ANNUAL REPORT 2021

NATIONAL INSTITUTE OF POST-HARVEST MANAGEMENT

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ACT AND LEGISLATIONS

The National Institute of Post-Harvest Management (Institute of Post-Harvest Technology) functioning under the purview of Ministry of Agriculture established on 19th June 2000 by the Extraordinary Gazette of the Democratic Socialist Republic of Sri Lanka No. 1137/10 for the purpose of carrying out post-harvest research and development on all agricultural crops. The newly established institute has taken over the functions of the Rice Processing Research and Development Centre (RPRDC) of the Paddy Marketing Board at Anuradhapura, which was set up with FAO/UNDP assistance in 1976. The new Institute has been assigned the functions and responsibilities for carrying out post-harvest research and development on not only rice and grains but also on other field crops, vegetables, fruits, spice crops and cut flowers. The name of the institute was changed as National Institute of Post-Harvest Management by the Extraordinary Gazette, 2093/26 of the Democratic Socialist Republic of Sri Lanka on 27.10.2018

MANDATE

According to the mandate given in the gazette notification, The National Institute of Post-Harvest Management is supposed to serve as the coordinating body to bring together all agencies concerned for the purpose of identifying and prioritizing the research needs and implementation of programs for the development of the postharvest technology in Sri Lanka.

VISION

To be the center of excellence in sustainable postharvest development for national food security

MISSION

Sustainable development of national food security through efficient and effective postharvest technological interventions to strengthen the supply and value chains of the agricultural produce and products with high quality and safe food, to cater to the domestic and export markets at competitive price.

BOARD OF MANAGEMENT

As at 31st December 2021

Chairman

Prof. W.A.P. Weerakkody

Vice Chairman

Mr. W.M. Manjula Hiroshana

Members

Dr. S.H.S. Ajantha De Silva
Mrs. S.A. Sriyani
Mr. Sarathchandra De Silva

Secretary to the Board

Eng. Mr. H.M.A.P. Rathnayake

ORGANIZATION STRUCTURE

Organization Structure as per the Scheme of Recruitment (SOR) approved

Institute has re-structured its divisions in 2018 as follows. (Currently, the total cadre and the organizational structure is being re-structured).

1. Research division
2. Engineering division
3. Technology Transfer division
4. Project Management division
5. Laboratory Service division
6. Planning and Monitoring division
7. Administration division
8. Finance division
9. Academic division
10. Internal Audit Unit

SENIOR MANAGEMENT

As at 31st December 2021

DIRECTOR/CHIEF EXECUTIVE OFFICER (Acting)

Eng. H.M.A.P. Rathnayake

ADDITIONAL DIRECTOR (RESEARCH AND TECHNOLOGY TRANSFER)

Eng. H.M.A.P. Rathnayake

ADDITIONAL DIRECTOR (ADMINISTRATION AND FINANCE)

Mr. R.K.A.P. Ramanayake

RESEARCH DIVISION
Dr. (Mrs.) R.M.N.A Wijewardhane
HOD | Principal Research Officer

ENGINEERING DIVISION
Eng. B.D.M.P.Bandara
HOD | Seniot Mechanical Engineer

TECHNOLOGY TRANSFER DIVISION
Mr. W.M.C.B.Wasala
HOD (Acting) | Principal Research Officer

PROJECT MANAGEMENT DIVISION
Mr. W.M.C.B.Wasala
HOD | Principal Research Officer

LABORATORY SERVICE DIVISION
Mr. C.R. Gunawardhane
HOD | Senior Research Officer

PLANNING AND MONITORING DIVISION
Dr.(Mrs.) R.M.R.N.K. Ratnayake
HOD | Senior Research Officer

ACADEMIC DIVISION
Dr. (Mrs.) D.M.S.P. Bandara
HOD | Senior Mechanical Engineer

ADMINISTRATION DIVISION
Mr. R.K.A.P.Ramanayake
HOD | Additional Director (Admin & Finance)

INTERNAL AUDIT DIVISION
Mr. R.M.D.Rathnayake
HOD | Internal Auditor

FINANCE DIVISION
Mr. I.M.N.P. Illangasinghe
HOD | Accountant

MANAGEMENT COMMITTEES

As at 31st December 2021

AUDIT AND MANAGEMENT COMMITTEE

Name	Position
Mrs. S.A. Sriyani	Chairman
Dr. S.H.S. A. De Silva	Member
Mr. Sarathchandra De Siva	Member
Eng. H.M.A.P. Rathnayake	Secretary
Mr. R.M.D. Rathnayake	Convenor
Mr. J.A.S.D. Perera	Observer
Mr. U.S.L. Kumara	Observer

RESEARCH ADVISORY COMMITTEE

Name	Position and Place
Dr. Ajantha De Silva	Additional Secretary, Agriculture Technology Division, Ministry of Agriculture.
Prof. S.B Nawarathna	Senior Lecturer, Faculty of applied science, University of Sri Jayawardanepura.
Dr. Rohitha Prasantha	Senior Lecturer, Faculty of Agriculture, University of Peradeniya.
Dr. J.W. Damunupola	Senior Lecturer, Faculty of Science, University of Peradeniya.
Prof. L. Suriyagoda,	Senior Lecturer, Faculty of Agriculture, University of Peradeniya.
Prof. Sanath Amarathunge	Senior Lecturer, Faculty of Agriculture, University of Peradeniya.
Ms. Nilamani Yapa	Senior Lecturer, Faculty of Applied Science, Rajarata University of Sri Lanka.
Mr. Haridas Fernando,	Group General Manager (Agri business). Cargils Ceylon PLC.
Prof. K.H.Sarananda	Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka
Dr. S.D.G.S.P. Gunawardana	Senior Lecturer , Faculty of Engineering University of Peradeniya

RESEARCH RELEASING COMMITTEE

Name	Position
Dr. (Mrs.) R.M.N.A. Wijewardana	Chairman
Mrs.G.D.N.Manike	Secretary
Mr. W.M.C.B.Wasala	Member
Mr. B.D.M.P. Bandara	Member
Dr.(Mrs.) R.M.R.N.K.Ratnayake	Member

CHAIRMAN'S MESSAGE

The National Institute of Postharvest Management (former the Institute of Post-Harvest Technology –IPHT-), operating under the Ministry of Agriculture, covers up all areas of postharvest sector with the goal of enhancing food security in the country. IPHT was established on 19th June 2000 by the Extraordinary Gazette of the Democratic Socialist Republic of Sri Lanka No. 1137/10 under the provisions of the State Agricultural Corporations Act. No. 11 of 1972 for the purpose of carrying out postharvest research and development activities pertaining to cereals, pulses, oil seeds, other field crops, fruits, vegetables, spice crops and ornamental plants. The name of the institute was changed as National Institute of Post-Harvest Management by the Extraordinary Gazette, 2093/26 of the Democratic Socialist Republic of Sri Lanka on 27.10.2018.

Year 2021 was no difference to the previous year with respect to the challenges faced by the staff on their traveling and team work. In addition national organic agriculture program imposed on April, 2021 affected the farming practices of many commercial cropping systems, affecting the programs of the NIPHM. Our main challenge was to continue with the research and developmental activities to solve the issues in postharvest sector despite the COVID pandemic. However, with the aim of ensuring national food security, the institute was able to successfully conduct 13 state funded research projects, 09 state funded developmental projects and 01 foreign funded research project during 2021. All these projects addressed the key issues of supply and value chains of economically important agricultural commodities. Research projects mainly focused on developing technologies to minimize postharvest losses through improving supply and value chains of agricultural crops by addressing the existing gaps at critical loss points.

Regarding the developmental activities, proper post-harvest practices of rice, grain legumes, fruits, vegetables and spice crops were introduced to the supply chains especially through subsidized technology transfer programs and awareness developments. Since the methods of transportation have been identified as the key points in minimization of postharvest losses, both in quantity and quality, the development project on 'Introduction of safe packages for handling and transportation of fruits and vegetables' was continued in the year 2021 too.

Compared to other government institutions, NIPHM was much blessed to do conduct almost all R and D projects and also a number of training sessions and thus spend the allocated funds 70 – 90 %. Further to this, filling essential cadre positions, maintain assets (including regional offices), upgrading library facility, restructuring the office network and settling some dragging issues were the other significant progress reported by the institute.

Finally, with the success of these activities, reduction of postharvest losses is expected and it would lead to create a marked impact on agriculture of the country while uplifting the nation.
Based on the experience gathered during the year of 2021, I am confident that the institute would be able to improve the postharvest industry in the coming years.

Prof. W.A.P. Weerakkody
Chairman

YEAR AT A GLANCE

All the activities conducted in the year 2021 were directly related to achieving sustainable development goals (SDG) by 2030 namely, ***Goal 2:*** End hunger, achieve food security and improved nutrition and promote sustainable agriculture, ***Goal 12:*** Ensure sustainable consumption and production pattern. Programmes and projects proposed by the institute to achieve these two goals also address to the SDG ***Goal 1:*** End Poverty.

Postharvest Technologies ready to be disseminated…

Thirteen research projects were conducted and some of the technologies developed through research are being introduced/ready to be introduced to the field.

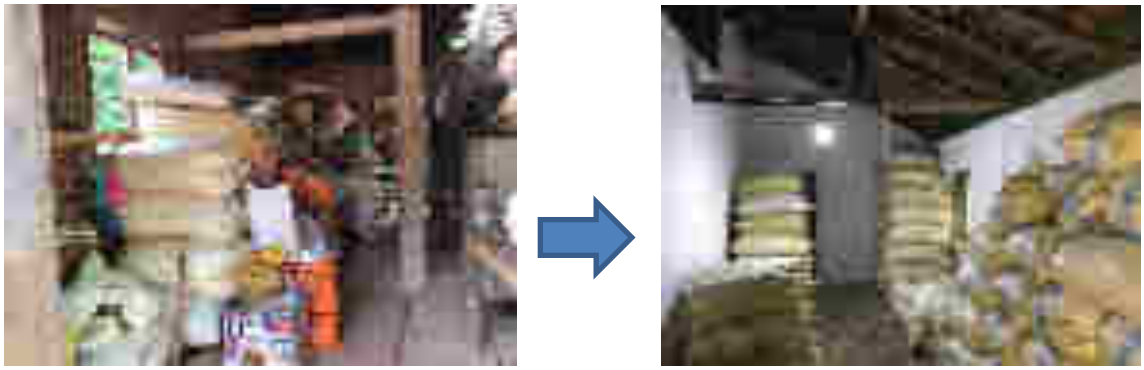
Minimization of postharvest losses during handling and transportation of fruits and vegetables

If the post-harvest losses during transportation can be reduced by 10%, about Rs. Mn. 5800 can be saved annually.

