result in the selection of healthier, nutritionally balanced meal options. This will prevent the family from ordering takeout that is unhealthy. It is also a good way to combat child malnutrition.

This method also helps to reduce packaging waste as it needs a few large bags to transport and store ingredients from the market instead of multiple small-sized bags or containers. Even though this might seem insignificant, over time, even a small change can make a significant difference.

Many cleaning supplies can be saved because a large quantity is cooked all at once. A single pan and chopping board can be used for several things. Cleaning cooking utensils ought to be done once per week. As a result, when compared to daily cooking, less water and dishwashing chemicals will be lost. An additional benefit is that the female household member shouldn't plan the meals at the end of each day.

Along with these benefits, bulk cooking has some drawbacks as well. When defrosted, salad greens, vegetables with high water content, egg-based meals, mayonnaise, cooked pasta, milk-based dishes, and fried foods become limp and soggy, change in color, flavor, and texture, and lose their crispness and crunch. These foods cannot be used for bulk cooking.

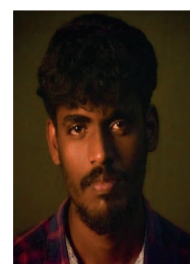




# Contribution of Small-scale Fisheries to the Food and Nutrition of the Northern Fisheries Community

Most of the people living in the Mullaitivu and the Mannar districts have been fishing for their livelihood since ancient times. In some way, the people of this district have related to fishing. The population here is very low and people living below the poverty line live a lot. Lots of people contribute to the fisheries industry including women. Female-headed households also contribute to small-scale fisheries, such as fishing, de-netting, cutting, and processing of fish, dry fish production and preparation of fishing equipment. And their representation remains an invisible factor. The people, engaged in the fisheries industry, are facing some types of barriers as well. The contribution of northern people it's a major support for the Sri Lankan fisheries industry.

There are lots of varieties of fish and kinds of seafood consumed by Northern area peoples for their daily usage. Here, people add fish four or five times per week – mostly, people related to fishes like *Ayala*, *Nathalie*, *Kilaikkan*, *Siraya*, Saalai and Prawns, Squids, Crabs, etc. The meals they prepare with these kinds of seafood vary. They try different kinds of recipes and methods as a diet plan. Such as curry, gravy, roasting and frying. It's all enhanced the tastiness of the meals.



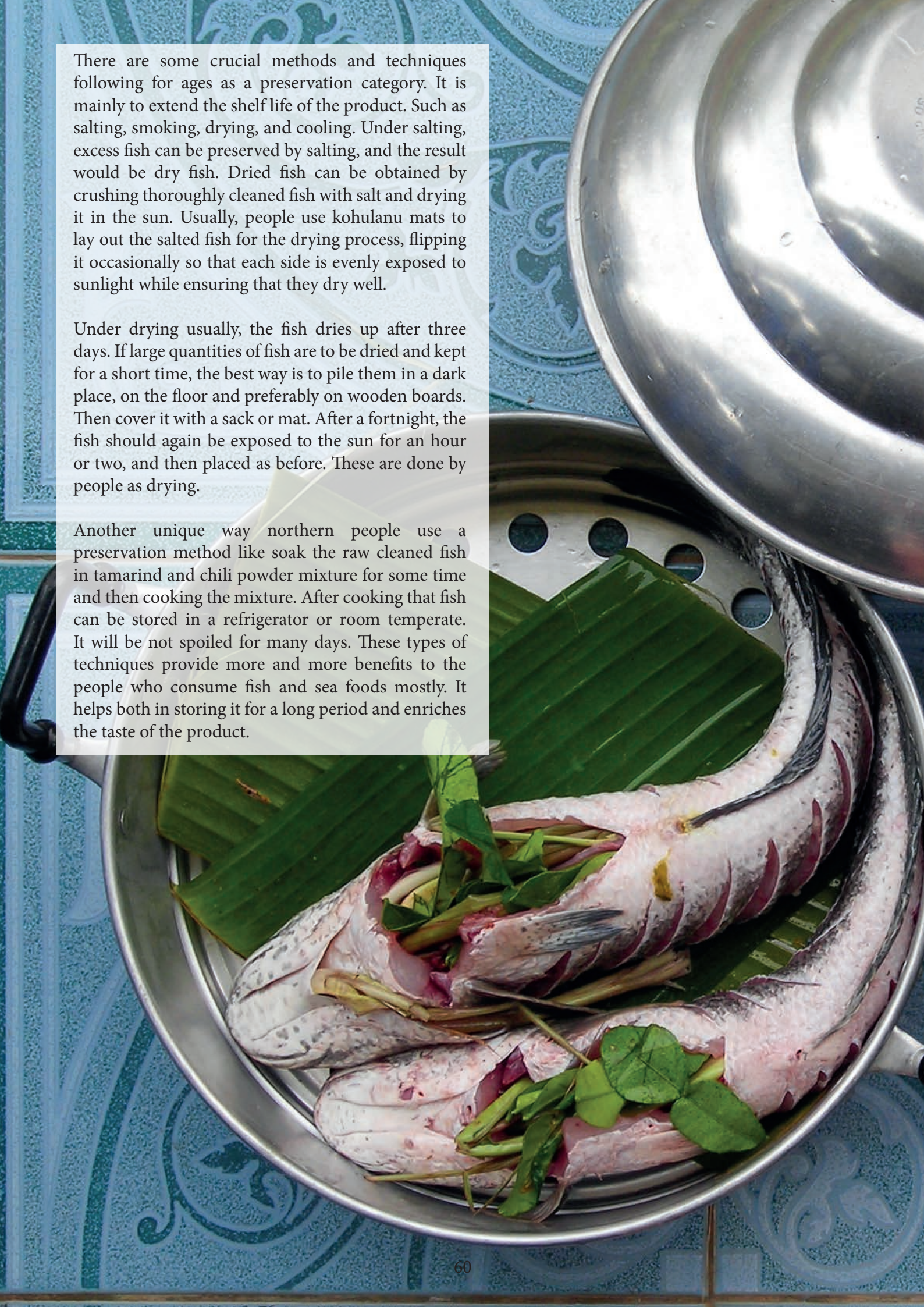
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From ancient times to now, the people from the northern side use some special methods to make meals. They make curry by adding pepper and manila tamarind (known as korukkapuli) to make curry. It is tasty and specially made for the illness people who are suffering from hemiparesis. And adding fish and kinds of seafood to meals provides more benefits to the people. Seafood and fish are healthy sources of low-fat protein and high in omega-3s, vitamins, calcium, iodine, iron, etc. The people of this district keep their bodies strong because they include fish in their diet in some way. It leads to the proper maintenance of their physical health.

There are some crucial methods and techniques following for ages as a preservation category. It is mainly to extend the shelf life of the product. Such as salting, smoking, drying, and cooling. Under salting, excess fish can be preserved by salting, and the result would be dry fish. Dried fish can be obtained by crushing thoroughly cleaned fish with salt and drying it in the sun. Usually, people use kohulanu mats to lay out the salted fish for the drying process, flipping it occasionally so that each side is evenly exposed to sunlight while ensuring that they dry well.

Under drying usually, the fish dries up after three days. If large quantities of fish are to be dried and kept for a short time, the best way is to pile them in a dark place, on the floor and preferably on wooden boards. Then cover it with a sack or mat. After a fortnight, the fish should again be exposed to the sun for an hour or two, and then placed as before. These are done by people as drying.

Another unique way northern people use a preservation method like soak the raw cleaned fish in tamarind and chili powder mixture for some time and then cooking the mixture. After cooking that fish can be stored in a refrigerator or room temperate. It will be not spoiled for many days. These types of techniques provide more and more benefits to the people who consume fish and sea foods mostly. It helps both in storing it for a long period and enriches the taste of the product.



# ශ්‍රී ලංකාවේ දකුණු වෙරළ තීරයට ආවේණික වූ රිටිපන්න මාළු කර්මාන්තය



## තාරකා ලක්ශාණී

කෘෂි ව්‍යාපාර අධ්‍යයන අංශය

කෘෂිවිද්‍යා පීඨය

ශ්‍රී ලංකා සබරගමුව විශ්ව විද්‍යාලය

රිටිපන්න කර්මාන්තය යනු ශ්‍රී ලංකාවේ දකුණු වෙරළ තීරයේ බහුලව භාවිත වන සාම්ප්‍රදායික හා පෞරාණික මසුන් ඇල්ලීමේ ක්‍රමයකි. විශේෂයෙන් ම විදේශිකයන්ගේ මහත් ආකර්ෂණයක් දිනාගත් මෙම රිටිපන්න ක්‍රමය කොග්ගල, අභංගම, වැලිපැන්න, කතලව හා තලරමේ යන ප්‍රදේශ පහ තුළ පමණක් ජනප්‍රියව දක්නට ලැබේ. මුහුදේ සිටුවන ලද රිටික හෙවත් දණ්ඩක නැග පන්න කිරීම නොහොත් මාළු බැම සිදු කරන බැවින් රිටිපන්න ලෙස මෙයට නම් පටබැඳී ඇත.

මෙහිදී මුහුදේ වලක් භාරා එයට ශක්තිමත් ගසක ඉන්නක් සිටුවා එය හරහා ලියෙන් හරස් අතට බැඳගත් පුංචි ඉඩක් සහිත ඉති දෙකක හිඳගෙන පැය ගණනාවක් නිසොල්මනේ මාළු බැම සිදු කෙරෙයි. මෙම කුඩා අට්ටාරය වඩදිය හා බාදියට සරලන උසකින් සකස් කරන අතර මසුන් ඇල්ලීම සඳහා කිතුල් වලින් සාදන ලද දණ්ඩක් භාවිත කරනු ලැබේ. මුහුදේ ඉණවටක් බැස යාමට සිදුවන නිසා ඔවුන් බිලි කටු ආදිය රැඳවීම සඳහා හිසෙහි විශේෂ ජටාවක් සහ යම් පුද්ගලයන් ඉකිරි වලින් හා විෂ මාළුන්ගෙන් ආරක්ෂා වීමට විශේෂිත පාවහන් යුවලක්ද පළඳිනු ලැබේ.

ඇමක් නොමැතිව ඊයම් වලින් නිර්මාණය කරනු ලබන සුදු ඊයම් බිලි කටුව මෙම රිටිපන්න කර්මාන්තයේ දක්නට ලැබෙන ඉතා සුවිශේෂ උපාංගයක් ලෙස සැලකිය හැකිය. දැල්ලෙකුගේ කටුවකින් සාදාගත් කෝවක් වැනි විශේෂ උපකරණයකට රත් කරන ලද ඊයම් වත් කිරීමෙන් මෙම බිලි කටුව සාදයි. මෙම බිලි කටුවට අනෙක් බිලි බැම වලදී මෙන් ඇමක් යොදා නොගන්නා අතර බිලි පිත්ත එක්තරා රිද්මයකට වලනය කිරීමේදී කටුවේ ඇති කුහිස්සෙකු වැනි හැඩයට රැවටෙන මාළුවා ඇම ගිලීයී. බොහෝ විට හුරුල්ලන් වැනි කුඩා මසුන් මෙයට හසු වේ.

ධීවරයින් උදෑසන 5.30ට පමණ මුහුදේ සිටුවා ඇති කණුවට නැග පැය දෙකත් දෙකහමාරත් අතර කාලයක් මාළු බැම සිදුකර නැවත ගොඩට පැමිණ එම මසුන් අලෙවි කිරීම සිදු කරති. අනන්තරුව උදෑසන 10ත් 11ත් අතර හා සවස 3ත් 4ත් අතර කාලයේ එම ක්‍රියාවලිය ඒ ආකාරයටම සිදුවේ. මත්ස්‍යයන් උදෑසන කාලයේ වෙරළට සමීප වී ඉර බැස යන විට නැවත ගැඹුරු මුහුදට යන බව ඔවුන් විශ්වාස කරන අතර ඒ හේතුවෙන් සවස් කාලයෙන් පසු මසුන් ඇල්ලීම සිදු නොකෙරේ.

සාම්ප්‍රදායානුකූල ව පැවත එන මෙම රිටිපන්න කර්මාන්තයේ බිලි කටුව නිර්මාණය කිරීම මෙන්ම මසුන් ඇල්ලීමේ ක්‍රියාවලිය සඳහා ද ඉතාමත් ඉවසීමක් හා විඳදරා ගැනීමක් අවශ්‍ය වේ. මන්දයත්, ධීවරයින්ට එක් අතකින් කණුව හා අනෙක් අතින් බිලි පිත්ත අල්ලාගෙන පැය ගණනාවක් නිශ්ශබ්දව බලා සිටීමට සිදුවන බැවිනි. වායුගෝලයේ කිසියම් ශබ්දයක් හෝ බාධාවක් ඇති වුවහොත් මසුන් ඉවතට යන බැවින් ඔවුන් සන්සුන්ව හා නිශ්ශබ්දව සිටිය යුතුය.

සාමාන්‍යයෙන් වසරේ මාස 6-8ත් අතර කාලයක් පමණක් මෙම කර්මාන්තය දක්නට ලැබෙන අතර නිරිතදිග මෝසම් මාස වන මැයි-සැප්තැම්බර් දක්වා කාල සීමාව මසුන් ඇල්ලීමේ උච්චතම සමය ලෙස සැලකේ. ඉතිරි කාලවලදී රිටිපන්න කර්මාන්තකරුවන් වෙනත් කුමන හෝ රුකියාවක නිරත වේ. එමනිසා ආර්ථික අතින් අපහසුතාවට පත්වන ඔවුන් මෙම සම්ප්‍රදායානුකූල කර්මාන්තයෙන් ඉවත් වීම වර්තමානයේ සිදුවෙමින් පවතින ඉතා කණගාටුදායක තත්වයකි.

# Let's defeat the **Fuel Crisis in our Country** The Resources are here



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Sri Lanka is currently in an economic and political crisis of mass proportions, recently culminating in a default on its debt payments. The country is also nearly empty of foreign currency reserves, decreasing the ability to purchase imports and driving up domestic prices for goods. As a result of that, the prices of goods and services has been increased.

Among them, the fuel crisis plays a major role. Fuel is an essential thing in our day-to-day lives. So, people are trying to buy as much fuel as they wish and the competition thereof is rapidly increasing. As a result, at least 10 people have died in fuel queues since the beginning of the crisis according to local news reports.

As Sri Lankans, we have to overcome these problems. So, what we can do about these problems?

In our view, we think we can do something because most of the resources can be found as our country is agricultural-based. With the support of energy engineers and agricultural erudite people, we can solve this fuel problem.

Here, we are going to introduce the fuel development from Rice Bran and Palm Kernel Shells.



# Fuel Development from Rice Bran and Palm Kernel Shells

The recycling of agricultural waste products, specifically rice bran, into useful products is rarely practiced in developing countries. This has led to environmental problems, such as pollution, resulting in refuse on the streets and in the drainage systems and waterways, causing blockages of waterways on rainy days. This practice has also led to the outbreak of epidemics.

In the past, researchers focused on alternative fuel sources to meet the ever-increasing energy demand and to avoid dependence on fossil fuels. Rice bran is a potential agro residue that could be used to make briquettes, which do not pose collection or drying problems. A promising alternative is a biomass because of its renewability, abundance, and environmental friendliness with no release of carbon dioxide and a very low Sulphur content. Biomass is difficult to handle, transport, store, and utilize in its original form due to its high moisture content irregular shape and size, and low bulk density.

## What about the availability of rice bran and palm kernels in Sri Lanka?

The recycling of agricultural waste products, specifically rice bran, into useful products is rarely practiced in developing countries. This has led to environmental problems, such as pollution, resulting in refuse on the streets and in the drainage systems and waterways, causing blockages of waterways on rainy days. This practice has also led to the outbreak of epidemics.

In the past, researchers focused on alternative fuel sources to meet the ever-increasing energy demand and to avoid dependence on fossil fuels. Rice bran is a potential agro residue that could be used to make briquettes, which do not pose collection or drying

Rice bran is a major by-product of rice processing. It consists of the fibrous outer layer of the grain, some hull, chipped grain and calcium carbonate which is added during the milling process. Raw rice bran

contains 13-19% oil which is removed by a solvent extraction process leading to the production of de-oiled rice bran. This contains crude protein ranging from 13-16% and TDN 55-65%. De-oiled rice bran is a good source of proteins, vitamins and minerals. In addition, it also contains a better assortment of amino acids, particularly lysine and methionine, compared to other cereal grains, including maize and wheat. As an agricultural country, we can easily find these rice bran and palm kernels as raw materials.

These problems can be solved by compacting the biomass materials into briquettes to be used as a solid fuel. Rice bran is another form of biomass that is a potential substitute for coal as it has good quality, low moisture content, and is readily available. The production statistics of paddy rice are increasing worldwide. It has been estimated that 588 million tons of paddy rice were produced worldwide in 1999. For every one hundred kilograms of paddy rice, 18-20 kg of rice bran is generated worldwide.

Fuel is defined as a natural or artificial organic substance used as a source of energy or raw material for industries. Fuels, according to their state of aggregation, are divided into three types. They are solid, liquid, and gaseous. Also, according to their origin, there are natural and artificial fuels. Bound or compressed rice bran (briquettes) is a solid fuel and are natural. Briquetting is defined as the compaction of loose combustible material for fuel-making purposes. The products obtained from the process of briquetting are known as briquettes, which are blocks of flammable matter used as fuel to start and maintain fires. A briquette can be homogenous or non-homogenous. Desirable materials for making briquettes include sawdust, paper mill waste, coconut husks, rice bran, olive refuse, and wheat straw, etc.

Their heating value can be improved by adding palm kernel shells. In order to validate the effectiveness of rice bran briquettes, there is a need to determine and quantify their energy content.

In an earlier work, biomass materials, such as palm kernel shells, charcoal, coconut shells, and

coconut fibres, were mixed with sawdust in various proportions and the calorific values of the derived briquettes were discovered. Researchers have attempted to develop different composite briquettes.

Here we are talking about the briquettes which are made of rice bran and palm kernel shells in different grain sizes. The right proportion ratio of the rice bran to palm kernel shells for effective burning was determined, as well as the proportion with the highest heating value. The heating values using rice bran alone and when mixed with palm kernel shells using local starch as the binding agent were compared. Starch was chosen because it is readily available, cheap, and can be used in raw form. It also has a higher binding effect and burns effectively with less smoke.

Here we focus only on the production of briquettes with mixing ratios of 1:9, 2:8, 3:7, 4:6, and 5:5 of palm kernel shell to rice bran using cassava starch as the binder.

## Materials

The biomasses involved in this work were rice bran and palm kernel shells with cassava starch as the binder. These three materials were selected because they are readily available in large quantities.

## The required sizes

The palm kernel shells can be collected from small agro farms. The rice bran materials should be sorted using a 180 W sieve shaker, while the palm kernel shells were ground into particles (2 mm, 4 mm, and 6 mm diameters) using a 0.75 KW pulverizer.

## Briquetting Process

In briquetting the rice bran and palm kernel shells, the rice bran was ground to a semi-fine powder form. The palm kernel shells were ground into three different particle sizes (2 mm, 4 mm, and 6mm diameters). The three particle sizes of palm kernel shells are mixed separately with rice bran, each in ratios of 1:9, 2:8, 3:7, 4:6, and 5:5 of palm kernel shell to rice bran.

The briquettes will form by compressing the mixture of rice bran and palm kernel shells into the molds of a manually operated briquette-making machine. A briquette-making machine is a machine like a palate-

making machine. The crumbles or powder forms can be used as input forms. Then, they are converted into pellets.

The machine operated on hydraulics and consisted of sixteen molds into which the mixed biomass is fed. The mixed biomass was loaded into different molds on the machine and pressure was applied to compact it, after which it was ejected by the machine to dry.

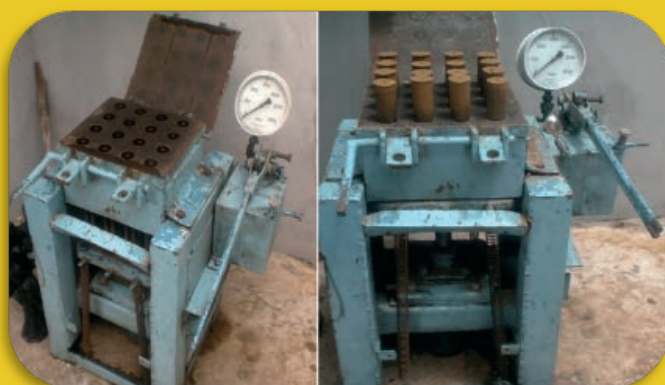


Figure- Manually operated briquette and Briquetting process-making machine



Figure- Briquettes made from rice bran and palm kernel shells using starch as a binder

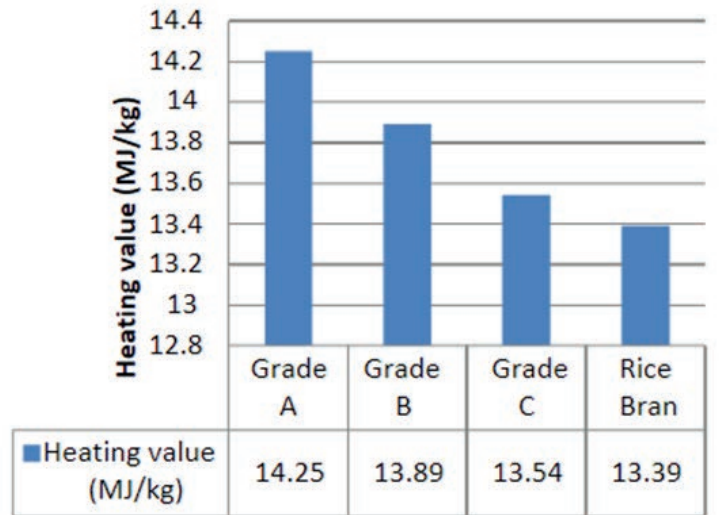
This is the main task of the process. Then Calorific Values and Briquette Density can be determined with the support of energy engineers.

Then the energy (as fuel) can be obtained by heating the Briquettes which are made from rice bran and palm kernels.



The mean heating value obtained for the briquettes produced from rice bran and palm kernel shells of Grades A, B, and C were 14,250 kJ/kg, 13,890 kJ/kg, and 13,540 kJ/kg, respectively, with 14,250 kJ/kg as the highest heating value. This energy value is sufficient to produce the heat required for household cooking and small-scale industrial cottage applications compared to the heating value of 13,390 kJ/kg of rice bran alone. It also compared well to most biomass energy.

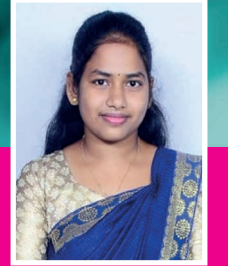
## Heating Value (MJ/kg)



# கோவிட்-19 மற்றும் பொருளாதார மந்தநிலை காரணமாக இலங்கையில் இளம் தலைமுறையின் வாழ்க்கை முறையில் ஏற்பட்டுள்ள மாற்றங்கள்

இன்று மாறிவரும் உலகில் அடிக்கடி மாற்றங்களுக்கு உள்ளாகி வருவது கலை, கலாசாரம் மற்றும் மொழி என்பவற்றோடு மக்களின் வாழ்க்கைப்பாணியும் (டகைநளவலடந) ஒன்றாகும். அதிலும் குறிப்பாக இளைஞர்களின் வாழ்க்கை முறை அன்று தொட்டு இன்றுவரை பற்பல மாற்றங்களுக்கு உள்ளாகி வருகின்றது. வாழ்கைப்பாணி என்பது ஒரு தனிநபர் அல்லது குழுவின் அன்றாட வாழ்க்கை முறை அல்லது வாழ்க்கை முறையுடன் தொடர்புடைய பழக்கவழக்கங்கள் அல்லது குறிப்பிட்ட ஆரோக்கியமான, நாகரீகமான தனிநபர் அல்லது குழுவின் ஒருங்கிணைந்த வாழ்க்கை முறை ஆகும். இது தனிநபரின் நடத்தை மற்றும் அணுகுமுறையினால் வகைப்படுத்தப்படுகிறது.

தற்போதைய காலகட்டத்தில் பொருளாதார மந்தம் மற்றும் கோவிட்-19 காரணமாக இலங்கை மக்கள் அனைவரினதும் ஜீவனோபாயம் மற்றும் வாழ்க்கைப்பாணியும் பெரும் ஆட்டம் கண்டுள்ளது என்பதனை உறுதியாகக் கூற முடியும். குறிப்பாக இளம் தலைமுறையினரின் தூங்கும்முறை, உணவுப்பழக்கவழக்கம், பொழுதுபோக்கு மற்றும் கல்வி போன்றவையும் மிக அதிகமாகவே மாற்றத்திற்கு உள்ளாகியுள்ளது. இவ் கோவிட்-19 மற்றும் பொருளாதார மந்தம் என்பன ஏழை, பணக்காரன் என்ற வாழ்க்கைத்தர வேறுபாடு இன்றியும். சிறுவர்கள், முதியோர் என்ற வயது வேறுபாடின்றியும் ஆண், பெண் என்ற பாலின வேறுபாடுகள் இன்றி அனைத்து வகையான தரப்பினரினதும் வாழ்க்கை முறையில் பாரிய அளவில் தாக்கத்தை ஏற்படுத்தியுள்ளது.



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நாட்டின் பொருளாதார வளர்ச்சிக்கு இளம் தலைமுறையினரின் பங்கு மிக முக்கிய காரணியாகும். இளம் தலைமுறையினரின் வாழ்க்கை முறை (டகைநளவலடந) பாரிய அளவில் மாற்றத்திற்கு உள்ளாகியது இந்த பொருளாதார மந்தம் மற்றும் கோவிட்-19 காலப்பகுதியிலேயே ஆகும். அத்தோடு இவ் கோவிட்-19 காரணமாக இலங்கைப் பொருளாதாரம் படிப்படியாக வீழ்ச்சியடைய ஆரம்பித்தது. நாளுக்கு நாள் மக்களை வறுமை ஆட்கொண்டது. இதனால் அவர்களின் வாழ்க்கை முறை படிப்படியாக மாறத் தொடங்கியது. உதாரணமாக, உணவுப் பழக்கவழக்கத்தின் மாறுதலைக் குறிப்பிடலாம். பொருளாதார மந்தத்தினாலும், கோவிட்-19 இனாலும், நாடு தழுவிய ஊரடங்கு சட்டத்தினால் நாட்டின் மொத்த உள்நாட்டு உற்பத்தி குறைவடைந்ததுடன் நாட்டின் மொத்த ஏற்றுமதி சடுதியாக குறைவடைந்தது. இதனால் மொத்த தேசிய வருமானம் குறைவடைந்ததன் காரணமாக மொத்த தேசிய செலவினை ஈடுசெய்வதற்கு அரசாங்கம் பொருட்கள், சேவைகளின் விலையை அதிகரித்தமையினால் பொருள் பற்றாக்குறை ஏற்பட்டதுடன் கறுப்புச் சந்தையும் தோற்றம் பெற்று மக்கள் தமது அடிப்படைத் தேவையான உணவுத் தேவையைக் கூட பெற்றுக்கொள்ள முடியாத நிலைக்குத் தள்ளப்பட்டனர். குறிப்பாக, இளம்

தலைமுறையினரில் ஒரு சாரார் வறுமை என்னும் கொடிய நோயினால் ஆட்கொள்ளப்பட்டனர். இதனால் அவர்களின் உணவுப் பழக்கவழக்கம் நாளொன்றுக்கு மூன்று தடவைகளில் இருந்து இரண்டு அல்லது ஒரு தடவையாக மாறியது. வேறு சில ஏழை எளியவர்கள் ஒரு வேளை உணவைக்கூடப் பெற முடியாத சூழ்நிலையும் ஏற்பட்டது. பணம் படைத்த இளைஞர், யுவதிகளில் பலர் ஊரடங்கு சட்டத்தினாலும், பொருட்கள் சேவைகளின் விலை உயர்வினாலும் விரைவு உணவுப் (கயளவ கழமூன) பழக்கவழக்கத்திற்கு மாறினர்.

