

ANNUAL REPORT 2019

NATIONAL INSTITUTE OF POST-HARVEST MANAGEMENT

Research and Development Centre

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National Institute Of Post Harvest Management
Jayanthi Mawatha
Anuradhapura.

Hon. Minister of Agriculture
Ministry of Agriculture
No 85/5, "Govijana Mandiraya"
Rajamalwatta Lane
Battaramulla

Hon Minister,

ANNUAL REPORT – 2019

In terms of section 14(2) of the Finance Act No 38 of 1971, we wish to submit Annual Report and Statement of Accounts of National Institute Of Post Harvest Management , for the year 2019.

Your faithfully



Prof. W.A.P Weerakkody

Chairman

National Institute Of Post Harvest Management

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 2019

Chairman

Mr. T.H.M.P. Sagara (November 2018-April 2019)

Dr. A.R. Ariyaratne (April 2019- December 2019)

Vice Chairman

Mr. Nishantha Liyanage

Members

Prof. Aruni Weerasighe

Prof. Sanath Hettiarachchy

Mr. J.K. Wickremasinghe

Secretary to the Board

Eng. Mr. T.M.R. Dissanayake (January to October 2019)

Eng. Mr. H.M.A.P. Rathnayake (October to December 2019)

SENIOR MANAGEMENT

As at 31st December 2019

DIRECTOR/CHIEF EXECUTIVE OFFICER (Acting)

Eng. T.M.R. Dissanayake (January to October 2019)

Eng. H.M.A.P. Rathnayake (October to December 2019)

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.) Nilanthi Wijewardhane

HOD | Principle Research Officer

ENGINEERING DIVISION

Eng. B.D.M.P. Bandara

HOD | Mechanical Engineer

TECHNOLOGY TRANSFER DIVISION

Mrs. Chamindi Dissanayake

HOD | Senior Extension Officer

PROJECT MANAGEMENT DIVISION

Mr. W.M.C.B. Wasala

HOD | Senior Research Officer

LABORATORY SERVICE DIVISION

Mr. Chaminda Gunawardhane

HOD | Research Officer

PLANNING AND MONITORING DIVISION

Mrs. Ruwanka Ratnayake

HOD | Senior Research Officer

ACADEMIC DIVISION

Eng. (Mrs.) Daminda Athapththu

HOD | Mechanical Engineer

ADMINISTRATION DIVISION

Mr. R.K.A.P. Ramanayake

HOD | Additional Director (Admin & Finance)

INTERNAL AUDIT UNIT

Mr. R.M.D. Rathnayake

HOU | Internal Auditor

FINANCE DIVISION

Mr. Niluka Illangasinghe

HOD | Accountant

MANAGEMENT COMMITTEES

As at 31st December 2019

AUDIT AND MANAGEMENT COMMITTEE

Name	Position
Mr. R.M.D.K.G.N.B.Ranathunge	Chairman
Mr. W.P.J.K. Wickremasighe	Member
Eng. Mahesh Dissanayake	Secretary (01.01.2019 - 01.11.2019)
Eng. H.M.A.P.Rathnayake	Secretary (01.11.2019 – 31.12.2019)
Mr. R.M.D. Rathnayake	Convenor
Mrs. M.Y.J.Weerasighe	Observer
Mr.U.S.L.Kumara	Observer

RESEARCH ADVISORY COMMITTEE

Name/Position	Place
The Director General	Department of Agriculture, Sri Lanka
The Chairman	Sri Lanka Council of Agriculture Research Policy
The Chairman	Sri Lanka Institute of Marketing
The Chairman	Consumer Affairs Authority
Prof. K. Samarasinghe	Department of Animal Sciences, University of Peradeniya
Dr (Mrs) Ginigaddara,	Department of Agricultural systems, Rajarata University of Sri Lanka
Prof. S.B. Agampodi	Department of Community Medicine, Faculty of Medicine, Rajarata University of Sri Lanka
Prof. S.B Nawarathna	Department of Food Science and Technology, Faculty of Applied Science, University of Sri Jayewardenepura
Dr. A.K.Kulathunga,	Department of production Engineering, Faculty of Engineering, Peradeniya.

RESEARCH RELEASING COMMITTEE

Name	Position
Additional Director (R & TT)	Chairman
HOD/Extension	Secretary
HOD/Research	Member
HOD/Engineering	Member
HOD/Planning and Monitoring	Member

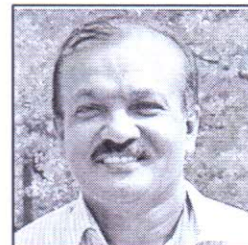
CHAIRMAN'S MESSAGE

The National Institute of Postharvest Management formerly the Institute of Post-Harvest Technology (IPHT), operating under the Ministry of Agriculture, covers up all areas of postharvest industry with the goal of enhancing food security in the country. The Institute of Post-Harvest Technology 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.

With the aim of ensuring national food security, the institute has conducted 42 research projects and 02 developmental projects during the year 2019. All these projects addressed the key issues of supply and value chains of economically important agricultural commodities. Research projects were conducted under three thrust areas, namely, minimization of postharvest losses, food processing and value addition and food safety and human nutrition. Out of these 42 research projects 15 projects to be continued in 2020.

Regarding developmental projects, proper post-harvest practices were introduced to the supply chains especially through awareness creation programs and continuous training and demonstrations of stake holders. And also, the project beneficiaries were provided with subsidies for improving necessary infrastructure facilities for sorting, grading, safe ripening, packing and transportation, which have been identified as the key points in minimization of postharvest losses, both in

quantity and quality. Through these developmental projects the institute established handling and processing units with



improved postharvest practices for four fruit crops; mango, banana, papaya and guava. Thus 50 units for mango, 60 units for banana, 50 units for papaya and 20 units for guava were established island wide and 32 new fruit brands were introduced to the market. Producing/providing 'safely ripen fruit in good quality' was the foremost theme of these projects. By launching these handling and processing units, living standards of the beneficiaries have increased distinctly. Further, good quality fruits are being provided to the consumers at a reasonable price while confirming higher income not only for the farmer but also for all the other stakeholders involved in the chain. The total fund received through the ministry of agriculture for research and development projects during the year of 2019 was Rs.Mn.95.5823.

Finally, with the success of these projects, 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 2019, I am confident that the Institute would be able to improve the postharvest industry in the coming years.

A blue ink signature of Prof. W.A.P. Weerakkody, featuring a stylized 'W' and 'P'.

Prof. W.A.P. Weerakkody
Chairman

EXECUTIVE REPORT | YEAR AT A GLANCE

The Year 2019 was very successful year to the institute. All the key activities of the institute; Research, Development Projects, Technology Transfer activities, Consultancy, Laboratory and Engineering services 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 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, 42 research projects were carried out. It consisted with 25 research projects funded through the Ministry of Agriculture under 'National food production Drive' (12 research projects continued from 2018 and 13 new research projects initiated in 2019; Total allocation was Rs. Mn.4.82. Besides, three (03) research projects were conducted as public-private partnership projects and funded by private sector. In addition to that 14 research projects were conducted as

student research by undergraduate students from different universities and they were supervised by the Research officers, Extension officers and the Engineers of the institute.