In 2021, 31240 plastic crates were provide to all the stakeholders of the supply chain; Growers, collectors, transporters, wholesalers and retailers

Nine development projects were conducted and proper postharvest technologies were implemented in the field. Income generating self employments were initiated through the establishment of these agro processing industries.

- **Development of on-farm storage facilities of rice, maize and pulses to increase the farmers' income**



68 on-farm Storages were improved

- **Development of cottage level rice processing industry**

77 rice processing units were established in the major paddy growing areas

Posharvest loss assessment of selected agricultural food crops.

Implementation of proper postharvest practices in the field has reduced the postharvest loss significantly. Therefore, updating current figures of postharvest losses is highly important. Results of the recent studies have revealed that current postharvest loss in mango supply chains (supply chains improved by NIPHM) was reduced to 7% from 40%.

EXECUTIVE REPORT

The Year 2021 was a very challenging year to the institute. All the key activities of the institute; Research, Development Projects, Technology Transfer activities, Consultancy, Laboratory and Engineering services had to be completed even amidst the Covid pandemic. However, the institute was able to complete almost all the planned activities with a little deviation. Those key activities were aligned for the improvement of supply and value chain management practices of agricultural crops with special focus to the fruits and vegetable sector of the country. And also, all these activities were directly related to achieving sustainable development goals (SDG) by 2030 namely, *Goal 2:* End hunger, achieve food security and improved nutrition and promote sustainable agriculture, *Goal 12:* Ensure sustainable consumption and production pattern. Further these activities also addressed to the SDG *Goal 1:* End Poverty. Thus we were able to stride towards the vision of the institute 'To be the center of excellence in sustainable postharvest development for national food security'.

RESEARCH

The research and development programme of the institute was directed towards solving technological and socio economic problems confronting the postharvest industry. During the year 2021, twenty five (25) research projects were carried out. It consisted with four (04) research projects continued from 2020 (funded by the Ministry of Agriculture under 'National food production Drive'), nine (09) research projects initiated in 2021 and four (04) research projects that were conducted as public-private partnership projects thus funded by the private sector. In addition to that, eight (08) research projects were conducted by undergraduate students from different universities and they were supervised by the Research officers, Extension officers and the Engineers of the institute.

Assessment of postharvest losses of banana

Furthermore, one foreign funded research project, "Strengthening Sri Lanka's efforts to quantify greenhouse gases related to postharvest losses'' was conducted as a collaborative research project with a research team of Engineering Faculty, University of Peradeniya.

DEVELOPMENT PROJECTS

The development projects were carried out by the institute in order to ensure technology adoption and their impact on the postharvest industry with special emphasis on agribusiness development and assuring food security. During the year of 2021, nine development projects were conducted by the institute.

Information gathering from the farmers: project- Developing a technologically sound regional distribution network for fruits and vegetables

TECHNOLOGY TRANSFER ACTIVITIES (Training & Extension)

The training activities were aimed towards updating the knowledge and to ensure effective technology transfer activities to the large number of stake holders involved directly or indirectly in supply chain and value chain activities. These included farmers, collectors, whole sellers, retailers, processors, extension personals, students from universities and other educational institute and beneficiaries of government and non-governmental organizations. During the year 2021, 75 training programmes were conducted and 1452 stake holders were trained on proper post harvest technologies. In addition to that, 102 new entrepreneurs were introduced to the agro based industries and these industries include 18 brands of spice based products, 43 brands of rice based products, 05 brands of dehydrated fruit products, 32 brands of fruit based products and 04 pulse based producers.

These activities were conducted island wide by Research and Development center in Anuradhapura and the district centers at Kurunegala, Kandy, Nuwara-Eliya, Ampara, Hambantota and Kilinochchi in liaison with the department of Agriculture, Department of Agrarian Service, provincial councils, Mahaweli Authority of Sri Lanka and Non-governmental organizations.

Training programmes

CONSULTANCY AND OTHER SERVICES

NIPHM provides consultancy and other services to public, private and cooperative sector organizations that are either directly or indirectly involved in the post-harvest industry. Through this, services were given to establish new processing plants, modernizing of existing mills and plants and to solve technological problems encountered by rice millers and other food processors in their day-to-day operations. NIPHM helped to prepare technical report, feasibility report and special reports for any agro food processing industry as per their request. Institute supported the stakeholders by providing laboratory and engineering services especially for the quality control activities both in industrial products and process lines. Laboratory services consist of chemical, physical and microbiological services. Fumigation of warehouses is another service given by the division of laboratory services to the stake holders. Engineering services consists of machinery/equipment testing and evaluation and operator training. In the year 2021, the institute was able to provide 21 consultancies for the postharvest industry island wide.

SOCIAL, WELFARE AND RELIGIOUS ACTIVITIES

Strengthening institutional governess is one of the goals of the institute. Employee satisfaction is vital to the growth of the organization. Therefore, various social, welfare and religious programmes and activities are organized annually to achieve this goal.
However, the institute was unable to conduct such activities in 2021, due to the Covid 19 pandemic.

FINANCIAL PERFORMANCE

Description	2020 (Rs. Mn.)	2021 (Rs. Mn.)	Growth (%)
Deficit for the Year	4.7	2.2	53
Cash Equivalent	30.8	37.6	22
Total Current Asset	46.9	67.4	43.7
Total Current Liabilities	33.4	39.6	18.6
Net Asset (Equity)	273.3	373.7	36.7

HUMAN RESOURCE DEVELOPMENT

Although it was not able to conduct human resource development activities as planned, due to the Covid situation, research and development staff members were able to participate in 14 online training programmes.

Overall, 2021 was a year of achieving goals in the midst of many obstacles.

Eng. H.M.A.P. Rathnayake
Director/CEO (Acting)

PERFORMANCE HIGHLIGHTS

RESEARH AND DEVELOPMENT

The research and development programme of the institute was directed towards solving technological and socio economic problems confronting the postharvest industry. During the year of 2021, twenty five (25) research projects were conducted by the institute; among them, 04 research projects were funded by the Ministry of Agriculture and total funds received was Rs. Mn.1.6945; Nine research projects were conducted using the financial allocations of the institute given by Treasury and the total funds received was Rs. Mn. 3.254. Eight (08) projects were conducted as student research projects and undergraduate students were engaged with them. Four (4) research projects were conducted to solve the issues in industries and they were funded by respective private industries. Details of the research programme are listed below.

In addition to disseminating the research finding as new technologies within the postharvest sector for its improvement, the results of the studies were published in peer reviewed national and international journals, Institute of Engineers of Sri Lanka, Symposia conducted by different universities.
Summary of the Research projects are shown in the table below.

	Project Title	Date of Commencement	Approved Budget (2021)	Financial Progress (as at 31.12.2021)		Physical Progress (%)
				Rs. Mn	%	
1	**Reseach Projecs Continued from 2020 to 2021**					
1.1	Mitigating rice stickiness to enhance consumer preference through accelerated aging of fresh paddy.	01.07.2019	0.1235	0.12293	99.53	100
1.2	Investigation of nutritional and medicinal properties of value added products from sour soup (*Annona muricata*).	01.09.2019	0.01	0.009	90.6	100
1.3	Development and performance evaluation of washing equipment for carrot (Daucus *corotaL*) combined with ozone treatment.	01.10.2019	0.155	0.1549	99.8	85
1.4	Enhancement of quality characteristics in dehydrated fruits by optimizing process parameters of dehydrating technologies.	01.02.2019	1.406	1.4056	99.97	100

2	**Research Initiated in 2021**					
2.1	Study on present status of postharvest practices & loss assessment of selected agricultural food crops.	01.01.2021	1.438	0.082	5.7	55.7
2.2	Economic analysis at different postharvest stages and farmers willingness to store of selected economically important food grains	01.01.2021	0.161	0.0152	9.44	42.9
2.3	Design and development of monkey and rat repellent device	01.01.2021	0.033	0.003	9.09	50
2.4	Reduction of postharvest losses of *Allium cepa L. aggregatum* group by improved postharvest technologies	01.01.2021	0.148	0.1377	93.04	43.3
2.5	Potential of substituting wheat flour by jackfruit and breadfruit flour in food products and evaluating their functional properties and sensorial attributes	01.01.2021	0.071	0.049	69.01	63.8
2.6	Effect of carbohydrate profile and gluten content for the replacement of wheat flour with *Dioscorea alata* (raja ala)	01.01.2021	0.02	0.019	95	45
2.7	Survey on rice mills and other food grinding mills	01.01.2021	0.246	0.0192	7.8	70
2.8	Design and Development of a process line for groundnut oil extraction	01.01.2021	0.811	0.6922	85.35	88.8
2.9	Development of a science based protocol for postharvest handing of Avocado	01.01.2021	0.326	0.316	96.93	100

Private Funded Research Projects

1. Design and Development of process line for extraction of cashew nut shell oil in Sri Lanka. Research was funded by Udaya Industries pvt Ltd, kandy
2. Effect of different fruit covers on postharvest quality of mango and guava. Research was funded by Ellawala Horticulture (Pvt) Ltd. Dambewatana, Galkiriyagama
3. Development and quality evaluation of osmotically dehydrated fruit pieces. Research was funded by Ceylon nutria products pvt Ltd, 103/59, Roland Park, Weligampitiya, Jaela.
4. Development of organic rice based dairy free drinks. Research was funded by Research was funded by Ceylon nutria products pvt Ltd, 103/59, Roland Park, Weligampitiya, Jaela.