மேலும் திடீரென உற்பத்தி உள்ளீடுகளின் விலை உயர்வினாலும் அதிகரித்த மின்சாரக் கட்டணத்தினாலும் பேக்கரி உணவுகளின் விலையினை பேக்கரி உரிமையாளர்கள் சடுதியாக உயர்த்தியமையினால் அன்றாட காலை உணவைப் பாண், கேக் போன்ற பேக்கரி உணவுகளுடன் ஆரம்பித்த இளையோர் சமுதாயம் அப்பழக்கத்தை கைவிட ஆரம்பித்துள்ளனர். இளையோரின் காலை உணவுத் தேவையை பூர்த்தி செய்யும் பேக்கரி உணவுகள் பணக்காரர்கள் மாத்திரமே நுகரும் உணவுப் பொருட்களாக சாமான்ய மக்களால் தற்போதைய காலகட்டத்தில் பார்க்கப்படுகிறது. இது இலங்கைத் திருநாட்டிற்கு மிகப்பெரும் இழுக்கு எனலாம். அத்தோடு கோவிட்-19 மற்றும் பொருளாதார மந்தநிலை காரணமாக மதுபானங்களின் விலை உயர்வினால் மதுபான பொருட்களின் கேள்வி குறைவடைந்து அவற்றின் நுகர்வு குறையும் என எதிர்பார்த்த அரசாங்கம் மிகப்பெரிய ஏமாற்றத்தையே சந்தித்தது. காரணம் அவற்றின் கேள்வி சடுதியாக அதிகரித்தது. ஒரு சில மது பாவனையாளர்கள் மதுவை நிறுத்திக்கொண்டாலும் ஏனைய மதுப்பிரியர்கள் கறுப்புச் சந்தையில் கொள்வனவு செய்வதையும், அவற்றைப் பதுக்கி விற்பனை செய்வதையும் அவதானிக்கக் கூடியதாக உள்ளது. மேலும் உணவகங்கள் பலவற்றைத் தொடர்ந்து நடாத்த முடியாமையினால் அவை மூடப்பட்டு வருகின்றன. இதனால் வெளிமாவட்டங்களில் வேலைக்குச் செல்லும் மற்றும் வெளிமாவட்டங்களில் தமது கல்வியைத் தொடரும் உணவகங்களைச் சார்ந்திருக்கும் மாணவர்கள் மற்றும் இளைஞர் யுவதிகள் பாரிய அளவில் பாதிப்புக்கு உள்ளாகியுள்ளனர். இதனால் நாட்டில் பெரும்பாலான உணவகங்களை மையமாகக் கொண்ட இளையோர் வேலையை இழந்தனர். இது முறைகேடான முறையில் அவர்கள் வருமானத்தை ஈட்டிக் கொள்வதற்குத் தூண்டுதலாகவும் அமைந்தது எனலாம்.

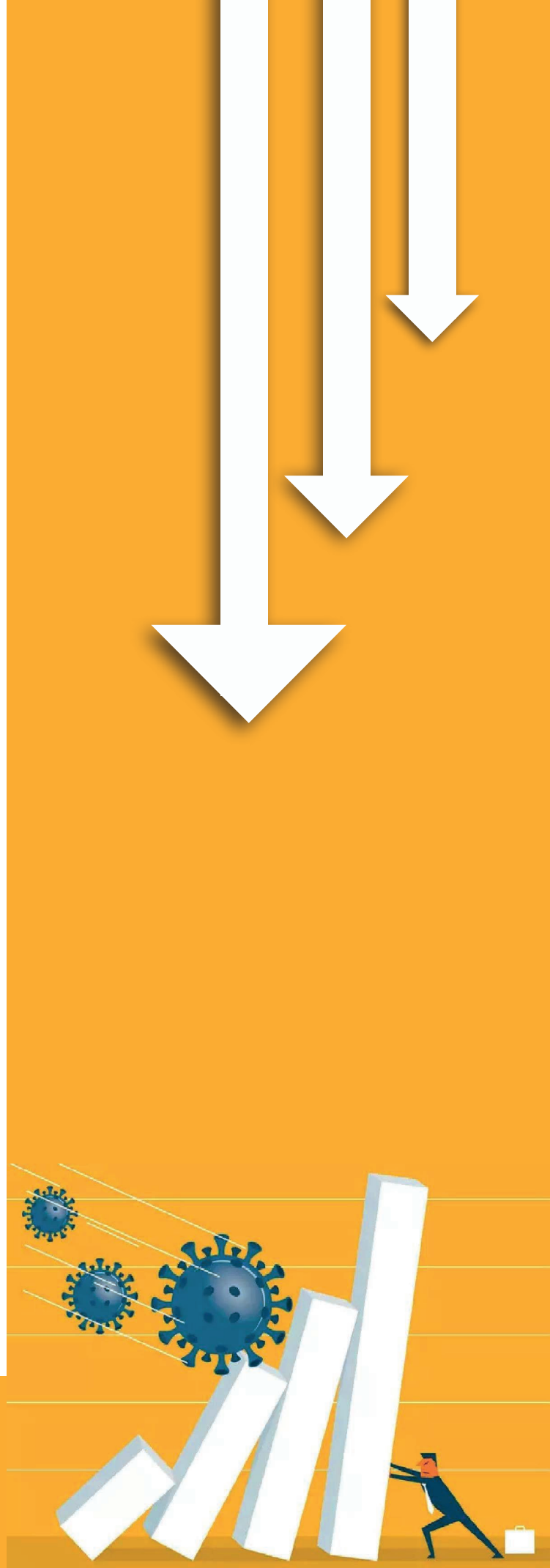
பொழுதுபோக்கு அம்சத்தில் ஏற்பட்ட மாற்றத்தை எடுத்து நோக்குகையில், நாடு முழுமையாக முடங்கியமையினால் பொழுதுபோக்கு அம்சங்களை அதிகம் விரும்பும் இளம் தலைமுறையினர் இன்னல்களுக்கு ஆளானர். நாள் ஒன்றினை கடப்பதே அவர்களுக்கு மிகவும் சிரமத்தை உண்டு பண்ணியது. ஆகையால் நெட்பிலிக்ஸில் (நேவகடலை) ஆங்கில வலைத்தொடர் (நுநடி எநசநைள) பார்க்கும் பழக்கம் பெரும்பாலானோர் மத்தியில் உண்டாகியது, அதுமட்டுமின்றி திரையரங்குகளுக்கு செல்லும் வழக்கம் குறைவடைந்து ஒற்றி பிளாட்போர்ம்களில் (முவுவு - மூளநச வாந வழி அநனயை) திரைப்படம் பார்க்கும் பழக்கத்திற்கு மாறினர். அத்துடன் பெரும்பாலான இளையோர் நிகழ்நிலை விளையாட்டுகளான (முடெநெ பயஅநள), பப்ஜி (ரீடிப), ப்ரி:ப்யர் (குசநந கசைந) போன்றவற்றில் மூழ்கினர். அநேகமானோர் அதற்கு அடிமையும் ஆகினர்.

மேலும் இளையோர் கோவிட்-19 மற்றும் பொருளாதார மந்தநிலை காரணமாக வீட்டில் இருந்தபடியே கரம் (உயசசமுஅ) போன்ற விளையாட்டுக்களிலும் ஈடுபட்டிருந்தனர். சில இளைஞர், யுவதிகள் இவ் ஊரடங்கில் தத்தம் கலைகளை வளர்த்துக்கொள்வதிலும், புத்தாக்கங்களில் ஈடுபடுவதிலும், புதியவற்றை தேடித் தேடி கற்றுக்கொள்வதிலும் தமது பொழுதை இனிதே கழித்தனர். வேறுசில புத்தகப்பிரியர்கள் புத்தகங்களை வாசிப்பதிலும், வாசித்த புத்தகங்கள் பற்றிய பதிவுகளை சமூக வலைத்தளங்களில் பதிவிடுவதிலும், வாசிக்க வேண்டிய புத்தகங்கள் பற்றிய விமர்சனங்களை வாசிக்கவும் சமூகவலைத்தளங்களில் பெரும்பாலான நேரத்தை செலவிடுகின்றனர். முன்னரை விட குறிப்பாக கோவிட்-19 மற்றும் பொருளாதார மந்தநிலைக்கு முன்பை விட தற்போதைய நிலையில் அதிகளவான நேரத்தை இளையோர் தமது கையடக்க தொலைபேசிகளினூடாக சமூக வலைத்தளங்களிலேயே செலவழிக்கின்றனர் என்பதே கவலைக்கிடமான உண்மை ஆகும். இதனால் அவர்களின் நாளொன்றுக்கான சராசரி தூக்கம் குறைவடைந்து வருகின்றது அதாவது நாளில் பெரும்பாலான நேரத்தை கையடக்க தொலைபேசிகளில் செலவு செய்வதனால் உளவியல் சார்ந்த பிரச்சினைகளுக்கு இளையோர் உள்ளாவதுடன் மன அழுத்தம், தற்கொலை உணர்வு, கண் சம்பந்தமான நோய்கள், தூக்கமின்மை, பசியின்மை என்பன ஏற்படும் அபாயம் உள்ளது.

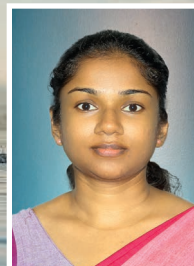
மேலும் பொருளாதார மந்தத்தின் காரணமாக இலங்கையின் பாரிய வருமான மூலமான சுற்றுலாத்துறை வீழ்ச்சியடைந்தது. இதனால் சுற்றுலாத்துறையினை மையமாகக் கொண்ட இளைஞர், யுவதிகள் தமது வேலையை இழந்தனர். அத்தோடு தமது பொழுதை இயற்கையோடு கழிக்க விரும்பிய இளையோர் தமது சுற்றுலாவினையும், வெளிக்கள செயற்பாடுகளையும் இடைநிறுத்திக்கொண்டனர். இதற்குக் காரணம் பொருளாதார மந்தத்தினால் ஏற்பட்ட பெற்றோல், டீசல் விலை உயர்வு மற்றும் போக்குவரத்து கட்டணங்களின் உயர்வே ஆகும்.

அடுத்து கல்வித்துறையில் ஏற்பட்ட மாற்றத்தை எடுத்து நோக்குகையில் ஆசிரியர்கள் மற்றும் மாணவர்களுக்கு அளவுக்கு மீறிய விடுமுறை நாட்கள் மற்றும் நிகழ்நிலை வகுப்புக்கள் (முடெடைநெ உடயளள) இடம்பெற்றாலும் மாணவர்கள் ஆர்வத்துடன் பங்குபற்றுவதில்லை. மேலும் ஏழை மாணவர்கள் பலர் பொருத்தமான இணைய வசதியோ, கையடக்க தொலைபேசியோ, கணினி வசதியோ இல்லாமையினால் மாணவர்களின் கல்வி நடவடிக்கைகள் பாரிய பின்னடைவை நோக்கி நகர்வதை காண முடிகிறது. இதனால் கல்வி நடவடிக்கைகள் வினைத்திறனற்றுப் போனது. குறிப்பாக, பாடசாலை மற்றும் பல்கலைக்கழக மாணவர்கள் தமது பாடசாலை மற்றும் பல்கலைக்கழக பருவத்தை இழந்தனர். வேலைக்குச் செல்லும் இளையோர் வீட்டில் இருந்தபடியே வேலைக்கு செல்லுதல் (நழசம கசழஅ ஈழஅந) என்பது தற்போதைய காலகட்டத்தில் பரவலாக எல்லா நிறுவனங்களாலும் அறிமுகப்படுத்தப்பட்டது.

மேற்குறிப்பிட்ட எடுத்துக்காட்டுகள் பொருளாதார மந்தம் மற்றும் கோவிட்-19 காரணமாக மக்களின் குறிப்பாக, இளைஞர் யுவதிகளின் உணவுப் பழக்கவழக்கம், பொழுதுபோக்கு, உளவியல் மற்றும் கல்வி என்பவற்றில் ஏற்பட்ட மாற்றத்தை, அதாவது அவர்களின் வாழ்க்கைப் பாணியில் (டகைநளவலடந) ஏற்பட்ட மாற்றத்தை தெள்ளத் தெளிவாக எடுத்துரைக்கின்றது. இளையோர் வாழ்க்கை முறை (டகைநளவலடந) சடுதியாக மாற்றமடைந்தாலும் அது நன்மை, தீமை எனும் இருவேறு தூண்களினால் ஆக்கப்பட்டு உள்ளது என்பதே யாராலும் மறுக்க முடியாத உண்மை எனலாம். இளையோர் இவற்றில் நன்மை பயக்கும் மாற்றங்களை மட்டும் எடுத்துக் கொண்டு தீமை பயக்கும் மாற்றங்களை கைவிடுதல் அவர்களின் ஒளிமயமான எதிர்காலத்திற்கு வழிவகுக்கும்.



# Sustainability of Small - Scale Fisheries at a risk?



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Sri Lanka is a tropical island where 15 districts out of 25 are successfully carrying out fisheries activities. Nearly half of the annual seafood produced is sourced from small-scale fisheries on the island. According to the statistics small-scale fisheries grew over the years but after 2016 the contribution of artisanal fisheries to the total marine output depicted a decline while deep-sea fisheries showed an increase in production over time. The decline in production is shown in figure 01.

Though the downward trend is still at its beginning, it should not be neglected. Since small-scale fisheries generated livelihood opportunities for 224,610 individuals, while 804,760 of the households depended on income from fisheries in the year 2019, even a small change can create a huge impact on the fisheries community and the economy at large.

Artisanal fisheries in Sri Lanka are mainly impacted by 05 forces. Those are the Polk Bay geopolitics, Tsunami, Government policies, development projects near the shore and the ELAM war. Northern and Eastern coast fishers suffered direct losses from the ELAM war and Polk Bay geopolitics while Southern and Eastern fishers had to face indirect impacts such as limited seasonal migratory fisheries during the ELAM conflict.

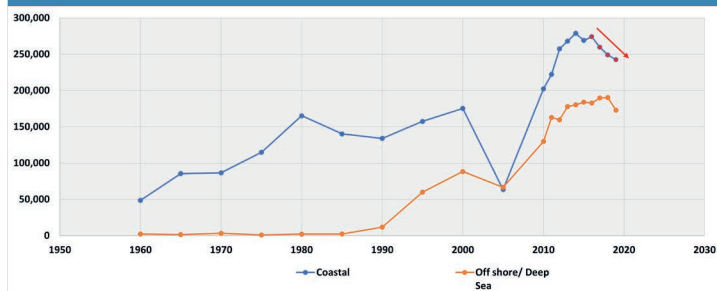


Figure 1- Total marine contribution from off shore and coastal fisheries

Still today, Polk Bay territory is rich in fisheries resources. Indian fishermen with the *Pink Gold Rush*; increased global demand for shrimp and started to exploit fisheries resources in Polk Bay. This has been accelerated with the patronage of the Indian government with the *fisheries Boom* providing motorized equipment and fishing gear to harvest marine resources. But later, upon consuming all the resources in Indian territory, Indian trawlers started to enter Sri-Lankan waters. This exploitation of resources has been facilitated by the ELAM conflict since Sri Lankan fishermen were not allowed to fish in the Northern territory. A high-security zone was declared and only a 3km sea span from the shore was allowed to fishermen during the peak period of the conflict from 6 a.m. to 6 p.m. Hence Indian fishermen continued to enjoy the resources in Sri Lankan waters using bottom trawlers. To date, fishermen in the North are severely affected by the Illegal Indian fishers. Nearly 22% of small-scale fishermen have lost their livelihoods due to the Polk Bay geopolitics.

With the ending of the ELAM conflict rehabilitation of families in Northern and Eastern provinces started. This allowed the fishermen to resume their normal livelihood. Thus, in figure 02, a sudden increase in the fisheries community can be identified. This has created increased competition among the small-scale fisheries for the limited sea resources while a part is being exploited by Indian poachers. Also, fishermen in the north have to face competition from seasonal migratory fishermen from the west and south after the ELAM conflict.

After the post-war development boom (2009-2011) in the North and East, the government implemented many development projects such as *Northern spring*, *Eastern awakening*, harbors, airports, highways, and mega-scale hotels. Employment opportunities were created in these mega-scale projects for individuals. However, after the boom wearied off, many found themselves unemployed and shifted to small-scale fisheries. The number of active fishers and fishing households in districts such as Galle, Matara, Tangalle, Batticaloa, and Mullaitivu exhibits an increasing trend while Jaffna, Mannar, Puttalam, Kilinochchi and Colombo depict a relative stagnation in compared to the decreasing trend identified in Kalutara, Negombo, Kalmunai, Trincomalee and Chilaw. This stagnation and the increasing trend may be due to the relative stagnation of other employment opportunities and economic activities in the districts. This silently signals the crisis of other economic activities in the mentioned districts.

With Tsunami, 12 fisheries district out of 15 has been devastated. Fishermen lost lives, houses, fishing gear, and fishing infrastructure. This has caused negative consequences in coastal ecosystems too. Marine production in the year 2005 drastically reduced due to the Tsunami impact (figure 01). It is a question that the relief, funds, and fishing gear after the Tsunami has been received by the small-scale fishermen. By the time of the Tsunami majority of small-scale fishermen were not registered in fisheries cooperatives. Also, those who had received fishing boats did not receive nets and fishing equipment. Hence beneficiaries sold the boats and worked as laborers in other fishing vessels. This has adversely affected the small-scale fisheries' sustainability and resulted in trapping fishermen in the vicious cycle of poverty, generating multiple vulnerabilities up until today.

Mega-scale development projects have displaced fishermen from their traditional fishing grounds and



landing sites. For example, the Pasikuda tourism promotion zone has affected the local small-scale fisheries by prohibiting them from accessing their fishing grounds. Also due to the construction of ports down south and port city development in Colombo, the marine ecosystems have been adversely affected. This in turn affects the fisheries resources and artisanal fisheries. Moreover, the majority of policies and development projects in fisheries have always targeted commercial-scale deep-sea fisheries, making small-scale fishermen further vulnerable. For example, under the “**vision 2025**” (*Northern Province Sustainable Fisheries Development Project*) and the “*Aquaculture Industrial Zone- Batticaloa*”) government encouraged private parties’ participation in deep-sea fisheries and the development of a new mega fisheries zone. This effort in commercialization has targeted maximizing commercial fisheries productivity while it can adversely affect small-scale fishermen and their livelihoods. Artisanal fisheries are incapable of competing with private parties since they lack resources, infrastructure, literacy, and capital.

Government policies enacted since 1994 to date has always been under the influence of political regime changes. As previously mentioned, the development projects have always targeted commercial-level export-oriented fisheries. Under the new fisheries policy of 2018, the government put forward the *Blue Economy* (BE) concept enabling local and foreign investors to enter Sri-Lankan commercial-scale fisheries. Unless the participation of an increased number of stakeholders is regulated, it will be the smallholder fishermen who are at the bottom of the supply chain with low negotiation and bargaining power at the disadvantage.

Moreover, the unexpected maritime disasters such as collapsing of the Express Pearl ship (2021) on the western coast have accentuated the adverse impact on small-scale fishermen. Because of the X-Press Pearl Maritime Disaster, Sri Lankan authorities placed a fishing embargo on the marine area from Negombo to Panadura (over 80km area), which directly affected around 15,000 Sri Lankan fishermen. Though this decision had been taken to avoid contaminations moving up along the food chains, the decision has adversely affected the livelihood of small-scale fishermen. The fishermen could not go out to the sea and catch the harvest. Moreover, the customers did not want to buy fish fearing contamination. If Sri Lanka had failed to control the fire at the Blue Diamond ship on the East coast of Sri Lanka (2020) it would

have been marked as one of the worst maritime disasters endangering the marine ecosystems and the livelihood of small-scale fishermen and all other related economic avenues.

Moreover, the Port City development project has adversely affected the livelihood of the fishermen in Negombo, Wennappuwa, Uswetakeiyawa, Hendala, Panadura, Wellawatte, Mount Lavinia, and Moratuwa. The fishermen were banned from accessing their usual fishing grounds, the community was displaced and fish breeding grounds had been devastated. Hence the fishermen are experiencing a reduction in the fish harvest in the area. Moreover, the coral reefs surrounding the area had also been destroyed, amplifying the destruction of fish breeding grounds. The sediments and too much stress on reefs from sand and granite mining have created unimaginable damage to the sea bed and the surrounding coral reefs. Port city area, which had previously been a good breeding ground for Lobsters and crabs (due to the sediments carried from Kelani river and natural sea currents) is now filled with construction materials destroying the entire lobster/crab habitat.

All these unplanned projects and man-made maritime disasters have decelerated small-scale fisheries further. This will endanger the lives of people dependent on small-scale fisheries causing a rippling effect on the entire economy.

Hence, it is essential to generate a discussion on the sustainability and way forward of small-scale fisheries in Sri Lanka.



Fishing practices that employ small and traditional fishing vessels; depend on family labour; exhibit seasonal migration; supply to local markets; dependent on intermediaries and money lenders for credit; low capital input; poor technology literacy and access; and fishing depends on the cast and ethnicity are known as small scale fisheries.

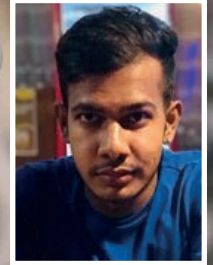


## References

- Amarasinghe, O. & Bavinck, M. (2011) Building resilience: fisheries cooperatives in Southern Sri Lanka, In Jentoft, S. & Eide, A. (eds.) *Poverty Mosaics: Realities and Prospects in Small-Scale Fisheries*, Dordrecht: Springer Netherlands, pp: 383-406.  
DOI: [https://doi.org/10.1007/978-94-007-1582-0\\_17](https://doi.org/10.1007/978-94-007-1582-0_17)
- Bavinck, M. (2015) Fishing rights in post-war Sri Lanka: results of a longitudinal village enquiry in the Jaffna region, *Maritime Studies*, 14(1), 1.  
DOI: <https://doi.org/10.1186/s40152-014-0019-0>
- Bhavani, F. & Mirak, R. (2009) *Trincomalee High Security-Zone and Special Economic Zone*, Colombo: Centre for Policy Alternatives [Online] Available from: <https://cpalanka.org/Wpcontent/uploads/2009/11/Trincomalee%20High%20Security%20Zone%20and%20Special%20Economic%20Zone.pdf> [Accessed:15th November 2019]
- De Silva, D. & Yamao, M. (2007) Effects of the tsunami on fisheries and coastal livelihood: a case study of tsunamiravaged southern Sri Lanka, *Disasters*, 31(4), pp: 386-404.  
DOI: <https://doi.org/10.1111/j.1467-7717.2007.01015.x>
- Dodangodage, P. K. (2017) Illegal fishing by Indian trawlers violating the maritime boundary of Sri Lanka and its impact on livelihood and the Indo-Sri Lanka relations, *Proceedings of the 10<sup>th</sup> International Research Conference of KDU, Ratmalana, Sri Lanka: General Sir John Kotelawala Defence University*.
- Fonseka, B. & Raheem, M. (2009) *Trincomalee high-security zone and special economic zone*, Colombo: Centre for Policy Alternatives.
- Gaasbeek, T. (2013) Actors in a masala movie: fieldnotes on the NGO tsunami response in eastern Sri Lanka, In McGilvray, D. B. & Gamburd, M. R. (eds) *Tsunami Recovery in Sri Lanka. Ethnic and regional dimensions*, London, New York: Routledge, pp: 145-162. DOI: <https://doi.org/10.4324/9780203856512>
- Ibrahim, F. A. (2020). *Between the sea and the land: small-scale fishers and multiple vulnerabilities in Sri Lanka*.



# A Boost to the Economy Through Mushroom Cultivation



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“Cultivation of mushrooms can be converted into human food. Mushroom cultivation in Sri Lanka is mostly done at the household level as a small business. Much research has been done on mushroom cultivation; there are only several types of mushrooms in Sri Lanka. Normally, Oyster and Abalone mushrooms are distributed around Sri Lanka. Though there is a good market demand for mushrooms, most farmers cannot meet the demand and required quality products due to lack of knowledge, techniques as well as resources. Thus, it is important to make the farmers aware of doing mushroom cultivation properly as this is a profitable business if done correctly.”

## What are mushrooms?

Mushroom belongs to the kingdom of fungi. Fungi are again divided under four major groups: Zygomycota, Ascomycota, Basidiomycota and Deuteromycota. Normally mushrooms belong to the group, Basidiomycota. They are developed by the fungi to store the spores to continue their reproduction process.

Mushrooms were grown naturally. Later, people started to cultivate mushrooms commercially. The demand for mushrooms has increased in Sri Lanka in the past few years.

## What are the advantages of mushroom cultivation as self-employment?

One can commence it by small initial capital. There is good return on investment and low-cost raw materials are available. Also, there is the ability to cultivate throughout the year. It requires small space. It can be harvested within a short period and is not affected by bad weather conditions. If proper technique was used for cultivation extra expenses for pest control can be reduced

## What are the commercially-cultivated mushrooms in Sri Lanka?

- Iduru Bimmal
- Muthubeli Hathu
- Boththam Hathu
- Sukiri Bimmal
- Kan Hathu
- Abaloni Bimmal

## What are the most popular types of mushrooms in Sri Lanka?

‘Muthubeli Bimmal’ (Oyster) is the most popular type and Piduru Bimmal is commonly cultivated.

## What is Oyster (Muthubeli) Mushroom?

It has the shape of an oyster, so is called an Oyster/ Muthubeli Bimmal. It is available in white, cream, grey, yellow, pink and pale brown colors. Two types of oyster mushrooms are cultivated in Sri Lanka: American Oyster (White color) and Abalone Mushroom (pale brown color)

What is the cultivation method for Oyster mushrooms?

In polypropalin bags using sawdust and in the polythene/ polypropalin bags using straw media.

What are the ingredients of mushroom cultivation?

- Polypropalin bags - 200 gauge
- PVC tube- 3-4 (width and 1-2 height)
- Rubber bands
- Cotton
- Dried saw dust
- Rice bran
- $\text{CaCO}_3$
- Samaposha
- $\text{MgSO}_4$
- Water

## How is mushroom cultivated?

Preparing the culture media:

Spread the saw dust throughout the cement ground or polythene and mixing rice bran, samaposha and  $\text{CaCO}_3$ , and the whole content should be mixed well in the saw dust.

Then, add  $\text{MgSO}_4$  to the above mixture. Prepare polythene bags of 200 gauge and fill the bags with the mixture. Put PVC tube on the tip of the polythene bags with a cotton ball on it. Then, seal the polythene bags and sterilize them. After sterilization, desiccate the bags and add mushroom seeds. Allow the fungi to grow inside the bags. Properly maintain watering, temperature, ventilation and light.

Harvest the mushroom in 1 1/2 months from the date of cultivation.



## How is the Cultivated Mushroom Sold?

Put a label according to the Consumer Protection Act. It should include trade name, name of producer and address, manufactured date, expiry date, registration number and price.

We met Mr. Chaminda Rohana, a mushroom cultivator living in Belihuloya, who had done mushroom cultivation in a large scale. He shared his experience with us.

**“I have started this mushroom cultivation 8 months ago. I did it in a large scale in a separate place in my home. About 1500 mushroom packets were made. An extension officer in the area was guided for the cultivation. Mushroom seeds were brought from a place in Balangoda. Saw dust was brought from sawmills.**

Unfortunately, I stopped the mushroom cultivation due to the covid-19 situation. Also, I have started a broiler farm in my home. The mushroom cultivation needs special care, and it was disturbed with the farm (check with the author). Because of these reasons, I had to stop the mushroom cultivation.”

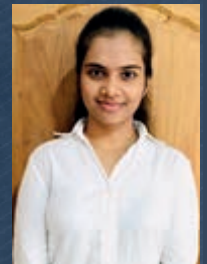
Register Mushroom Cultivation as a Small business..

The help for this can be got from the relevant Divisional Secretary Office, where required training certificates are issued on request from the institution.

The Government institutions and their contact numbers where the Oyster mushroom seeds:

- Thelijawila Research Institute - 041 2240464
- Makadura Research Institute - 031 2299625
- Pothuhera national training Institute - 037 2237800
- Export Development Authority - 011 2225421
- Seed farm Kundasale - 081 2845258
- Gannoruwa - 081 3845258

# Used Plastic Gain Dollars



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Plastic is a non-degradable material used for day-to-day work. Plastic processing has been a flourishing industry in Sri Lanka for over 45 years. Currently, Sri Lanka has over 400 companies engaged in plastic processing. The capacity of the local plastic processing industry at present is nearly 140000 MT per

annum with an annual average growth rate of around 10% -12%. Generally, plastic exports could be divided into two forms; primary forms of plastic exports and finished product of exports. Some of the major export market for Sri Lanka include the United States, United Kingdom, Japan, Bangladesh and India. The USA has been the dominant buyer of plastic products of Sri Lanka – nearly 40% of the total exports. Products such as sacks and bags, articles of apparel/clothing accessories and cellulose are manufactured through plastic processing and exported directly and indirectly. The country is still at a preliminary production stage and it is only beginning to seek out new opportunities and explore new markets.