Laboratory experiments

DEVELOPMENT PROJECTS

The development projects are 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 2019, 02 development projects were conducted by the institute namely, Quality and process enhancement of improved supply chains of mango, papaya, guava and banana and Introduction of safe packaging and transportation methods to reduce postharvest loss in perishable supply chains in Sri Lanka. Total Financial allocation for these two projects was Rs. Mn. 32.47. Under the project of 'Quality and process enhancement of improved supply chains of mango, papaya, guava and banana', thirty four (34) 'Fruit processing zones' with proper postharvest handling and processing practices were established island wide and good quality, safe fruit brands were introduced to the market. Therefore, by launching these

regulated postharvest chains living standards of the beneficiaries have increased significantly.

Following fruit brands were introduced to the market through these established fruit zones



Towards national food security by adopting new and appropriate technologies via Development Projects

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 2019, 191 training programmes were conducted and 5365 stake holders were trained on proper post harvest technologies. 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 Colombo councils, Mahaweli Authority of Sri Lanka, Rural development projects and Non-governmental organizations.



Technology Dissemination 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 2019, the institute was able to provide 12 consultancies for the postharvest industry island wide.

SOCIAL, WELFARE AND RELIGIOUS ACTIVITIES

Strengthening institutional governness 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. It has passed 19 years since the institute was established in 19th June 2000 as the successor to the Rice Processing Research and Development Centre of Paddy Marketing Board. That moment was celebrated by organizing a religious sermon on 25th June 2019. All the employees together with the chairman of the institute were participated to that.

Annual 'Poson dansala' was also held in this year successfully.



Annual Dhamma sermon



Annual Poson Dansala

FINANCIAL PERFORMANCE

Description	2018 (Rs. Mn.)	2019 (Rs. Mn.)	Growth (Rs. Mn.)
Deficit for the Year	15.2	19.1	25.66%
Cash Equivalent	12.1	26.8	121.49%
Total Current Asset	1.9	1.9	-
Total Current Liabilities	77.5	51.9	-33%
Net Asset (Equity)	325.7	305.5	-6.2%

HUMAN RESOURCE DEVELOPMENT

Twelve human resource development programs were conducted for the staff. They were based on different categories; financial planning, scientific writing, landscaping, hospitality management etc.



Training programme on hospitality management

NEW APPOINTMENTS AND RESIGNATIONS

The senior mechanical engineer who served as the acting director of the institute resigned from his post and joined the private sector organization. Additional director (Research and Technology Transfer) was appointed as the acting director by a decision made by board of management. One new mechanical engineer was recruited to strengthen the research and development team of the institute.

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

PERFORMANCE HIGHLIGHTS

RESEARH AND DEVELOPMENT

Research, being the main activity of the NIPHM, was directed towards solving technological problems confronting the postharvest industry. According to the research programme for 2019, the research activities included both fundamental and applied research, although the latter predominates in the research efforts.

During the year 2019 forty two (42) research projects has been carried out, which consisted twelve (12)research projects continued from year 2018 and thirteen (13)new research projects initiated in 2019. Those twenty five research projects were funded by the ministry of agriculture under the provision of National Food Production Programme. Further, three (03) research projects were conducted to solve the technical issues pertaining to the private industries thus funded by the private sectorand seven research (10) projects were conducted as student projects.

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.

Research Projects Continued from 2018 to 2019

01. Use of Potential Biological Control Agents in Controlling Post Harvest Diseases of Mango with special reference to Anthracnose
02. Prebiotic potential of resistant starches and dietary fibers of Sri Lankan traditional rice varieties and its application in food industry
03. Influence of pretreatments on post-harvest quality and shelf life extension of Mango cv.Karuthakolomban
04. Development of a food additive to preserve food by incorporating of oil extractions of nutmeg (*Myristica Sp*) and cinnamon (*Cinnamon Zeylanicum*)
05. Design & construction of a tunnel type forced air cooler for cooling or fresh Mango
06. Development of value added legume based granular bar boosted with antioxidant activity
07. Process improvement for freeze preservation of vegetables (Carrots, Beans, Beet-root)
08. Feasibility analysis to use geospatial tools to improve the mango supply chain via enhancing the traceability: A case study based on Omaragolla mango collector group

09. Identification and development of strategies for enhanced quality and postharvest life of lotus
10. Design & development of an image processing based low cost fruit maturity identification instrument
11. Effect of Citronella grass leaf extracts on degree of insect infestation and storage quality of the stored maize in Sri Lanka
12. Evaluation of the effectiveness of freeze drying and vacuum packing technology for preservation of fresh fruits (Papaya , Guava , Pineapple)

New Research Projects initiated in 2019

1. Quality improvement of fresh leafy vegetables by controlling undesirable postharvest physiological activities.
2. Mitigating rice stickiness to enhance consumer preference through accelerated aging of fresh paddy.
3. Investigation of nutritional and medicinal properties of value added products from sour soup (*Annona muricata*).
4. Development and performance evaluation of washing equipment for carrot (*Daucus corota L*) combined with ozone treatment.
5. Reduction of postharvest losses of big onion (*Allium cepa*) by improved curing & storage technologies.
6. Development of ready to use formulation for enhance the shelf life and quality of cut flowers.
7. Enhancement of quality characteristics in dehydrated fruits by optimizing process parameters of dehydrating technologies.
8. Development of heat pump dryer for drying wet paddy.
9. Evaluation of the chemical residues associated with artificial ripening and establish safe and economically viable dosing protocols for major fruit crops.
10. Field application of rice husk silicon to control pre-harvest and postharvest disease of bitter melon and green chilies.
11. Determination of energy output from the small, medium and large rice mills in Anuradhapura and Polonnaruwa districts and providing solutions for their production, technical and financial problems.
12. Economic evaluation of pricing strategy in vegetable supply chain: towards a cleaner production.
13. Identification of oriental fruit fly infested mango using non – destructive technology.

Private Funded Research Projects

1. Production of parboiled rice at commercial level without soaking paddy. Research was funded by 'Sandaru Sahal', Gamsabha Mawatha, Puliyankulama, Anuradhapura
2. Efficacy of amorphous silica against major insects of stored grains in Sri Lanka. Research was funded by Semiochem Lanka Pvt Ltd. Colombo 2.
3. Efficacy of frappe ethylene removal absorbant (Zeolite, calcium alumina silicate) and Mecypro (Cyclodextrin 96%+ 1MCP 3%) for delaying ripening of fresh fruits. Research was funded by Safe and Green Technologies, No.15, Mill Road, Nagoda, Kandana