Student Research Projects

No.	Student	University	Supervisor	Research Title
1	A.M.H.G.N.K.Abeyrathne	Jaffna	Mr.W.M.C..B.Wasala	The effects of different fruit covers on postharvest quality of guava
2	D.M.S.M.Dissanyake	Jaffna	W.B.W.M.R.C.P.Aluwihare	Quality improvement of selected fruit varieties by using freeze drying technology
3	G.I.P. Ihalagama	Jaffna	Dr.R.M.N.A.Wijewardane	Development of Moringa enriched tomato based soup cube
4	D.G.S.K.Gunasekera	Rajarata	Dr.R.M.N.A.Wijewardane	Identification of suitable low temperature storage condition for green chilli and condition in treatments before retailing
5	R.M.P.N.Rathnayake	Rajarata	Mr.W.M.C.B.Wasala	Artificial ripening of mango using solar evaporative cooling technology
6	A.M.H.S Shalinda	University of Vocational Technology	Mr. W.M.C..B.Wasala	Improving the postharvest quality of banana(using the Cavendish banana variety)
7	B.N.N.Silva	Uva Wellassa	Mr. Kasun Hettige	Development of probiotic frozen yoghurt by incorporating soursop
8	U.P.L.M. Lionel	Uva Wellassa	Dr. Nilanthi Wijewardana	Development of avocado based supplement food

PROGRESS OF THE RESEARCH PROJECTS

Research Projects continued from 2020

1. Mitigating rice stickiness to enhance consumer preference through accelerated aging of fresh paddy

Stickiness of freshly harvested rice is one of major problems which has directly influenced the rice millers in Sri Lanka. In Sri Lanka most of rice millers are either small scale or medium scale. This problem has added an additional cost for rice millers to provide storage facilities for the freshly harvested rice throughout the natural aging period until they turn into a form preferred by the consumers. Simultaneously this can be considered as a non-economic aspect due to storage space requirement, insect damage, and high operating and maintenance cost. By considering the requests emerged at the stakeholder meetings held at National Institute of Post - Harvest Management, this research project was carried out to find out whether the dry heat treatments and steam heat treatments as artificial aging methods are successfully imparting best organoleptic, physical and chemical properties in rice cooked using freshly harvested paddy.

Freshly harvested BG 352 paddy was subjected to dry heat treatment, dry heat treatment followed by standard parboiling procedure, steam heat treatment and steam heat treatment followed by standard parboiling procedure. The treated samples were analyzed for physical, chemical and organoleptic parameters. The final output of the study is to cut down the holding costs during natural aging of freshly harvested paddy from present average holding cost of Rs.30 million/ miller. The total financial allocation for the project was Rs Mn. 5.21. The total expenditure from the 01/07/2019 to 31/12/2021 was Rs Mn. 4.75; 2019 allocation and expenditure were Rs. Mn. 0.013 and 0.0126 respectively, 2020 allocation and expenditure were Rs. Mn 5.07 and 4.62 respectively while 2021 allocation and expenditure were Rs. Mn. 0.1235 and 0.123 respectively (Total Financial progress is 91.32%.). Findings of this research cut downs the holding costs of paddy, hence provides more benefits to Farmers and millers. Total Physical progress is 100%

Cooked rice samples of steam heated fresh paddy

2. Investigation of nutritional and medicinal properties of value added products from soursoup (*Annona muricata*).

Soursop (Annona muricata) has a wide distribution throughout tropical and subtropical parts of the world and mainly in developing countries including Sri Lanka. It is available in throughout the year. Currently in Sri Lanka, people utilize soursop mostly as a fruit juice. But there are very high potential of various product range and value addition from soursop. It also delivers a nutritious fruit among people and gives lots of health benefits.

The objective of this research is to develop value added food products from soursop and analysis of nutritional value of developed food products. The main value additions of this research are control the discoloration of dehydrated soursop powder and probiotic frozen yogurt from soursop fruit and herbal tea from soursop leaves.

The dehydrated soursop powder was treated with citric acid, ascorbic acid, combination of citric + ascorbic (1:1 ratio) and sodium metabisulfite with and without blanching treatment to control the discoloration. They were compared with the control which has no chemical treatment. Sensory results revealed that the best discoloration treatment is 0.1% sodium metabisulfite without blanching. Developed soursop powder could be stored for twelve weeks at ambient conditions without adding any preservative.

Herbal tea was developed by using mature soursop leaves. Leaves were dehydrated and grinded to obtain leave powder. According to the sensory evaluation, best product is 50% soursop leaf powder + 45% green tea + 5% cinnamon powder.

The probiotic frozen yogurt was made by incorporating soursop pulp to milk and fermented with probiotic culture containing *Bifidobacterium bifidum* and *Lactobacillus acidophilus*. 20% soursop pulp added frozen yogurt evaluated as the best product in sensory evaluation. This could be stored for eight weeks in frozen conditions without adding any preservative. Probiotic growth is significantly higher in soursop incorporated frozen yogurt compared to plain frozen yogurt.

Total allocation for the research was Rs. Mn. 0.245 and the total expenditure was Rs. Mn. 0.162 (2019 allocation- Rs. Mn. 0.00954 and Expenditure Rs. Mn. 0.00954, 2020 allocation- Rs. Mn. 0.225 and Expenditure Rs. Mn. 0.143, 2021 allocation- Rs. Mn. 0.01 and Expenditure Rs. Mn. 0.009). Financial progress 91.34% and the physical progress-100%.,

Probiotic incorporated soursop frozen yogurt

3. Development and performance evaluation of washing equipment for carrot (*Daucus corota* L) combined with ozone treatment.

Carrot (*Daucus carota* L.) Potato (*Solanum tuberosum*) and Radish (*Raphanus raphanistrum*) are economically important vegetable crops in Sri Lanka, The major problems associated with commercial cultivation are excessive postharvest loss during storage due to the soft rot caused by bacteria like *Erwinia carotovora* subsp. atroseptica and *Erwinia carotovora* subsp. carotovora. As a solution, there is a potential of using ozone as a pre-treatment to disinfect bacteria and other microorganisms on crop surfaces. Ozone is unstable with a short half-life. Ozone decomposes to form oxygen; therefore, food products treated with ozone are free of chemical residues. Apart from that Washing vegetables is necessary to remove soil and other foreign material before sorting, grading, weighing and selling in the market. But, presently the grower brings vegetables to the market, either unwashed or inadequately washed under unsanitary conditions. Therefore there is a need of developing an efficient and effective vegetable washing system that minimizes post-harvest losses by damages and bruises.

The objective of this research was to develop washing equipment combined with ozone treatment to remove pathogens and other inert materials from vegetable surfaces. The selected vegetables were washed using the designed washing equipment and ozone treatments were done for the washed vegetables and those trials have given successful results. The output of this research was the availability of washing equipment for efficient cleaning of vegetables and a protocol for controlling soft rot disease by application of ozone and the outcome was the extension of the shelf life of vegetables by controlling soft rot disease and efficient washing of vegetables without damages. The total financial allocation for this research was Rs. Mn. 0.479 and the total expenses were Rs. Mn 0.344 (2020 allocation- Rs. Mn. 0.324 and Expenditure Rs. Mn. 0.190, 2021 allocation- Rs. Mn. 0.155 and Expenditure Rs. Mn. 0.154). Financial progress 71.81% and the physical progress-100%.

Developed washing equipment

4. Enhancement of quality characteristics in dehydrated fruits by optimizing process parameters of dehydrating technologies

Post-harvest loss is high in fruit sector due to perishability and seasonality of production. Drying is one of the widely used food preservation method which can reduce post-harvest losses and added value to fruits. World demand for dried fruit is increasing because of its multi usages. Dried fruits are considered a super fruit snack with high nutritional value, full of vitamins which appeals to health aware international markets. Today the potential for dehydration is greater than ever. Pretreatment plays an important role to prevent enzymatic browning in fruits. Most of the food products are pretreated to minimize the drying time, improve taste and structure, to conserve flavor and to protect the nutrition of the food before dehydration. But the pretreatment methods should be cost effective and easy to conduct even by small and medium scale producers. Main objective of this research was improving quality characteristics of selected fruits (Mango, Papaya, Banana, Guava, Pineapple and Riped jack fruits), as suitable for the export market, by manipulating various parameters involving in dehydrating process. Project outputs and expected outcome were introduce alternative approaches to preserve the surplus of fruits produced during the season and minimizing issues pertaining to the supply and the value chain of fruits, popularize consumption and food applications of dehydrated fruit products in Sri Lanka and indirectly enhance the consumption of fruits to build up healthy nation and to introduce novel technologies and techniques, relevant to the fruit dehydration, to the dehydrated fruits manufacturing industries in different scales, through the technology transferring activities.

The selected fruit samples were prepared for the dehydration by peel out and slicing into uniform sizes and subjecting to pretreatments processes by applying several chemical treatments (sodium meta bisulfite and citric acid) and non-chemical treatments (blanching techniques). The ideal pretreatment was identified for each fruit item. Pretreated fruit samples were subjected to different drying techniques. Pretreated fruit samples received the highest scores for all sensory attributes in comparison with the untreated (control) one. Comparatively best quality shows in freeze dried fruit samples than other drying methods. However freeze drying is very expensive because its capital cost and running cost are very high. Therefore heat pump drying can be recommended for small scale and medium scale stake holders in Sri Lanka due to its low running cost, moderate capital cost and can produce good quality product as well. Total financial allocation for this research was Rs. Mn. 8.224 (2019- Rs. Mn. 0.470, expenditure Rs. Mn. 0.416, 2020 allocation- Rs. Mn. 6.348 and Expenditure Rs. Mn. 4.369, 2021 allocation- Rs. Mn. 1.406 and Expenditure Rs. Mn. 1.4056). Total financial progress -75.88% and the physical progress-100%.

Dried Papaya using heat pump dryer

Research Projects initiated in 2021

01. Study on present status of postharvest practices & loss assessment of selected agricultural food crops.

During the past two decades The National Institute of Post Harvest Management carried out different activities to improve the post harvest sector of perishables. However, no studies have been conducted so far to determine whether there has been a positive growth in the postharvest sector. This research was initiated to identify current postharvest practices and losses in a more generalized form which represent the whole scenario of supply chain of fruits and vegetables. Therefore, the National Institute of Post Harvest Management (NIPHM) is planning to carry out a study on present status of postharvest practices, loss assessment and determination of the pesticide residual levels present in selected agricultural food crops. The project will be conducted for selected grains (paddy and maize), fruits (guava, papaya, pineapple, avocado, rambutan) and vegetables (carrot, capsicum, cabbage, tomato, beet root, bitter gourd, green chilli, long bean, brinjal) and big onion, where these data are not available or out dated. Financial allocation for the research (2021) was Rs. Mn. 1.438 and the expenditure was Rs. Mn. 0.082. Physical Progress 55%. Project duration 2 years, 2021 and 2022. Total allocation for the research is Rs. Mn. 4.892. Project duration 3 years.