ZeroPlastic, a nationwide movement striving to usher Sri Lanka into an era when plastic is used to the bare minimum, is one of the numerous organizations fighting to combat the catastrophic impact plastic has had on our nation.

Nishshanka De Silva is the founder of ZeroPlastic. He realized that Sri Lanka has a serious issue with managing its plastic in late 2019. Research papers published at the time identified Sri Lanka as a highly polluted country, and Leonardo DiCaprio shared information about Sri Lankan elephants ingesting plastic in landfills that led to their demise. Being this badly contaminated for such a little nation in the Indian Ocean is worrying, he said.

Until he realized that “my cutting board is made of plastic, my food covering, my broom, my flowerpots, my bins, virtually everything in the bathroom, it was all made of plastic,” Nishshanka frequently ruminated on this fact.

By exposing natural ecosystems to plastic garbage and hazardous amounts of harmful microplastics, the rising usage of plastics has unquestionably influenced the environment. Nishshanka points out, however, that we have also exposed ourselves and our loved ones to microplastic poisoning by consuming plastic products.

He emphasized that “these objects wear down and release microplastics in our home and our meals, from the broom to the cutting board.”

Nishshanka further pointed out that as a result of our growing reliance on plastic goods, many regional industries have died out, eliminating several sources of income for households across the nation that are in dire need of money.

By pointing out that most people choose to buy plastics rather than locally manufactured goods made by artisans, we have unavoidably prevented families who have practiced their skill for centuries from working in it, supporting their families and livelihoods, and enjoying an honest meal.

“Because we don’t buy them, we’ve taken away the livelihood of local business owners that make alternatives to plastic. More people would surely be inclined to start earning money as cab drivers if there was no reliable source of income for the next generation, he said.

Nishshanka decided to alter his life and assist others in doing the same after realizing that something needed to be done. The ZeroPlastic campaign was established as a result.

Ceylon Today discovered that the ZeroPlastic initiative strives for a Sri Lanka that uses plastic more responsibly. This includes avoiding the use of plastic bags whenever possible, recycling plastics when possible, and forgoing the purchase of plastic products in favor of relying on local artisans who make the tools and products we use out of naturally sourced materials. More individuals must join this transformation for it to be as significant as ZeroPlastic hopes.

Everyone must contribute to the solution if we are all to blame for the current pollution, according to Nishshanka.

He thinks education will be crucial for this transition to occur, especially among the younger population and youngsters. Knowing this, Nishshanka has worked relentlessly to spread his message to the student community at nearby universities.

ZeroPlastic needs to continuously reach a large audience across the nation if Nishshanka’s dream is to become a reality. This means going well beyond the university ecosystem. In addition, he must coordinate with countless numbers of like-minded people who have chosen to become part of a network of volunteers for ZeroPlastic’s mission. Naturally,

the issue is how to handle them all.

Nishshanka said, “What worked for us is comparable to what you see the Rotaract club do with their organization. There are currently 15 ZeroPlastic clubs at universities across the nation, and each club’s goal is to finish at least one project that advances the ZeroPlastic aims each month.

The numerous ZeroPlastic organizations across the nation continually educate the public about the importance of reducing, reusing, and recycling plastic while also supporting the growth of volunteer members’ networks and leadership skills. Nishshanka, however, hopes that the ZeroPlastic movement will grow to include people of all ages, including adults and schoolchildren.

Ideathon, hackathons, and many other similar projects have all been organized and carried out by ZeroPlastic to raise public awareness and help Sri Lanka wean itself from its dependence on plastic. Furthermore, with the help of their extensive reach and strong volunteer network, ZeroPlastic also collaborates with corporate customers on sustainability and CSR programs that address the plastic problem in Sri Lanka.

In the near future, Nishshanka and ZeroPlastic intend to expand their reach to public schools all across the nation and include corporate executives in each district. Of course, Nishshanka has many other important ideas as well, but they will all materialize in due course.

ZeroPlastic is a fantastic illustration of how regular individuals can change the world, altering not only their own lives but also the livelihoods and perspectives of others.

According to officials, Sri Lanka is recycling 30% of its waste plastic, including rubbish that washes up on its coastlines, into fabric and brushes, which are becoming multimillion-dollar industries.

Trischel Fabric (Pvt.) Ltd, a completely owned subsidiary of MAS Holdings in Sri Lanka, manufactured 4500 meters of fabric using yarn made from used plastic bottles, including bottles gathered from the country’s beaches.

The World Cup shirt for the Sri Lanka cricket team in May 2019 was created of recycled yarn produced

by Eco Spindles (Pvt) Ltd, a division of the BPPL group of Sri Lanka.

A jersey's worth of yarn, according to officials, can be produced from around ten PET bottles.



MAS Holdings, a maker of intimate, sports and swimwear had launched an initiative collaborating with the Navy, Sri Lanka Cricket and Eco Spindles (Ltd), a unit of Sri Lanka's BPPL group, Sri Lanka Cricket and Sri Lanka Navy to collect beach plastic.

“Looking at plastic, Sri Lanka has a tackleable problem,” MAS Kreedha chief executive and managing Director Sarinda Unamboowe says.

Sri Lanka is already recycling about 30 percent of its plastic water.

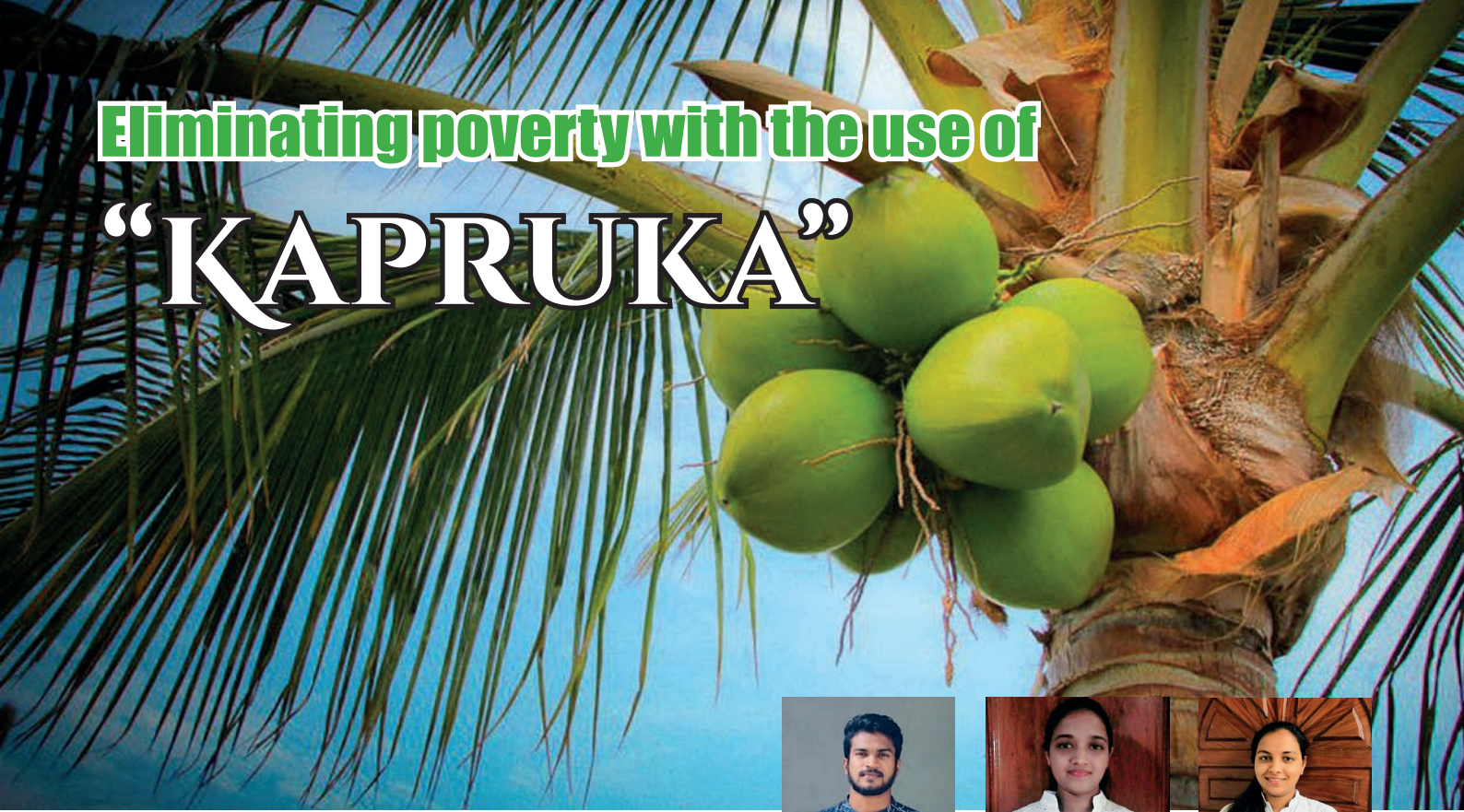
“We (Sri Lanka) import 1500 metric tons of plastic polymer per month, and 30% of that is re-exported, with 680 tons ending up in landfills,” said Nimesh Amalean, general manager at MAS Active.

By 2025, when the recycled polyester market may be worth \$25 million US, the majority of the brands MAS works with are anticipated to discontinue utilizing virgin polyester raw materials.



# Eliminating poverty with the use of

# “KAPRUKA”



## Introduction

Poverty is a problem faced by the majority of Sri Lankans. Thus, coconut remains to be one of the most important crops and a major import and export of Sri Lanka. Coconut is also known as the “tree of life” also referred to as “Kalpavriksha” - “the tree of heaven” as every part of the palm is useful to mankind in one way or another. It provides food, drink, fuel and timber. Most families in Sri Lanka depend on coconut for their livelihood either directly and indirectly. It is considered a major Export, contributing 3.6% of the country’s gross value added(GVA) in agriculture, next to banana, corn and rice. indeed, the country remains to be a top producer and exporter of coconut. A strategic direction could be the continued development of coconut while also encouraging the development of oil palm. Another is to focus investments in producing and developing other coconut products such as coconut sugar, coconut water, virgin coconut oil, coconut flour, and coco coir, among others. Normally coconut is grown in different soil types such as sandy, loamy and clayey good soil structures where air and water can circulate well. Coconut is very important for the Sri Lankan economy. Furthermore, the exports of coconut products serve as the nation’s prime foreign exchange earner. Planting coconut trees is a simple affair. We plant them for their beauty and perhaps

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to create shade. However, it is a poverty-eliminating tool. So the coconut tree, found at every nook and corner in Sri Lanka, has a long history intertwined with the Sri Lankan life cycle. From our everyday food to delicacies, farm equipment to household items, roofing material and furniture, the coconut tree has been a useful source of materials throughout the centuries. Sri Lanka is the fourth-largest exporter of coconut products in the world. The remaining harvest is used to produce a range of products from various parts of the coconut for local consumption as well as export markets.

There are many coconut based products made in Sri Lanka. Includes; coconut kernel-based products, coconut water-based water products, coconut fiber-based products, coconut shell-based products, coconut sap-based products and coco peat-based products. Popular exporting includes desiccated coconut, brown fiber, virgin coconut oil and coconut water which are available through a number of exporters.

**Coconut kernel-based products** include desiccated coconut, coconut oil, coconut chips, virgin coconut oil, coconut milk, coconut cream, coconut butter and coconut flour.

#### **Desiccated coconut:-**

- Made from the peeled kernel of the seasoned coconut, desiccated coconut from Sri Lanka is a dry, finely ground, white ingredient that is mainly used in the bakery and confectionery industries.
- The place held by Sri Lankan desiccated coconut in the world market is built upon its unmatched quality in ingredients, rich taste, and texture. Its quality is mostly demanded by international producers of biscuits, chocolates, and other sweets. Sri Lanka is the birthplace of desiccated coconuts. These dried, shredded particles are originally extracted from the peeled kernel of the fruit.

#### **Coconut Chips:-**

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#### **Coconut milk:-**

- Mostly known for its wide use in the preparation of food, coconut milk from Sri Lanka is a product





of the coconut kernel that enjoys a high demand in the world market. Coconut milk is produced by pressing grated fresh coconut kernel to extract its white concentrated liquid with a creamy flavor and tropical aroma.

- Although traditionally used in cooking, with the current global trends such as vegan & Gluten-free and Soy-free foods coconut milk has gained recent popularity as a substitute for dairy milk. Accordingly, today a wide range of flavored and unflavored drinking coconut milk is being manufactured and exported from Sri Lanka to the world. The distinct white color followed by its unique aroma and flavor has made Sri Lankan Coconut milk the most sought-after in the world market.

#### **Coconut butter:-**

- Coconut butter is made by grinding up white coconut meat. It contains small flakes of ground coconut meat. The product contains a lot of nutrients that support its consumers with their good health.
- Similar to coconut oil, coconut butter is known for aiding weight loss, boosting immunity, and many more but unlike coconut oil, it also contains higher amounts of saturated fat and dietary fiber.

Coconut-water-based products; it has been a refreshing drink enjoyed by Sri Lankans for centuries. Water from the tender coconut locally known as Kurumba or the King Coconut the orange coloured variety of coconut native to Sri Lanka is now a celebrated drink around the world for its sweet taste as well as high amount of minerals, vitamins and electrolytes. Coconut water is great for quick hydration and its slightly high pH value means it can be used to produce vinegar in addition to the coconut sap.

- Coconut water-based products made in Sri Lanka include; pre- packed tender coconut water, pre-packed king coconut water & coconut-water-based vinegar.

#### **Tender coconut water:-**

- Widely known as TCW, it is the liquid derived from the green-coloured tender coconut, which is yet to ripen. Coconuts usually take 10 - 12 months to fully mature. Tender coconut water is a nutritious, wholesome beverage that first became



popular among people in the tropic. Coconut water producers from Sri Lanka supply bottled tender coconut water to the markets in the USA and the EU along with other value-added versions including flavoured coconut water and fizzy coconut water.

### Natural coconut water vinegar:-

- Sap vinegar is made using the sap taken directly from the coconut flower at the top of the coconut tree. Coconut water vinegar is made using coconut water and added sugars. Vinegar is rich in minerals and vitamins such as beta carotene, calcium, iron, magnesium, and potassium since it is naturally fermented. Still, it has to be noted that there are types of synthetic vinegar available in the market.

### King coconut water:-

- King Coconut is indigenous to Sri Lanka. Locally called “Thambili”, the orange-colored coconut is a top favourite of tourists visiting the island. Sri Lanka is the largest producer of king coconuts. Sri Lankan exporters serve the global demand with bottled king coconut water. The organic liquid contains several types of natural sugar such as sucrose, fructose, and glucose, giving rise to its unique sweet flavour.

Coconut sap-based products; Coconut tapping for the sap of the coconut flower demands a nimble hand and steady feet and is one of the risky tasks with a sweet outcome.

- Sri Lanka produces a range of sweet and zesty products using the sap of the coconut flower including jaggery, treacle, and coconut sugar. Fermented coconut sap is used to make toddy, a slightly alcoholic beverage while two-step bacteria-based fermentation is used to produce coconut vinegar.
- Coconut sap-based product exports from Sri Lanka include coconut jagger, treacle and vinegar and coconut sugar while toddy is mainly produced for local consumption.

Coco peat-based products; Also called coco pith, coco peat is a 100% organic, natural and biodegradable substance that was the by-product of the coconut fibre extraction process.

- The possible use of coco peat in horticulture, animal husbandry, and other industries was discovered in the early 1990s creating a global



market for a by-product of the coconut fibre industry in Sri Lanka.

- Today Sri Lanka exports a range of coco peat products including; grow bags, planter bags, grow cubes, compressed blocks, discs and loose coco peat that is used in agriculture, industries and farms.

Coconut is a super product; the tree of life. All its parts can be used, so it's easy to accept when experts contend that it has more than a hundred functions.

### **Coconut oil:-**

Can start a self-business by making coconut oil at home, using coconuts in your garden and surrounding places. Also, can join neighbors and make new job opportunities.

### **Coconut husk products:**

Sri Lanka's smallholders and home-based industries produce goods using coir fiber, they are ranges of bushes, brooms and production of brown coir fiber. In its raw form, brown fiber is used intensively and extensively in numerous industries both locally and internationally. Coir twine is used in agriculture for fence making, pot hanging and tying up plants. Coir mats also can be made in homes and sold in both export and local markets. Collecting some poorest people in the village, can improve the business and also, can improve their life standers by eradicating their poverty.

Coco peat or coir dust is another valuable product. Coir dust is usually shipped in the form of compressed bales, briquettes, slabs or discs the end user usually expands. This is an excellent medium for plant growth, reptile bedding, and potting the mixture. The superior features of Coco Peat are the excellent ability to retain moisture, enabling excellent root development, improving air and moisture retention, reducing the frequency of irrigation and enhancing a strong and healthy root system. These products can be sold in local and global markets. Widely used in horticulture and commercial applications, it can be started as a small household business to earn a lot of money. Further, extension services can be given for the rural people to develop their business, introducing new machineries.



### **Coconut shell products:**

In Sri Lanka, coconut shells are one of the primary manufacturing sources of activated carbon and coconut shell charcoal and they are mainly in the global market. Our country, pioneered the process of green charcoal manufacturing, successfully developing and introducing a pollution-free method of generating electricity with pollutant gas and heat produced in the process of manufacturing coconut shell activated charcoal. Charcoal is used as organic fertilizer in the horticulture industry. By popularizing among the rural people, they can produce charcoal and earn additional income and it a one way to solute the money-based problems. Coconut shell-activated carbon from Sri Lanka is mainly used for wastewater treatment, industrial water treatment, portable water treatment and the beverage industry.

Natural coconut shell is used in shell bowls, spoons, coffee cups, mugs, wooden cutlery, wall decorates, key tags and images.

Coconut shell crafts are made by highly skilled Sri Lankan craftsmen using a variety of coconut-shell cutting tools. These products are considered a great investment when considering the safety aspect and the eco-friendly qualities that this product brings out. These hand crafts have high demand in the global market. They can be made in our home and sold in the export market, getting high profits with the minimum cost of inputs. Launching extension services can give knowledge on these products.



# Demand Of Underutilized Horticulture Crops in the Export Market

Sri Lanka carries a huge potential for cultivation. Since ancient times, it is known for its success in cultivation. Today, there are various types of cultivation done for both local and export markets where its contribution to the national GDP is roughly around 7.5%. And also it is estimated that roughly 30% of Sri Lankans are directly or indirectly employed in the Agricultural sector. However, still there is the question of whether Sri Lanka has reached its full potential in cultivation. When it comes to fruit crops, the Sri Lankan per capita consumption of fruits remains far below the required daily average of 40g, which means that the potential for fruit cultivation is still there to be reached to its maximum potential. By improving the availability of fruits at an affordable price, demand and consumption can further be created. Even though Sri Lanka is in a financial crisis, the internal monetary circulation has thus far not been affected by a significant amount, and therefore the potential for increments in per capita fruit consumption can be increased significantly. By doing so, the contribution of the fruit sector towards the national income would also be increased by a huge margin. At the same time, the current forex crisis Sri Lanka is facing nowadays, the fruit sector has a massive potential to support the country to overcome its problems. While Sri Lanka's overall exports are predominantly dependent on Agricultural exports, it carries a huge



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potential growth since there are various types of crops that we still have not utilized effectively to increase our effort revenue. The fruits such as Katuanoda (*Annona muricata*), Madan (*Syzigium cumini*), Lavalu (*Pouteria campechiana*), Beli (*Aegle marmelos*), Guava (*Pisidium guajava L.*), Jackfruit (*Artocarpusheterophyllus Lam*), Nelli (*Emblica Officinalis*), Pomegranate (*Punica granatum L.*), Tamarind (*Tamarindus indica*), Veralu (*Elaeocarpus serratus*), Woodapple (*Ferronialimonia*), Durian (*Durio zibethinus*), Goraka (*Garcenia zeylanica*), Gaduguda (*Baccauria motieyana*) and Kon (*Schleicheraa oleosa*) carries enormous potential in the export market. But unfortunately, it remains as an untapped market by the Sri Lankans, and if the agricultural export sectors focus on those fruits as an export opportunity, targeting the markets in the USA, Europe, Canada, Australia and Japan we as a country will be opening doors to massive export revenue.

## Katuanoda

Katuanoda (*Annona muricata*) is one of the fruits which carries a huge potential to be grown as a million-dollar industry and yet it remains an underutilized horticulture fruit in the export market. In the recent research activities carried out by both local and international medical professionals, it is evident that Katuanoda fruits have very strong anti-cancer effects.

This research has also found that Katuanoda has the ability to kill cancer up to 10,000 times more effectively than strong chemotherapy drugs. And this is done without having an impact on the healthy cells. So compared to chemotherapy, Katuanoda can be considered more effective and it is a natural way to keep you cancer free. This tells you the potential that Katuanoda carried in the export market.



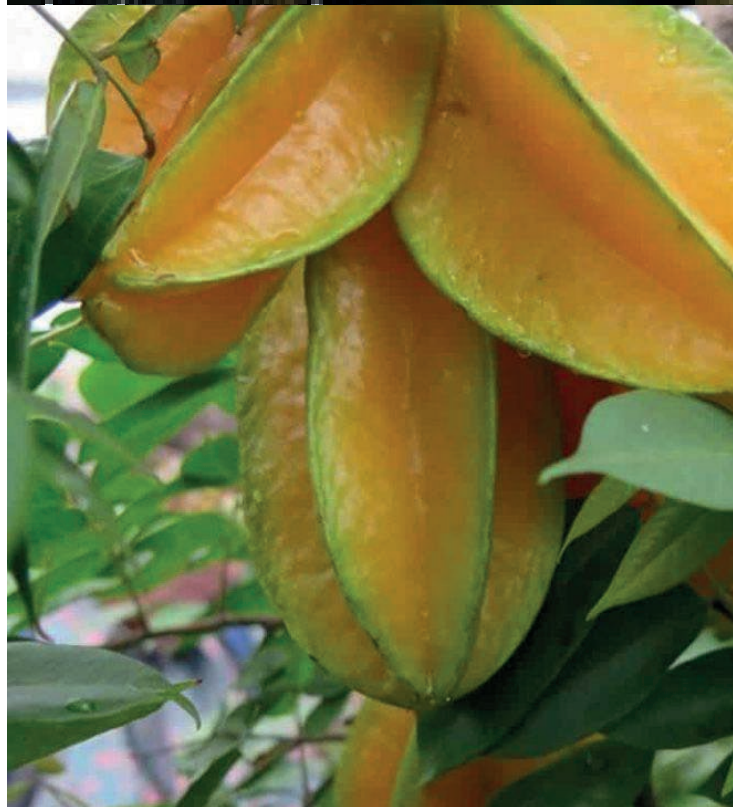
## Carambola

Carambola, also known as star fruit, is the fruit of *Averrhoa carambola*, a species of tree native to tropical Southeast Asia.

Raw carambola is 91% water, 7% carbohydrates, 1% protein, and has negligible fat (table). A 100-gram reference amount of raw fruit supplies 128 kilojoules (31 kilocalories) of food energy and rich content of vitamin C (41% of the Daily Value), with no other micronutrients in significant content.

Like grapefruit, carambola is considered to be a potent inhibitor of seven cytochrome P450 isoforms. These enzymes are significant in the first-pass elimination of many medications, and, thus, the consumption of carambola or its juice in combination with certain prescription medications can significantly increase their effective dosage within the body.

The Carambola pulp was used for formulating and standardizing 6 value-added products like Carambola RTS (CR), Carambola Squash (CS), Carambola Toffee (CT), Carambola Bar (CB), Carambola Chutney (CC) and Carambola Butter (CB).



## Nelli

*Phyllanthus emblica*, also known as the Indian Gooseberry or Nelli in Sinhala, is a small to medium-sized tree that naturally grows in tropical Asian countries' forests and can reach heights of 8 to 18 meters. The fruit has six vertical stripes or furrows and is almost spherical in shape. It is



pale greenish-yellow in color and appears to be quite smooth and rigid.

One of the ingredients of the well-known Ayurvedic concoction known as Trippala is dried fruit. Nelli is said to increase longevity, improve digestion, relieve constipation and lower fever. For the treatment of diarrhea, dysentery, hemorrhage, anemia, jaundice, and dyspepsia, dried fruit is employed. Skin outbreaks can be effectively treated with boiled Nelli leaves and patients who suffer from chronic diarrhea are given an infusion of fenugreek seed and leaves. The Nelli tree is highly prized commercially in all of its parts. It is traditionally believed to nourish the hair and scalp and prevent premature gray hair. Nellie is a natural component used in a variety of commercial industries, including medications, leather, dyes, chemicals, oil, drinks, and cosmetics. However, due to its medical benefits and capacity to produce high-quality dye and tannin. Although Nelli has a wide range of home and industrial uses, its full potential has not yet been realized in Sri Lanka.

### **Tamarind**

The scientific name of the tamarind is *Tamarindus indica* and it includes the Leguminosae family. Fruit pulp can be consumed. Many people find the young fruit's hard, green pulp to be overly sour, although it is frequently used in savory meals, as a pickling spice, or as a way to make some dangerous yams in Ghana safe for food. Since the fruit gets sweeter and less acidic as it ripens, it is often thought to be more delectable. It is used in sorbets, ice creams, jams, juice blends, sweetened drinks, and other desserts and snacks. It can be found in Worcestershire sauce in Western cuisine.

Tamarind plays a huge role as a medicine. Its juice is a mild laxative, used to treat bile disorders, lowers cholesterol, and promotes a healthy heart, the pulp, leaves and flowers, in various combinations, are applied on painful and swollen joints, and can be used as a gargle for sore throats, and as a drink to bring relief from sunstroke, the heated juice is used to cure conjunctivitis. Eye drops made from tamarind seeds maybe a treatment for dry eye syndrome, tamarind seed polysaccharide is adhesive, enabling it to stick to the surface of the eye longer than other eye preparations, and tamarind is a good source of antioxidants that fight against cancer. In addition to that, It is used as a diuretic remedy for bilious disorders, jaundice and catarrh, helps the body digest food, and can be applied



to the skin to heal inflammation. Juice extracted from the flowers is given internally for bleeding piles.

### **Suggestion**

First of all, the government of Sri Lanka must have a policy in place with a long-term and medium-term plan on how to develop these underutilized horticultural crops targeting the export market. Once the policy framework is finalized and established, the government must promote the concept of developing these new markets to the farmers. This must include small and medium-scale farmers and also large-scale farmers. Large-scale private sector firms must also be invited to invest in these sectors.

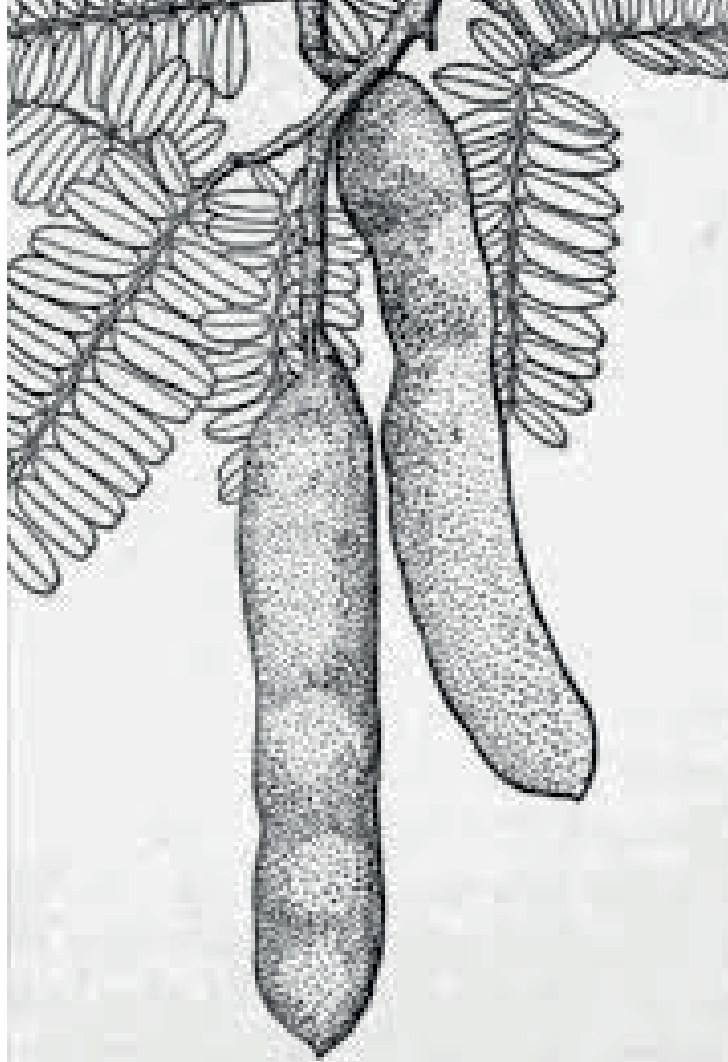
A financial aid program must be introduced for the farmers who are willing to get involved with these underutilized crop development programs. These financial aid programs must come with very minimum interest rates so that the farmers can be encouraged to invest.