Student Projects

No	Student	University	Supervisor	Research Title
1	Mr. N.Gajarooban	Wayamba	Mr. W.M.C.B Wasala	Shelf life extension of TJC mango Storage
2	Ms. H.D.S.J.Gunawardane	UvaWellassa	Dr. (Mrs.) R.M.N.A. Wijewardane	Optimization of suitable precooling conditions and storage quality evaluation of raw mango (<i>Mangifera indica</i> L.) under cold storage
3	Miss G.C.R.Thilakarathne		Dr. (Mrs.) R.M.N.A. Wijewardane	Shelf life extension of minimally processed lettuce (<i>Lactuca sativa</i>)
4	Miss. W.M.T.L.Siriwardane		Mrs.R.M.R.N.K. Ratnayake	Preharvest soil application of silicon on Postharvest quality of green chilies
5	Miss W.D.H.W.Wijerathna	UvaWellassa	Dr. (Mrs.) R.M.N.A. Wijewardane	Testing and evaluation of different postharvest treatments for quality and shelf life extension of banana and mango for setting protocols in sea transportation
6	Mr.A.M.Jayawardhane	Rajarata	Mr.Kasun Hettige	Development and quality evaluation of dehydrated soursop powder
7	Miss J.A.L.H.Jayasinghe		Mr.Kasun Hettige	Development of Prebiotic ice cream incorporated traditional rice bran
8	M.I.F.Ifrah		Dr. Gayan Thilakarathne	Effect of pretreatments on final quality of dehydrated fruits
9	Ms. M.D.T.Perera		Dr. (Mrs.) R.M.N.A. Wijewardane	Development of a protocol for artificially ripening of papaya (<i>Carica papaya</i>)
10	Ms. K.G.N.H.Kumari		Dr. (Mrs.) R.M.N.A. Wijewardane	Development of a protocol for artificially ripening of Embul banana (<i>Musa spp</i>)
11	Ms. Sherani Fernando		Miss. T.M.A.N Weerasinghe	Development of protocol for freeze preservation of green chilies (<i>Capsicum annum</i>)

12	Tirani Palugaswewa	Jaffna	Mr. B.D.M.P. Bandara	Design and development of a finger millet cleaning machine
13	Miss A.M.M.K.Amarasighe	Sri Jayawardhana pura	Dr. Gayan Thilakarathna	Functional, physico chemical and antioxidant properties of two different banana varieties and development of banana flour incorporated biscuits
14	Miss Sathsara Deyalage		Dr. Gayan Thilakarathna	Influence of cooking methods on antioxidant activity of selected leafy vegetables in Sri Lanka

PROGRESS OF THE ONGOING RESEARCH PROJECTS

Research Projects continued from 2018

1. Use of potential biological control agents in controlling post-harvest diseases of mango

Post-harvest losses of fruits and vegetables are comparatively higher than other crops and one of the main causative factors for the post-harvest loss is diseases. Currently using postharvest disease management strategies i.e. chemical treatments can increase the cost of fruits and vegetables in several folds from field to consumer. Also they are harmful to human health as well as the environment. However, rising consideration over food safety has placed the use of synthetic fungicides under study, thus creating a need to develop



Isolated yeast species

alternative methods to control these diseases. Among different biological approaches for controlling plant pathogens, use of microbial antagonists like fungi, yeast and bacteria to prevent and/ or suppress plant diseases, is quite promising and gaining popularity worldwide. This research project is aimed to explore the ability of microorganisms in natural environment for their ability to suppress or control the growth and development of the causal organism of anthracnose i.e. *Colletotrichum spp.* And so far one yeast isolate showing antagonism to *Colletotrichum spp.* has been found and further identification of the isolate, in vivo trials with the antagonistic microbe and formulation of a biopesticide containing the antagonistic microbe is in progress.

2. Prebiotic Potential of Resistant Starches and Dietary Fibers of Sri Lankan Traditional Rice Varieties and Its Application in Food Industry

This study was conducted to investigate the prebiotic potential of selected traditional rice varieties by inoculating with probiotic bacterium *Lactobacillus plantarum*. Five traditional rice varieties; Suwandel, Pachchaperumal, Kaluheenati, Kuruluthuda and Madathawalu as treatments and BG-358 rice variety as control were used in flour form. Dietary fiber (DF) and resistant starch (RS) content of selected varieties were measured. Modified culture

media was prepared by combining MRS agar with rice flour in 4:1 ratio and inoculated *L. plantarum*. Colony forming units (CFU) and prebiotic activity score (PAS) was calculated by inoculating *L. plantarum* as the probiotic and *Escherichia coli* was used as the enteric bacteria. According to the results of DF, RS, CFU and PAS evaluation, all traditional varieties were significantly higher ($p < 0.05$) compared to control variety. Kaluheenati possesses significantly ($p < 0.05$) the highest value of $6.97 \pm 0.03\%$ and $2.53 \pm 0.02\%$ for DF and RS respectively. CFU were varied from $1.87 \pm 0.04 \times 10^7$ to $2.58 \pm 0.05 \times 10^7$ and highest CFUs were reported in Kaluheenati. PAS was varied from 1.23 ± 0.01 to 1.46 ± 0.02 and Kaluheenati was reported



Prepared Idli

significantly higher ($p < 0.05$) score compared to other traditional varieties. Rice idli mix was developed by using two rice varieties with highest PAS value and the best product was determined by a sensory evaluation. Best idli mix was combination of kaluheenati and suwandel in 1:1 ratio. The highest PAS reflects Kaluheenati variety has higher prebiotic potential compared to other varieties hence benefit towards consumer digestive health by enhancing the growth and activity of probiotic micro flora in digestive track.

3. Influence of pretreatments on post-harvest quality and shelf life extension of Mango cv. Karuthakolomban

Mango (*Mangifera indica* L.) is a major fruit crop in Sri Lanka but due to its rapid ripening process it has a short shelf life and it represents a serious constraint for efficient handling and transportation. Therefore, techniques for storage of mango fruit have to be standardized and employed to enhance the storage life. Natural products are taking place as an alternative approach for delaying ripening and reducing postharvest deterioration of fruits. Edible coatings act as a barrier, decrease gas exchange between fruit and the surrounding atmosphere, result in modified internal atmosphere (high CO_2 and low O_2), as well as decreased water loss. Edible coatings are used as a postharvest management tool to maintain fruit quality and minimize the size of non-biodegradable packaging materials.

In this background, we have designed a research in order to extend the shelf life of mango by



application of edible wax coating, IPHT bio wax, chitosan coating and Gum Arabic as postharvest treatments on storage life and quality of mango fruit cv. Karuthakolomban in order to overcome market surplus during peak season that results in significant price drop. These waxes have discovered that the shelf life of fresh fruits can be

extended without quality deterioration. They can be easily applied to the fruits by dipping in formulated coating solutions with distilled water.

4. Development of a food additive to preserve food by incorporating of oil extractions of nutmeg (*Myristica Sp.*) and cinnamon (*Cinnamom Zeylanicum*)

This research was conducted with the objective of development of a natural preservative by using cinnamon and nutmeg seed oil extractions to replace artificial preservative by taking tomato sauce as the selected food product. Tomato sauce was prepared based on SLS 260:1989 by using locally grown tomato (*Lycopersicon esculentum L.*) cv. Platinum. Cinnamon and nutmeg essential oils were added in different concentrations to freshly prepared tomato sauce and carried out a sensory evaluation. Nutmeg seed oil treated sample was the most preferred sample. Then antimicrobial potential of cinnamon and nutmeg seed oils was investigated and best potential was observed in nutmeg seed oil treated sample. Control sample was also in good condition with in 01 month storage. Based on the investigations, natural additive was developed and experiments are going on to analyze the antimicrobial potential and sensory preferences of developed food additive. Shelf life determination for developed preservative added tomato sauce sample is continuing. Product is safe for consumption up to 04 months considering the physiochemical properties and microbial analysis.