Gathering data from different stakeholder groups of the supply chain

02. Economic analysis at different postharvest stages and farmers willingness to store of selected economically important food grains

Post harvest loss (PHL) of food grains is higher in developing countries compared to the other developed nation,. This is assisted by several reasons or factors such as, inappropriate harvesting, threshing, drying, storing, transportation as well as milling. PHL of grains inSri Lanka is ranging from 10 to 15%. In paddy, 7.5% of the loss occurs at the time of storage, which is nearly half of the total loss of paddy according to the FAO data. As this is a huge economic loss to the country and affecting self-sufficiency, National Institute of Post Harvest Management (NIPHM) and several other government and Non-government

organization try to facilitate the farmers to store their paddy and other grains themselves in a safe method to reduce loss as well as to increase the profitability of farmer from those grains. However, the farm level storage of paddy and other grains is not in accepted level. This may be due to several reasons, such as credit, storage space, cost of storage, willingness to storage, opportunity cost and profitability. Although there are ample studies on PHL of food grains, number of studies for above mentioned reasons are less. And also, the most of the data in those studies are outdated. Moreover, there are no any studies to gather data on willingness to storage of food grains for Sri Lankan situation. Therefore, it is crucial to conduct a thorough study now on the storage and profitability at each post-harvest stage to ensure proper planning to reduce the loss of food grains. In this background, this research aims to update the existing data and to find the farmers' willingness to storage (WTS), Opportunity cost of storage, factors affecting farm level storage of food grains with different price level and the change in the profit at every post harvest stages of grains. Cereals-Paddy, Maize, Finger millet, and pulses-Soya bean, Black gram, Green gram, Cowpea were selected as economically important food grains for this study. Furthermore, this research study is most important to maintain the self-sufficiency and food security of paddy and other grains in the nation. In the year 2021, questionnaires were prepared and they were pre tested in the field. Field activities will be conducted in the year 2022. Financial allocation for the research (2021) was Rs. Mn. 0.161, however, it was not spent since most of the field activities were not conducted due to Covid 19 padamic situation in the country. Physical Progress 43%. Project duration 3 years, 2021,2022 and 2023. Total allocation for the research is Rs. Mn. 2.4.

03. Design and development of monkey and brat repellent device

Canopy level pest attacks in agriculture has been identified as one of the most important factors that endangers the national food security. Many research attempts are found to minimize the damage of insect pests and fungal pathogens where the least concern is given to control canopy level pests. Canopy level pests that directly reach the canopy of tall fruit trees and spices are the most difficult group to implement control measures compared to animal pests that walk along the ground. Continuous observations and control of animal attacks are highly recommended due to the unpredictable nature of animal pest attacks.

When considering Sri Lankan situation tall canopy fruit trees and spices are severely affected by animal pests. Also, no research evidence is found to address the canopy level animal pest attack in Sri Lanka. Hence, the needs of new technological strategies were identified to repel animal pests that damage tall canopy fruit trees.

Hence, the study was designed aiming to minimize the damage on yield, quality, flower buds and other vegetative parts of tall and seasonal bearing tropical fruit species due to monkey and bat attacks at home gardens, mini orchards and large farms.

Objective of the study was to reduce of post-harvest losses of fruit crops with automated electronic device in which the specific sound and light frequency ranges of the selected animals can be repelled easily. After having ethical approval to conduct the research, information gathering on historical studies and appropriate methods on canopy level pest control is in progress now. And also, designing of a prototype electronic device is in progress. Financial allocation for the research (2021) was Rs. Mn. 0.033 and the expenditure was Rs. Mn. 0.003. Physical Progress - 50%. Total financial allocation- Rs. Mn. 2.83. Project duration 3 years, 2021,2022 and 2023.

04. Reduction of Postharvest Losses of Red Onion (Allium cepa L. Aggregatum) through Improved Postharvest Practice

Red onion farmers are constrained due to high postharvest losses mainly during storage period and farmers are required to store onion for about six months to supply seed onions (bulbs) for next cultivation season. Therefore, this research was executed with the objective of reducing the postharvest losses of red onion and increasing the postharvest shelf life thereby to increase the economic states of red onion farmers. Pre-trials were conducted to test the effectiveness storage ofonion under room condition followed by shade curing with and without foliage. The total loss after three months of storage was comparatively less for the treatment that was cured with foliage. Currently, curing practices (Shade curing and artificial curing) and storage practices (Temperature and RH) are being tested to select the best practice to minimize the postharvest loss and extend the shelf life. Red onion farmers and traders will be benefited by especially minimizing the storage rotting loss. Financial allocations for the year 2021 were Rs.Mn. 0.148 where Rs. Mn. 0.138 was expended. Physical progress- 43.3%. (In the year 2019 a research was conducted to develop a technology to minimize postharvest losses in big onion. However, the developed technology can not be directly applied to red onion since all the cultural practices are different in red onion in addition to the morphological and genetical variability. Therefore, this research was initiated in 2021. Total financial allocation- Rs. Mn. 0.27. Project duration 2 years, 2021,2022.

Red onion after harvesting

05. Potential of substituting wheat flour by jackfruit and breadfruit flour in food products and evaluating their functional properties and sensorial attributes

In Sri Lanka, there is a considerable post-harvest loss prevailing in Jackfruit bulbs, jackfruit seeds and breadfruit due to perishable nature and short shelf life and there is a current need of extending the storage period of these crops. There is a huge potential of substituting wheat flour with jackfruit bulb flour, seed flour and breadfruit flour which increase the nutrient content of the final product. And also value addition to that flour will create a demand for cultivating jackfruit and breadfruit in Sri Lanka. The proposed research aims to study the ability to produce the composite flour by incorporating jackfruit bulb flour, seed flour and breadfruit flour into wheat flour and identify the most appropriate ratio of wheat flour and jackfruit bulb flour, seed flour and breadfruit flour to examine its performance in bakery items production and other cottage level products like Noodles. This research will be continuing in 2022 too. Total allocation for the research (2021) was Rs. Mn. 0.071 and the expenditure was Rs. Mn. 0.049. Total financial allocation- Rs. Mn. 0.11. Project duration 2 years, 2021 and 2022.

Products developed from jack fruit and bread fruit based flour

06. Effect of carbohydrate profile and gluten content for the replacement of wheat flour with *Dioscorea alata* (raja ala)

Traditional yams are now popularizing throughout country. From the traditional yams, *Raja Ala* (*Dioscorea alata*) has the more demand and cultivations are spreading. It has light purple color which preferred by the most of food processes and consumers.

In Sri Lanka, there are no any research conducted to evaluate the carbohydrate profile is very important factor when considering the bakery and other products which currently used wheat flour.

The objective of this research is to replace wheat flour with *Dioscorea alata* (*raja ala*) in flour and bakery industry of Sri Lanka. In here determine the carbohydrate profile and gluten content of Dioscorea alata (raja ala) Then plan to develop value added bakery products and find out the nutritional value of flour and value added bakery products.

Developed Rajaala flour

Raja ala flour was made by dehydration of yam in conventional air dryer and heat pump dryer. The quality of flour was superior in heat pump dryer compared to conventional dryer. Best dehydration temperature and time was 45 ^{0}C for 6 hours in heat pump dryer. Discoloration of raja ala flour can be controlled by treating with 0.5% citric acid solution for 2-3 minutes before drying. Development of value added products is in progress. Total allocation for the research (2021) was Rs. Mn. 0.02 and the expenditure was Rs. Mn. 0.019. Physical progress- 45%. Total financial allocation- Rs. Mn. 0.475. Project duration 3 years, 2021, 2022 and 2023.

07. Survey on rice mills and other food grinding mills

Rice mills and others agro food grinding mills play a vital role to provide foods to nation and make a considerable impact in the national economic development of Sri Lanka. Even though the number rice mills and other agro food grinding mills in each districts is very much important in different expect for policy makers, development project conductors and for the relevant government bodies, there is no such proper data available with any government institutes so far. But these millers are registered in different government institutes since it is a requirement for operation and for their existence. Therefore, it is going to collect data from different institutes and make a data base on presently available rice mills and other agro food grinding mills under this project. Basically data are collected from the four major districts of rice processing Anuradhapura, Polonnaruwa, Ampare and Hambanthota. There are 60 AGA offices in these districts. During the year, data were collected from 25 AGA offices.

Total allocation for the research (2021) was Rs. Mn. 0.246 and the expenditure was Rs. Mn. 0.0192. Physical progress- 70%. Total financial allocation- Rs. Mn. 1.924. Project duration 2 years, 2021 and 2022.

08. Design and Development of a process line for groundnut oil extraction

The groundnut (*Arachis hypogaea* L.) is one of the important oil seed crop in legume family and it is a good source of protein and fiber. Groundnut oil is often used as healthy edible oil in some countries around the world. The nutrients that can be found in groundnut oil include a low percentage of saturated fats, a high percentage of monounsaturated and polyunsaturated fat and also rich in essential vitamins and have good antioxidant properties. Therefore it can be used and introduced as an edible instead of coconut oil which is commonly used in Sri Lanka. Red Spanish, Tissa, Walawa, Indi, Tikiri, ANKG1 are the main varieties cultivated mainly in Moneragala, Kurunegala, Ampara, Badulla, Puttalam and Rathnapura districts in Sri Lanka. The annual production in Yala and Maha seasons is about 27,602 tons (AgStat 2018). Under the new manifesto, the government has recognized 16 important crops including groundnut that should have to be increased the cultivation. Therefore, it is expected that the annual production will be increased in the coming years. Hence, it will be more important to pay our attention on the developing post-harvest practices in terms of minimizing post-harvest losses and value addition of that harvested products as well. In this regard, introduction of oil extraction will be the main value addition product under groundnut cultivation and that can be introduced as a new major market opportunity. Therefore, through this research we are going to develop a process line for groundnut oil extraction from local groundnut verities by determination of extraction efficiency, cost of production and capacity of the extraction process. At the end of the year 2021, oil extraction process has been optimized and further improvements with quality assessment were in progress. Total allocation for the research (2021) was Rs. Mn. 0.811 and the expenditure was Rs. Mn. 0.692. Physical progress- 88.8%. Total financial allocation- Rs. Mn. 1.075. Project duration 2 years, 2021 and 2022.

Oil extraction by Screw press oil expeller and Extracted groundnut oil samples

09. Development of a science based protocol for postharvest handing of Avocado

As perishables, fruits such as Avocado (*Persea americana* Mill.) shows shorter postharvest shelf life, high postharvest diseases and ripening related issues. Apart from that it is very rare to find avocado based locally produced value added products in the local market. Therefore, this experiment was designed to develop value added products from avocado, to find environment friendly methods (essential oils and plant extracts) to control postharvest diseases, to develop a harvesting tool and to develop effective ripening method for avocado. As the first step, optimum ethephon concentration and exposure time were found for proper ripening. This is a two year research starting from 2021 and the total budget allocation was Rs.Mn. 0.326 for the year 2021 and the total expenditure was Rs. Mn. 0.316. Physical progress-100%. Total financial allocation- Rs. Mn. 0.625. Project duration 2 years, 2021 and 2022.