At the same time, the government must encourage the private sector to develop the product. Rather than exporting the fruit, exporting a value-added product would be highly beneficial.

Also to protect the farmers entering this new area of agriculture, an insurance scheme must be introduced so that the risk for the farmers is mitigated, and that would further encourage farmers to get involved with this industry.

While setting up the local environment for the farmers to get involved in farming, the government must encourage private sectors to find their buyers from the export markets. Attractive tax concessions must be introduced for the revenue generated through these industries.

By doing so the government must be able to encourage both farmers and investors from the private sector towards this new industry and must be able to convert it into a billion-dollar industry within another 10 years.



# Sojan Cultivation



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The agricultural sector is an indispensable field since ancient times for the existence of human beings. The backbone of any economy is its agricultural sector, which now provides the raw materials for industrialization as well as the essential ingredients for human life. The agriculture industry includes businesses whose main activities are the production of crops, the raising of animals, and the harvesting of fish and other animals from farms, ranches, or their natural habitats. There are different types of agricultural practices including mixed crop and livestock, livestock ranching, grain farming, dairy farming, commercial gardening and fruit farming, Mediterranean agriculture, plantation farming and Sojan cultivation. Well-rounded new technology is used in the agriculture sector at the present. In any cultivation, we have to think about how can we earn a profit, and how much profit do we have and we need to look at the market for the product. Considering all these factors, out of the above methods, Sojan method is a very effective and profitable method.

## What is Sojan Cultivation?

Sojan cultivation method was initially started in Indonesia based on traditional cultivation methods. It is cultivated according to traditional

agriculture by using well-rounded new technology. Sunlight, water, temperature, air and nutrients, which are essential factors in cultivation will not be limited in this method. In short, “Sojan” is a lowland agricultural method to minimize land degradation and protect the wetland ecosystem and increase agricultural productivity.

The Sojan system involves building moats between two strips of land to aid in the drainage of agricultural land that does not drain. The arrangement of the arches between the two strips of land is what makes this method unique. Additionally, there are beekeeping, poultry farming, freshwater fish farming, as well as crops like vegetables, fruits, and supplemental crops. Normally, chili, okra, eggplant, tomato, snake gourd, bitter gourd, luffa, cucumber, and long beans are grown as vegetables. Catla, rohu and tilapia are reared as freshwater fish.

Generally, in Sojan method, cultivation is initiated in the dry season. This is mainly because rainfall may cause flooding conditions, resulting in intolerance in plantlets. Vines are directed onto arches while other plants are grown in the strips of land between drains. In these stripes, ridges are prepared to grow crops. When preparing these ridges, first sand is applied, then the soil is applied on the sand to make a ridge.



It prevents the over-absorption of plants. The harvesting is done with the use of boats, which is a characteristic of this cultivation. It could be seen from the plantations in countries like Malaysia and Thailand that this cultivation method is very successful in such places.

Saline soils, swamps, and paddy lands that can be grown but aren't allowed to drain correctly can all be effectively farmed using the Sojan agriculture method. Particularly in such areas, slightly higher ridges are created and planted with food crops.

The advantages of Sojan cultivation are,

- This is an ecologically sustainable method.
- Allows maximum land utilization.
- Crops are grown only using organic fertilizer. There is high demand for organic food.
- Pest attacks are minimum and there is no melon fly attacks. Therefore, there is no need to use pesticides.
- No need to cover fruits.
- Minimize damage to fruits and vegetables.
- Highly profitable method.
- Helps to utilize saline soils, swamps and fallow fields.

### **Sojan Cultivation in Sri Lanka**

The Ministry of Environment has decided to introduce five more new cultivation projects this year (2022) under the Sojan cultivation system.

These projects are implemented by the Ministry of Environment with financial assistance and the public is entrusted with the care and maintenance of these projects.

At present there are 20,917 acres of barren paddy lands in our country which cannot be used for agriculture and also, and 46,325 acres of fallow paddy lands can be cultivated. Most of the fallow paddy lands which cannot be cultivated are located in the Western Province. That area is 5903 acres. Also, about 50 percent of the fallow paddy lands that can be cultivated are in the Western Province. It is 18,461.35 acres. These are lands that can be utilized. It is instructed to cultivate these lands using the Sojan method as much as possible.

### **Holuwagoda Sojan Farm**

Holuwagoda farm is the first floating sojan farm in Sri Lanka. It is in the Baddegama area in Galle district of Southern province. It is managed by Mr. Chandralal Abeygunawardana, who has won the best farmer award thrice.

This cultivation was done in the field which had been fallow for more than 45 years. It was clear that the water did not drain well, the mixing of salt water, flooding, and wind were the reasons for the fallow.

In this place, about 16 types of vegetables like chili, okra, eggplant, tomato, snake gourd, bitter melon, luffa, cucumber, and long beans, fruits and green leaves are grown. And fruits like bananas and papayas are grown as side crops. Fresh water fish farming, beekeeping, chicken farming is also done.

Freshwater fish Tilapia, Rohu and Cattle fish are reared. Breeding fish and poultry management is done by a belt layer system. The initial cost for this farm was about ten lakhs. Of that, about eight lakhs was spent on labor and the rest was spent on sticks, ropes, seeds and the construction of chicken coops.

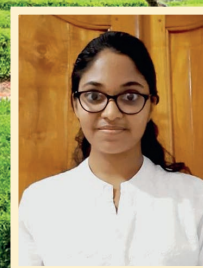
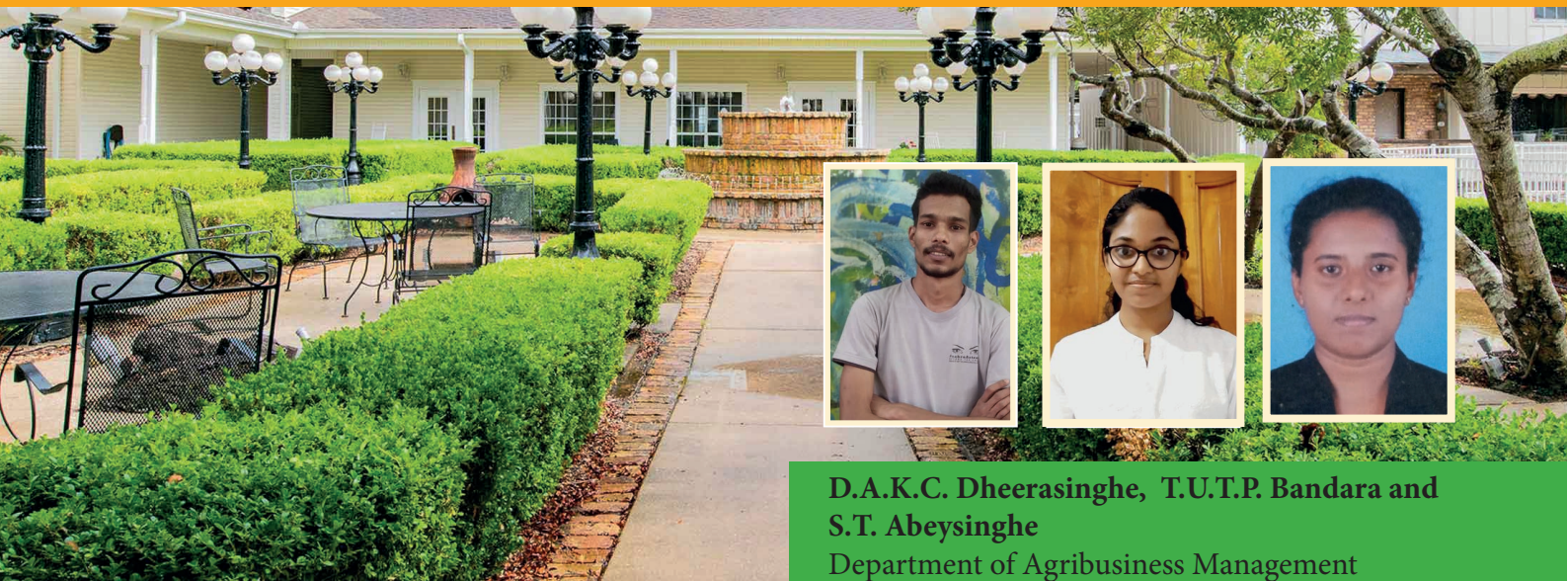
This method of cultivation can easily be done by anyone who has an interest in and dedication to any cultivation. The use of indigenous agricultural chemicals and the use of organic fertilizers are the secret of success in cultivation. According to this cultivation method, it can be cultivated in any swampy land and by cultivation, a net income of 1:4 can be obtained in 3 months.

We, as a country, should grow as much as possible so that our country can become self-sufficient and strengthen the economy in a short time. Sojan cultivation method is a very effective method to achieve the above purpose. As of now, there is potential for us to establish this method, but there are only a few pieces of information on Sojan cultivation and people are still unaware of such methods. Therefore, our responsibility is to spread awareness of Sojan method and educate farmers who have potential.



# Homestead

An organic way of farming for yourself



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**W**ith the current economy and prices of food, it is common to hear people say it is too expensive to buy some vegetables and other food ingredients. But, if someone can grow at least some of their food it would be a great help for the family. Homestead, which is a widely accepted concept of home-centered farming is one of the best solutions for this condition. It is also beneficial for people's mental and physical health as well.

*The organic homestead is a concept of using organic manure, other fertilizers and nature-friendly methods to homestead farming with minimum intervention into the natural ecosystems. It is a cheaper solution for the rising prices of fertilizers and farming materials as well as a great way to live without much harm to the environment.*

## What is a homestead?

Agricultural practices on small scale are common thing in a country like Sri Lanka. Let it be some curry leaves, a small chili plant or lime grass, people used to grow some essential food and spices nearby usually. When it comes to the homestead concept, it is a bit more organized than this traditional practice. In other words, the homestead is a well-organized and more effective version of traditional home gardening. Along with the related concepts of backyard farming and mini farming, this

concept also focuses on enriching the nutrition of the family by using the available resources for farming to the maximum. Whether you live in an apartment with limited space or a large land you can use this concept equally as it is flexible to adapt according to the place. Other than that, the "homestead" concept can be applied to both rural and urban areas. Usually, about 1/10 to 1/4 of an acre is enough to grow enough food for a small family. Unlike large-scale farms, homesteaders live and farm in the same space they live. The main objective is to grow their food, but there can be an extra harvest that can be easily sold to the market at a good price. Therefore, the homestead is known to consume most of the harvest while keeping the extra amount for sale.

## Way of sustainability....

It is a big word to call something like a house-based farmland "sustainable", but with a homestead, it is easy to make the difference between the worldly concept and real farming smaller. A small space of garden or concrete floor can produce a lot more food than enough for a family all year round. The main concept is based on the sustainable use of land and resources available in the same living space for the homesteader. Usually, the farmer and the family are involved in food production.

Homestead farming mainly focuses on necessary vegetables, spices and even fresh eggs in sometimes. Organically, there are many easy and safe ways to make compost and even liquid fertilizer on a small scale. Therefore, it is a great solution for growing a good harvest without searching for chemical fertilizers for farming everywhere. Other than that, the homestead is a great way to reduce resource waste at the ground level, as people can use almost anything they have which are suitable for farming such as farming pots from plastic bottles and organic fertilizer from kitchen waste materials.

### When to start?

If someone has a proper and reliable farming plan according to the space available, as well as other basic materials such as soil, pots and seeds then it is time to start their homestead garden.

### How to plan and keep forward?

There are a few steps to planning a good homestead garden.

#### 1. Plan the space

This is another important factor in starting a homestead. No matter whether the available space is small or larger it must be balanced and well-planned for growing maximum food for the family.

There is a simple and effective way to plan your space for farming.

Observe the land carefully

Make a simple layout of your land

Mark the house, big trees, fences or walls and other available clear landmarks on the field according to the scale of the layout

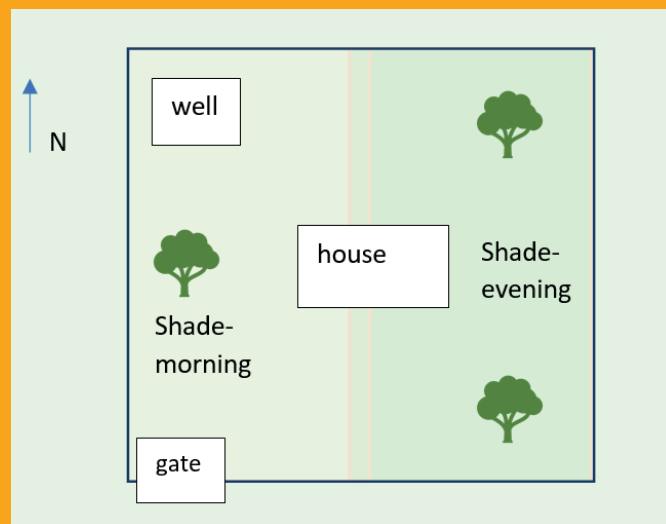
Mark water and power resources available

Mark the areas with shade and light, according to morning, noon and evening

Mark the available crops and useful vegetation in the field

Calculate the rest of the space, and decide it according to the types of crops selected

An example would be like this



2. What do you have and what is the scale of the garden?

- It is better to start on a small scale
- Use a few of the most important and necessary crops at first
- Count the available resources, and how much cost can be separated from the initial cost
- Collect the available seeds, soil and basic farming tools

3. What do you want to grow?

This is mainly based on the nutritional requirement and the preference of the family. Also, the climate and the normal weather condition of the area greatly impact on the selection of crops for a homestead.

As an example, if someone lives in a dry area then the food crops can be more drought-tolerant species. Similarly, there are some other important factors as well, such as the power and water availability, human resources and the knowledge level of the homesteaders.

In temperate regions, people grow food specified for each season. For a tropical country like Sri Lanka, there is a large range of crops to grow. Unless the area is extremely dry or wet zone other areas can adopt so many types of crops.

According to the preference and other factors, there can be crops such as

- Cereals
- Vegetables

- Fruits
  - Yams and tubers
  - Edible flowers
- And so on.

#### 4. Collect requirements

The most basic requirements for the homestead are

- Pots and planting materials
- Watering can or hose pipes
- Small amount of basic farming tools such as mamoty, hand forks, hand scopes and rakes
- Compost
- Coco-feed, burnt paddy husk and nets if you want to start a nursery for plants
- Covering materials such as polythene to protect plants from pests (but a used saree, a few gunny sacks or a few old clothes would do the same)

#### 5. How to plant

Homesteads use mixed cropping and multi-cropping methods which can hold multiple varieties of crops together on the same land. Plants in a homestead can be grown in the ground in beds, or pots and various other containers can be used in small spaces.

There are lots of ideas to add to a homestead such as raised beds, tanks, hanging pots and rooftop gardening.

The soil needs to be smoothened without rocks, pebbles and other foreign materials.

Prepare the soil first, then it can be combined and mixed with organic compost and some materials to contain moisture such as partially burnt paddy husk. These water-containing materials are important to avoid wilting of plants in dry conditions mostly in growing crops in containers.

Once you start homesteading, you can have seeds and planting materials from your own space. Other than that there are lots of planting materials such as sprouted potatoes and yams, removed root caps and leftover seeds of cereals.

#### 6. Maintenance

The most important practice in maintaining a homestead is to give proper care to the crops.

Usually watering require two times a day and the

other important factor is adding fertilizer to the crops.

Water is better to be without chlorine. If the water is chlorinized it is better to leave the water to remove chlorine first.

As for the fertilizers, it is a lot easy to use homemade compost and other fertilizer than using commercial fertilizer types.

#### **Homemade fertilizers**

Homemade fertilizers are rich in nutrients and easy to combine with the native soil of your garden. Composting kitchen waste and other biodegradable materials from the garden is also a good practice to keep the environment clean.

#### **Composting**

Add dry materials (plants, dried grasses and other dry content) and fresh organic components such as kitchen waste, removed plant materials in a 1:1 ratio, and add a few handfuls of nutrient-rich soil from your garden. Usually, there is a lot of well-developed nutritious soil under trees and places of decomposing leaves after sweeping the garden. This can introduce the native microorganisms that are helpful for gardening. Other than that cow dung and slurry are two of the other materials that can be incorporated into the compost.

#### **Liquid fertilizer**

Liquid fertilizers are more expensive in the market, but there are more convenient ways to make them at home. There are some effective liquid fertilizers such as

- Biofertilizerer – jeewamurtham
- Worm liquid fertilizer from earthworm

#### **How to add small livestock**

Adding small-scale livestock for the homestead is helpful to increase sustainability, and needless to say, it can add more beauty to the land.

For beginners and small-scale homesteads, bees and chickens are two good cooperatives types of livestock. They are great sources of bee honey and fresh eggs.

Honey bees require about 30cm x 30 cm hive box per colony and it should be placed in a calm place with shade.

Chicken requires about 3 square feet per bird apart from outside run space. They can run and feed in the garden as well, which is also helpful to control pests. Apart from that chicken manure is a great organic fertilizer for crops.

Other than chicken and bees quails and ducks can be used for homesteads as well. They have some more requirements, but basically, they require 1 square foot per quail and 6 square feet per duck.

### **Other extensions of homestead**

Other than supplying food for the whole family from the same land they live in, the homestead has a few extended uses as well.

A well-known extension of homestead farming is homestead tourism. It is based on supplying housing and food for one or a few visitors as tourists in the land. This is quite popular among foreign and native tourists, and if the homesteader has a spare space it is a good way to promote their farming experiences as well as earn some income.

Another extension is to sell the extra harvest from the homestead garden. Organic vegetables, fruits, bee honey and fresh eggs are popular among most people and they also have a high price.

Food forest and timber growing are also a part of somewhat large-scale homesteads. Food forests mean growing all trees and crops which have edible uses in a way such a natural forest would grow. This is more eco-friendly and a good way to maintain pests and diseases as the various plants would incorporate to maintain the pests and diseases by themselves as well as keeping the soil nutrition content higher. Timber trees can be added to the homestead for firewood, which is also a solution for the fuel problem.

### **Benefits of Homestead**

- Can provide a nutritious diet for the family all year round without expending too much money
- Can help to increase the income of the family
- A nature-friendly way of sustainable farming practices

- Can give a good place to relax and is good for mental health
- Farming is a good exercise for people to stay healthy
- Can reduce taxations by providing food from the land in some countries
- Good way to reuse and recycle waste in a productive way
- Can grow several types of food in a small land area
- Increase the beauty and value of the land



# Effects of Animal Feed Shortage for Livestock Productivity and Suitable Remedies



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The Sri Lankan economy has contracted by 1.6% and the agriculture sector by 6.8% during the first quarter of 2022. The agriculture sector was growing at +6.4% during the first quarter of 2021. The most recent press release by the Department of Census and Statistics (DCS) has stated that the lack of chemical fertilizers during the first quarter of 2022 had a direct and major impact on agricultural activities resulting in a significant decline in crop cultivation. This is the largest contraction in agricultural economic activities recorded for the first quarter, since 2015.

From 24 June 2022, the Consumer Affairs Authority (CAA) of Sri Lanka has issued an Extraordinary Gazette Notification prohibiting the sale or use of domestic or imported rice or paddy for animal feed production. This will help bridge the gap between rice production and the country's requirement. However, maize is an essential energy source in animal feed (mainly poultry feed). Broken rice was often used as a substitute for maize in preparing animal feed. As stated previously, maize production was also severely affected during the last cultivating season. In the production of formulated animal feed, maize is used up to 60% of its weight as an energy source.

Considering the shortage, the Government has allowed the importation of 125,000 Mt of maize in the first quarter of 2022. However, only 20,000 Mt have been imported to date due to foreign exchange and other related issues. However, soybean meal, the main protein source in animal feed, has still been imported due to the forward agreements signed by the large feed mills in Sri Lanka with foreign suppliers. Overall, the animal feed industry is badly affected, and hence the poultry industry. The continuous increase in the price of chicken meat and eggs in the Sri Lankan market is a good reflection of this.

The industry needs certain vitamins, minerals, and enzymes, none of which is produced locally. Imports of these have been halted. Since chicken meat and eggs are the most basic sources of animal protein for humans, poultry farmers have asked the government to classify animal feed imports as essential services. Since the industry's parent bird farms have stopped their buy-back programs, 20,000 small and medium-scale poultry farmers among 30,000, have already shut down their businesses.

## **Present status of animal feed production in Sri Lanka.**

The poultry industry is yet again faced with a shortage of chicken feed which has affected the availability of eggs in the local market. According to the All Island Poultry Association (AIPA), egg production has contracted by about 40 percent.

Due to the increased feed cost, most of the small-scale farms have halted operations, AIPA President Ajith Gunasekera told. The shortage of egg production was also attributed to the high humidity.

### **Why do egg and meat prices increase?**

Lack of maize in Sri Lanka because import was prohibited. Also prohibited fertilizer importation... farmers did not grow maize crops but they didn't have any fertilizer for this crop. Therefore, they can't get good harvesting, which leads to a shortage of maize. As well as feed price is highly increased because of this, feed cost is the main production cost of meat and egg production. If the feed price is high then it leads to high prices for meat and eggs.

Claiming that the prevailing shortage of animal feed in the country is the main reason for the increase in the prices of chicken and eggs, the State Minister of Livestock, Farm Promotion, and Dairy and Egg Related Industries said that it is hoped to import animal feed under the Indian credit facility and reduce the prices of the said commodities during the coming festive season.

In addition, he said that tax concessions have been given to the companies importing animal feed, taking into account the existing US dollar (USD) deficit.

“The Government allowed animal feed companies to import 100,000 metric tons of maize recently. However, those imports have not yet been done. When inquired about this, the companies said that they find it difficult to import new stocks because they have to pay in USD for previously purchased maize. Therefore, we are currently working to provide the necessary USD for them to settle the arrears' payments.”

Speaking further, Herath said that plans have been made to cultivate maize using chemical fertilizers and to procure maize locally for animal feed production, adding that it would however take another three or four months.

Egg prices have also risen on the back of a sharp rise in the prices of all consumer goods in the wake of the country's prevailing economic crisis. As of 31 March, the price of a pack of 10 eggs at a well-known supermarket was between Rs. 375-405. In addition, the price of chicken has also increased significantly

### **Effect of animal feed shortage for livestock production.**

Animal feeds are essential to improve the productivity of livestock animals. Due to the current shortage of animal feed, many sectors are affected severely.

#### **1. Effect on aquaculture**

Fishes are more sensitive animals other than chickens and cattle. We have to provide meals 3 times per day. Breeding potential can develop by giving formulated feeds. Fish quality can be reduced. We can't get good income from ornamental fisheries.

#### **2. Effect on broiler production**

The weight of the carcass will be reduced. The strength of eggshells will be reduced. Cannibalism will improve. Egg production will decrease. The mortality rate can be increased.

#### **3. Effect on layer production.**

Three types of meals are provided for layers. Layer starter, layer grower and layer finisher. If we haven't provided the required amount of these meals, we are unable to get good productivity. We have to increase the growth rate of layers. Reduce raw materials that use to produce meals. Small-sector animal feed producers are faced with problems to continue their activities.

#### **4. Effect on dairy milk production**

Mainly the shortage is affected by dairy milk production. If not enough feeds, the production will be decreased.

For higher milk production, enough feed is required. Low production can lead to economic loss. That affected the life of the people.

## Remedies for improving animal feed production in Sri Lanka

### 1. We can use natural resources for production

There are many natural sources available in our environment that can be used to produce animal feed. Animal waste, food residual, poultry offal, banana stem, and leaves are some examples. We can produce cattle, fish, poultry feeds by using these things. The availability of these components is very high.

### 2. Provide extension services for rural farmers.

Rural farmers haven't good knowledge about the production of animal feed. They mainly focused on traditional feedstuff. The nutrition supply is low in these feeds.

Good extension programs will provide more knowledge about the production of animal feeds.

### 3. Provide government support to improve production.

The inception of production can more expensive. Rural farmers haven't the resources to maintain animal feed sections. Government can start providing loans. It will ease the procedure. The non-government organization also can provide knowledge and capital.

### 4. Introduce technical knowledge for farmers.

Technical knowledge is most important to continue production. Rural farmers haven't knowledge about those things. Operating methods and new systems are new for them. We can give good knowledge to improve productivity.





# Effect Of Current Economic Crisis in Agriculture Extension



Sri Lanka has a long history of economic challenges, including the consequences of the country's 30-year civil war, successive loans from the International Monetary Funds (IMF), an excessive increase in the economy's money supply in an attempt to reduce fiscal deficits—the economy's money supply has increased by approximately 42 percent in the last four years, deep tax cuts enacted just months before the pandemic, and, of course, the soaring external debt. Sri Lanka, which covers 65,000 square kilometers and has a moderate climate, fertile soil, and an abundant supply of groundwater, has long benefited from favorable agricultural conditions. The sector continues to be an economic mainstay and a major national employer. Agriculture's position as the primary economic engine has eroded in recent years as manufacturing and industrial activities have expanded, though it remains a major strength, with high-value tea, rubber, coconut, and spice production contributing significantly to export earnings. Despite falling global commodity prices and reduced production, export crops have suffered in recent years. In this article we are not concerned about the economy and how agriculture is going on. Here we focus our attention on the economic crisis and how extension service in agriculture goes on.

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Agricultural extension, despite its importance in agricultural development, remains a neglected component of Sri Lanka's agricultural knowledge and information system. Agricultural extension services in Sri Lanka's food crop sector had been built up over time as an evolutionary process. In recent years, this sector has seen the implementation of various extension approaches such as traditional technology transfer, training and visits, integrated agricultural extension, and block demonstration, as well as the introduction of information and communication technology interventions. But nowadays the situation is roughly changing due to the economic crisis. So we pay attention to it.

For our article, we collect information from Kandy, this samaharamaya and Ambilipitiya farmers. We asked them what they feel about the current extension service in Sri Lanka. First, we introduced a questionnaire to the farmers.



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 කෘෂි විද්‍යා පීඨය  
 ශ්‍රී ලංකා සබරගමුව විශ්ව විද්‍යාලය

ස්කොට් බොනට් (Scotch Bonnet) යන නයි මිරිස් ප්‍රභේදය Bonney Pepper සහ Caribbean red pepper යන නම් වලින්ද හඳුන්වනු ලබයි. මෙම මිරිස් ප්‍රභේදයේ තාප ශ්‍රේණිගත කිරීම (heat rating) ස්කොට්ට් ඒකක (scoville unites) 100,000 - 350,000 පමණ අගයකි. මෙම නයි මිරිස් ප්‍රභේදයේ නිජබිම වන්නේ කැරබියන් දූපත් සහ මධ්‍යම ඇමරිකාවයි. Scotch Bonnet ලොව පුරා රටවල් වල බොහෝ ආහාර වර්ග රසවත් කිරීමට මෙන් ම සෝස් වර්ග සෑදීමට සහ කුළුබඩු සෑදීමට යොදා ගැනේ මෙම නයි මිරිස් ප්‍රභේදය අඩංගු Capsaicin (C<sub>18</sub> H<sub>27</sub> NO<sub>3</sub>) රසායන සංයෝගය නිසා පිළිකා නාශනය, හෘද රෝග, දියවැඩියාව, ආමාෂගත වණ වීම, බර අඩු කර ගැනීම, සහ ප්‍රතිශක්තිය වර්ධනය වීම වැනි සෞඛ්‍යමය වාසි රැසක් ලබා ගැනීමේ හැකියාව ඇති මෙම නයි මිරිස් ප්‍රභේදය වටිනි, සෝස් වර්ග, මිරිස් කුඩු සහ කැලි මිරිස් සෑදීමට යොදා ගැනේ.