Sensory evaluation of developed food additive incorporated tomato sauce

5. Design & construction of a tunnel type forced-air cooler for cooling of fresh mango.

Fresh fruits and vegetables are an important and necessary part of a healthy and nutritious diet. Mainly mangos contain over 20 different vitamins and minerals, fiber and poly-phenolic flavonoid antioxidant compounds. Also, it is fat free, sodium free and cholesterol free. In Sri Lanka, post harvest losses in mango nearly ranged from 30 to 35%. So it is imperative to improve safety and quality of fresh mango and reduce post-harvest losses thus overcome market excess and price fluctuation in year round market in Sri Lanka.

Temperature is the most significant factor which affects the storage life and quality of fresh fruits. Rapid and uniform cooling immediately after harvest helps to slow down rate of respiration and other biological processes and provide a longer shelf life. Also, lowering the temperature reduces the rate of ethylene production and moisture loss, as well as the inhibit growth of some microorganisms. The process of pre-cooling is the removal of field heat as soon as possible after harvest. It can be achieved via different methods like room cooling, forced-air cooling, hydro cooling, top icing, vacuum cooling etc.

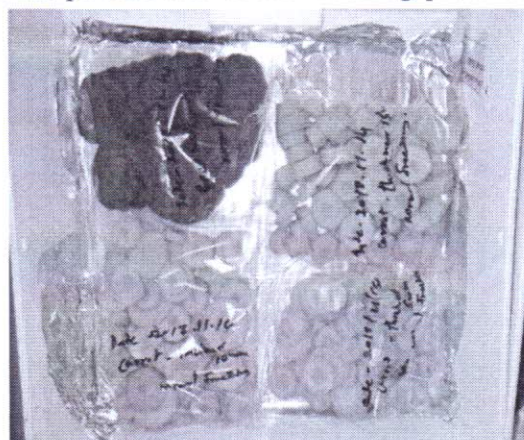
In forced air cooling, chilled air is forced to flow around each piece of commodity. Therefore through this research we are going to design and construct a low cost tunnel type forced air cooler to remove field heat from mango. Thus, we can reduce postharvest losses in mango fruit by improving quality and extending shelf life. Up to now, 40% of the research was completed.

6. Process improvement for freeze preservation of vegetables (Carrot, Beans, Beet-root)

High postharvest losses of vegetables during peak production periods has become a tremendous problem in Sri Lanka as our country still undergoes around 30-40% postharvest losses in vegetable sector from the past. “Surplus” creating imbalance between the existing supply and the demand for the vegetables is the major reason for the postharvest losses. Even though some of profit oriented mind groups willingly engage in preserving the stuff that is having a risk to undergo a high postharvest loss after catering the consumers demand, most of large scale and medium scale farmers, vendors are not concerned on the above problem. Because of their incapability of employing technological aspects into their professions due to lack of technological and technical support from outside party. But still a fistful of individuals does even the exportation of vegetables after applying many preservation techniques. By paying attention on these matters and by considering their requests came through the stake holder meetings held by National Institute of Post-Harvest Management, Anuradhapura, it was planned to do a research on process improvement for freeze preservation of vegetables (Carrots, Beans and Beetroot) since the frozen vegetable industry holds a considerable market share in foreign countries and there is a potential to emerge frozen vegetable industry in our country with economic development and busy life styles of the people. But, considering the cost of living it is needed to cut off the market price of the final produce to a reasonable level. Therefore, process parameters of the freezing protocol were planned to be optimized in order to reduce the cost of production.

The project was started on 01.04.2018 and planned to be continued up to 28.02.2020. Research was completed up to the level of checking the quality parameters of the samples frozen under normal freezing. Research project showed a financial incapability for the blast freezing at different treatment combinations. Apart from this, random breakdowns and the mal function of the blast freezer directed to

discontinue the research as per the recommendations of the research advisory committee.



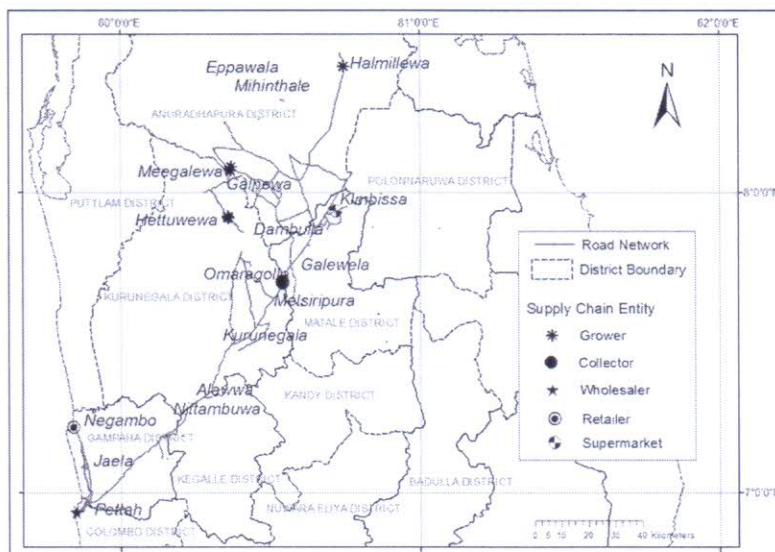
7. Feasibility analysis to use geospatial tools to improve the mango supply chain via enhancing the traceability: A case study based on Omaragolla mango collector group

A growing demand for efficient traceability systems was identified globally due to food safety concerns. With the technological advancement the concept of geo-traceability was developed that was capable of tracing the origin of the product and movements of the product along the supply chain. Karathakolomban was identified as one of the most demanded mango variety with high quality defects where real time tracking of supply chain movements is highly important to identify origin of quality defects and reasons behind.

Hence, this study was conducted as a case study aiming to identify the feasibility of mobile tracking as a GIS capability to enhance the geo-traceability of the selected Mango supply chain.

A geo-database was created to enclose all the spatial information with respect to the selected database as well as personal information and information on personal information. Then, Movement of mango through farmer to retailer was tracked with the aid of the developed mobile tracking software. It is capable of tracking the location and time of the supply chain player there by root followed. Hence, unnecessary movements and time delays were identified for the selected chain. Speed of the movements was derived by using tracking data that is important to identify traffic zones and other delays.

According to the feasibility study, mobile tracking is feasible only for fixed supply chains such as GAP certified chains and fixed chains available for export market. It is not feasible for existing Karthaklomban chain due to mainly its dynamic nature and ad-hoc nature of collection.