DEVELOPMENT PROJECTS

Development projects were carried out by the institute in order to ensure technology adoption and their impact on the postharvest industry with special emphasis on agribusiness development and assuring food security. During the year of 2021, nine development projects were conducted by the institute in the key areas of development of agro based industries in the country and the total financial allocation for the projects was Rs. Mn. 74.6. All these projects were planned as 2 year projects thus continued to 2022. Summary of the development projects are given in the following table.

	Project Title	Date of Commencement	Approved Budget (2021)	Financial Progress (as at 31.12.2021)		Physical Progress (%)
				Rs. Mn	%	
1.1	Introduction of safe packaging and transportation methods to reduce postharvest loss in perishable supply chain in Sri Lanka	01.01.2021	49.587	49.274	99.4	97.5
1.2	Developing a technologically sound regional distribution network for fruits and vegetables	01.01.2021	5.45	5.31	97.4	58
1.3	Development of cottage level rice processing industry	01.01.2021	4.274	4.2055	98.4	100
1.4	Establishment of pulse de-hulling units in major pulses grown areas in Sri Lanka	01.01.2021	2.625	2.032	77.4	65.7
1.5	Development of on-farm storage facilities of rice maize and pulses to increase the farmers income	01.01.2021	1.78	1.747	98.1	100
1.5	Establishment of secondary processing centers to empower the stakeholders of fruit value chain in Sri Lanka.	01.01.2021	3.995	3.45	86.4	88.3
1.6	Introduction of Spice processing micro - enterprises in rural level	01.01.2021	1.13	1.053	93.2	100
1.7	Establishment of medium scale extrusion units for development of value added extruded products by using local yams,jack,maize,pumpkin and other food crops	01.01.2021	4.01	3.9196	97.7	76.2
1.8	Upgrading the laboratory facilities for strengthening the new product Development (NPD) procedures and product quality enhancement	01.01.2021	1.8	1.7766	98.7	51

1. Introduction of safe packaging and transportation methods to reduce postharvest loss in perishable supply chain in Sri Lanka

Serious quantitative post harvest losses and quality deterioration occur during all stages of the horticulture supply chain in Sri Lanka. The results of a surveys and studies conducted have revealed that the post harvest loss in fruits and vegetables range from 30-35% in which highest contribution is given during the transportation due use of unsuitable packaging. Therefore, this project was initiated to popularize the use of appropriate packaging for transportation of fruits and vegetables among farmers, collectors, transporters, whole sellers, retailers. One of the main activities of the project was awareness creation to improve the knowledge of stakeholders; farmers, collectors, wholesalers and retailers on improved postharvest technologies and their applications for fruits and vegetable supply chains in Sri Lanka. The project aimed to provide plastic crates to all the stakeholders of fruits and vegetables supply chain in the country on 70% subsidy basis. During year 2021, 31240 plastic crates under two categories were introduced to stakeholders in major perishables supply chains in Sri Lanka. Using these plastic crates approximately 500 MT of fruits and vegetables are being transported daily. Then, the postharvest losses of some fruits and vegetables have reduced remarkably from 30-40% to 15-20%. Total budget allocation was Rs.Mn. 49.587 for the year 2021 and the total expenditure was Rs. Mn. 49.274. Physical progress 100%.

Use of plastic crates in handling and transportation

2. Developing a Technologically Sound Regional Distribution Network

Improper distribution chain of vegetables and fruits is the main reason for higher price fluctuation and higher postharvest losses of perishables. Therefore, the project launched to develop a technologically sound regional distribution network for fruits and vegetables. It is also implemented to provide technologies and necessary facilities to improve the handling activities of fruits and vegetables to the beneficiaries of the project. These beneficiaries were selected based on their willingness to join the project and from the stakeholders who are in the current supply chain in the selected areas. With all factors being considered in the project covering all activities and stake holders of the supply chains of fruits and vegetables, loss reduction and high profits gained by entrepreneurs and making high quality produce products being available in the market will enable the project to be highly successful. This is a 3 year project starting from the year 2021. The budget allocation for the year 2021 was Rs. (Mn) 5.45 and total expenditure was Rs. (Mn) 5.303. As the initial step, the areas and the beneficiaries were identified who are farmers, transporters and retailers to precede the project as expected. . Physical progress 58%.

3. Development of cottage level rice processing industry

The existing supply chain of rice is that the farmer sells his paddy in the unprocessed form to a middleman and this paddy is usually processed into rice in a separate rice mill and be sold in the market. Therefore, many middlemen are involved in between farmers and consumers and it has caused increases in retail price of rice while the farm gate price decreases. This leads to reduction of farmers' income while the consumers pay more. Development of the rice industry at cottage level will initiate rice processing micro enterprises at farm level that lead farmers to increase the market value of their produce and thereby significantly increase their income and at the same time, create self-employment among the rural farming sector. The consumers will have high quality rice for reasonable prices.

The cottage level rice parboiling and processing methods developed by the National Institute of Post-Harvest Management (NIPHM) has overcome the drawbacks of conventional parboiling such as incomplete parboiling which results in a product with white bellies and poor milling qualities. Other advantage is that, this whole process can be done easily by the farm women by improving knowledge, skills and attitudes towards appropriate post-harvest technologies in rice process. So, they can process parboiled paddy into rice from the village level custom rice millers and will be able to sell them in the open market. Since the less cost of production (Low time consumption, low fuel consumption, low labor cost) and less middlemen involvement in this process will lead to provide high profit margin for the farmer. At the same time, they will be able to sell their high-quality rice for a reasonable price to a consumer.

The project proposed to introduce of improved parboiling techniques for the rural community and initiate rural level micro enterprises by creating awareness and conducting training programs on improved parboiling techniques and after selecting beneficiaries they

were provided with parboiling equipment and drying sheets (for sun drying process) free of charge. And also, two soaking tanks per beneficiary were constructed at 50% cost reimbursement basis. It was planned to establish 100 rice processing units in major paddy cultivation areas in the country and at the end of the year 2021, seventy seven (77) units were established as follows; 04 units at Kandy district, 03 units at Kegalle, 03 units at Matale, 25 units at Kurunegala, 03 units at Jaffna, 05 units at Kilinochchi, 01 unit at Vaunia, 01 unit at Mullaitivu and 32 units at Ampara district. The budget allocation for the year 2021 was Rs. (Mn) 4.274 and total expenditure was Rs. (Mn) 4.205. . Physical progress 100%.

Different stages of the project

4. Establishment of pulse de-hulling units in major pulses grown areas in Sri Lanka

Green gram, black gram cowpea and kollu are the major pulse grains in the Sri Lanka. And government has taken steps to increase production further to satisfy the country production to the demand. In Sri Lanka, pulses such as green gram, black gram and cowpea are cultivated under subsistence farming systems in the dry and intermediate rainfall zones. Kollu (Horse gram) is grown in Nuwara-Eliya district especially in Walapane Area.

Pulses are cultivated for their seeds. The seeds are used for human and animal consumption or for the production of oils for industrial uses. Pulses are consumed as Dal, which is a cheap source of plant protein. The high content of iron (Fe) and zinc (Zn) in pulses is specifically beneficial for women and children at the risk of anemia. Pulses are low in fat and rich in soluble fiber which can lower cholesterol and help control blood sugar. Processing of pulses is very much important to reduce or eliminate the anti-nutrient compound of them. De-hulling involves the removal of the hulls of grain seeds. De-hulling can be done traditionally with mortar and pestle, which makes the process laborious and time consuming. The de-hulling of legumes results in reduction of fiber and tannin content, and, most importantly, affects the appearance, texture, cooking quality, digestibility, and palatability of the grains. This has created an high market potential specially for green gram, black gram, pigeon pea, cowpea and Kollu etc..

NIPHM has developed a pulse de-hulling machine and it has a capacity of 200 kg/day. Therefore, this machine can be introduced to initiate pulse de-hulling industries in small/medium scale since an increased demand for the processed product, as aforesaid, is observed. So, the objective of this project was to Increase the availability of de-hulled pulse in the market through establishing 50 small/medium scale new pulse dehulling units in the country. It was planned to establish 15 pulse dehulling units in major pulse growing areas in the country and at the end of the year 2021, all the beneficiaries were identified and machineries were being fabricated in the workshop of NIPHM. After construction these machineries will be distributed to establish pulse processing units at, 02 units at Kurunegala, 01 unit at Kilinochchi, 02 units at Mullaitivu, 02 units at Vavunia, 04 units at Anuradhapura, 01 unit at Hambanthota and 03 units at Ampara district. The budget allocation for the year 2021 was Rs. (Mn) 2.625 and total expenditure was Rs. (Mn) 2.032. . Physical progress 65.7%.

NIPHM developed Pulse dehulling machine, pulses before dehulling and after dehulling

5. Development of on-farm storage facilities of rice, maize and pulses to increase the farmers' income

When considering the paddy, maize and pulses industry, high cost of production and the low farm gate price during the harvesting seasons constrain the farmer by low income. Therefore, promoting on-farm storage was identified as a solution that minimizes direct sales and increases the profit margin to the farmer through off seasonal sales. Thus, this project was implemented to improve the condition of on-farm storage facilities and minimize quantitative and qualitative post-harvest losses of grains, and to safeguard the industry. Project was proposed as a three year activity where the first year was completed successfully. The project was executed in six districts namely; Ampara, Mulaithivu, Kurunegala, Kandy, Anuradhapura and Hambantota. Farmers who currently store grains in home scale were selected as beneficiaries where training programmes were conducted to

improve their knowledge on scientific way of grain storage. Among them farmers who were willing to improve the existing condition of their storage were selected and guided to renovate the grain storage scientifically and an allowance was given based on a pre-prepared standard estimate. Within the year 2021, seven training programmes were conducted and also some farmers were trained individual basis due to the prevailed pandemic situation. Further, allowances were provided for renovating 68 number of on-farm storages (at. Kandy-05 units, Kurunegala- 13 units, Kilinochchi- 01 unit, Vavunia-02 units, Mullaithivu-12 units, Ampara-31 units, Anuradhapura-02 units and Hambanthota-02 units) Budget allocation for the year 2021 was Rs. Mn,1.78 where Rs. Mn. 1.747 was spent. . Physical progress 100%.