ප්‍රධාන වශයෙන් Scotch Bonnet ආනයනය කරන රටවල් ලෙස ජැමෙයිකාව, ඕමාන්, කටාර්, මාලදිවයින, නේපාලය, තුර්කිය, ඕස්ට්‍රේලියාව, එක්සත් රාජධානිය, ඉතාලිය, ස්පාඤ්ඤය, ඉන්දුනීසියාව වැනි රටවල් දැක්විය හැකිය. මෙම ප්‍රභේදය අඩු ඉඩ ප්‍රමාණයකින් හොඳ අස්වැන්නක් ලබා ගත හැකි ප්‍රභේදයකි.



මා මුල් වරට Scotch Bonnet යන නයි මිරිස් ප්‍රභේදය පිළිබඳව දැනගනු ලැබුවේ සමාජ මාධ්‍ය හරහායි. ඉන් පසු මෙම නයි මිරිස් ප්‍රභේදය අපනයනය කරනු ලබන ආයතනයක් හා සම්බන්ධ වී මිරිස් වගාව ආරම්භ කළේ පසුගිය වසර අග භාගයේදී ය. අවශ්‍ය පැල ප්‍රමාණය ඇණවුම් කර මාසයකින් අපට එය ලබා ගත හැක. ඒ කාලය අතරතුර නයි මිරිස් පැල සඳහා අවශ්‍ය පස සකස් කර ගැනීම සිදු කළ යුතු ය.

මෙම වගාව සඳහා 35% ක සෙවනක් අවශ්‍ය වන අතර අප තෝරා ගන්නේ සෙවන සහිත පරිසරයකි. එම නිසා අප සෙවන දැල් භාවිතා කළේ නැත. පැල සිටුවා මාස තුනකින් පමණ පසු මල් හට ගැනීම ආරම්භ වූ අතර මාස හතරක් පමණ ගත වන විට ඵලදාව නෙලීම දීමට අපොහොසත් වුවත් දඹුල්ල ආර්ථික මධ්‍යස්ථානයට ලබා දී ආදායම් උපයා ගැනීමට හැකි විය.

මාගේ අත්දැකීම් වලට අනුව Scotch Bonnet නයි මිරිස් ප්‍රභේදය අපනයනය සඳහා පිවිසීමට නොහැකි වුවත් අපනයනය කරනු ලබන නියෝජිතයන්හට අස්වැන්න ලබා දීමෙන් සාමාන්‍ය නයි මිරිස් වලට ලැබෙන මිලට වඩා ඉහළ මිලක් ලබා ගැනීමට ගොවියාට හැකි වේ. එමෙන්ම විවෘත භූමියේ වගා කිරීමෙන් කෘමි හානිය සහ ලෙඩ රෝග වැඩි වන බවත් මාස 10 න් පසු කප්පාදු නොකළහොත් අස්වැන්න අඩු වන බවත් අත්දැකීමට මට හැකි විය.

කෙසේ වෙතත් ආරක්ෂිත ගෘහ තුළ සිදු කරන Scotch Bonnet වගාවෙන් විවෘත භූමියේ සිදු කරන වගාවට වඩා ඵලදාවක් ලැබෙනවා සේම එම වගාවට නිබෙන කෘමි හානිය ද අඩු වන බව ආරක්ෂිත ගෘහ තුළ වගා කරන ගොවිහු පවසති. Scotch Bonnet යනු අපනයනය සඳහා සුදුසු නයි මිරිස් ප්‍රභේදයක් වනවා සේම මෙය දේශීයවද ලාභ ලැබිය හැකි ව්‍යාපාරයකි.

මෙම ප්‍රභේදය සඳහා පවතින ඉහල ඉල්ලුම නිසාම Scotch Bonnet යැයි පවසා වෙනත් නයි මිරිස් වර්ග වල පැල පාරිභෝගිකයාට ලබා දීමට ඇතැමුන් ක්‍රියා කරයි. එම නිසා පැල ලබා ගැනීමට නම් නිවැරදි විභවසවන ආයතනයක් හා සම්බන්ධ වීම සිදු කළ යුතුය.

- සැබෑ Scotch Bonnet නයි මිරිස් ප්‍රභේදයේ,
- කරලේ ප්‍රමාණය විශාලයි
  - කරලේ හැඩය අක්‍රමවත් ය
  - ආවේණික වූ සුවඳක් ඇත
  - ලා කොල පැහැති හා තද කොල පැහැති ප්‍රභේද දෙකකි.

මීට අමතරව අවශ්‍ය ප්‍රමාණයට පොහොර සොයා ගත නොහැකි වූ නිසා අස්වැන්න අඩු වීම හා ශාකයේ වර්ධනය අඩාල වීම සිදු විය. මෙවැනි හේතූන් නිසා ලාභය තරමක් අඩු වූව ද නැවතත් අළුත් පැල ලබාගෙන වගාව පවත්වාගෙන යාම සහ අනාගතයේදී සෘජුව ම අපනයන වෙළඳපොළට පිවිසීම මාගේ අරමුණයි.



# Importance of Edible Gardening under Urban Horticulture



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## What is Edible Landscaping?

The utilization of edible plants as landscaping accents is known as edible landscaping. Commercially manufactured food is not featured; instead, these plants are used both as food and for aesthetic purposes. A progressive food systems strategy known as edible landscaping also referred to as food saping (or spring??), urges everyone to promote local food in their homes, businesses, and public spaces.

## The Benefits of Edible Landscapes

Edible landscaping improves a garden by adding distinctive ornamental element with added health, aesthetic, and financial advantages. There are numerous benefits to including food plants in residential landscaping. These consist of,

- To enjoy the freshness and flavor of home-grown, fully ripened fruits and vegetables.
- To enjoy yourself while being outside and interacting with the environment.
- To grow unusual varieties not available in stores.

To allow users to be more connected to their land and their food while being able to build a food community around them.

## The Importance of Edible Landscaping for Urban Environments

Globally, over 50% of the population lives in urban areas today. By 2045, the world's urban population expected to be enhanced by 1.5 times to 6 billion. The world's urban population has rapidly increased, making managing urban regions one of the most significant development concerns of the 21<sup>st</sup> century.

A decrease in agricultural areas has been observed in the past decades in industrialized countries. This is due to demand for nature conservation areas, urban, industrial and infrastructural areas, amenity areas, and also as a consequence of land abandonment. Losses of agricultural lands accelerate the rapid urbanization. Cities have absorbed a significant portion of the most productive agricultural land as well as forests and other wilderness areas. Urban sprawl is taking place on fertile agricultural grounds that are located immediately surrounding cities.

Projects for urban design and planning might incorporate edible landscapes as sustainable elements. Similar to other green places, edible landscape offers numerous advantages from an ecological, economic, health, social, and cultural standpoint.

Residential, institutional, educational, and public landscapes can all be edible. Garden scales and varieties are all included in edible landscapes. House gardens, rooftop gardens, public parks, streetscapes, community gardens, backyard plots, schoolyards, campuses, urban forests, and green ways can all include edible landscape.

#### Role of edible landscaping in Sri Lankan context

In 2021, Sri Lanka's urban population (as a percentage of the country's overall population) was reported to be 18.86%, according to the World Bank's compilation of development indicators, which was compiled from officially recognized sources. Rapid urbanization increases the urban population and causes agricultural fields to be replaced by development sites. City people are forced to rely on processed food or food that has been carried over great distances, which causes nutrient loss and high food prices.

Since gaining independence in 1948, Sri Lanka has never faced a more severe economic crisis. With the year-over-year food inflation rate of about 94 %, prices of the majority of food goods have been steadily rising since the fourth quarter of 2021 and hit a record high in August 2022, severely reducing household purchasing power. Foods that are considered staples, including rice and vegetables, have doubled in price. Over 30% of Sri Lanka's population, or 6.3 million people, are "food insecure" and in need of humanitarian aid, according to the World Food Programme. Of these, almost 5.3 million are skipping or limiting their mealtimes, and at least 65,600 are extremely food insecure.

#### Why urban gardening is important with edible plants?

Urban greening systems have the potential to be improved by incorporating edible landscapes, increasing the availability and security of urban food. Most people tend to home gardening during this economic crisis period to fulfill their food requirements. Home gardening can aid in economic growth, environmental protection, reducing pollution, and preventing food poisoning. Lack of land spaces is the biggest issue that emerges when gardening in urban areas. But edible landscaping provides a great opportunity to take advantage of limited land in urban areas. Because vertical gardens like edible landscaping systems are a more viable solution for low-space gardening systems.

Following of edible landscaping in urban areas specially help to close the open loop system in urban areas. Normally, open loop system is characterized by the importation of food from rural areas and the exportation of wastes to regions outside the cities or towns. Urban farming is done for obtain food in closed loop urban agriculture systems; it does not depends on foods from rural areas while urban wastes utilize to produce fertilizers and other purposes.

In urban areas, people can earn extra income with healthy foods by maintaining an edible landscape. For low-income urban residents who grow their food, edible landscapes are beneficial. Food insecurity and malnutrition problems among children have become major problems in Sri Lanka these days due to the economic crisis period. In urban areas in particular, many people face these difficulties due to high living costs.

But if people can get involved in establishing edible landscaping systems in urban environments, they will not face those problems and they can build sustainable, attractive surrounding areas as well.

In a summary, food security is positively and dramatically impacted by edible landscaping. This can help fight hunger and poverty. Edible landscaping, especially in urban settings in Sri Lanka, may assist every home experiencing a food crisis by generating cash and improving food quality. Additionally, it allows every household the opportunity to produce their food, making it simpler for them to acquire a healthy diet. Spending on food may be decreased so they can meet other demands.



## Ways to incorporate Edible planting into the urban landscape

- Vertical gardens - In metropolitan settings with limited space, edible leafy greens can be easily grown in pockets or containers, offering a sizable growing surface. Planting vertical gardens has additional advantages, such as improved building insulation, cooling, and soundproofing.
- Roof gardens - We have access to large, flat, abandoned roof spaces that can be utilized to build green roofs thanks to the urban concrete jungle. Although installing a green roof necessitates some technical research, the long-term sustainable benefits, such reduced building energy costs due to insulation and storm water cleansing, make them a valuable urban investment. If considerations like irrigation and wind protection are made, they are also the perfect area for urban agriculture.
- Community Urban Food Gardens - The development of many urban food gardens is the result of the desire for organic fruit and vegetables combined with the need to generate positive urban communities. Inner-city communities have begun to claim disused council land, providing a place for people to interact while growing their own organic food supply.
- Mini-greenhouses - Provide a means for incorporating edible planting into the harsh urban landscape. They enable year-round food production by establishing precisely controlled inside microclimates. While greenhouses are typically tiny plastic or glass structures, recent construction projects have started to incorporate greenhouse structures into the city's built environment, creating structures specifically designed for urban agriculture.
- Hydroponics - Includes providing plants with nutrient-rich water solutions to grow plants without the usage of soil. This technique delivers a quick production of highly nutritious and flavorful vegetables that can compete with the supply and demand of industrial-scale farming, making it perfect for growing edible items in urban areas.

## Factors should consider when design a edible landscape

- Think useful.
- Think about structures. Bring vining fruits to your backyard with the help of a fence or tiny arbor; the structures are lovely before/after the plant blooms or are harvested.
- Consider contrast. Salad greens can be added to bright orange or yellow bulbs to fill up the ground.
- Think containers: Small hot pepper plants add color and can be placed right alongside brightly-hued flower containers of complementary colors.

### \* Plant selection for edible

Fruits and vegetables (such as strawberries, blackberries, guavas, and sweet guavas), herbs, medicinal and fragrant plants (such as geranium, peppermint, and rosemary), and even flowers can be used in edible landscapes.

- Plant size is a crucial factor. We must take into account all the prerequisites a particular plant needs to grow and develop.

Plants should be exposed to at least 6 hours of sunlight.

- Cabbage, lettuce, and other leafy vegetables can be used along the edges of roads instead of other ornamental plants.
- Vine crops like Bitter melon, Snake melon, Wing bean, and others can be used for arches.
- When we are selecting plants for rooftops, like places in buildings, we should think about the strength of buildings and prefer to have lightweight plants like lettuce and other leafy vegetables.



## Edible Landscape Maintenance

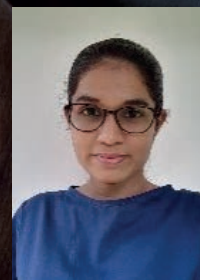
Both attractive and edible plants require upkeep. With little care, many common decorative plants can live. To produce well, however, the majority of edible plants need some care. They might need some additional watering, pruning, fertilizer, or pest control. By placing the “right plant in the right place,” maintenance requirements can be reduced. To put it another way, make sure to take local environmental factors into account while choosing a plant. Vegetables can only grow at certain times of the year; therefore you should also take the season into account when planting them. Pruning, fertilization, watering, and keeping an eye out for pest issues are requirements for all plants. When considering pest and control methods, we can incorporate integrated pest and disease control methods. Crop rotation practices like cultural methods can be easily followed to minimize pest and disease attacks.

Natural alternatives that are likewise safe for pets include organic insecticides, horticultural oil, insecticidal soap, iron phosphate (for slugs and snails), and neem oil. In urban areas, a huge amount of organic waste materials can be found. It is very important to produce organic fertilizers like compost, which people can then incorporate into their crop cultivation along with other chemical fertilizers. That will reduce costs also. Crops will require greater fertilizer amounts as we incorporate edibles into our landscaping. Nitrogen, phosphorous and Potassium, like major nutrients, should be supplied frequently with other micronutrients. Low-space cultivation in urban areas leads to high-density cultivation. This high-density planting system will lead to pest and disease problems, harvesting and other maintenance problems. So we have to follow proper cultural practices like pruning, fruit and flower thinning, and staking. Although grafting, harvesting can often be difficult. During the harvest season, keeping track of ripening fruits and vegetables may require weekly, or even daily, monitoring. Full maturity and optimal stage for harvest should be detected for each crop. Clean and sanitized buckets and bins can be used to collect the fresh harvest. Fruits that fall from trees may be dangerous or visually unpleasant if they are not picked. Fruits that have gone bad will also draw pests. Highly perishable produce will need to be processed quickly for example, by canning, freezing; drying or friends and neighbors will have to accept the surplus





# Impact Of Current Economic Crisis on Risk of Child Malnutrition in Sri Lanka



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**D**ue to the current rampant inflation in country, Sri Lankans across many socio-economic demographics are increasingly struggling to adjust their habitual consumption patterns. As UNICEF South Asia Regional Director George Laria-Adje recently noted, most families in Sri Lanka have become unaffordable for staple meals, making child malnutrition a serious problem and already became the top country in the region.

As well as according to the UNICEF appeal highlights, more than 5.7 million people are in need of humanitarian assistance, including 2.3 million children. Sri Lanka is among the ten countries with the highest number of malnourished children and the number is expected to rise further. The UNICEF report further indicates that Sri Lanka is among the ten countries with the highest number of malnourished children and that number will continue to rise. Renuka Jayatissa, the president of the Sri Lanka Medical Nutrition Association and other nutritionists also warned of the developmental dangers of malnutrition.

Even as local and foreign nutritionists are warning about a child malnutrition crisis and a lack of protein along with the above, a Sri Lankan government minister has denied the reports.

There is a direct relationship between children's nutrition and the food they eat. Therefore, the nutritional quality of the food given to them is important when talking about children's nutrition. There are different forms of malnutrition that children face during their life cycle. These include stunted growth in children due to malnutrition, being underweight, low body mass index (BMI), micronutrient deficiency disorders, anemia, vitamin A deficiency and calcium deficiency. Sri Lanka has been struggling with malnutrition since before the economic crisis and is expected to worsen due to the current unaffordable cost of living. Due to nutrient-deficient diets, children are vulnerable to nutrient deficiencies.



Image courtesy: UNICEF

The above circumstances led mainly to the economic and political instability in Sri Lanka. In the face of skyrocketing inflation, foreign currency shortage, restricting imports only to essential goods, skyrocketing prices of essential materials and shortage of food and medicine are working to drag Sri Lanka into a dire situation. The unfortunate fact here is that in the face of this food crisis, nutritional imbalance and malnutrition are spreading rapidly among children.

For nearly 50 years, the government has been providing free '*Triplosha*' nutritional supplements and undernutrition programs to pregnant women, lactating women with babies below 6 months and underweight children from 6 months to 5 years. To prevent child malnutrition, the program also provided essential vitamins including iron tablets to pregnant women. However, for the past few months, the government has failed to provide triplosha and iron tablets continuously. If this situation continues, it will adversely affect even the children about to be born, and there will be a huge question mark about the future of the country.

There is an immediate need for a formal action plan to ensure optimal nutrition of children and mothers. It should be promptly remedied by effective and appropriate nutritional intervention programs. Proper management and attention to the programs implemented there is a need of this time.

Considering the current economic situation in Sri Lanka, children who need priority attention should be identified and their malnutrition eliminated through short-term and long-term nutrition programs. Special attention should be given to children as well as mothers who are expecting children and mothers who are breastfeeding their children. For this, as before, it is a task to continue the program of giving triplosha implemented by the government. It is also important to pay more attention to their other nutritional needs.

The World Food Program and UNICEF have already expressed their willingness to provide support to overcome this situation in Sri Lanka. They have already prepared plans to work in the year 2022 on child nutrition in Sri Lanka under four categories. Thus, the responsibility of the government as well as all responsible citizens to contribute to raising the nutrition of children in the country will promote the creation of a smart future in the country.

# Let's Strengthen the Economy through the Cultivation of Rambutan



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## Do you know about *Rambutan*?

*Rambutan* is a medium-sized tropical tree in the family, Sapindaceae. The name also refers to the edible fruit produced by this tree. The scientific name is *Nephelium Lappaceum*.

*Rambutan* is a gift we got from Malaysia. Sri Lankan can only get *Rambutan* during the season from June to August. Usually, *Rambutan* is grown in the Wet Zone. The main districts are Gampaha, Colombo, Rathnapura, Kandy and Kegalle. The famous city is Malwana to *Rambutan*.

There is a great demand for *Rambutan* from all these areas as it is harvested in different periods and brought to markets. In the Dry Zone of Sri Lanka, it is somewhat difficult to grow *Rambutan* due to the high temperature.

*Rambutan* contains a variety of vitamins, including A, B, and C. It also has a high concentration of zinc, potassium, iron, magnesium, calcium, phosphorus, and manganese. *Rambutans* are also low in fat and contain natural sugars such as fructose and sucrose.



## Characteristics of *Rambutan*

**Plant of *Rambutan***-This tree is an evergreen that can reach a height of 3m-4m.

**Leaves of *Rambutan***- This plant's leaves will alternate and measure 20cm-30cm in length.

**Flowers of *Rambutan***- The flower of *rambutan* will be small in size, the flower will be 2.5mm-5mm, which has apetalous, discoidal, and born with panicles of 15cm-20cm.

**Fruits of *Rambutan***- The fruit will have a round shape with a single oval shape. The fruit's skin will be a radish color.

**The seed of *Rambutan***- *Rambutan* seed has a glossy appearance and is brown in color. The seed will be 1cm- 1.3cm.



Small Rambutan Plant



Rambutan knots



Rambutan Flower



Rambutan fruit



Large size Rambutannt



Sri Lanka currently grows a diverse range of rambutan varieties. A number of the best varieties have been identified for cultivation in the country's various agroecological regions. To get a higher yield from a rambutan tree, such adaptable varieties must be used. Fruits of various varieties each have their own distinct flavor and taste.

Varieties recommended for the country's various agro-climatic regions

- Malwana Special
- Malayan Red
- Malayan Yellow

Why are they unique?

Rambutan is becoming popular in many parts

of Sri Lanka. Except in certain upcountry areas, it is extremely rare to find a home garden in our country without a rambutan tree. Rambuatn is a popular fresh fruit in local markets. Similarly, exporting both fresh and processed rambutan products could generate significant foreign exchange.

### Potential for the Rambutan processing industry

Rambutan is eaten as ripe fresh fruit as well as in a variety of processed products. Rambutan can be purchased as canned fruit in syrup. Because of the two fruits' unique flavor combination, stoned rambutan stuffed with a chunk of pineapple and canned syrup is quite popular among foreign canned fruit consumers.

Rambutan in syrup, rambutan jam, dehydrated rambutan, and frozen rambutan are examples of processed rambutan products.



### **Syrup of rambutan**

Rambutan can be canned in syrup alone or in combination with other fruits such as pineapple, jackfruit, and star fruit. The syrup concentration is adjusted according to market demand.

### **Jam made from rambutan**

Rambutan jam is made from the pulp of the rambutan fruit. Cooking the pulp alone or in combination with pulps of other fruits, fresh or semi-processed, with sugar or sorbitol, with or without additional pectin, is how it is made. Jam must have at least 35% fruit and 65% total soluble solids. It is permitted to contain preservatives, coloring, flavoring, and food conditioners. Rambutan jam is packaged in small attractive bottles for added value.

### **Rambutan frozen**

Rambutan can be frozen in its entirety. Before serving, the frozen fruits are thawed. Rambutan can be frozen for up to 6 months.

Pickles, fruit rolls, jelly confectionery, and mixed fruit cordials are some other products that could be made from rambutan.

We can export these items and earn foreign currency to Sri Lankan economy.



Rambutan Syrup



Rambutan Jam

# Ways of Bringing Cassava Cultivation to the Right Position



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The current economic crisis is the result of several factors: covid 19 and the easter attack, the decline in tourist arrivals, the reduction of value added tax, income tax, economic service charges, corporate tax, the stoppage of chemical fertilizers imports, resulting in agricultural production fell drastically, and the declining productivity of tea and rubber. Imports became more needed as agricultural production declined. Unfortunately, there was not enough money to import food, thus there was food scarcity. As a result, prices increased and an inflationary situation developed. Remedies are needed to overcome this food shortage and boost exports: by raising cassava cultivation, the economy can be strengthened. Due to the use of organic fertilizers, cassava can be easily identified as a type of potato grown without chemical fertilizers. Cassava is the major tuber crop that produces high yields with minimal attention, minimal water, fertilizer, labor, and land. This crop can grow in both droughts as well as barren land. A few decades ago, cassava was added to the main diet of Sri Lanka as a crop, but today the consumption is very low. There is a high demand for cassava in the world market. Cassava is widely consumed in Middle Eastern countries and Europe. Africa is the leading producer of cassava.

## Areas Suitable for Cultivation

Cassava can be cultivated in all areas from sea level to 1500 meters except in areas with high cold climate conditions. Large areas of commercial cultivation are mostly in Puttalam, Anuradhapura, Jaffna, Polonnaruwa, Vavuniya, Kurunegala, and Gampaha. The taste, starch, and quality of the same cassava variety vary slightly from area to area.

## Nutritional components of cassava and benefits of eating cassava

Compared to other root crops, cassava has a higher protein content. The specialty of this is that it does not contain gluten. Because cassava does not contain cholesterol, eating it does not affect blood cholesterol levels. Apart from this, iron, vitamins, and potassium are also contained in cassava. Therefore, bone disorders are prevented and the risk of anemia is reduced. Cassava contains antioxidants that help in reducing stress. Unlike other types of potatoes, cassava does not contain starch. Therefore, the blood sugar level does not increase. They have a high fiber content which makes digestion easier. Cassava, which offers many such benefits, has a unique ability to destroy cancer cells.

## Cassava Varieties

- Shani
- Suranimala
- HORIDI Mu 01
- Kirikawadi
- Mu 51
- HORDI 06
- CAR5 555

At present, various cassava-related products have emerged, most of which have been produced based on cassava roots. The production process of these products is very simple and has to be borne at a low cost, therefore many economic benefits can be obtained by resorting to such products. Not only the export of tea, coconut, and rubber known since the past, but cassava also has the potential to become a major export crop. There are various products made from cassava abroad; therefore, cassava can be exported for producing them.

Many people in Sri Lanka think that cassava is only eaten as a boiled vegetable. But there are many different types of food items that can be made from it. Housewives can use cassava flour to make Pittu, String Hoppers, Roti, Patties, Murukku, Cake, Bundi, Kokis, etc. at home.



## Cassava-based Products Manufactured in Sri Lanka

- Cassava Flour
- Cassava Chips



## Cassava-based Products that can be started in Sri Lanka

- Macaroni
- Noodles
- Papadum
- Cassava milk
- Cassava biscuit
- Cookies
- Cassava starch
- Bread
- Candy
- Snacks
- Soup
- Animal feed
- Medicine for cancer



## Cassava-based Products that Can be Served in Restaurants

- Cassava cake
- Fried Cassava chips
- Cassava pasta
- Cassava noodles

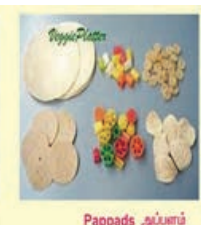
There are some advantages of producing value added products from cassava.

- Improving the eating quality of food.
- Can produce various taste of foods.
- Remove toxic nutrients compounds
- Increase consumer acceptance and demand.
- Increase the production yield.
- Improve the income of the farmers

Cassava flour is often used in making various products related to cassava. In making cassava flour, the tubers are washed, peeled, and cut into small pieces. Then it keeps drying to remove the water. Drying the moisture content of cassava should be less than 8%. Then dried cassava is milled to produce flour. This process can be run as a small-scale business as well as a large-scale business. Using cassava flour instead of wheat flour for food production is also very beneficial for the human body. It also saves the cost of importing wheat flour. The steps in the cassava flour manufacturing factory are as follows:

The temptation to produce fresh milk as a new product from cassava can add diversity to the market. Also, fresh milk made with cassava is available in the USA market under the name “veggemo”. Therefore, producing cassava milk in Sri Lanka, even cancer patients can drink it. It can be produced using flavours like vanilla, chocolate.

At present, there are only a few producers of cassava-based products. Many cassava-based products are made using cassava flour. Therefore, the number of factories producing cassava flour should be increased. Such factories should be developed by providing government support. Also, cassava growers should be encouraged and the production quantity should be improved. Thus, by producing different types of food without being limited to only one aspect of a certain food, Sri Lanka can be made into a country with a good economic status in the world by 2030- 2035.





# Relief from Toor Dal Cultivation to The Economic Crisis



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**D**al curry is a staple food of Sri Lankan people. It is like without a dal curry on a plate compared to life without love. Most Sri Lankan people consume red lentils. Unfortunately, due to the economic crisis that Sri Lanka is currently facing, it is difficult to import red lentils, so the price of red lentils is increasing day by day. Therefore, the government has paid more attention to local dal crops to solve these problems. The only type of lentil grown in Sri Lanka is Toor dal. This is the best time to cultivate Toor dal in Sri Lanka. Two decades ago, Toor dal cultivation in Sri Lanka was stopped and it restarted in 2019. Toor dal (pigeon pea) is a dry mature legume seed of *Cajanus cajan* L., from the family Fabaceae. Its skin on greenish-brown in color and without its skin it looks yellow. Toor dal is widely grown in the dry zone in Sri Lanka. Farmers can get their harvest within two to three months. Toor dal is a protein-rich staple food. It contains about 22% protein, which is almost three times that of cereals. Toor dal is a greater alternative crop for red lentils.

In 1977 with economic linearization new government regulations changed and it tends to consume imported pulse varieties. Majorly Sri Lankan People embraced red lentils highly. Unfortunately, that imported product became the main curry in the Sri Lankan kitchen. According to the server about the consumer preference for red lentils average of at least 5 times people are added red lentil curry to their meals within one week. So red lentils are 100% imported pulse variety mainly from Australia and India. According to the 2021 Central Bank Annual Report, Sri Lanka spends 97 USD \$ Million importing only red lentils. Before 1977 Sri Lanka had a golden history as a self-sufficient country. Sri Lankans do not depend on those of other countries. However, for the country to globalize with international trade is good for the economy and also international relationships. However, it has to think about the border of international trade. In the past history that Sri Lanka was a self-sufficient state and was known as the Granary of the East. With the arrival of the imperialists, this good name was destroyed little by little. In the present situation, Sri Lanka fails to produce food at least for its own people. This is the time of return to see the past again.

Thus, Sri Lanka's current situation is not good. Now, Sri Lanka is ranked as a bankrupt country. The country's inflation increases from time to time badly and accordingly, the prices of goods and services increase. But people's purchasing power goes down day by day. Most Sri Lankans fail to cover their main three meals. That is a very crucial and difficult period for Sri Lankans. Still, we are not late going back to the Sri Lankan-grade agriculture techniques and cultivation, and it is an apt opportunity for Sri Lanka to stand as a self-sufficient nation.