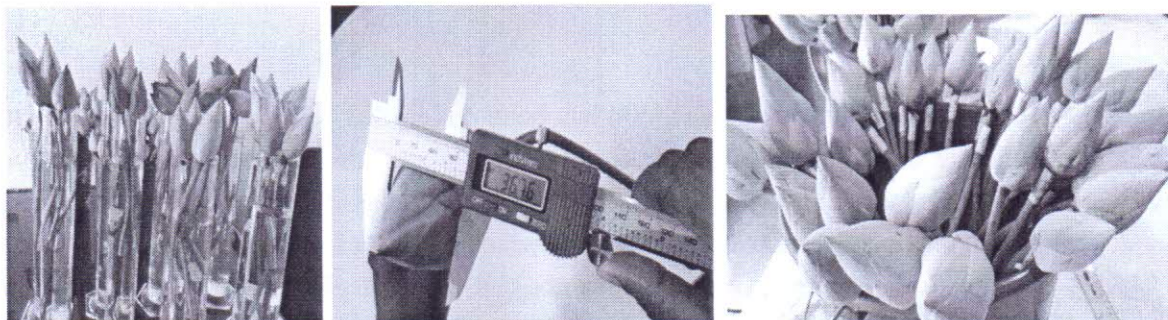


8. Identification and development of strategies for enhanced quality and postharvest life of lotus

Lotus flowers are widely distributed in dry zone of Sri Lanka. Anuradhapura is one of the main lotus flowers producing area due to availability of water tanks. Rural community people engaged in cut lotus flower industry but flowers are end up with short vase life resulted high wastage. Therefore they are unable to earn good income. Problem with this sector is short post-harvest life due to poor handling practices. Proposing activity is to develop a package of practices to improve quality and shelf life of cut lotus flowers. The direct beneficiaries are the people who are engaged in lotus cut flower industry and indirect beneficiaries are flower consumers. The output of this research will be helped to the people who are actively engage in lotus flower trade as pluckers, collectors, sellers to increase the quality and shelf life of the product, there by reduction the postharvest losses. Thus helps to increase their income.

Lotus (*Nelumbonucifera*) flowers were collected from Anuradhapura area. Following three experiments were conducted. Experiment one was conducted to find out best maturity stage and harvesting time of the day for flowers. Flowers were harvested at three different maturity stages and day time. The best results I have taken were early in the morning is most suitable

time for flower plucking and best maturity stage were flower buds one day prior to bloom. Second experiment was done to find out best harvesting method and best packing method for transportation among three packing. Harvested and packed flowers as has been mentioned above were transported to the laboratory as soon as possible. The third experiment was conducted to identify best preservative solution and storage condition which will be carried out simultaneously. These flower stems were placed in preservative solutions and were kept in controlled temperature or under ambient temperature.



9. Effect of Citronella (*Cymbopogon nardus*) grass leaf extracts on insect infestation and storage quality of the stored maize in Sri Lanka

Damage of *Sitophilus zeamaze* on stored maize is a concern among Sri Lankan maize growers, traders and consumers. With the increased awareness on health and environmental consequences associated with synthetic insecticides there is growing demand for alternate insect control strategies. Use of botanicals with essential oils can be considered as a potential alternate therefore Citronella grass (*Cymbopogon nardus*) was identified as a potential plant species for controlling of *S. zeamaze*.

This study was conducted with the objective of evaluating the efficacy of Citronella grass aqueous leaf extract against Maize weevil, *S. zeamaze*. Area preference bio assay was conducted for the laboratory scale repellency analysis under five treatments that was a dilution series of the citronella aqueous leaf extract; 15, 20, 50, 100µl/ml and control (distilled water). Repellency index was developed and three dilutions with higher repellency index were selected for storage trial. Selected three treatments (20, 50, 100µl/ml) were tested using distilled water as the control. Experimental results revealed that the insect damage was significant for all the treatments ($P < 0.05$) and it was significantly increased with the storage time period. Furthermore, No significant difference of Mass loss due to insect damage ($P > 0.05$) among the treatments and control was observed after one month, two months and three months of storage periods. Hence, it can be concluded that, selected dilutions of citronella aqueous leaf extract were not effective in controlling maize weevil. Most probably, it may be due to the volatile nature of active compounds of citronella grass leaf extract. Future research could be planned to investigate the same volatiles coupled with a slow volatile release mechanism.

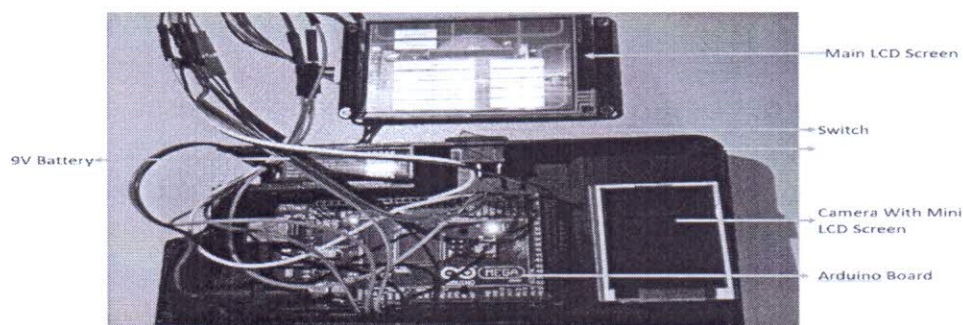
10. Design & development of an image processing based low cost fruit maturity identification instrument

Fresh fruits and vegetables are being more demanding in today's market. This is mainly because of increased consumer awareness on potential health benefits that can be gained by regular consumption of these commodities. In order to have high quality produce, the correct harvest maturity plays a critical role. Because, it determines the commodity's ability to ripen naturally and its nutritional and functional properties may also be affected by the optimum harvest maturity.

Computer Vision Systems (SVC) has been developed based on digital images to inspect and estimate the color of fruits. Until now, several studies have been conducted to estimate fruit yield. Many of these studies employed image-processing technologies to estimate the yields of fruits such as apples, citrus fruits, peaches, grapes and mangoes. These were employed because image-processing technologies can conduct objective detection of color accurately, quickly and non-destructively. Therefore, this research project was conducted to design and development of an image processing based fruit maturity identification instrument.

TJC Mango samples were collected and analyzed required physical and chemical properties (fruit color intensity, Tss, brix, PH, TA, Chlorophyll, Length, width, volume, Mass, Specific gravity). Statistical modelling was performed using SPSS 16.0. Multi Linear mathematical expressions were obtained with high R^2 value for every chemical properties i.e. chemical properties highly correlated to the L a b values. (Coding a Matlab based image processing program to evaluate color intensity and shape, Validation of model for different condition. (such as different environment light condition and Uploaded it to portable device (Arduino) and fabrication of the portable instrument were the main activities conducted). Image processing algorithm was implemented and used it to evaluate color intensity. After finding the color intensity of TJC mango, statistical model used to determine the chemical and physical properties of that. Main items that used to fabricate this device shown below.

Components of the Instrument



11. Development of value added legume based granular bar boosted with antioxidant activity

At present, many health issues arise as a result of free radical caused oxidative stress. Especially, conditions like hyperglycemia increases the free radical content in the body and excess free radicals cause damages to the cells and important organs in the body (macro- and micro vascular dysfunction, chronic renal failure, retinal diseases etc.). Antioxidants are vital to neutralize the detrimental action of free radicals and the balance between free radicals and antioxidants is necessary for proper physiological function. Therefore, aim of this research is to develop a legume base ready to eat granular bar boosted with antioxidant activity, as a supplementary diet, to reduce oxidative stress caused due to the hyperglycemia. The granular bar was mainly developed using locally available legumes such green gram, peanut, sesame and cereals like rice together with spices and the leftover of the green tea manufacturing process, to boost the antioxidant activity at the same time without adding any kind of sugar or its derivatives. The product was organoleptically acceptable and consists with better nutritional compositions as well. The shelf life of the product was confirmed up to 6 months with appropriate packaging materials (double laminated or triple laminated). This product can be used as a supplementary diet for people with hypoglycemia conditions to mitigate their oxidative stress of the people.