Conducting training progrmmes, onfarm storages before improvements and improved storage facilities

6. Establishment of Secondary processing centers to empower the stakeholders of fruit value chain in Sri Lanka

At present, one of the main national-level challenges is how to reduce post-harvest loss of perishables. Lack of proper value addition related knowledge and technologies is also the main barrier to developing the fruit processing sector of the country to cater for the demand of the international market and thereby increase the availability of fruit-based products all over the world. Usage of food preservation methods (processed and value-added products) is one of the options to reduce the postharvest losses of fruits. The most common and popular methods of preservation of fruits are pulping and dehydration which will lead to extending the shelf life.

Through this project, it was planned to provide the initial support for the target beneficiaries by establishing three pulping centres and two dehydration (fruit processing) centres to initiate the dehydration and pulp production line which can be used for value addition practices of fruits in off seasons in Anuradhapura, Mathara, Kurunegala, Monaragala and Kegalle districts. Beneficiaries were trained on selected two technologies via training programmes. The main criteria in the selection of these beneficiaries were whether they are already involved or willing in participating in selected activities or when selecting, the requests done by beneficiary societies were considered. The project proposed to provide the relevant machinery and equipment to the beneficiaries under the ownership of NIPHM while signing an agreement with them to assure proper usage of the facilities provided. After two years of supervision and based on proper implementation of the project activities by the

beneficiaries, the ownership of the machinery and equipment will be handed over to the beneficiary. The output of this project is the availability of pulping and dehydration centres for the beneficiaries who wish to engage in businesses related to value addition and the outcome is the reduction of post-harvest loss of fruits by introducing value addition techniques like pulping and dehydration. But even at the end of the year pulping machines were not delivered by the suppliers due to the prevailing financial crisis of the country. Therefore the pulping units were not established although establishment of dehydration units is in progress.. The financial allocation for this project is Rs Mn. 3.995 and the total expense is Rs. Mn 3.45. . Physical progress 88.3%.

Conducting training programmes on value addition

7. Introduction of Spice Processing micro-enterprises in rural level

Spices play an important role in enhancing the flavour and taste of the processed foods. Ground spices are extensively used in all types of curried dishes in Sri Lanka and abroad. Although spices are traded chiefly in an unprocessed form, a small yet significant quantity enters international trade as spice powders. Curry powder is the foremost of those blends or mixes and sometimes consists of 20 or more spices designed to add the characteristic flavour of a Sri Lankan curry, which is appreciated all over the world. Hence the demand for unadulterated spices and curry powder in attractive packaging is fast emerging. Moreover, current regulations on restricting importations of whole spices have increased spice farming in the country. Consequently, the market for processing spices has enormous potential.

In this context, this project was initiated with the objective of promoting spice processing in the country, thereby small / medium entrepreneurs, farmers and unemployed youth are made aware on establishing agro processing industries to increase their income levels through value addition. In the year 2021, the NIPHM was able to establish 15 spice processing units all over the country (Kandy- 02 units, Kurunegala- 02 units, Mullaithivu-01 unit, Ampara-03 units, Anuradhapura-04 units, Kegalle-01 unit, Hambanthota-01 unit, Kilinochchi-01 unit). Beneficiaries of the project were well trained on spice processing before providing the machinery in 50% subsidized basis. Total estimated cost of the project was Rs. Mn. 1.13 and the expenditure was Rs. Mn. 1.053. . Physical progress 100%.



8. Establishment of medium scale extrusion units for development of value added extruded products by using local yams, jack, maize, pumpkin and other food crops

Nowadays extruded products are well popular among young generation. So there is a necessity of introducing more nutritious food items in ready to eat forms. Thus, considering availability, popularity and nourishment, value added products can be developed through the extrusion process by using yams, jack, maize, pumpkin and other food crops that well grown in Sri Lanka. Extruded product can be used as value added products for the seasonal crops and crops with higher price fluctuation. Utilization of excess production in the season can reduce the post-harvest loss and also increase the food product diversification in the market. Extrusion processing center will be established in National Institute of Post-Harvest Management. Major crop cultivation areas of selected crops with surplus production will be selected and conduct training and technology transfer programs for the entrepreneurs who wish to engage in food processing industry and entrepreneurs who are already engaged in extrusion food industry. The project proposes introduction of novel extrusion techniques for the medium scale enterprises. 100 no of farmers who grow yams, jack, maize, pumpkin and other local food commodities will be selected to supply raw materials for the extruded snack production.

The extrusion unit is mainly equipped with flour mixer, twin type double screw extruder machine and flavoring machine. Gas filling automatic band sealer, batch/date coder machine, electric scale and other utensils were ordered as other supporting items. All machineries and equipment were ordered but delayed due to covid-19 situation and economic status of the country.

Total estimated cost of the project was Rs. Mn. 4.01 and the expenditure was Rs. Mn. 3.9196. Physical progress 76.2%.

9. Upgrading the Laboratory Facilities for strengthening the New Product Development (NPD) procedures and Product Quality Enhancement

NIPHM is mainly undergoing activities in terms of research and development, technology transferring and providing laboratory services for outside parties such as university students, other public and private institutions, etc. As an institution that is shouldering for national responsibilities, NIPHM is much strong in empowering the entrepreneurs with preciously established concepts and methodologies through research and development activities in value addition to agricultural commodities as it can be identified as a national priority in order to find a feasible solution for Postharvest losses. Gaps in laboratory facilities directly affect the quality of the laboratory works as well as the assistance and support given to the outside parties. Apart from that, there are limited numbers of food products quality testing facilities available in Sri Lanka and those places are not affordable for small and medium scale entrepreneurs. Hence, this project was planned to equip the laboratories of the NIPHM in order to become a government body that can facilitate those tests at affordable rates for the benefit of small and medium scale industries in their product quality testing. This is a two-year project and during the first year we were able to purchase a stomacher blender and an anaerobic incubator to strengthen the capacities of our laboratories and there are a few more to be purchased in the coming year. With the new additions to the laboratories, the value addition of food commodities will be widening to many avenues which can reach up to the growing market need. The total budget allocated for this project for the year 2021 was Rs. Mn. 1.8 and the expenditure for the first year was Rs.Mn.1.78.

TECHNOLOGY TRANSFER ACTIVITIES

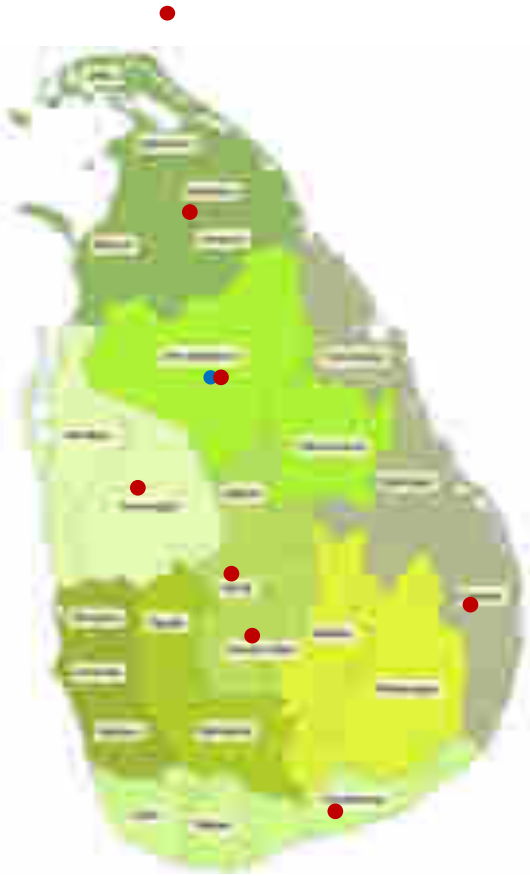
Extension division carries out its technology dissemination activities through its island wide extension Centers in liaisons with government and non-government organizations. Technology dissemination through field level extension work, which is one of the major activities of the institute, was continued during the year 2021.

Main different Sectors Selected for Technology Transfer activities.

a) Minimization of postharvest losses in agricultural crops
b) Introducing technologies for storage methods
c) Processing of rice, pulses and other grains
d) Spice processing
e) Value addition for fruits and vegetables
f) Rice and pulse based product development
g) Awareness programs on human nutrition and food habits in Sri Lanka

The island wide extension network consists of eight field Centers located in the following major crop producing areas:

1. Anuradhapura (covering Anuradhapura, Polonnaruwa, Trincomalee)
2. Ambanpola (covering Kurunegala, Puttalam)
3. Kandy (covering Kandy, Matale, Kagalle)
4. Nuwara Eliya (covering NuwaraEliya, Welimada and Badulla)
5. Ampara (covering Ampara, Monaragala, part of Baticallo, Mahawelli System C)
6. Hambantota (covering Hambantota, Matara, Galle, Ambilipitiya)
7. Kilinochchi (covering Kilinochchi, Vavuniya, Mulathiv, Jaffna, Mannar)
8. Colombo (covering Colombo, Gampaha, Kaluthara)



Currently island wide technology transfer activities are covered by 8 extension centers

TRAINING

Training programs were conducted with the aim of improving supply and value chains of agricultural commodities, ultimately to reduce the postharvest losses. These programs were conducted under following two strategies;

- Residential training programs
- Non-residential programs

Programs conducting at the institute are referred to as residential training programs and the programs conducted in the field are considered as non-residential training programs. All these programs are based on stakeholder requirement and were organized to cater to the training need of the beneficiaries.

Residential Training Programs

These training programs were conducted at Research and Development Center in Anuradhapura. Beneficiaries of the training programmes were mainly farmers/farm women, collectors, transporters, whole sellers, retailers/traders and processors. Further these programs were also conducted under training of trainer aspect for officers of government and non-governmental organizations, students of universities, technical colleges and schools.

These programs were aimed towards awareness creation on postharvest technology, entrepreneur development, loss reduction, process and product quality improvement, etc.

During the year 2021, 10 short-term residential training programmes were conducted and 448 people were trained in various disciplines of post-harvest technology. The following table contains the details. The majority of the residential programs had to be canceled in accordance with the COVID-pandemic health regulations.