Currently, the Department of Agriculture is trying to achieve a certain percentage of the use of Masoor dal from Toor dal that grows well in the local environment. For this, the Regional Agricultural Research and Development Center of the Department of Agriculture is carrying out the research and development activities of Toor dal. In the future, the Department of Agriculture expects to reduce the import of Masoor dal by improving Toor dal cultivation in Sri Lanka. Cultivation work is being done by solving the pest issues which were earlier issues. After the Covid-19 pandemic, the plant genetic center at Gannoruwa carried out breeding research using selected dal genes. At present, the selection of varieties suitable for mechanical harvesting, the selection of short-term and perennial varieties, and the selection of varieties suitable for horticulture are carried out by the agriculture research and development center. In addition, it is hoped to introduce stronger hybrid varieties that are resistant to pest damage with high quality. As the best solution to the economic crisis, dal cultivation is ready to be cultivated in the dry zone of Sri Lanka, and the mechanization of the Department of Agriculture is expected to tune the machinery to prepare the harvest, establish large plantations in partnership with private growers and introduce consumption patterns to the consumer. In the near future, the inspection division of the Department of Agriculture will make available all the technical information about Toor dal cultivation to the farmers, and with the popularization of Toor dal in Sri Lanka, it will be possible to become a healthy nation that eats Toor dal instead of Masoor dal.



# PURPLE YAM,

## a Miracle Food Solution for Crippled Economy and Hunger



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**P**urple Yam, also called Raja Ala, is a tuberous root crop. It is an underground plant that is part of the Dioscorea genus. This genus is also known as the Yam family. The Purple Yam is native to the Philippines and other Asian countries. Purple yams are a widely-grown root vegetable in Sri Lanka, cultivated in both wet and dry zones. According to the Department of Agriculture, purple yams are mostly grown commercially in the Moneragala, Jaffna and Anuradhapura districts.

Purple yams are an excellent source of dietary fiber. They have a low glycemic index and contain very little sugar. In addition, they offer complex carbohydrates, vitamins, minerals, and proteins. Purple yams are also a good source of calcium, iron, copper, manganese, and phosphorus – all of which promote overall health.

### How Purple Yam Can Benefit Your Health

Enabling the Improvement of Blood Circulation  
Minerals like potassium, which are abundant in

yam, may enhance blood circulation. Studies indicate that potassium may increase blood flow since it is also vasoactive. Additionally, the blood circulation is significantly influenced by anthocyanin, a purple pigment found in purple yam.

### Facilitating Weight Loss

The yams' rich fiber content may help you consume fewer calories and encourage weight loss. Additionally, fiber keeps you full and prevents overeating. Purple yams are also lower in calories. A diet low in calories may support weight loss.

### Treating Digestive Issues

Purple yams contain soluble fiber called pectin, which may aid with digestion. Food's high in fiber aid in intestinal cleansing. Additionally, fiber has been demonstrated to enhance intestinal motility and to be a successful method of both treating and preventing constipation. Additionally, pectin has special qualities that could help treat or prevent intestinal infections.

## Reduces the Risk of Cancer

Vitamin C, a powerful anticancer agent, is abundant in purple yams. Free radicals, which could otherwise raise the chance of developing cancer, are eliminated by vitamin C. Additionally, it is known that antioxidants like vitamin C scavenge reactive oxygen species, reducing DNA damage and other consequences linked to cancer.

## How Sri Lanka Can Create Food Security and Eradicate Hunger by Using Purple Yam

In Sri Lanka, purple yam is a food, underutilized and ignored, and needs to be made more popular to prevent malnutrition and food poverty. The nation will have to deal with the latter problems that may result in restricted food production and income-earning options that may affect future food and nutrition security.

Yams have been recognized as a crop with the capacity to combat hunger and malnutrition and have helped many developing and underdeveloped nations maintain their food security.

The yield can be obtained, according to the Department of Agriculture, after eight months of purple yam growing. A hectare of land can yield between 30 and 37 metric tons alone from the dry zone. The advantages include a reduced risk of pest damage to the crop and a moderate requirement for irrigation during cultivation.



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කෘෂි විද්‍යා පීඨය  
ශ්‍රී ලංකා සබරගමුව විශ්වවිද්‍යාලය

අන්තාසිවල මූලාරම්භය ඛණ්ඩලයන් සිදුවී ඇති අතර පලතුරක් වශයෙන් මෙන්ම අගය වකතු කළ නිෂ්පාදනයක් ලෙස ද ලෙඹ වෙළඳාමට ඉදිරිපත් කිරීමෙන් තදින් අන්තාසි ව්‍යාපාරිකයන් වැඩි අදාළවීමක් ලබා ගැනීමට හැකි වන අතර ශ්‍රී ලංකාවට විදේශ විනිමය ගෙන වෙළඳාමට අවස්ථා දැවැන්ත කරගනු හැකි වන අතර අදාළ පලතුරක් ලෙස වෙළඳාම කළ පලතුරක් ලෙසද ස්භාවික ජානයක් ලෙස ද අන්තාසි වලට නව වෙළඳාමක් නිර්මාණය කර ගැනීමට අවකාශය ඇති වර්තමානය වන විට අන්තාසි සඳහා ලොවට ද ඉහළ මට්ටමින් අතර ගෝලීය වෙළඳාමට ද වගා ඉල්ලුමක් පවතී. මෙම ලිපිය කියවන ඔබට අන්තාසිවල ස්වභාවය සහ අන්තාසිවල ව්‍යාපාරික අන්තාසි වගා කිරීම අන්තාසි වෙළඳාම කර ගෝලීය වෙළඳාමට ඉදිරිපත් කිරීම පිළිබඳව සරල අවබෝධයක් ලබාදීමට අපගේ අරමුණයි.

අන්තාසි සම්භවය  
කුලය - බිරොමිලියේසි කුලය  
උද්භිත විද්යාත්මක නාමය - *Ananas comosus*  
“අනනස් කොමෝසස්” යන උද්භිත නාමයෙන් අන්තාසි හැඳින්වේ. ක්‍රි.ව 1493 දී ග්වාඩලූප් දිවයිනෙහි අන්තාසි සොයා ගැනීමේ ගෞරවය ක්රිස්ටෝපර් කොලොම්බස්ට හිමිවන නමුදු මෙම පලතුර දිගු කාලයක් දකුණු ඇමෙරිකාවෙන් වගාකර තිබෙන බව වාර්තා වේ.

අන්තාසි විශාප්තිය  
මැදපෙරදිග හා මෙක්සිකෝව දක්වා ගමන් කළ කොළඹබස් විසින් අන්තාසි ස්පාඤ්ඤ ජාතිකයන්ට හඳුන්වාදී ඇත. පසුව එය පිලිපීන් හා හවායි දූපත් වෙත රැගෙන ගොස් තිබේ. ඒවගේම ක්‍රි.ව 1519 දී බ්රසීලයේ අන්තාසි සොයා ගැනීම සඳහා ගස්ටෝගේ නාමය ගෞරවයට පාත්ර වී තිබේ. ක්‍රි.ව 1555 දී අන්තාසි එංගලන්තයට විශාප්ත වී තිබෙන අතර එතැන් පසු ශිෂ්‍ය ලෙස ඉන්දියාව, ආසියාව සහ බටහිර ඉන්දීය කොදෙව් දක්වා විශාප්ත වී ඇති අන්තාසි යුරෝපය තුළ දී අලංකාර උද්යාන සැදීමට ද යොදා ගෙන තිබෙන අතර 1751 දී බාර්බඩෝස්හි පෝර්ප් පාලකයා අන්තාසිවල රස බලා ඔහුගේ ප්‍රියතම නිවර්තන පළතුර බවටත් ප්රකාශ කර තිබේ. 1770 දී කැප්ටන් ජේම්ස් කුක් හවායිවලට අන්තාසි හඳුන්වා දී ඇත. කෙසේ හෝ අන්තාසි වගාවට නම් දැරූ රට වන්නේ බ්රසීලයයි. අද ශ්‍රී ලාංකික අප ද ආහාරයට ගන්නා අන්තාසිවල මූලාරම්භය වන්නේ බ්රසීලයයි. (අන්තර්ජාලය ඇසුරෙනි)

## අන්තාසි වගා කිරීම

අන්තාසි වගාව සඳහා වසර පුරා පැතිරුණු මි.මී 1500 - 3000 පමණ වර්ෂාපතනයක් අවශ්‍ය වන අතර සෙල්සියස් අංශක 24-32 අතර අගයක වායුගෝලීය උෂ්ණත්ව පරාසයක් පැවතීම වඩාත් සුදුසු වේ. වැලි ලෝම පස සහ ලැටරයිට් පස යොදාගනිමින් වගා කටයුතු කිරීම සුදුසු වන අතර මැටි හෝ හුණු අධික පසත්, හොඳින් ජලය බැස නොයන බිම් ප්‍රදේශයන් ද වගාව සඳහා සුදුසු නොවේ. තවද පසෙහි PH අගය 5.5 - 6 අතර පැවතිය යුතු වේ. මෙහිදී වගා කටයුතු සිදු කිරීමේදී වෙනත් බෝග මෙන් මූලික බිම් සැකසීමක් මගින් පස සකස් කරනු ලැබේ. පසුව 20cm ගැඹුරු හා 20cm ක් පළල කාණු සකසනු ලැබේ. බැවුම් සහිත ඉඩමක නම් කාණු දමනු ලබන්නේ සමුච්චිත ක්‍රමයට වෙයි. ඉවත් කරන ලද පස් බැවුම් ඇති දිසාවේ කුඩා වැටි සෑදෙන ආකාරයට සකස් කිරීමට යොදාගැනේ. තැනිතලා බිමක් නම් නැගෙනහිර හෝ බටහිර දිශා ඔස්සේ කාණු කැපීම වඩාත් සුදුසු වේ. පැළ සිටුවීමේදී සකස් කරගත් කාණු ඔස්සේ මොරෙයිගන් කෙලින් සිටින අයුරින් වැටියට හේත්තු කර වැටියට විරුද්ධ පැත්තෙන් පස් සුරාගෙන මොරියන් ගෙ පාදස්ට කොටස 10- 15cm පමණ වැසෙන සේ පසේ මට්ටම යොදනු ලැබේ. අන්තාසි වගා කිරීමේ දී රෝපණ ද්‍රව්‍ය ලෙස අන්තාසි බෝගයෙහි විවිධ මොරෙයිගන් භාවිත කළ හැක. ඒ සඳහා කරඬුව හෙවත් ගෙඩිය මුදුනෙහි තිබෙන මොරෙයිගන්, නටු මොරෙයිගන් හෙවත් ගෙඩිය නටුවෙන් මතු වෙන මොරෙයිගන්, අක්ෂි මොරෙයිගන් හෙවත් පත්‍ර අතරින් මතු වෙන මොරෙයිගන් හෝ මුල් මොරෙයිගන් හෙවත් කඳු පාමුල මතු වන මොරෙයිගන් භාවිත කළ හැක. අන්තාසි වගාවෙන් ප්‍රශස්ත අස්වැන්නක් ලබා ගැනීම සඳහා කාබනික පොහොර මෙන් ම නිර්දේශිත රසායනික පොහොර ද නිසියාකාරව යෙදිය යුතු ය. අන්තාසි සිටුවීමට සති දෙකකට පෙර කුකුල් පොහොර ගොම හෝ කොම්පෝස්ට් පොහොර හෙක්ටයාරයකට ටොන් 10 ක් යෙදීම මගින් ගුණාත්මක ඉහළ අස්වැන්නක් ලබා ගැනීමට ඉවහල් වේ. අන්තාසි වගාව තනි බෝගයක් ලෙස අතුරු බෝගයක් ලෙස ද වගා කළ හැකිය. අතුරු බෝගයක් ලෙස වගා කිරීමේදී පොල් සහ රබර් වගා කර ඇති ඉඩම්වල වගා කිරීම නිර්දේශ කරනු ලැබේ. තවද කෙසෙල් සහ වෙනත් අපනයන කෘෂිකර්ම බෝග සමග මිශ්‍ර බෝගයක් ලෙස ද වගා කළ හැක.

### ගෝලීය වෙළෙඳපොළ සඳහා අන්තාසි

ශ්‍රී ලංකාව වාර්ෂිකව පලතුරු මෙට්‍රික් ටොන් ලක්ෂ 5.4ක් පමණ නිෂ්පාදනය කරයි. ඒ අතරින් නැවුම් සහ සැකසූ අන්තාසි වර්ග ලෝකයේ බොහෝ රටවලට අපනයනය කෙරේ. නැවුම් නිෂ්පාදනවලින් 60% ක් පමණ අපනයනය කරනු ලබන්නේ මැද පෙරදි රටවලට සහ මාලදිවයිනට යි සැකසූ නිෂ්පාදන



වලින් 98% ක් පමණ අපනයනය කරනු ලබන්නේ යුරෝපීය වෙළෙඳපොළට ය. එක්සත් අරාබි එමීර් රාජ්‍යය, සෞදි අරාබිය, මාලදිවයින, ඉන්දියාව, එක්සත් රාජධානිය, කුවේට්, ඉන්දියාව, ජර්මනිය, කතාර්, පාකිස්තානය ශ්‍රී ලංකාවෙන් පලතුරු සහ එළවළු ආනයනය කරන ප්‍රමුඛ රටවල් වේ. මේ වන විට ශ්‍රී ලංකාව අන්තාසි අපනයනයෙන් 34 වන ස්ථානයේ පසුවන අතර ලොව අන්තාසි නිෂ්පාදකයින් අතර සමස්ත ලෝක නිෂ්පාදනයෙන් 1% කට වඩා අඩු ප්‍රමාණයක් ලබා දෙයි. කෙසේ වෙතත්, අපනයන වෙළෙඳපොළක් සඳහා දැවැන්ත විභවයක් ඇති ගෝලීය වෙළෙඳපොළට ශ්‍රී ලංකාව හොඳම අන්තාසි සපයයි. කෙසේ වෙතත්, එයට ප්‍රමාණවත් සහයෝගයක් සහ ප්‍රවර්ධනයක් නොලැබෙන අතර, ශ්‍රී ලංකාවේ වගා කරන අන්තාසි පෝෂ්‍යදායී හා ප්‍රණීත බැවින් ඒවාට ඉල්ලුමක් පවතී. ශ්‍රී ලංකාවේ අන්තාසි වගාව වසරින් වසර ව්‍යාප්ත වෙමින් පවතින අතර, අපනයනය කළ හැකි ගුණාත්මක අන්තාසි ප්‍රමාණවත් ප්‍රමාණයකින් සොයා ගැනීම සම්බන්ධ ප්‍රධාන ගැටලුවක් පවතී. ශ්‍රී ලංකාව සම්බන්ධයෙන් ගත් කල, සමස්ත අන්තාසි නිෂ්පාදනය සහ අන්තාසි සමස්ත අපනයන පරිමාව අතර විශාල පරතරයක් පවතී. ශ්‍රී ලංකාව සකස් කළ හෝ සංරක්ෂණය කරන ලද අන්තාසි සහ නැවුම් හෝ වියලු අන්තාසි අපනයනය කරයි.

අන්තාසි වලට අගය එකතු කිරීමෙන් විශාල මුදලක් ලබා ගැනීමට හැකියාව ඇත. අගය එකතු කළ නිෂ්පාදන ලෙස විජලනය කරනලද අන්තාසි බෝතල් කරන ලද අන්තාසි සහ අන්තාසි පල්පය ටින් කරන ලද අන්තාසි මේ අතරින් කිහිපයකි. මේ සඳහා යුරෝපානු රටවල හා ඇමරිකාවේ අගය එකතු කළ අන්තාසි නිෂ්පාදන සඳහා විශාල වෙළෙඳ පොළක් සහ ඉල්ලුමක් පවතී. එමගින් රටට විශාල විදේශ විනිමයක් උපයා දීමට හැකියාව ඇතිදැනට ලංකාවේ වැඩිපුර අපනයන කරන පලතුරු අන්තාසි ය. එය අගයක එකතු කළ නිෂ්පාදනයක් හෝ නැවුම් පළතුරක් ලෙස අපනයනය මේ වන විට සිදුකරනු ලබයි. දේශීය අන්තාසිවල තිබෙන වෙනස් රසය නිසා අපට අපනයන



**අන්තාසි විජලනයේ මූලික පියවරයන්**

- 1 නැවුම් අන්තාසි තෝරාගැනීම.
- 2 වර්ග කිරීම.(වර්ණය පරමාණය හැඩය ආදී ලක්ෂණ අනුව)
- 3 සේදීම.
- 4 පොතු ඉවත් කිරීම.
- 5 පෙති කැපීම.
- 6 කහට පිපීම හෙවත් දුඹුරු පැහැවීම නවත්වා ගැනීම මේ සඳහා දෙහි යුෂ යොදන ලද ජලය.
- 7 භාජනයකට කපන ලද පෙති ගිල්වීම. ( නදින් කහට පිපෙන ද්‍රව්‍ය සඳහා 0.1% KMS හෝ SMS ද්‍රාවණයක ගිල්වීම)
- 8 ජලය / දිය බේරීමට තැබීම.
- 9 විජලන යන්ත්‍රයේ ඇසිරීම. (මෙම යන්ත්‍ර වෙළඳපොළෙන් ලබාගත හැක)
- 10 විජනය කිරීම. ( 50-60 C° උෂ්ණත්වයේ පැය 6ක් 8ක් විජනය කිරීම )
- 11 ඇසුරුම් කිරීම. (පොලිපොපිලින් මේ සඳහා යොදා ගත හැක)

වෙළෙඳපොළේ ඉහළ තැනක් හිමිකරගත හැකිය. නවත් රටවල් කීපයක වෙනස් අන්තාසි වර්ග දැකගත හැක. එය එම්. ඩී දෙක නමින් හඳුන්වයි. එම අන්තාසි වර්ගයේ හැඩයෙහි වෙනසක් ඇත. ලංකාවේ අන්තාසිවල කේතු (Comical) ආකාර හැඩයක් ඇත. අන්තාසි ගෙඩියේ උඩ, මැද හා යට මහන සමාන නැත. එහෙත් එම්. ඩී දෙක නමින් හඳුන්වන වර්ගයේ උඩ මැද යට මහන සමානය. ඒ අන්තාසි වර්ගය පහසුවෙන් කැපිය හැකි අතර කපද්දී කැපෙන්නේ කෙළින් ඉරකිනි. අපේ අන්තාසි ගෙඩි කෙළින් ඉරකින් කැපුවොත් නාස්තිය විශාලය. ඒ නිසා එම්. ඩී දෙක නමින් හඳුන්වන අන්තාසි වර්ගය අපනයනය සඳහා සකස් කිරීමේ කටයුතුවලට බෙහෙවින් උචිත වේ. එම්. ඩී දෙක අන්තාසි වර්ගය තිබෙන්නේ තායිලන්තය, වියට්නාමය, ඉන්දුනීසියාව වැනි රටවල වන අතර ලෝකයේ වඩාත් ප්‍රචලිතව පවතින්නේ ද මෙම වර්ගයයි.

විජලනය කළ ආහාර යනු ලෝකයේ පවතින පැරණිම හා සරල ම මෙන් ගුණාත්මයෙන් වැඩි ආහාර කල්තබා ගැනීමේ ක්‍රමයකි. මේ මගින් ආහාර පවතින ජලය /තෙතමනය ඉවත් කරන අතර එම නිසා ආහාර නරක් වීමට බලපාන ක්ෂුද්‍රජීවීන්ගේ ක්‍රියාකාරීත්වය ද විජලනය නිසා නවති. විශේෂයෙන් ම ආහාර මත වෙසෙන ක්ෂුද්‍රජීවීන්ගේ එන්සයිමීය ක්‍රියා විජලනය මගින් පාලනය කෙරේ. මෙම නිසා විජලනය කර ආහාර දිර්ඝ කාලයක් කල්තබා ගතහැක. (විත්රාන්ත කළුආරවිචි- හිඳෝගම සමූහය)

අන්තාසි පමණක් නොව එළවළු වෙනත් පලතුරු මෙන් ම මස්මාංශ ද විජලනය කිරීමේ හැකියාව පවතී

මේ ආකාරයටම හොඳින් පැසුනු අඹ, ගස්ලබු ආදී පලතුරු ද බටු, කරවිල, වට්ටක්කා, කොස්, දෙල් ආදී එළවළු ද විජලනය කර ගත හැක.

**විජලන ක්‍රියාවලියේ වෙනත් වාසි**

- 1 විජලිත ආහාර ස්වාභාවික ආහාර මෙන් නරක්වීමේ ප්‍රවණතාවය ඉතා අවම වීම.
- 2 ගබඩාකිරීමට අවශ්‍ය ඉඩකඩ අවමවීම.
- 3 ඇසුරුම් කිරීම පහසුවීම.
- 4 භාවිතය පහසුවීම.
- 5 අවාරයේ ඉහළමිලක් ලබා ගැනීමට හැකි වීම.

එළවළු සහ පලතුරු විජලනය කර ඇසුරුම් කරන ආයතන බිහිවන රටක් දැකීමට කුඩා උත්තේජනයක් දීම මෙම ලිපියේ අභිප්‍රායයි.

# ආර්ථික අර්බුදය කර්තෘ ජීවිත වීම



**සදීශ ලක්විදු**  
කෘෂි විද්‍යා පීඨය  
ශ්‍රී ලංකා සබරගමුව විශ්වවිද්‍යාලය

## ආර්ථික අර්බුදයක් යනු?

ආර්ථික අර්බුදයක් යනු එකවර නිර්මාණය වන්නක් නොවේ. එය කාලයක් තිස්සේ පැවතෙන හේතු ගණනාවක් නිසා ඇති වන්නකි. මෙය මූලිකව බලපානුයේ වෙළඳපොළ කටයුතු හරහා ය. රටක් වශයෙන් ගත් කළ මෙය බලපානුයේ රටේ මූල්‍ය සංවිච්ඡා හිට වීමත් සමඟ වන අතර තනි පුද්ගලයාට මෙය බලපානුයේ ඔහුගේ ඵදිනෙදා කටයුතු කර ගැනීමට හෝ සිය අවශ්‍යතා පිරීමට ගැනීමට නොහැකි වීමත් සමඟ ය. මීට මූලිකව බලපානුයේ අවිධිමත් මූල්‍ය කළමනාකරණය යි. එනම් රටේ ආදායමට වඩා වියදම වැඩි වීම, විවෘත වෙළඳපොළෙහි ප්‍රාග්ධනය ඒකරාශී වීම, අසාමාන්‍ය ලෙස ධනය බෙදී යාම යනාදියයි.

ආර්ථික අර්බුදය හමුවේ රටේ විවිධ ක්ෂේත්‍ර වලට වන බලපෑම.

ආර්ථික අර්බුදය හේතුවෙන් රටේ පවතින සුළු පරමාණු, මහා පරමාණු, මධ්‍ය පරමාණු ආදී ලෙස වූ සියලු ව්‍යාපාර බෙහෙවින් වන අතර ඒවායේ සේවකයන්ට වැටුප් ගෙවා ගැනීමට නොහැකි වීමත් සමඟ ඔවුහු නොදැනුවත්වම මහ පාරට වැටෙති. එසේම මෙය රටේ බැංකු පද්ධතියට බලපෑමත් සමඟ රට තවත් අසාදයටම වැටේ. බැංකු හා මූල්‍ය ආයතන වලට මෙය බලපානුයේ බැංකු ණය ලබා ගත් ජනයා මුදල්

නොමැතිකම නිසා ඒවා ගෙවීම පැහැර හැරීමත් සමඟයි. මේ නිසා මෙම ආයතන දැඩි දුර්වලතා හිඟයකට ලක්වේ. දුර්වලතා හිඟයට කාලයක් තිස්සේ මුහුණ දීමත් සමඟ ක්‍රමයෙන් රටේ බැංකු හා මූල්‍ය පද්ධතිය බෙහෙවින් භාවයට පත් වේ. එසේම මිලගට සිදු වනුයේ රක්ෂණ සමාගම් බෙහෙවින් වීමයි. මෙය සිදුවනුයේ වතුරට වැටුණු මිනිහා තුන්තිරි ගසෙන් එල්ලෙන්ට බලන්නාක් මෙන් මුදල් හිඟකමින් පෙළෙන ජනයා වංචාවෙන් රක්ෂණ සමාගම් වලින් මුදල් ලබා ගැනීමත් සමඟ හා සමහර රක්ෂණ සමාගම් වල රක්ෂණ ක්‍රම නිසා ඔවුන්ට සිය සේවාවලාභියාගේ ණය මුදල් ගෙවීමට සිදු වීම නිසා ය. ආර්ථික අර්බුදය මිලගට බලපානුයේ කොටස් වෙළඳපොළටයි. කොටස් වෙළඳපොළ රට පවතිනුයේ ආයෝජකයන්ගේ ආයෝජන මතයි. රටේ ඊළඟ දිනයේ පැවතීමට හැකි ආර්ථික තත්ත්වය ඵදිනට වඩා හාත්පසින් ම වෙනස් හෝ අවිනිශ්චිත වීමත් සමඟ ආයෝජකයන්ගේ ඇති විශ්වාසය අඩු වීමට හේතු වේ. කිසිවෙක් මෙවැනි තත්ත්වයකදී සිය මුදල් වල සුරක්ෂිතභාවය පිලිබඳ නොසැලකිලිමත් නොවේ. මෙහිනිසා කොටස් වෙළඳපොළට ඔවුන්ගේ ආයෝජන නොලැබීමත් සමඟ කොටස් මිල පහළ යන අතර මෙවැනි තත්ත්වයන් හමුවේ ආයෝජයෝ සිය ආයෝජන නැවත ලබා ගැනීමටද පසුබට නොවෙති. මෙහිනිසා කොටස් මිල ශීඝ්‍රයෙන් පහළ යාම සිදුවේ. රටක ආර්ථික අර්බුදයක් උද්ගත වීමට මූලිකව බලපානුයේ කෘෂි අපනයන, ඇඟලුම්, සංචාරක ආදී ක්ෂේත්‍ර දැඩි අර්බුදයන්ට මුහුණ දීමයි.



**ආර්ථික අර්බුදය තීව්‍ර වීමට බලපාන හේතු**

මෙවැනි තත්ත්වයකදී වෙනත් රට වලින් වන ආයෝජන අඩු වන අතර වෙනත් රටවලින් ණය ආධාර ලබා දීමද යම් තරමකට අවම වේ. මෙවැනි අවස්ථාවන්හිදී මිතුරු ලෙසින් උපකාරයට එන බොහෝ රටවල යටි අරමුණු වනුයේ රට තවදුරටත් අස්ථාවර කිරීම හා රටේ වටිනා දේපළ ආදිය මංකොල්ලා කෑමයි. මෙවැනි තත්ත්වයකදී රට ස්ථාවර කර ගැනීම සඳහා අවශ්‍ය තීරණ ගත යුත්තේ රටේ රජයයි. මෙම තීරණ සඳහා පක්ෂ හේදයකින් තොරව සහය දැක්විය යුතුය. මෙවැනි අවස්ථාවලදී රජයේ තීරණ වලට බාධා කරමින් ජනතාව ප්‍රකෝප කරවමින් රට තවදුරටත් අරාජික කිරීමේ පටු දේශපාලන අරමුණු ක්‍රියාත්මක කිරීමෙන් දේශපාලකයන් වැළකිය යුතුයි මෙවැනි අවස්ථාවකදී ජනතාව පාරට බස්සවා උද්ඝෝෂණ කිරීමෙන් රටට කිසිදු යහපතක් නොවේ. මෙවිට සිදු වන දෙය නම් රට තව තවත් අසාදයටම තල්ලු වීමයි. මෙවැනි උද්ඝෝෂණ වලට සහභාගි වන උන්මත්තක පිරිස් විසින් රාජ්‍ය හා පෞද්ගලික දේපල වලට හානි සිදු කරමින් ගන්නා කෙටි කාලීන විනෝදය හා ව්‍යාජ පොරන්වයන් නිසා රටට සිදු වන යහපතක් නැති. එමගින් සිදු වනුයේ රටේ ඉතිරිව ඇති මුදලත් ඔවුන් විනාශ කර දමන දේපල ආදිය ප්‍රතිසංස්කරණයට වැය වීමයි. මෙවැනි අවස්ථාවන්හිදී වඩා උචිත වන්නේ ප්‍රකෝපකාරී වීම නොව ඉවසීමෙන් ක්‍රියා කොට රටක් වශයෙන් ජය ගැනීමයි. එසේම මෙවැනි අවස්ථාවල රටේ ජනතාව තවදුරටත් අසරණ කරන පිරිසක් ලෙස කළු කඩ කාරයන් දැක්විය හැක. මොවුන් නිතරම උත්සාහ කරනුයේ රටේ තත්ත්වය ගැන හා අනෙක් පාරිභෝගික ජනතාව ගැන නොතකා ඔවුන් තවදුරටත් තලා පෙලීමයි කළු කඩ කරුවන් සිය අභිමතය පරිදි භාණ්ඩ මිල වෙනස් කරමින් හා රජයේ තීන්දු තීරණ වලට අනුගත නොවෙමින් කරන්නාවූ වෙළඳාම් නිසා නූගත් ජනයා වෙර බඳිනුයේ රජය සමගයි. මෙය ඇත්තටම සිදු වන දෙය හරිහැටි තේරුම් නොගන්නාකම නිසා හා බුද්ධිමත්ව නොසිතා තීරණ ගැනීම නිසා සිදුවේ. මෙවැනි සිදුවීම් වලට රජය සැම විටම වගකිව යුතු නැති රජය විසින් පනවන පාලන මිල යනාදියට අවනත නොවී ඔවුන් කටයුතු කරනුයේ බොහෝ විට රජය අස්ථාවර කිරීමේ යටි අරමුණ ද සහිතව ය. මෙවැනි අවස්ථාව හට මෙවැනි අස්ථාවර අවස්ථාවකදී වුව ද නොඅඩුව දේශපාලන ක්‍රියාකාරීන් හා බටහිර සංවිධාන සහයට සිටී. මෙවැනි කුඩු පුද්ගලයන්ගේ ක්‍රියා වලට ජනතාව දොස් නගනුයේ රජයටයි. එය තවදුරටත් රජයේ තීන්දු තීරණ අඩපණ කරන අතර රට තවදුරටත් අසාදයට වැටේ.