Developed Mung based granular bar

12. Evaluation of the effectiveness of freeze drying and vacuum packing technology for preservation of fresh fruits (Papaya , Guava , Pineapple)

Freeze drying of fruit and vegetable helps to extend the shelf life. This method of drying is remarkable because it causes very low or no damage to the nutrition of the food being preserved.

Experiments were conducted to identify Optimum ripening stage of Papaya (cultivar Red lady) and pineapple cultivar Mauritius as well as to identify anti browning treatments for guava cultivar *apple guava*. Results revealed that the optimum ripening stage of Papaya (cultivar Red lady) for dehydration is the stage at which three days after harvesting ($P > 0.05$). At this stage peel color values were 61.76 ± 1.45 (L^*), 5.45 ± 0.86 (a^*), 52.58 ± 1.83 (b^*), firmness was 67.80 ± 2.08 N, Total soluble solid content was 11.13 ± 0.21 and pH value was 4.81 ± 0.22 . Optimum ripening stage of Pineapple cv. Mauritius accepted by the consumers for dehydration is the fruits at which 75% of yellow color developed stage ($P < 0.05$). At this stage brix value was 17.10 ± 0.76 , pH value was 3.67 ± 0.04 , titratable acidity was 0.80 ± 0.02 , and firmness was 12.76 ± 1.13 N. Ideal anti browning treatment to prevent browning of guava cv. *apple guava* was dip in 0.3% citric acid solution for 10 minutes followed by blanching in 60 °C for 2 minutes. Blanching treatment in 60 °C for 2 minutes without dip in citric acid also showed satisfactory results. At this stage, the research project had to be discontinued since the freeze dryer supplied to the institute was not in working condition thus it was rejected by the technical evaluation committee. Therefore, the research advisory committee advised to discontinue the research and publish the results, already obtained based on the preliminary experiments.

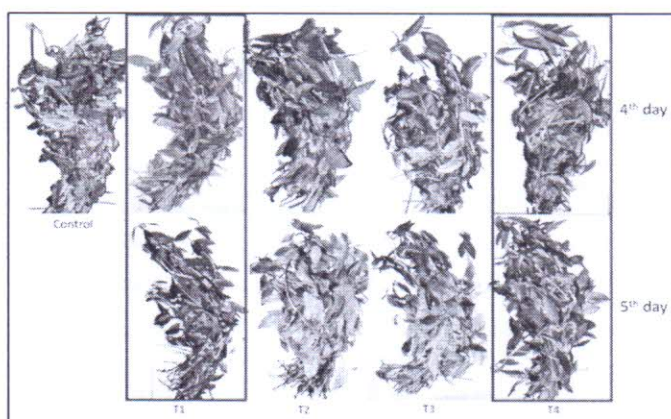
NEW RESEARCH PROJECTS INITIATED IN 2019 (Continued in 2020)

1. Quality improvement of fresh leafy vegetables by controlling undesirable postharvest physiological activities

As perishables, leafy vegetables show shorter shelf life which is less than 2-3 days after harvesting. Leafy vegetables contain adequate amount of dietary fibers, minerals including calcium, iron and phosphorus, vitamins especially vitamin C and A, antioxidants, phytochemicals and other nutrients. Dietary intake of leafy vegetables negatively associated with many chronic disease conditions such as, Cardiovascular diseases, cancer, diabetes mellitus, Alzheimer disease, cataract, and age-related functional decline. Many leafy vegetables have been used in traditional medicine for therapeutic and curative purposes.

Therefore leafy vegetables have higher demand in local as well as in export market due to its nutritional and medicinal properties. Because of higher export market potential, it has higher potential to gain export income.

Even though leafy vegetables precede higher nutritional and medicinal value, they have very shorter shelf life leading to higher postharvest losses. At present there is no proper method to extend the postharvest life in fresh form in the local market and in exporters. Therefore there is a huge gap in the postharvest handling of leafy vegetables to improve the quality while enhancing the shelf life in the fresh form. These experiments are being conducted to fill the existing gap in the postharvest knowledge in order to enhance the quality after harvesting while extending the shelf life in fresh form.



Shelf life extension of
'Mukunuwenna'

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

With the dawn of the industrialization, the competitiveness among each and every venture in food industry has being excelled. Earlier people do not much bother on the taste and the appearance of the foods but only the nutritive quality of the food. But nowadays the taste and the appearance have become the major marketing tools, since the majority of the consumers tends to grade the stuff based on the taste and the appearance. Same aspect applies in the rice industry also. The cooking quality of rice is one of the important factors influencing the

consumer attraction and the acceptability. Freshly harvested cooked rice becomes a sticky or pasty mass, swells only slightly and losses a fair amount of solids (starch) into the cooking water, yielding a thick gruel. It also splits more on sides during cooking. Upon storage for a minimum period of 3 – 4 months, the rice swells more easily with less stickiness and the gruel becomes thin, its linear elongation upon cooking is more than in fresh rice. This natural process is called as “aging of rice”. In addition, aged rice has higher volume expansion ratio and water absorption and less dissolved solids on cooking. Due to these reasons most of consumers prefer aged rice over freshly harvested rice.

This phenomenon has directly influenced the rice millers in Sri Lanka. In Sri Lanka most of rice millers are remained as small scale and medium scale rice millers. The problem mentioned above adds 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 will be carried out to facilitate the artificial aging of freshly harvested paddy to obtain the best organoleptic, physical and chemical properties of rice cooked from freshly harvested paddy. The final output of this research will definitely minimize the holding costs of freshly harvested paddy by rice millers until it gets aged naturally. Presently the holding cost is around Rs.30 million/ miller. The project duration is two years and the project was commenced on 01.07.2019 and will be continued up to 31.06.2021. Currently the procurement process and the literature review are in progress. The output of this research will be beneficial to the people who are actively engaged in rice industry as Farmers or millers as these findings will cut down the paddy holding costs and maximize the profit by leading to a high market share.

3. Investigation of nutritional and medicinal properties of value added products from sour soup (*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. Currently in Sri Lanka, people utilize soursop mostly as a fruit juice. But there is a very high potential for value addition from soursop. It also delivers a nutritious fruit among people and gives lots of health benefits.

Soursop fruit is highly perishable, being very susceptible to bruising and decay. Thus, they must be handled with extreme care. On the other hand, due to being a well grown food crop and increasing trend of cultivating of soursop in commercial scale in Sri Lanka, there will be a high production of soursop in near future. Research on value addition is very essential in this context. Thus, the objective is to develop value added food products from soursop and analysis of nutritional value of developed food products. Our main targets are, controlling discoloration of dehydrated soursop powder and preparation of probiotic frozen yogurt from soursop fruit as well as a herbal tea from soursop leaves. Experiments for controlling discoloration of dehydrated soursop powder are in progress.

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

Even though Carrot (*Daucus carota* L.) Potato (*Solanum tuberosum*) and Radish (*Raphanus raphanistrum*) are economically important vegetable crops in Sri Lanka they have a huge post-harvest loss due to the soft rot disease caused by *Erwinia* spp. In order to prevent this disease we are currently conducting a research in order to develop carrot washing equipment combined with Ozone treatment as Ozone is highly effective in inactivating pathogens and removal of contaminants. This research was initiated during the fourth quarter of the year 2019 and being continued.