Group	Description	No.of Programs	No.of trainees
A	Awareness creation programmes on postharvest technologies for Farmers/farm women and members of farmer organizations	02	47
B	Programmes on food processing and value addition for the small/medium scale entrepreneurs	05	81
C	1. Students from Secondary schools, Universities, Schools of Agriculture and Technical Colleges (Including students for industrial training)	01	276
	2. (Including students for industrial training)		14
D	Training programmes for Individual requests	02	30
Total		**10**	**448**

Non-residential/ Field training programs

These programs are conducted in the field itself. These are conducted by the R&D center in Anuradhapura and the extension centers of NIPHM. During the year 2021, 65 field training programs and demonstrations were conducted and 1004 individuals were trained.

For the stakeholders in the supply and value chains of agricultural produce, such as farmers and farmwomen, collectors, transporters, whole sellers, retailers/traders, and processors, training programs were conducted with the goal of raising awareness about postharvest technology, entrepreneur development, loss reduction, process and product quality improvement, etc.

Many of these beneficiaries are using the technologies given in these training programs. Through the technical knowledge attained, knowledge improvement, quality enhancement of produce, income generation, rural empowerment, and many other benefits were achieved. This directly contributes to the loss reduction and quality improvement of the local produce in the agriculture sector, which is one of the main limiting factors in national development in line with food security.

Group	Description	No. of Programs	No. of trainees
A	Development projects related training programs	51	831
B	Training programs conducted, based on the field request	14	173
Total		**65**	**1004**

Further these training of stake holders had contributed to industrial development, economic development and social development with improved living standards as well. Thus, 102 new entreprebeurs were introduced to the agro based industries and these industries include 18 brands of spice based products, 43brands of rice based products, 05 brands of dehydrated fruit products, 32 brands of fruit based products and 04 pulse based producers.

Technology adoption in the field

CONSULTANCY SERVICES

National Institute of Post Harvest Management (NIPHM) provides consultancy and other services to public, private and cooperative sector organizations that are either directly or indirectly involved in the post-harvest industry. Through this, services are given to establish new processing plants, modernizing of existing mills and plants and to solve technological problems encountered by rice millers and other food processors in their day-to-day operations. In the year 2021, NIPHM helped to prepare technical reports, feasibility reports and special reports for different agro food processing industries as per their request. Institute supported the stakeholders by providing laboratory and engineering services especially for the quality control activities both in industrial products and process lines. Laboratory services consisted with chemical, physical and microbiological services whereas engineering services included machinery and equipment testing and evaluation, and operator training. In the year 2021, the institute was able to provide 21 consultancies for the postharvest industry island wide.

Summarized details of consultancies are listed below.

No	Name of the Customers	Services
01	Mahindarathna Rice Mill, Thambuththegama	Project report to establish a waste water treatment plant in rice mills
02	M.A.R.S.Ananda, Kirindiwela	Consultancy service on rice milling
03	Darshana Galappaththi, Ragama	Dehulling of Black gram- Sample testing
04	Upul Kumara	Dehulling of Black gram
05	Sriyan Edirisighe, Welikanda	Consultancy service on rice milling
06	Manager, Cooperative Wholesale Establishment	Participating to TEC and providing Technical Evaluation report for Hingurakgoda rice mill
07	S.M.J.M.Kumara	Providing pulse dehulling machine
08	Manager, Multi-service Co-operative Society Ltd, Hingurakgoda	Inspection of rice mills
09	J.P.I.Kamalsiri, Kanthale	Inspection of the rice mill.
10	Director, Food Promotion Board	Participating to the Technical Evaluation committee of the valuation and destroying some items in Kalankuttiya food processing unit
11	Manager, Multi-service Co-operative Society Ltd, Pemaduwa, Wilachchiya	Modernization of the Rice processing unit and submission of the project report on Lime processing
12	N. Harsha Jayantha, SAFE Foundation	Providing specifications for chilli processing
13	Aruna Rupasinghe, Agriculture Sector, Modernization Project	Inspection of rice mills
14	Priyamani Hemachandra	Consultancy on preparation of Mango based products and moringa powder
15	Thiekshana Nayanthara, Ampara	Providing technical report on fruit and vegetable dehydration
16	Manager, Multi-service Co-operative Society Ltd, Kobeigane	Inspection of rice the mill
17	Innovation of Machineries programme of the Ministry of Agriculture	Inspection of machineries of Mr.J.K.W.S Jayasundara
18	'Innovation of Machineries' programme of the Ministry of Agriculture	Inspection of machineries at Batticalo
19	Ceylon first exporters Pvt Ltd., Thambuththegama	Technical advises for Bottling of fruit and vegetables
20	R.D.V.J. Rajapakse, Horana Rd., Handapangoda	Project report on food dehydration
21	Department of Agriculture	Technical support to provide/establish 50 chilli dryers in different places of the country

Laboratory Services

The Institute played an important role in exercising quality control of agro/food products in the country by analyzing samples received from both private and public sector organizations for their physical, chemical and microbiological quality. NIPHM is equipped with well-developed laboratory facilities; especially the chemical laboratory is equipped with Atomic absorption spectrophotometer, Gas chromatography and high performance liquid chromatography, Gas chromatography Mass spectrometer etc. and the newly renovated Microbiology laboratory is equipped with Biosafety cabinet, autoclaves, incubators, ovens, light microscopes and image processing microscope etc.

Using these facilities, NIPHM has commenced to outsource the laboratory facilities and also taking accrediation for some of its laboratory analyses. Fumigation of grain warehouses is another promoising facility given through laboratory services to the stake holders. During the year 2021, 351 laboratory reports were isuued to the stakeholders after analysing their food samples.Further, 5 fumigations were conducted.

Laboratory facilities

CAPACITY BUILDING AND PRODUCTIVITY DEVELOPMENT

Institute takes a keen interest to enhance theknowledge of its employees. The following officers of the Institute underwent postgraduate study and training in the fields pertaining to Post Harvest Technology during the year 2021.

Postgraduate Degree Programmes

Completed Programmes

Mr. B.A.M.S.Kumara
M.Sc. in Horticulture
Post Graduate Institute of Agriculture (PGIA)
University of Peradeniya

Mrs.R.M.R.N. K. Rathnayake
Ph.D. in Postharvest Technology
Post Graduate Institute of Science (PGIS)
University of Peradeniya

Eng. (Mrs.) D.M.S.P. Bandara
Ph.D. in Bio System Engineering
Post Graduate Institute of Agriculture(PGIA)
University of Peradeniya

Continued programmes

Mr. W.M.C.B. Wasala
Ph.D. in Postharvest Technology
Post Graduate Institute of Agriculture (PGIA)
University of Peradeniya

Eng. (Mr.) B.D.M.P. Bandara
Ph.D. in Bio System Engineering
Post Graduate Institute of Agriculture (PGIA),
University of Peradeniya

Mrs. C.K.Marasinghe
Ph.D. in Engineering
Center for Engineering Research and Postgraduate Studies
Faculty of Engineering, University of Peradeniya

Miss. S.S.K.Weerasinghe
M.Sc. in Horticulture
Post Graduate Institute of Agriculture (PGIA)
University of Peradeniya

Mrs. W.B.W.M.R.C.P. Aluvihare
M.Sc. in Horticulture
Post Graduate Institute of Agriculture (PGIA)
University of Peradeniya

Short term training/ Meetings/Conferences

Research and development staff participated in training programs/workshops conducted on a virtual platform since they were unable to attend overseas trainings under the COVID pandemic situation. Details are listed below.

Name of the programme	No. of participnat	Duration of the programmes
Internal auditing on quality management systems of laboratories	02	02 days
Identification of standards related to laboratory quality control	03	3 hours
Quality control of microbiology laboratories	03	2 hours
Assessment of unsertanity in laboratory measurements	03	2 days
Assessment of unsertanity in microbilogical readings	03	2 days
Calibration certification for sample testing laboratories	03	3 hours
Training programme on Microbiology	03	2 hours
Identification of control samples for sample testing laboratories	03	1 day
Waste Management in a Laboratory	2	1 days
Value addition for underutilised crops	03	03 hours
Food packaging	16	02 days
Value addition for fruits and vegetables and novel trends in postharvest technologies	12	1.5 hours
Awareness of how to win your career	16	2 hours
International Training Program on “Innovative Marketing Models for Small Scale entrepreneurs”	1	5 days

AWARDS AND RECOGNITIONS

Eng. H.M.A.P. Rathnayake

- Member of Faculty Board, Faculty of Agriculture, Rajarata University of Sri Lanka
- Member of Board of study of Master of agriculture degree programme, Rajarata University of Sri Lanka

Dr. Nilanthi Wijewardana

- Steering Committee Member of the Sri Lanka Association for Advancement of Sciences (SLAAS), Sri Lanka
- Member of the working committee of the Sri Lanka Standard Institution for Formulation of standards for papaya
- Chairman, environmental committee of SLAAS
- Consultation on Agriculture and Livestock Sector for Review and Update of Nationally Determined Contributions (NDCs) of the Climate Change Secretariat of the Ministry of Environment, Sri Lanka.