NAWALOKA HOSPITAL - NEGOMBO  
 Nawaloka Medicare (Pvt) Ltd.,  
**INVOICE** 0285

Patient Name:..... 0 P D  
 O.P.D. / B.H.T. No:..... Room No:.....  
 Department:..... Date: 2020/12/04  
 Consultant (Dr.):.....

Qty.	Description	Rs.	Cts.
01	face MASK	30	00
30/-			
No. 5389			

**රජයේ කාර්යභාරය**

මෙවැනි විටක රජයක කාර්යභාරය වනුයේ සියලු බාධා අභියෝග මැඩ ගෙන රටේ ආර්ථික කටයුතු නංවාලීමට අවශ්‍ය කටයුතු ජනයාට නිවැරදි තතු ප්‍රකාශ කරමින් සම්පාදනය කිරීමයි. මීට මූලික විසඳුමක් ලෙස වියදම් හැකි ලෙස සීමා කිරීම නැණවත් ආර්ථික උපක්‍රමයකි. එසේම විදේශ විනිමය රටට ගලා එන සංචාරක කර්මාන්තය, ඇගළුම් කර්මාන්තය වැනි ක්ෂේත්‍ර නගා සිටුවීමට කටයුතු කළ යුතුය. රටේ ආර්ථිකය ශක්තිමත් කර ගැනීමට පොළී හා විනිමය අනුපාත ස්ථාවරව පවත්වා ගැනීමට කටයුතු කළ යුතු ය. එසේම හදිසි ප්‍රාග්ධන පිටවීම් සඳහා මුහුණ දීමට හැකි වන පරිදි සීමා සහිතව භාණ්ඩාගාර බිල්පත්, බැඳුම්කර ආදිය විදේශ ආයෝජකයන් සඳහා විවෘත කළ යුතු ය. රටේ බැංකු පද්ධතිය සුරක්ෂිත කිරීම උදෙසා බැංකු අධීක්ෂණ කටයුතු වඩා විධිමත් කිරීම හා ණය සීමා පැනවීම කළ යුතු ය. මෙවැනි අවස්ථාවකදී රටේ ජනගහන පාලනය පිළිබඳව මනා වැඩපිළිවෙලක් ගොඩනැංවිය යුතු ය.

## ආර්ථික ජීවිතයට හුරුවීම

ආර්ථික ආර්ථිකයක් හමුවේ ජනතාවට සුබෝපහෝගී ජීවිත ගත කළ නොහැක. මෙවැනි විටකදී සුබෝපහෝගී ජීවිත ගත කළ හැක්කේ කෝට්පතියන්ට හා කළුකඩ කාරයන්ට පමණි. අනෙක් ජනතාවට ආර්ථික ආර්ථිකය හමුවේ කැප කිරීම් කිරීමට සිදුවේ. රටේ ආර්ථිකය සම්බන්ධ කර ගැනීම සඳහා සෑම දෙනාම හැකි ලෙස විසඳුම් අවමකර ගත යුතු ය. ආදායමට වඩා විසඳුම වැඩි වූ විට කිසිවිටෙකත් මෙම අභියෝගය ජය ගත නොහැක. එසේම ජනතාව සම්පත් සීමිතව පරිහරණයට හුරුවිය යුතු ය. මෙවැනි අවස්ථා හමුවේ භාණ්ඩ හා සේවා මිල ඉහළ යාම අරමුණට කරුණක් නොවේ. එනිසා භාණ්ඩ මිල අඩු කරන ලෙස හා සේවා නොමදුව සපයන්නැයි රජයට බල කරමින් උද්ඝෝෂණ සිදු කිරීමෙන් පලක් නැත. මෙවිට කළ යුත්තේ හැකි පමණ විකල්ප ක්‍රම ඔස්සේ තම අවශ්‍යතා සපුරා ගැනීමයි. ආර්ථික ආර්ථිකයක් ඇති මොහොතක රටට බොරතෙල් ආදිය ආනයනය කිරීමට විශාල මුදලක් වැය කළ නොහැක. මෙහිසා රටේ ප්‍රවාහන ක්ෂේත්‍රය මෙන්ම විදුලි සැපයුම් සේවා ආදී අත්‍යවශ්‍ය සේවා නොමදුව සැපයීමට නොහැකි වේ. මෙවිට ජනතාව කළ යුත්තේ හැකි ලෙස පෞද්ගලික වාහන භාවිතයෙන් වැළකීම හා පොදු ප්‍රවාහන සේවා භාවිතය යි. එසේම විදුලිය අරපිරීමක්මෙන් භාවිත කරමින් විදුලි නාස්තිය අවම කළ යුතු ය. එමෙන්ම විදුලිය ජනනය කළ හැකි විකල්ප බලශක්ති ප්‍රභව භාවිතයට නැඹුරු විය යුතුය. එසේම මෙවැනි තත්ත්ව හමුවේ ජනතාවගේ මානසික පීඩනය අතිශයින් වැඩිවන අතර සිය එදිනෙදා අපේක්ෂාවන් ඉටුකර ගැනීමට නොහැකි වීමත් සමඟ මෙය තවත් උත්සන්න වේ. මෙහිසා අධික රැකියා පීඩනය, මානසික ආතතිය වැනි බෝනොවන අහිතකර රෝග හට ගැනේ. මෙලෙස සාමාන්‍ය ජනතාවගේ සෞඛ්‍ය පිරිහීමට පත් වීමට නොදී ඔවුන්ට මෙය හරිහැටි තේරුම් කර දීමට වැඩසටහන් ක්‍රියාත්මක කළ යුතුය. මෙම වැඩසටහන් හරහා මෙම ගැටලුවලට විසඳුම් සෙවීමට ජනතාව හුරු කළ යුතු අතර උද්ඝෝෂණ කිරීම හරහා ගැටලුවලට විසඳුම් නොලැබෙන බව ඔවුන්ට තේරුම් කර දිය යුතු ය. මෙවැනි අවස්ථාවකදී රජය ආනයන සීමා කිරීම් මගින් රටේ ආර්ථිකය ආරක්ෂා කර ගැනීමට පියවරයන් ගත යුතු අතර ජනතාව ඊට සහය දැක්විය යුතුය. එසේම රජය විසින් රැකියා විරහිත තරුණ තරුණියන් ශ්‍රම බලකායට ඇතුළත් කර ගැනීමට වැඩපිළිවෙළ සකස් කළ යුතු අතර ඔවුන්ව ඒ සඳහා දිරිමත් කළ යුතුය. රජය විසින් දිගින් දිගටම පාඩු ලබන තෙල් සංස්ථාව, විදුලිබල මණ්ඩලය, ශ්‍රී ලංකන් ගුවන් සමාගම, සතොස, ජල සම්පාදන මණ්ඩලය වැනි ආයතන ප්‍රතිව්‍යුහගත කළ යුතු ය. එනම් සීමා සහිතව මෙම සේවා ආයතන පෞද්ගලිකරණය කළ යුතුය. එසේම රජයේ මෙවැනි තීන්දු තීරණ වලට ජනතාව විරුද්ධ වීමට ප්‍රථම ඒ පිළිබඳ ව හොඳින් සිතා බැලිය යුතු ය. රාජ්‍ය දේපළ පෞද්ගලිකරණය යන්න පිළිබඳ ව ජනතාව තුළ ඇත්තේ වැරදි මතයකි. එසේ පෞද්ගලිකරණය කිරීමකින් තොරව




මෙවැනි පාඩු ලබන ආයතන තවදුරටත් රජයට බරක් වීම තුළින් ආර්ථික ආර්ථිකය ජය ගැනීම තවදුරටත් සිහිනයක් වනු ඇත. එසේම ජනතාව රාජ්‍ය සේවයට පමණක් නොව පෞද්ගලික අංශයේ සේවයටද දිරිමත් කළ යුතුය. සුදුසුකම් නොසලකා දේශපාලන පත් වීම් ලබා දීම මගින් රාජ්‍ය සේවකයින් වැඩි කිරීමෙන් රටට සිදු වන යහපතක් නැත. එය ජනතාව ද තේරුම් ගත යුතු ය. අත්‍යවශ්‍ය ලෙස අතිරික්ත සේවකයන්ට මුදල් ගෙවීම මගින් රජයකට ආර්ථික ආර්ථිකය ජය ගත නොහැක. එමෙන් ම සුදුසුකම් නොමැති අය රාජ්‍ය ආයතනවල සේවය කිරීම මගින් මෙවැනි ආයතන තවදුරටත් අසාදය කරා යනුයේ ඔවුන් ගන්නා මුග්ධ තීරණ නිසාය. එනිසා වනුයේ රටේ උගත් ප්‍රජාව වෙනත් රටවල් සඳහා සේවය සැපයීමට යාමයි. එය රට තුළ උගත් ශ්‍රම බලකාය අඩු වීමට හේතුවකි. මෙහිසා රාජ්‍ය ආයතන දියුණු වීම කිසිදුක සිදු නොවේ. මීට විසඳුම් ලෙස රාජ්‍ය අංශයට සේවකයන් ගැනීමේදී විධිමත් ක්‍රම උපයෝගී කර ගත යුතු ය. එසේම මෙවැනි අවස්ථාවක ජනතාව පක්ෂ හේද නොසලකා කටයුතු කළ යුතු ය. රජය වෙනස් කිරීමෙන් ආර්ථික ආර්ථිකයකට විසඳුම් සෙවිය නොහැක. මීට අවශ්‍ය වනුයේ තිරසාර විසඳුම් ක්‍රියාත්මක කිරීමයි. එමෙන් ම ජනතාව තම හැකි අයුරින් යමක් වගාකර ගත යුතු ය. ඉන් එක් ආහාර වේලකට හෝ වැයවන මුදල ඉතිරි කර ගත හැකිවේ. එය මෙවැනි අවස්ථාවකදී ඉතා වටිනා දෙයකි. තමාට වැඩිපුර ඇති දෙයක් අන් අය සමඟ බෙදා ගැනීමට මෙවැනි අවස්ථාවකදී හුරු විය යුතුය. එය රටක් ලෙස ඉදිරියට යාමට මනා හේතුවකි.

# Adding Value to Neglected and Underutilized Crops and Introducing Them to the Foreign Market



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**N**eglected and underutilized crops can make an important contribution to the economy, food security, and nutrition requirement of Sri Lanka. Sri Lanka is predominantly an agrarian-based country with world-renowned unique agricultural diversity. Though the climate is generally tropical, differences can be observed across the country due to changes in rainfall and elevation. Sri Lanka is divided into three distinct climatic zones primarily based on the annual rainfall: a wet zone (2500–5000 mm), a dry zone (1250–1900 mm), and an intermediate zone (1900–2500 mm). The island has been defined into 46 unique agroecological regions based on features such as rainfall, elevation, soil type, landform, land use, and relief. Sri Lanka is enriched with high biodiversity despite its small size of 65,610 km<sup>2</sup>. The variety of crop species that are cultivated in different Areas is an important component of this biodiversity. Underutilized is generally used to refer to species whose potential has not been fully realized and exploited. In the Sri Lankan context, they are still significant for local

food and nutrition security and traditional medicine. Some crop species are widely distributed globally but may occupy locally confined niches. Considering the current demand for neglected and underutilized crops due to health benefits and socio-cultural use, future research should be focused on the characterization and genetic conservation of neglected and underutilized crops. These plants possess rich genetic diversity with unprecedented potential to improve the quality and resilience of future crops and can be used by plant breeders for future crop improvements. Neglected and underutilized crops have received little consideration or have been completely ignored by agricultural researchers, plant breeders, policymakers, extension workers, and farmers, although some research work has been carried out for the collection characterization, and evaluation of these species. The increasing global population and varying dietary requirements are likely to put pressure on food and agriculture in the future. Thus, more diversified agricultural and food systems are needed to cater to these growing demands. Recent studies show that neglected and underutilized crops have very good potential to address the food, nutrition, and income security of rural people living in drought-prone areas. Thus, promoting these neglected and underutilized crops to make them more “consumer-friendly” and “commercial” can be considered a powerful means of achieving sustainable development like the reduction of poverty and malnutrition.

There is a high potential for growing crops for the export market in Sri Lanka. Sri Lanka has many indigenous neglected and underutilized crops that can sustain the current economic growth with high production. These are some underutilized crops and value-added products in Sri Lanka

- Mango Leaves - Important for optimal vision and immune health.
- Curry leaves (*Murraya koenigii*) - protect the body by reducing oxidative stress and scavenging free radicals.
- Pandan leaves (*Pandanus amaryllifolius*) - pain relief, especially arthritis and joint pain
- Jack fruit leaves - Important for slowing down the degeneration of skin cells
- Guava leaves - Important for improved heart health
- Gotu kola (*Centella Asiatica*) - leaves are used to heal wounds, improve mental clarity, and treat skin conditions such as leprosy and psoriasis.
- Betel leaves - leaves are used as a stimulant, an antiseptic, and a breath-freshener
- Ambarella (*Spondias dulcis*) - leaves help the body heal, build muscle, and form blood vessels.
- Banana leaves - leaves are used as pet supplies, care for fish and aquarium
- Avocado leaves - leaves help to promote a healthy heart by enhancing blood circulation
- Soursop leaves - leaves help to boost immune health
- Castor bean leaves - used externally by nursing mothers to increase the flow of milk
- Neem leaf (*Azadirachta indica*) - leaf extract used to reduce tooth plaque and treat lice.
- Butterfly pea flower - used for weight loss and better blood sugar control
- Cinnamon leaves - Used for Immune-boosting protection against colds and the flu.
- Papaya leaves - are used to treat symptoms related to dengue fever and to improve blood sugar control
- Cassava leaves - leaves are a rich source of protein, minerals, and vitamins.
- Blue lotus flower (*Nymphaea caerulea*) - is used primarily as a sleep aid and anxiety reliever.
- Nelumbo lotus (*Nelumbo nucifera*) - the whole plant is used as herbal medicine to cure diarrhea, insomnia, fever, body heat imbalance, and gastritis
- Catappa leaves (Indian almond leaves) - used for tank freshwater shrimp, aquariums, and terrariums



Therefore, the export of these crops can be used directly and indirectly to increase national income, employment opportunities, and the nutrition and health status of the people. The demand for underutilized crops and related products can be increased through awareness programs on the benefits of these products and market promotion. Although these crops are underutilized in Sri Lanka, the demand in foreign markets is huge. Although it is rare for exporters to export these underutilized crops wholesale, it has become a trend to sell these crops in a retail form on the Internet through the e-business concept. Here the main challenges faced by the exporters are that they have to incur huge shipping costs while selling through the retail method and the rules and regulations for exporting crops are very strict. These crops can be used for various value additions and these products are nutritious hence the international demand for them has increased. Some of these crops can be grown at a low cost. Lack of awareness and ideology, on the other hand, producers are not motivated to grow these crops. Underutilized crops in Sri Lanka can be developed and marketed in many long-shelf-life products. Many products can be successfully sold in markets such as Europe, the UK, Canada, the USA, Australia, UAE, etc. The demand for these neglected and underutilized crops is due to the increasing interest of people in healthy living increases annually.



# Future Trends of Eco-Friendly Food System in Sri Lanka



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ADM, a food technology company, observed that nearly two-thirds of consumers want their food choices to have a positive impact on the environment.

According to the FAO Document, an eco-friendly food system can be defined as “A food system that delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised.”

The Food Company of 2050 also lists “increasing sustainability” as a key factor for increasing brand awareness and market share. - Lux Research’s report

## DO YOU KNOW???

### “BAREBURGER”

Bareburger is one of the leading restaurants in Dubai. The specialty of this restaurant is the restaurant’s floors, ceilings, and furniture are all made from sustainable or recycled materials, and all ingredients are free-range and sourced from local farms. Even the packaging is compostable or made from recycled materials.

## What is an eco-friendly restaurant???

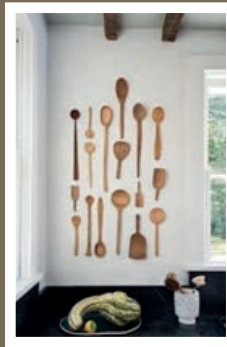
An eco-friendly restaurant is a restaurant that is not only interested in serving food and making money but also takes responsibility for its social impact, adopting measures to reduce the footprint of its activities and promoting more sustainable consumption that is in harmony with nature.

Nowadays, restaurants and sustainability is a trending topic, as the world’s consumers focus more on how to help and improve the planet. The restaurant practices changes with this sustainability. The restaurant tends to buy energy-efficient appliances for their operating and as well as other functions. The following features are used by eco-friendly restaurants:

Customers are going green eco-friendliness. Here’s why one should care:



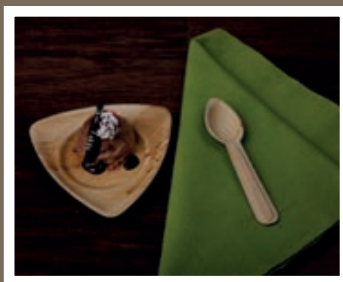
Sustainable layouts with eco-friendly design ideas and things.



Using eco-friendly furniture



Using eco-friendly kitchen appliances and consumer utensils.

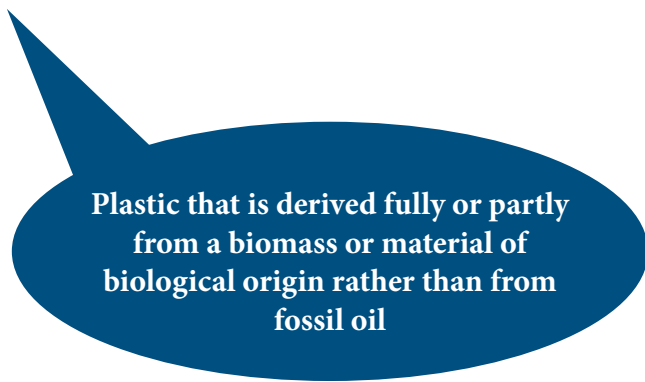


Using eco-friendly food packaging.



## So how you find truly biodegradable food packaging

- **Be alert for green washing**  
Product that claims to be environmentally friendly but are vague on how to, or don't, live up to the claim.
- **See timeframe for the biodegradability,**  
Any plastic packaging you intend to use for your food or beverage product, see if it takes longer than a year to degrade; if it breaks down into micro plastic instead of biomass or requires a special facility for which there is limited infrastructure.



Plastic that is derived fully or partly from a biomass or material of biological origin rather than from fossil oil

The trend for optimized eco-friendly food packaging

Optimization refers to making packaging better or more efficient in some way- minimizing the amount of packaging or making it thinner/ lighter.

Where the producers cannot turn to bioplastics and the like, optimizing packaging instead in conjunction with more eco-friendly materials that can be a way to reduce the carbon footprint of packaging while also cutting cost.

Advantages of package optimization.

- Reduce Carbon footprint – by using less material in packaging
- Cut the cost of packaging - again by using less of it
- Cut logical cost - by reducing weight, perhaps by moving to other materials.
- Reduce passing cost onto the customers

Barriers to package optimization.

- There is usually a trade- off to be enjoyed when reducing weight like durability of packaging.
- The regulations in certain industries can hinder packaging innovations.
- Lack of eco-friendly materials or facilitated required to recycle or compost them, which is always much better than the alternatives.

What is Eco-Friendly Eating?

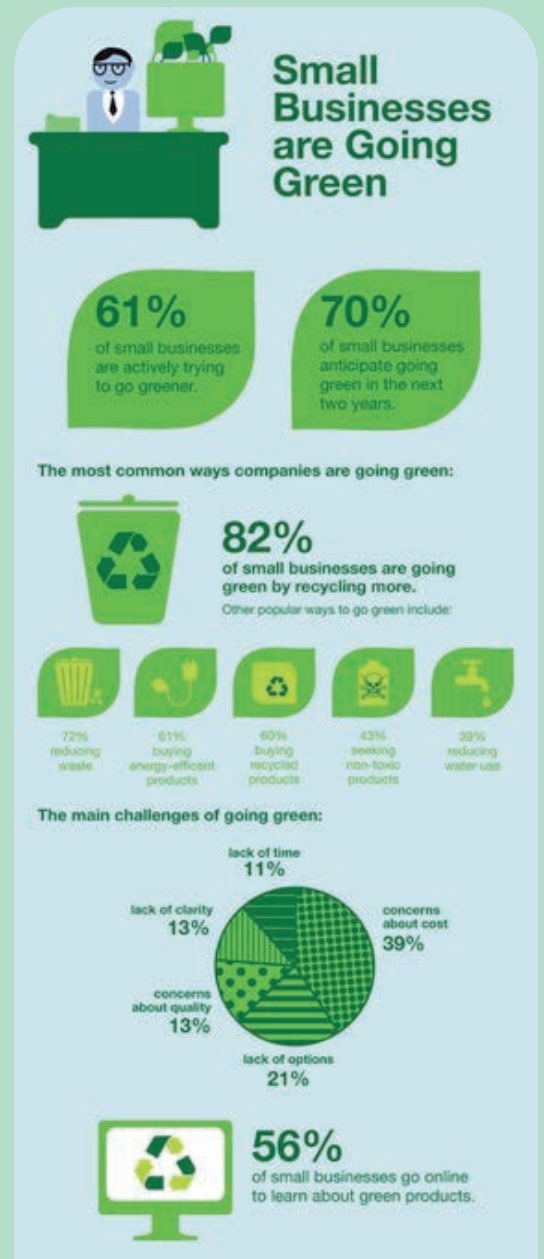
Eco-friendly eating means adopting eating habits that have a more positive impact on the environment and community.

To practice eco-friendly eating, we constantly need to ask ourselves what, when, how, and why we're eating certain foods and beverages. If ask ourselves these questions, we can develop a better understanding of the impact our food choices have on our communities and environment. After all, every food decision we make has an impact!

From the types of food that we enjoy, from how to cook and store food to the eating practices and embrace those practices, there are many ways that can all make them more intentional, eco-friendly food choices. Keep reading to find some of our best tips and resources to help adopt eco-friendly eating habits today.

## Tips to Adopt Eco-Friendly Eating Habits

1. Eat more plant-based food
2. Practice mindful eating
3. Cook once, eat twice
4. Limited food waste by -----?????
5. Use labels for -----?????
6. Organizing your freezer



## Eco-friendly green earning

### Generational differences in eco-friendly consumerism

Millennials are most likely to be thinking about sustainability while shopping.

**Q:** Please indicate to what extent you agree or disagree with the following statements around shopping sustainably. (Answers are a combination of "agree" and "strongly agree" responses)

**Darker shades of green** indicate greater proportions of agreement relative to other generational cohorts.

	Generation Z	Young millennials (age 23-26)	Core millennials (age 27-32)	Mature millennials (age 33-36)	Generation X	Baby boomers
I choose products with a traceable and transparent origin	47%	59%	60%	62%	56%	48%
I buy from companies that are conscious and supportive of protecting the environment	49%	60%	61%	58%	53%	47%
I intentionally buy items with eco-friendly packaging or less packaging	48%	55%	60%	55%	55%	51%
I am buying more biodegradable/eco-friendly products	48%	56%	59%	58%	52%	47%
When shopping for products, I check the labeling/packaging for sustainability certification[s]	47%	57%	58%	53%	51%	43%

**Base:** Generation Z (1,360); young millennials (933); core millennials (1,588); mature millennials (919); generation X (2,848); baby boomers (975).  
**Note:** The greatest generation (the oldest group) is not shown, because the base is too low.

**Source:** June 2021 Global Consumer Insights Pulse Survey



# Food Safety with Technologies



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## Artificial intelligence (AI)

World health organizations (WHO) which estimates that 600 million people (almost 1 in 10) fall sick each year after eating contaminated food resulting in roughly 420000 deaths. Therefore, access to sufficient amount of safe and nutritious food is important to sustaining life and promoting good health. Artificial intelligence is one of key revolution sing in food and beverage sector. It enables remote monitoring of conditions to ensure food safety and improved quality. An example of AI helping with food safety, IBM's collaboration with Cornell University, a leader in dairy research, where the technology is leveraged to gain insights in to how microorganisms interact within an environment to reduce the chance that the global milk supply impacted by safety breaches. And also, researchers in Singapore have developed an AI-driven “nose” that can detect freshness in meat. It works by reacting to the gases produced when meat begins to spoil. It could help reduce food waste, as food can be tested to confirm if it is safe to eat regardless of the “best before” date. In addition, AI used to reduce food waste, decreasing the chances of human error and improve production process.

**F**ood and beverage industry is gradually undergoing a technological transformation day by day. From large corporations to smaller, more flexible brands, companies are using technologies to collect more data regarding their workflow processes and to ensure safety & quality in food processing, packaging and distribution. Food safety has become an important food quality attribute in the food sector. Technologies that ensure food safety and quality include the application of blockchain, artificial intelligence (AI), food traceability system, IOT, biosensors, infrared heating, intelligent packaging, light technologies, etc. This article explores artificial intelligence, blockchain and food traceability system that contributions to ensuring food safety and quality in food and beverage sector.

## Block chain

Block chain holds information about various transactions and data, all of which are carried out on the network. They're all linked to one another. It keeps a record of transactions in a database synchronized and shared among members of peer-to-peer network. It helps to trace the origin of raw materials and ingredients used in particular food at any point in the supply chain from the farm to end consumers. In addition, it increases the levels of transparency and controlling in maintaining the food safety. An example of block chain is Cargill piloted a secure block chain solutions in 2017 that allowed consumers to track the turkey they purchased for thanksgiving. So, each block is essential of block chain to ensure the food safety. It cannot be altered information contained within a single block without modifying the entire chain. This establishes trust, accuracy and a clear representation of what's happening. And also, it allows a company to track contaminated foods along their journey, stopping them before they contaminate other goods or reach customers.

## Food traceability system

Food traceability system is highly knowledge intensive and information driven. It is commonly used by large distribution companies. The success of traceability is to meet the expectation of the consumers & stakeholders and the ability of ascertain the location of the food product. In this system, quality and safety status which measured and analyzed using appropriate instrument and procedures. As well as, environmental monitoring technology in traceability system helps to monitor internal aspect of food safety such as data of temperature, atmospheric composition of air. And also, it helps to managing records of bulk grocery orders, communicating allergen warnings, maintaining food and health requirements.

To conclude, these technologies are focused on food safety and quality, streamlining processes, maximizing efficiency and increasing supply chain resiliency. It offering big opportunity for food and beverage industry. As well as, it is very important in global food safety and traceability. Increased adoption of artificial intelligence, block chain, traceability system will strengthen the food safety infrastructure, leading to less contamination and fewer mass recalls. Farmers, processors and handlers, and food policy experts need to be aware of future development in food sector to ensure the food safety and quality.