5. Reduction of postharvest losses of big onion (*Allium cepa*) by improved curing & storage technologies.

This research was started to reduce the postharvest loss of Big Onion through improved curing and storage technologies and increase the economic states of onion farmer through offseason sales as well as facilitate seed production. Specific objectives of the research were to Simulation of the design using ANSYS software and optimize parameters in order to minimize cost, to develop a storage facility to cure and store onions, to evaluate the post-harvest losses and the cost effectiveness of the design.

Designing of the storage device is completed. Physical construction of the storage structure as not started due to procurement process is still in progress. A pre-trial was conducted to test the effect of shade curing. Dambulla Red selection was selected for the study and samples were collected directly from a farmer at Galnewa area. Two different treatments were used for the study; without curing, shade curing and foliage removed after curing. Physiological weight loss, Rotting percentage, Germination percentage, and Total Soluble Solids were collected in two week intervals to compare two treatments. Currently data analysis is in progress.

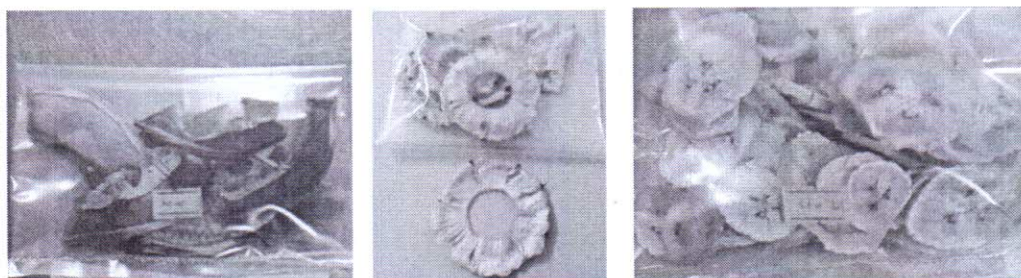
6. Development of ready to use formulation for enhance the shelf life and quality of cut flowers

Most of the people especially women engaged in cut flower industry. Majority of flowers are end up with short vase life resulted high wastage. These losses are lead to poor pre harvest and postharvest practices. Problem is, both temperate and tropical cut flowers are last only for a few days, therefore unable to keep natural beauty and attractiveness in decorations for even required time. Flowers end up with a short post-harvest life because of early senescence, wilting, petal falling, ethylene production and vascular blockage by air and micro-organisms. Therefore they are failure to earn good income. The direct beneficiaries are the people who are engaged in cut flower industry and indirect beneficiaries are flower consumers. Proposing activity is to develop a ready to use formula to improve quality and shelf life of cut flowers which are having short vase life. The output of this research will be

beneficial to the people who are actively engage in cut flower trade as pluckers, collectors, pack house operators and sellers to increase the quality and shelf life of the product, there by reduction the postharvest losses. Thus helps to increase their income. Therefore using appropriate preservation techniques could help to extend the vase life and reduce post-harvest loss. There is lack of readily use technique for shelf life improvement of cut flowers in Sri Lanka. Ready to use and easily available compounds is always crucial in this respect for small scale and large-scale decorations.

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

Dehydration is one of the methods of preserving fruits by reducing the moisture content; thereby mitigating the microbial and enzymatic activities in the fruits. Dehydrated fruits are popular in many countries and it has better market value. Although Sri Lanka has good opportunities to seek international market destinations in this regard, most of dehydrated fruit products produced in Sri Lanka are not being able to achieve the quality characteristics & consistency, to the same degree as in other competitive producers in the world (Thailand, Philippine, Malaysia, China etc.). Therefore the aim of the project was improving quality characteristics of dehydrated fruits, as suitable to the export market, by manipulating various parameters involving in dehydrating process. Under this ongoing research project, dehydration quality of eight different fruits, including Mango, papaya, Guava, Banana, Pineapple, Mature jack fruits, Rambutan and Mangosteen will be improved and the operations involved with a dehydration process such as Pretreatments (chemical and non-chemical) and drying techniques (hot air drying, vacuum drying, freeze drying, Osmotic drying etc.) will be assessed and optimize in order to gain high quality dehydrated fruits.



8. Development of heat pump dryer for drying wet paddy.

Available drying methods cannot be performed during rainy harvesting season to dry wet paddy. Hence, it is required to find an alternative drying option to dry wet paddy. An on farm drying method is suitable for drying wet paddy during rainy harvesting season. However, there is no a developed proper on farm drying method in Sri Lanka yet. Use of heat pump is a possible alternative drying option for this problem and it has several advantages. Therefore, it is developed a heat pump dryer for drying wet paddy during rainy harvesting season under this project. During the year, dryer fabrication was completed and few tests were conducted.



Developed machine is being tested

9. Evaluation of the chemical residues associated with artificial ripening and establish safe and economically viable dosing protocols for major fruit crops

Fruits are the good natural food for all and nowadays fruits are deliberately being contaminated by chemicals causing serious health hazards specially during artificial ripening. A research finding indicates that, ethephon and ethanol are the two potential chemicals can be used for fruit ripening and in application; those chemicals penetrate in to the fruit and converted in to ethylene Artificial ripening is done to achieve faster and more uniform ripening characteristics. The need of artificial fruit ripening is often encountered when fruit seller offer fruits to the customers to cater their urgent needs, seasonality, price and supply for continuous demand. At present it is much concern about artificial ripening of fruits, because some chemicals are used for artificial ripening by traders, collectors, transporters and these are associated with many health hazards. Although it was given the instruction and regulation to use artificial ripening agents, already people are using unsecure methods, because easy of application and lack of infrastructure facilities and lack of knowledge and concern. There is no more literature available in Sri Lanka as well as foreign countries about the hazardous effects using ethephon as spray or gasses. But there are some evidence recorded its effect on human health. Therefore, it is essential to evaluate the residual effects of such treatments and find out the proper concentration and other relevant conditions for accelerate the ripening process and altogether make available quality and safe fruits in Sri Lankan market.

10. Field application of rice husk silicon to control pre-harvest and postharvest disease of bitter gourd and green chilies.

Pre-harvest and postharvest diseases caused by different fungal pathogens are among the major constraints of vegetable supply chain. Application of synthetic fungicides is the primary means for managing/controlling such diseases. However, repeated fungicide treatments generate important economic losses, emergence of resistant pathogen population and potential environmental impacts. Therefore, alternative environment friendly methods for the management of fungal plant pathogens are being investigated all over the world Among the anticipated alternatives, application of Si plays an important role.

Silicon (Si) has been exploited for its beneficial effects in terms of disease control in a number of plant pathosystems. Although Si is abundant in soil, content of the plant available Si (soluble Si or monosilicic acid; H_4SiO_4) is very low, only at concentrations ranging from 0.1 to 0.6 mM (Epstein 2009). Hence, Soil amendments with soluble Si are necessary to maximize the Si uptake subsequently to activate the Si associated disease resistance in plant tissues.

Our previous studies conducted using Rice husk, a natural Silicon source on disease management of bitter melon (*Momordica charantia* L.) and green chili (*Capsicum annum* L.), two of the most popular vegetable crops in Sri Lanka that are highly susceptible to many fungal diseases at different growth stages have revealed the remarkable potential of rice husk-ash as an alternative strategy for synthetic fungicides.