Mr.W.M.C.B.Wasala

- Member, National Committee in Postharvest Technology coordinated by Sri Lanka Council for Agriculture Research Policy
- Member, Working Group for Storage of Paddy and Rice, Sri Lanka Standard Institute

Dr. R.M.R.N.K. Ratnayake

- Secretary, Sri Lanka association for mycology and plant pathology

PUBLICATIONS

- Aluwihare, W.B.W.M.R.C.P., Wijewardena R.M.N.A. (2021) Development of ready to use formulation for enhance the shelf life and quality of cut flowers, paper presented in National Symposium on Floriculture Research (NaSFLOR) on 16th December 2021 via zoom
- De Zoysa, P.N.T., H.P.S., Senarath, and Wijewardhana, R.M.N.A.. Utilization of Embul Banana (Musa spp.) Variety for Preparation of Flour as a Food Ingredient. (2021). Proceedings of Peradeniya University International Research Sessions 2021, Sri Lanka, Vol. 23, 11th & 12th November 2021.
- Gunawardane, E., Ratnayake, R.M.R.N. Jayathunga, K.G.L.R. and Illeperuma, C.K. (2021), Impact of pre-harvest soil application of rice husk ash on post-harvest quality of green chili (*Capsicum annuum* L.). Proceedings of the international conference on innovation and immerging technologies. 25-26 November 2021, University of Sri Jayawardanapura, Sri Lanka.
- Herath, H.M.B.H., Bandara, D.M.S.P.,.Weerasooriya, G.V.T.V., Kosgollegedara, E.J. Karthigayini, S., Wijethunga, G.A.M.A.. and Marasinghe, C.K. (2021), Performance Evaluation of a Power Operated Groundnut Decorticator. Proceedings of the National Engineering Research Symposium (NERS_2021)
- Hettige K.D.T. Development of soursop incorporated probiotic frozen yogurt fermented by Lactobacillus acidophilus. (2021). Publication on 5th International Research Conference, Uwa Wellassa University 2021

- Jayarathne, G.E.D.A.M, Navarathne, S.B., Wickramasinghe, I. (2021). Improvement of lycopene content in locally available tomatoes by adapting post harvest storage practices. Department of Food Science and Technology, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka;

- Jayasinghe, J.A.S.T., Kumara, B.A.M.S. and Jayathunge, K.G.L.R.. (2021). Optimization of Ethylene Concentration and Exposure Time to Enhance the Ripening Rate of Avocado Fruits. Proceedings of the 7th International Conference on Dry Zone Agriculture, 3rd and 4h December 2021, Faculty of Agriculture, University of Jaffna, Kilinochchi, Sri Lanka

- Kumara, B.A.M.S., Wijewardane, R.M.N.A. and Samarasinghe, Y.M.P. (2021). Evaluation of the effectiveness of freeze drying and vacuum packing technology for preservation of fresh fruits – (Papaya, Guava, Pineapple). Journal of Agricultural Sciences – University of Sabaragamuwa Sri Lanka

- Kumara, B.A.M.S., Menike, G.D.N. and Samarasinghe, Y.M.P. (2021). Quality improvement of fresh leafy vegetables by controlling undesirable postharvest physiological activities International Conference on dry zone agriculture – University of Jaffna Sri Lanka

- Kumara, B.A.M.S., Wijewardane, R.M.N.A. and Samarasinghe, Y.M.P. (2021). The Effect of Anti-Browning Treatments for Fresh-Cut Guava Slices in Prevention of Browning during Dehydration. *Journal of Agricultural Sciences - Sri Lanka.* 16(1):28-36. http://doi.org/10.4038/jas.v16i1.9181

- Kumara, B.A.M.S., Menike, G.D.N. and Samarasinghe, Y.M.P. (2021). Modified Atmospheric Packaging (MAP) Extends the Postharvest Life of Sesbania grandiflora (L.) Pers Fresh Leaves. Proceedings of the 7th International Conference on Dry Zone Agriculture, 3rd and 4h December 2021, Faculty of Agriculture, University of Jaffna, Kilinochchi, Sri Lanka

- Lionel, U.P.L.M., Wijewardana, R.M.N.A., Arachchi, M.P.M. and N.E. Wedamulla.(2021) Development and Quality Evaluation of Avocado (*Persea americana*) Based Nutritious Supplement Food. 5 th International Research Conference of Uva Wellassa University, IRCUWU2021 "Exploring Potentials in Challenging Periods" 1 st - 2 nd July 2021@ Uva Wellassa University, Badulla, Sri Lanka. Paper ID: IRCUWU2021-488

- Wijewardane**,** R.M.N.A., . Jayaweera, J.A.S. and Prera, G.A.A.R.. (2021). Formulation and quality valuation of fruit and vegetable based energy drink. International Conference on Applied and pure Science 2021, Faculty of Science, University of Kalaniya, Sri Lanka

2021 patent application

Name: G.E.D.A.M. Jayarathna
Topic: Development of a food additive to preserve food by incorporating of oil extractions of nutmeg (*Myristica sp.)* and cinnamon (*Cinnamon zeylanicum)*

Applied on: 31.07.2020 (still processing)

SOCIAL, WELFARE AND RELIGIOUS ACTIVITIES

The institute was unable to conduct social, welfare and religious activities due to Covid 19 pandemic in 2021.

HUMAN RESOURCES

The total permanent staff of the Institute was 155. Filled cadre positions as at end of December 2020 was 118. This total comprised of 52% in the technical divisions and 48% in the supporting divisions.

As at 31st December 2021

Position	Total Cadre Positions	Filled Cadre Positions
Higher Management Positions		
Director	01	-
Additional .Director (Administration & Finance)	01	01
Additional Director (Research & technology Transfer)	01	01
Total	**03**	**02**
Research & Development Staff		
Principal/ Chief Mechanical Engineer	01	01
Principal Research Officer	02	02
Principal Extension Officer	01	-
Senior Research Officer	03	02
Senior Mechanical Engineer	02	02
Senior Extension Officer	01	-
Research Officer	14	11
Mechanical Engineer	06	03
Extension Officer	05	05
Economist	01	01
Total	**36**	**27**

Supportive staff

Staff	Total Cadre Positions	Filled Cadre Positions
Internal Auditor / Senior Internal Auditor	01	01
Accountant / Senior Accountant	01	01
Technological Officer (lab)	01	01
Administration Officer	02	02

Librarian/ Publication Officer	01	01
Extension Assistant	10	10
Draughtsman	01	01
Technical Assistant	03	02
Technical Assistant (Civil)	01	01
Management Assistant (cashier)	01	01
Management Assistant	27	26
Laboratory Assistant.	04	02
Equipment Operator	02	01
Driver	13	12
Electrician	01	-
Welder/ Forman	01	01
Mechanic / Technician	02	02
Mill / Machine Operator	03	03
Boiler Operator	02	-
Cook	01	01
Office Aide	18	20
Boiler Assistant	01	01
Labourer (Sanitary)	03	03
Labourer (Canteen)	02	02
Security Guard	06	06
Maintenance Helper	08	08
Total	**116**	**109**

Expertise areas of Research and Development staff

In the area of post-harvest technology, the institute has good expertise in rice processing, grain storage and considerable expertise in fruit and vegetable, spice. The research and technology staff consists of engineers, agriculturists, chemist, microbiologists, food scientists etc. This help to analyses problems in different areas.

Distribution of Research and Development staff

No.	Area	Male	Female	Total
01	Agriculture	07	11	18
02	Engineering	03	03	06
03	Science	01	01	02
04	Food Science	-	01	01
05	**Total**	**11**	**16**	**27**

EXECUTIVE STAFF

As at 31st December 2021

DIRECTOR/CHIEF EXECUTIVE OFFICER (Acting)
Eng. H.M.A.P. Rathnayake
BSc. Eng, MEng. CEng.MIE (SL)

ADDITIONAL DIRECTOR (RESEARCH AND TECHNOLOGY TRANSFER)
Eng. H.M.A.P. Rathnayake
BSc. Eng, MEng. CEng.MIE (SL)

ADDITIONAL DIRECTOR (ADMINISTRATION AND FINANCE)
Mr. R.K.A.P. Ramanayake
BSc. Mgt. Licentiate Certificate, ICA, MIPFDA

RESEARCH DIVISION

HOD | Principal Research Officer
Dr. (Mrs.) Nilanthi Wijewardana
BSc. Agric, MSc. Agric, MPhil, PhD

Research Officers

Mrs. Y.M.P. Samarasinghe
B.Sc. Agric. MSc in Geo Informatics

Mr. B. A. M. S. Kumara
B.Sc. Agric. M.Sc.(Organizational Management)

Miss. T. M.A. N. Weerasinghe
B.Sc. in Export Agriculture (special),M.Sc. in Food Science & Technology

Miss G. E. D. A. M. Jayarathna
B.Sc. Food Science & Tech. (special),M.Sc. in Food Science and Nutrition

Miss W. M. S. S. K. Weerasinghe
B.Sc. Agric. M.Sc. in Organizational Management

Mrs. W. B. W. M.R. C. P. Aluwihare
B.Sc. Agric. MSc in Horticulture (Reading)

Mr K. D. T. Hettige
B.Sc. Agric., M.Sc. in Food and Nutrition

Mrs G. D. N. Menike
B.Sc. Agric. M.Phil. in Molecular and Applied Microbiology(Plant Protection)

ENGINEERING DIVISION

HOD | Senior Mechanical Engineer (Acting)
Eng. B.D.M.P. Bandara
BSc. Eng, MEng. CEng. MIE (SL)

Chief Mechanical Engineer
Mrs. D. P. Senanayake
BSc. Eng, MPhil. CEng. MIE (SL)

Mechanical Engineers
Mrs. C. K. Marasinghe
B.Sc. Eng., M.Phil.(Eng.), AMIE (SL), Ph.D.(Reading)

Mr. V.G.K.Maduranga
B.Sc. Eng.

EXTENSION DIVISION

HOD | Senior Research Officer
Mr. W.M.C.B.Wasala
BSc. Agric, MSc. Agric, MPhil.

Extension Officer
Mr. P.G. Lalith Wasantha
B.Sc. Agric., MSc Agric.

Mr. M.M. Herath
B.Sc Agric., Dip. in Counseling
Ph.D.(Reading)

Mr. N. Somakanthan
B.Sc Agric., MSc Agric.

Ms. Lakmini Senavirathne
B.Sc Agric.,

PROJECT MANAGEMENT DIVISION

HOD | Senior Research Officer
Mr. W.M.C.B.Wasala
BSc. Agric, MSc. Agric, MPhil. Ph.D. (Reading)

LABORATORY SERVICE DIVISION

HOD | Senior Research Officer (Acting)
Mr. Chaminda Gunawardhane
BSc (Chemistry) special.

Technological Officer
Mr. Champika Kumara
NCT (Electrical)

PLANNING AND MONITORING DIVISION

HOD | Senior Research Officer
Dr. (Mrs.) Ruwanka Rathnayake
BSc.Sp. (Botany), MSc., PhD (Reading)

Economist
Ms. K.A.T.S. Kumari
BSc. Agric, MSc (Reading)

ADMINISTRATION DIVISION

HOD | Additional Director (Admin & Finance)
Mr. R.K.A.P. Ramanayake
BSc. Mgt.Licentiate Certificate, ICA, MIPFDA

Administrative Officer
Mr. Janaka Subasinghe
BSc.

Administrative Officer
Mrs. D.N. Munasinghe

FINANCE DIVISION

HOD | Accountant
Mr. I.M.N.P. Illangasinghe
B.Com (Sp.), APFA, ACPM, MBA (Reading)

ACADEMIC DIVISION

Senior Mechanical Engineer (Acting)
Dr. (Mrs). D.M.S.P.Bandara
BSc. Eng, MPhil. CEng.MIE (SL) Ph.D. (Reading)

INTERNAL AUDIT Division

HOD | Internal Auditor
Mr. R.M.D.Rathnayake
BSc (Accounting)