# In the Face of the Economic Food Crisis, let's Appreciate Locality

The most talked about issue in Sri Lanka today is the shortage of dollars. An unexpected economic crisis occurred in this country. In the face of this economic crisis, all the activities of the country have been paralyzed. Economic growth has even reached negative levels. So, can you imagine the serious damage done? This impact is not limited to the economy. It dealt a severe blow to social, educational and even political aspects. As all these variables are interlinked, a collapse in one sector will affect other sectors.

The net effect of this dollar shortage is that the country's overall commodity prices have skyrocketed. As it is, the prices of certain commodities have increased by several times the existing prices. The reason for this is that the raw materials required for certain products manufactured in Sri Lanka have to be obtained through imports. Because the necessary raw materials are insufficient, missing or lacking in the country. The increase in the price of imported raw materials thus led to an increase in overall production.

Almost all of us live on food. Life also depends on the food we eat. So how can people cope with the increase in the price of food (especially vegetables and fruits)?

At present, the prices of vegetables are very high. Due to the high cost of transportation to be borne by the manufacturers, they increase the price of the products. This process continues until the economy is in a state of collapse. Is there a solution to this?



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Although we cannot grow every vegetable and fruit we eat at home, if we grow as much as possible, we can reduce the cost of food in our home, even if not completely. We are now telling you to bring information about a very healthy type of vegetable that can be grown at home and sometimes does not require any care.

Kohila is a plant commonly found in rural areas. Scientifically known as *Lasia Spinosa*, this is a large spiny swamp plant belonging to the *Lasia Lour* and *Araceae* family. This plant is found naturally in China, Taiwan, Bangladesh, Bhutan, India, Nepal, Sri Lanka and Malaysia. They thrive in wet swamps. Kohila leaves are used as a vegetable in Sri Lankan cuisine. It is also traditionally used as a herbal medicine for its antioxidant and dietary fiber content. This plant has high quality. That is, this plant contains more fiber, vitamins and water needed by the body.

Did you know that you can make the following ways of foods from Kohila?

Traditionally, we only eat this vegetable as a curry, but many people do not know that this crop can be used to prepare several types of food. So, let's see what dishes can be prepared using Kohila.

## 1. Kohila Moju

There are different types of Moju in Sri Lanka. Among them, eggplant moju takes an important place. But you may not have thought that moju can be made from kohilas. Kohila is a high-fiber food. In the current economy, it is not difficult for you to add such a new face to your daily diet from an easily grown crop.



## 2. Kohila Devel

There are many devels in Sri Lanka. Among them, chicken and fish devels are often seen. But due to the current economic situation, the prices of fish and meat have increased drastically, so the cost of processing these foods is high. But you can make such devels from kohila plant without any cost. You can make it without losing its taste and nutritional value.



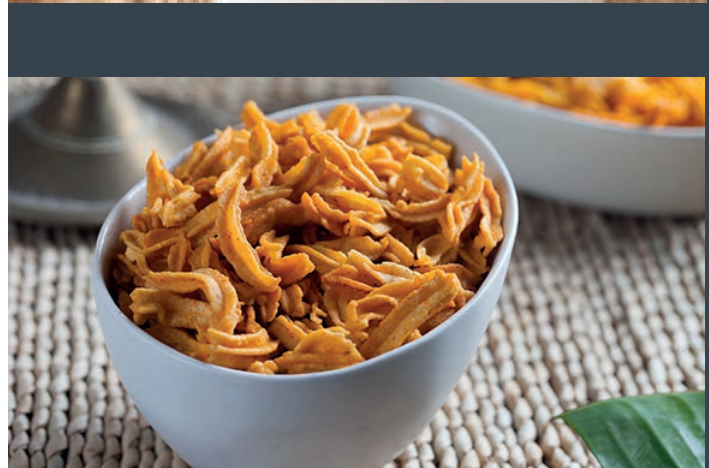
## 3. Kohila Sugar Sambol

Many people in Sri Lanka are used to making sugar sambols from onions. Its main ingredient is "onion". But for making Kohila sugar sambols very less onions are required. We can make "Kohila Sugar Sambola" at home using Kohila as the main ingredient.



## 4. Kohila Cutlet

"Cutlets" are an unmistakably popular food during festivals in Sri Lanka. Potatoes are needed to make their stuffing. Kohila potato cutlets can be prepared at home using Kohila as a substitute as potatoes are expensive in today's market.



**Not only this, the following foods can be also prepared using Kohila**

- Kohila crispy,
- Kohila Ala sambol,
- Kohila Green Curry,
- Kohila chatnie,
- Kohila bite,
- Kohila Ambula



## Let's see the business side of "Kohila"

You know that it is difficult for people to live according to the current economic situation of the country. The cost of living is higher. Sometimes, a person's monthly salary is not enough to pay the required monthly taxes. However, if you get additional income in addition to your monthly salary, it will be more convenient for you. Thus, you can create a business opportunity with this Kohila crop.

As mentioned above, Kohila is a local food that we can find in abundance. If we can introduce new products to the market using Kohila, we have the potential to own that business opportunity. Below are some such foods:

### • Kohila flour

We can make flour from Kohila. Kohila is a nutritious food easily available as an ingredient, so this can easily be taken as a business opportunity. Other types of flour like bread flour increase diseases like diabetes and obesity, but many diseases can be reduced by eating kohila flour. Therefore, the chances of success in the production of Kohila flour are high. Kohila flour can be used to make special types of food such as roti, hoppers, and hoppers. This business opportunity can be started locally and if it is successful in the country, it can be exported later.

### • Kohila Sausage

And we can make sausages from Kohila. Locally we can produce Kohila Sausage at a very low cost. With the current economic situation in the country, the price of sausages in the market is increasing, so sausages made from Kohila are a new experience for people as well as money in hand. Because we can produce this at a lower price.

Heart diseases caused by eating artificial sausages are common nowadays. This problem can be minimized by making sausages from quality ingredients. Therefore, it can be said for sure that anyone looking for quality food will love this product. Therefore, this can be a good business opportunity for you.

We all have a doubt about how and when the country's current economic downturn will enter the right path. But can't help it. We must build our lives. You have to work hard for it.



# Palm Fertility and the Economy of the Tamil People



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## **Palm Fertility and the Economy of the Tamil People**

**Palm is not just a tree.... the identity of the Tamil people.**

Palm-leaf manuscripts are the main reason for the development of the Tamil language. Palm trees have a long association with Tamil people. The palm tree, believed to have originated in Africa, travelled along with the Tamil people. Palm trees exist in the place where Tamil people lived such as Sri Lanka, Malaysia, Cambodia, Indonesia, Mauritius, and South Africa.

In Sri Lanka, there is a separate sector called Palm Development to conserve palm trees and produce and export value-added products from them. The Sri Lankan government, which has appointed a minister for this purpose, is teaching the people about the benefits of palm trees.

This oil, called palm oil, is mixed with all types of oils available in the market and sold in our town. The Malaysian government has invested several thousand crores of rupees to grow palm trees. Since the Sangam period, the palm tree has been a part

of the Tamil people's life. In the book, "Tala Vilasam" written Thirukudanda Arunachalak Kavirayar, had mentioned that 801 types of benefits are available to human society through the palm tree.

Called a young palmyra tree, the green pulp obtained when the small trees are broken is tasty and nutritious. They especially give it to pregnant women. The palm leaves obtained when grown and matured were used to make mats for thatching houses, for sleeping, sitting, and packaging goods. During severe droughts, palm leaves were fed to livestock. Fans made of palm leaves provide cool air. The palm leaves parts can be tied together and used as a house broomstick.

When the Palai (spathe of the palmyra flower) is produced from the palm tree, the Pathaneer (the sap of the palmyra tree prepared with lime; sweet toddy) from the *Palai* is obtained. If you don't lime the Pathaneer pot, you can get a delicious, slightly intoxicating, natural drink it is called *kallu* (toddy of the palmyra tree). In a few days, the palmyra fruit will appear from the *Palai*. It is from these pods that the young palmyra fruit is available in certain seasons.



Pathaneer



Kallu



Palm tree fruit

### **This is called Nungu (the young palmyra fruit)**

After a while, you will get a palmyra fruit that forms inside the nut, and this palm nut is tasty and nutritious for children to eat. The pulp extracted from the nut can be used to make mattresses and pillows. This tuber is an excellent remedy for stomach ulcers in humans. This fibre-rich food strengthens the inner stomach of the person.

**Karupatti** (a kind of molasses made from the palmyra juice) is obtained from the palm jaggery, which is poured into a cauldron and solidified at boiling point, and if the *pagu* (palmyra juice syrup) solidified at a higher boiling point is put in an earthen pot and covered with soil and taken out after three to six months, there will be stone sugar and molasses liquid. It can be used as food and molasses mixed with gasoline in specific quantities as an environmentally friendly vehicle fuel. The Malaysian government adheres to fuel economy in this manner.

With more than 500 lateral roots without taproots, palm tree roots typically reach 100 feet wide and 30 feet deep into the ground. This will prevent soil subsidence and soil erosion. The palm tree has the ability to store the water in the ground in the middle of the root without absorbing it into its leaves and survive in any dry season with that water. That is why our ancestors planted palm trees wherever there was water, such as lake ponds, drains, and fields. Palm tree products can also be used to make beauty products. For example, Handbags made of palm leaves, are used by Panam Kali (refuse of palmyra fruit) to make products like facial kits. Therefore, the Sri Lankan government is likely to come forward in the cosmetic sector as well.

Thus, this palm tree, which only has been beneficial from the base to the tip, is found more in the area where Tamil people live in Sri Lanka. This palm tree plays a major role in the economy of the Tamil people. Palm products are sold more in the areas

where Tamil people live. The Sri Lankan government should consider this and take palm tree products that are beneficial to the body and the environment not only nationally but also globally then the country's economy and exports can increase. Not only that, but it can also create more career opportunities. Palm trees don't need to be watered and maintained and the maintenance cost is low, so you can get a full profit at a low cost.

Currently, Sri Lanka is experiencing an economic downturn. There are problems like fuel scarcity. In order to solve this problem, the Malaysian government uses palm trees to produce fuel, and we can also produce fuel to solve this problem. Similarly, palm products can be packaged and introduced in the domestic market as well as in the foreign market.

Thus, if we don't destroy the palm trees and use their benefits in the best way then the economy of the country will grow and the economy of the Tamil people will grow because the Palm is not just a tree – the identity of the Tamil people.



# සිංහල කෑම මේසයෙන් සැඟවී ගිය රස ගුණ පිරි හෙල ධූජන්



**ඩී එම් එච් පී එච් එස් ආර් ධර්ශ්වාර එම් පී පී එම්  
ගිම්හානි සහ පී එස් එම් එස් ගුණසේකර**  
කෘෂි ව්‍යාපාර අධ්‍යයන අංශය  
කෘෂිවිද්‍යා පීඨය  
ශ්‍රී ලංකා සබරගමුව විශ්ව විද්‍යාලය

අධි රුධිර පීඩනය හඳුන්වන රෝග ල දියවැඩියාව හා පිලිකා මේ ඔබ ඇසීමෙන් පවා සිත සලිත කරවන බෝ නොවන රෝග කීපයකිනි වර්තමානයේ ශ්‍රී ලංකාවෙහි පමණක් නොව ලෝකය පුරාම සිදුවන මරණ අතරින් අති විශාල සංඛ්‍යාවකට මෙම බෝ නොවන රෝග හේතු වී ඇති බව නොරහසකි.

අතීතයේ මෙවන් රෝග නොතිබුන තරම්ය. වර්තමානයේ බෝ නොවන රෝගයන්ට ගොදුරු නොවූ හෝ එසේ ගොදුරු නොවූ අයෙකුගේ සම්පතමයෙකු සොයා ගැනීම නොමළ ගෙයකින් අබ මිටක් සොයන්නා සේ විරල කාරනයක් වී ඇත. වර්තමානයේ බොහෝ පර්යේෂකයන් වෛද්‍යවරුන් මෙයට හේතුව ලෙස පෙන්වා දෙන්නේ අධික කාර්බයිඩ්හුල බවල කෙටි කෑම වලට යෙමු වීම ව්‍යායාම නිසි පරිදි නොලැබී යාම වැනි හේතූන් වේ.

අතීතයේ මෙවන් රෝග ජනනාව අතර නොතිබුණු අතර මෙරට කෑම මේසය තුළම ඒ සඳහා ප්‍රතිකර්ම පැවතුනි. අපේ අතීත කෑම මේසය රස ගුණ පිරි ආහාර වර්ග වලින් අඩුවක් නොවුනි. වර්තමානයේ එම ආහාර අපෙන් දුරස්ථ යාම අවාසනාවට කරුණකි. එසේ අපේ හෙල කෑම මේසයෙන් වර්තමානයේ කෙමෙන් කෙමෙන් සැඟවී යන රස ගුණ පිරි ආහාර කීපයක් ගැන අපි සැකවින් සොයා බලමු.

### කුරහන් තලප



කුරක්කන් යනු අතීතයේ සිට ම ජනනාව අතර මුල් බැසගත් මහා ආහාර සංස්කෘතියකට හිමිකම් කියන ධාන්‍ය විෂේෂයකි. කුරක්කන්වල නිජබිම ඉතියෝපියාවේ උස් බිම් ලෙස සැලකේ. වර්තමානය වන විට කුරක්කන් ආසියාවේ සහ අප්‍රිකා රටවල් කේන්ද්‍ර කර ගනිමින් වගා කටයුතු සිදු වේග ශ්‍රී ලංකාවේ ගිරුවාපත්තුවල රජරටල උභව වෙල්ලස්සල බින්නැන්න යන ප්‍රදේශ විශාල ලෙස කුරහන් වගාව සිදු කරනු ලබයි. ඖෂධීය වශයෙන් ඉහළ ගුණයක් ඇති කුරහන් අතීතයේ සිට පැවත එන ධාන්‍යකි. කුරහන් ධාන්‍ය භාවිතා කරමින් විවිධ වූ ආහාර වර්ග පිස ගැනේ. කුරහන් තලපල කුරහන් පිරිටුල කුරහන් හැලපල කුරහන් රොට්ටල කුරහන් කැඳ අතීතයේ දක්නට ලැබුණු එවන් ආහාර වර්ගවරු කීපයකි.



නමුත් මෙම ආහාර බොහෝමයක් අපගේ ආහාර මේසයේ අද වන විට දක්නට නොලැබීම දැකට කරුණකි. අතීතයේ යෝධ වැවු අමුණු බිහි කිරීමට ශක්තිය ලැබුණේ මෙම කුරහන් තලප වැනි දෑ නිතරම ආහාරයට එක් කර ගත් නිසා බැවු අපගේ වැඩිහිටි පරම්පරාව කියනු අප කොතෙකුත් අසා ඇත. කුරහන් තලප පදමට ආනම හා වැවු මාලු හොඳද සමග මුසු වූ විට එන රසය වර්තමානයේ දන්නේ අතලොස්සකි. කුරහන් තලපය අපගේ කෘම මේසයෙන් සැඟව යාමට හේතුව එය පිස ගැනීමට බොහෝ දෙනා නොදන්නා බැවිනි.

කුරහන් පිටි ලුණු පදමට මිශ්‍ර කර නටන උණු වතුරට දමා හොඳින් තම්බා තලපයක් ආකාරයට ගෙන කුඩා කුඩා කුරහන් තලප බෝල සාදා මුං ඇට හෝ ධාන්‍ය වර්ගයකින් පොල් අඹරා සාදා ගන්නා ආනම වැවු කොරළි මාලු හෝ මස් ව්‍යංජනයක් සමග මෙම කෘම වේල අපට සකසා ගත හැක.

කුරහන් රළු ආහාරයක් නිසා ආමාශයේ පීරනය වීම සඳහා වැඩි වේලාවක් ගතවන එම නිසාම අධික ස්ට්‍රෙසාවෙන් පෙළෙන්නන් සඳහා කුරහන් වඩා හොඳ ප්‍රතිඵල අත්කර දේශ අධික තන්තු සහිත ආහාරයක් වන කුරහන් මලබද්දය වලක්වා ගැනීමට උපකාරී වන අතර පරණ කුරහන් ආහාරයට ගන්නවා නම් එහි මැග්නීසියම් බහුලව අඩංගු වන නිසා ඔබට දියවැඩියා රෝගයෙන් ආරක්ෂා වීමට උපකාරී වේ. කුරහන් වල යකඩ හා කැල්සියම් බහුලව පවතින නිසා ආර්තවහරණය සිදුවන කාන්තාවන්ට මෙය ඉතා ගුණ කෘමකි. ඊට අමතර ව අධි රුධිර පීඩනයල කොලෙස්ටරෝල්ල මුත්‍රාශ ගල් තැම්පත් වීම් වැනි රෝග රාශියකට වටිනා පිළියමකි.



දන්දින අල ලේ දන්තල ලේන පහුරු දන්දින අල යන විවිධ නාමයන්ගෙන් හඳුන්වනු ලබන මෙම අල විශේෂය අතීතයේ සිට පවතින ඖෂධීය ගුණ පිරි අල වර්ග විශේෂයකි. වර්ථමානයේ කෘම මේසයක දන්දින අල දැක ගැනීම ඉතාමත් විරල කරුණකි. එය එසේ වුවද ග්‍රාමීය හා නාගරික හේදයකින් තොරව වර්තමානයේ මෙම අල සොයා ගැනීමට යම් ප්‍රවණතාවක් පවතින අතර එයට හේතුව වී ඇත්තේ මේවාහි පවතින ඖෂධීය ගුණයයි. අධි රුධිර පීඩනයල රුධිර නාලවල ලේ කැටි ගැසීම වළක්වා ලීම. ප්‍රතිශක්තිකරණය ඇති කිරීමල ආහාර පීරණය පහසු කිරීමල විෂලනය වලකාලීම හා කුඩා ළමුන්ට රෝග බෝ කරන බැක්ටීරියාවලට විරුද්ධව

ක්‍රියා කරන අතර ශරීර උෂ්ණත්වය අවම මට්ටමක පවත්වා ගැනීමට උපකාරී වේ. දන්දින අල නැතහොත් දන්දින අල වල පවතින ඇන්තෝසයින්න් වර්ණකය (දම් පැහැති වර්ණය) මගින් මිනිස් ශරීරයේ හට ගන්නා පිළිකා සෛල විනාස කිරීමේ හැකියාව පවතී.

එමෙන් ම දන්දින අල තම්බා ආහාරයට ගැනීම කැඳ සෑදීම දන්දින කිරියා ව්‍යංජන ලෙස සෑදීම රෝගී සෑදීම යන ඕනෑම ආකාරයකට සකස් කළ හැකි අල විශේෂයකි. එ අතරින් දන්දින කැඳ යනු පුදුමාකාර රසයක් හා ගුණයකින් හෙබි කැඳ වර්ගයකි. ගතට සුව හෙතට ප්‍රිය දිවට රස ගෙනෙන මෙම දන්දින කැඳ අද වන විට දැක ගැනීම පවා විරල ආහාරයක් බවට පත්ව ඇති. තම්බාගත් දන්දින අල හොඳින් පොඩි කර පොල්කිරි හා පදමට ලුණු සමග මිශ්‍ර කර ලිපේ තබා පදමට තම්බා රසවත් දන්දින කැඳ පානය නිවසේදීම සකස් කර ගැනීමේ හැකියාව ඇති. සනියකට අවම වශයෙන් එක් වරක් හෝ දෙවරක් දන්දින කැඳ පිළියෙල කර ඔබට පානය කළ හැකි නම් ඔබේ බොහොමයක් රෝග නිර්වාචටම සුව වනවා සේම නැවත එම රෝගයන්ට ගොදුරු වීම වලක්වාලමින් ඔබව නිරෝගී ව තබනු බව නම් හො අනුමානයයි.

**මුන්සැන්ද මැල්ලම හා මුන්සැන්ද පපඩම්**



පලා වර්ගයක් අතීතයේ සිංහල ආහාර වේලක අතපසු නොවන අනිවාර්ය අංගකි. ඒ හේතුව නිසා ම අතීත අපේ හෙළයින්ගේ නිරෝගී භාවයල ශරීර ශක්තිය අදට වඩා බෙහෙවින් කීප ගුණයකින් ම ඉදිරියෙන් පැවතීනි. මුන්සැන්ද පලා වර්ගයද ඒහා සමාන අතීතයේ බහුලව භාවිත කරන ලද ඉතා ගුණදායී පලා විශේෂයකි. ගැමියෝ මෙම ශාකය වෙල් බුක්සරණ ලෙසද හඳුන්වති.

තරමක් පළල් අගල් එකහමාරක් පමණ දිගටි කොළ දැකිය හැකි මෙම ශාකය මගින් සෙංගමාලය රෝගය පාලනය කිරීමේ හැකියාව ඇති බව සොයාගෙන තිබෙන අතර සර්ප විෂ නැසීමේ හැකියාවක්ද මෙම පලා වර්ගය සතු ය. එමෙන් ම ළමුන්ගේ ධාරණ ශක්තිය වර්ධනයට ද මෙම පලා විශේෂය උපකාර වන බව පැවසේ. තවද ඇදුම ඇස් රෝග ස්නායු පද්ධතියේ රෝග උදුරාබාධ කල්ගතවූ තුවාල වැනි රෝග සඳහා ප්‍රතිකාරයක් ලෙස මෙවා යොදාගැනේ.

මුන්සැන්ද කොළ ඖෂධයක් ලෙස ප්‍රතිකාරයන්ට යොදා ගන්නා සේම ගුණවත් ආහාරයක් ලෙස ආහාර වේලට එක් කර ගැනීමට අතීත ජනතාව කටයුතු කර ඇත. මුන්සැන්ද කොළ යොදාගෙන මුන්සැන්ද මැල්ලම සහ මුන්සැන්ද පපඩම් සාදාගත හැකිය.

මුන්සැන්ද මැලේලුම සාදාගන්නා ආකාරය

අවශ්‍ය ද්‍රව්‍ය:

මුන්සැන්ද දල මිටක්

අමු මිරිස් කරල 4 ක්

උම්බලකඩ හා ලුණු අවශ්‍ය ප්‍රමාණයට

ගාගන් පොල් ස්වල්පයක්

රතු ඒණු ගෙඩි 4 ක්

සුදුඒණු බික් 3 ක්

මුන්සැන්ද කොළ හොඳින් සෝදා හිනියට කපා ගන්න. එයට ගාගන් පොල් ඊක කපාගත් රතු ඒණුල සුදුඒණුල උම්බලකඩ අමු මිරිස් පදමට ලුණු මිශ්‍ර කර මද ගින්නේ පිසගන්න.

මුන්සැන්ද පපඩම සකස් කරගන්නා ආකාරය

අවශ්‍ය ද්‍රව්‍ය:

සුදු මුන්සැන්ද කොළ 10 ක් පමණ

පොල් කිරි කෝප්ප 3/4

පාන්පටි 25

ලුණු අවශ්‍ය ප්‍රමාණයට

පොල් තෙල් කෝප්ප 1 යි

කොළ සෝදා දිය බේරෙන්න තබන්නග පොල් කිරි වලට ලුණු සහ පාන්පිටි දමා ඝන දියරයක් වන තුරු මිශ්‍ර කරන්න. ඉන්පසු කොළ මිශ්‍රණයේ පොඟවා ගැඹුරු තෙලේ බැඳගන්න.

කිඩාරම් අල වැණවන



බතට පමණක් දෙවෙනි ආහාරයක් ලෙස සහ බත් සඳහා හොඳ ආදේශකයක් ලෙස ද අල වර්ග අපට සැලකිය හැකිය. අප රටේ පැරණි ගැමියන්ගේ ආහාර වේලක අල වර්ගයක් තිබීම අමතක නොවන අංගයකි. සිංහල කෂම මේසයට පමණක් සීමා නොවූ දේශීය අල වර්ග භාවිතයෙන් ඖෂධ රැසක් සකස් කළ බව ආයුර්වේදයේ එන පැරණි පොත පතෙහි සඳහන් වේ. සාමාන්‍යයෙන් සෑම අල වර්ගයකින්ම ශරීර ශක්තිය වැඩි කිරීම ශරීරය පෘෂ්ඨමත් කිරීම හා ශරීරය ප්‍රාණාවත් කිරීම වැනි බොහෝ ප්‍රතිලාභ අත්කර දේ.

දේශීය ආයුර්වේදයේ ශ්‍රේෂ්ඨතම ඖෂධීය අල වර්ගය ලෙස කිඩාරම් අල සැලකේ. කිඩාරම් අලවල ඇති කැල්සියම් ඔක්සලේට් රසායනික ද්‍රව්‍ය නිසා අද සමාජයේ බහුල රෝග රැසකට කදිම ඖෂධයක් ලෙස මෙම අල වර්ගය හඳුන්වා දිය හැකිය. කිඩාරම් අල සනීපකට දෙවනාවක් හෝ ආහාරයට ගැනීමෙන් ආමාශ ගත රෝග, අර්ශස් රෝග වැනි බොහෝ පීඩාකාරී

රෝග සුව කිරීමේ හැකියාව පවතින බව අනාවරණය වී ඇත. කිඩාරම් අල ප්‍රභේද දෙකක් වන අතර ඒවා ග්‍රාමීය ප්‍රභේදය හා වන ප්‍රභේදය ලෙස හඳුන්වනු ලබන අතර ආහාර පිණිස ග්‍රාමීය අල ප්‍රභේදය ගනු ලබන අතර ඖෂධ පිණිස වන ප්‍රභේදය ගනු ලබයි.

ආහාරයක් ලෙස සැලකීමේදී කිඩාරම් අල වැණවන අල හෙල කෂම මේසයේ හිමි වූයේ දිව්‍ය හෝපනයකට සමාන නැතකි. කිඩාරම් අල හා පදමට මුසුවන කුළු බඩුත් සමගින් රස නහර පිනයන ලෙස කිඩාරම් අල වැණවන සකස් කිරීමට එකල ගෘහණියට තිබුණේ පුදුමාකාර අත්ගුණයක්.

කිඩාරම් අල වැණවන සකස් කරගන්නා ආකාරය

අවශ්‍ය ද්‍රව්‍ය:

පොතු ඉවත් කර කපාගත් කිඩාරම් අල 500

රතු ඒණු ගෙඩි 3

සුදු ඒණු

අමු මිරිස්

තුනපහ කුඩු

කහ කුඩු

ලුණු

මහදුරු

පොල් කිරි

සාදා ගන්නා ආකාරය

මැටි භාජනයක් ගෙන එයට කපාගත් කිඩාරම් අල දමන්න එයට රම්පේ අමු මිරිස්, සුදු ඒණු, රතු ඒණු, තුනපහ, කහ, මහදුරු, ලුණු සහ පොල් කිරි එක්කරන්න ඉන්පසු සියල්ල හොඳින් මිශ්‍ර කර මද ගින්නේ පිස ගන්න.

එසේ සැකසෙන කිඩාරම් අල වැණවන ඔබගේ ලෙඩ දුක සමනය කරන අතරම ඔබගේ රස සංවේදක කුල්මත් කරනු නිසැක ය.

තවත් බොහෝ රස ගුණ වලින් හෙබි කෂම වර්ග බොහෝමයක් අපගෙන් ඇත් වෙමින් පවතී. ඖෂධීය ගුණ පිරි කෂම තිබියදී වස අනුභව කරන මහා අවාසනාවන්ත ජාතියක් බවට අපි පත් වෙමින් සිටින්නෙමු. ලෙහෙසිය පහසුව පිළිබඳ සිතා කෙටි කෘතීම කෂම වලට යොමු වී සෞඛ්‍යයන් ආර්ථිකයන් යන දෙකම පිරිහීමට ලක් කර ගනිමින් සිටින්නෙමු. එම කෘතීම දෑ රස කරමින් අපි අපේ දුරු පරම්පරාවට ලබා දෙන අතර අනාගත පරම්පරාව ද රෝගී කරමින් සිටින්නෙමු. එමඟින් දෙමාපියන්ට පෙර දුරුවන් මිය යන අනාගතයක් ද අපි නිර්මාණය කරමින් සිටින්නෙමු.

දැන්වත් මෙය නැවත්විය යුතු කාලය එලඹ ඇත. මෙසේ අපගේ හෙළ කෂම මේසයෙන් විසකී යන රස ගුණ පිරි කෂම නැවත අප වෙතට ලබා ගැනීම සමස්ත ජාතියේම වගකීමක්ව පවතී.





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