However, all these experiments were conducted as pot trials to maintain a homogenous environment thus does not reveal the real effect on farmer field conditions since crops and their environments are highly complex systems with a multitude of variables that change from location to location in different degrees. Due to this complexity, practices optimized for a research station might not be so successful when transferred to another location, especially to a farmer field. Therefore, this study investigate the effectiveness of rice husk ash in controlling pre-harvest and postharvest diseases in bitter melon and green chili as a low-cost, environment-friendly method to be adopted by local farmers in three different agricultural areas Anuradhapura, Kurunegala and Kandy. Project is continued in 2020 too.

11. Determination of energy output from the small, medium and large rice mills in Anuradhapura and Polonnaruwa districts and providing solutions for their production, technical and financial problems.

Rice processing is the largest agro based industry in Sri Lanka. At present most of the rice millers facing lots of problems in selling their products due to high production cost. Energy cost is the main component of cost of production in rice processing. Electricity is the main energy source for this rice mills and is imported from the state electricity board grids. Electricity is used to run motors, pumps, blowers, conveyors, fans, lights, etc. The variations in the consumption rate of energy through the use of utilities during processing must also accounted for final cost of the finished product. The paddy parboiling, drying, milling consumes significant quantity of fuels and electricity.

This study was mainly focus to solve the problems facing by rice mills in Anuradhapura & Polonnaruwa Districts and compare the cost of production of small, medium and large rice mills in these two districts.

According to a study conducted in 1985 by Rice Processing Research and Development Centre (successor to the NIPHM) total number of rice mills in Sri Lanka was 7006. Out of that, custom rice mills (small mills where customers bring their paddy to the mill and milling is been carried out and pay the milling cost) were 77 % (5375) and Commercial mills were 23 % (1631) excluding North and Eastern Provinces. Commercial mills purchase paddy, store them and selling island wide after milling. At Present, Paddy Marketing Board, Industrial Development Board, Cooperative Development Department and Divisional Secretariat offices are having the records of operating rice mills in island wide. However, some information is still needed to find long term solutions for issues of rice millers.



Power consumption of a rice mill in Anuradhapura district is being checked with CEB officials

This study was mainly focus to solve the production, technical & financial problems facing by rice mills in Anuradhapura & Polonnaruwa Districts. According to the data gathered during the study, most of the Rice millers in Sri Lanka have faced financial difficulties such as, high KVA demand, high power consumption due to improperly designed and installed rice mills, high competition for purchasing paddy and selling rice, taxes, environmental effects, expensive boilers, labour shortage, high Water consumption, Fuel requirement, daily, monthly, yearly production capacity, machine arrangement, safety, boiler licenses, inadequate mill facilities, nonpayment of bank loans, and high electricity bills etc. It has been reported that the rice milling industry is facing different problems with regarding the tariff & power consumption. If a rice mill have a transformer: Day tariff (Off peak hours) from 5.30 to -17.30 pm is Rs.11.00. Night tariff (Off Peak hours) from 22.30 to 5.30 pm is Rs. 7.00: night tariff (Peak hours) from 17.30 to 22.30 pm is Rs.20.30. For small rice mills day and night tariff is Rs.12.00. Such situations should be considered in order to provide suitable long term solution for them. Final report of the study is being prepared.

12. Economic evaluation of pricing strategy in vegetable supply chain: towards a cleaner production.

Studying the cost variation along the vegetable supply chain is highly important to identify main cost contributing factors for future policy planning and implementation. Therefore this study was conducted to identify and study the cost factors and cost variations along the supply chain of economically important vegetables in the country. The main crops selected were carrot, Beet Root, Capsicum, Beans, Brinjal and Pumpkin. 500 members of the supply chain were selected including farmers, collectors, whole sellers and retailers. Study area included crop production areas, Anuradhapura, Matale, Norochhole, Nuwara Eliya, Badulla and Jaffna; whole sale markets Thabuttagama, Manin, Dambulla and Keppatipola; major consumer areas Anuradhapura, Kurunegala, Kandy, Gampaha, and Colombo. Both primary and secondary data were gathered and were analyzed using descriptive and non-descriptive methods. Primary data were collected using a semi structured pre tested questionnaire via personal interviews. According to the analyzed data cost of production, cost for the labour, packaging cost, postharvest loss, profit at each stage, commission, hauler fee and transport were significant cost factors. Cost of production (32%) and postharvest losses (30%) were the highly contributing cost factors to the final price of vegetables. Therefore, by reducing the cost of production and postharvest loss the final price of vegetables can be reduced while keeping the profits of the supply chain actors to be indifferent.

13. Identification of oriental fruit fly infested mango using non – destructive technology.

This Study was discontinued due to the issues identified during the preliminary experiments. Research advisory committee advised to discontinue the research.

DEVELOPMENT PROJECTS

The development projects carried out by the NIPHM during the year 2019 in order to ensure technology adoption and their impact on the postharvest industry are described below. While the national priorities aimed towards increasing production, exploration of export markets, agribusiness development and assuring food security, postharvest technology has become a more priority area of the national scope. In this context, NIPHM carried out development projects to address the issues in postharvest sector thus aimed to minimize postharvest losses and quality improvement of agricultural produce. And also these development projects aimed to introduce improved technologies for agribusiness development throughout the country.

During the year of 2019, the National Institute of Post-Harvest Management has conducted 02 development projects island-wide for effective dissemination of postharvest technologies and these projects were funded by the Ministry of Agriculture under 'National Food Production Programme' and the total fund received was Rs.Mn.32.47. Those development projects were as follows;

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 conducted to popularize the use of appropriate packaging for transportation of fruits and vegetables among farmers, collectors, transporters, whole sellers, retailers. 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 2019, 20,000 plastic crates under two categories were introduced to stakeholders in four major perishables supply chains in Sri Lanka. In addition, around 500 beneficiaries were trained on proper handling and transportation of fruits and vegetables.



2. Quality and process enhancement of improved supply chains of mango, papaya, guava and banana

Mango, Banana, Papaya and Guava are major fruit crops cultivated in Sri Lanka in terms of land extent, production and consumption. Sri Lankan climatic conditions and other factors are highly favorable towards cultivation of these crops giving high income year around. But high postharvest loss and low quality and associated safety issues due to use of improper postharvest practices had made the industry less profitable and problematic. Therefore 4 development projects were initiated in 2017 to improve the supply and value chains of these four crops. These projects were conducted to improve all steps in both supply and value chains through improving knowledge and also the project beneficiaries were given necessary infrastructure facilities to popularize the use of appropriate postharvest practices during supply and value chain activities. These projects were continued in 2018 and the institute was able to establish 'fruit processing zones' island wide via these projects. Accordingly, Postharvest handling and processing practices were improved in these zones thus proper postharvest practices including, mature harvesting (Avoid immature harvesting), Proper sorting and Grading based on the size, Safe, artificial ripening using ethylene gas (except Guava), Transportation using safe packages (from field to pack house using plastic crates; pack house to local market after ripening by 5-ply corrugated fiber board boxes-CFB-), were introduced to the beneficiaries by providing them with sorting and packing tables, ripening chambers, plastic crates, CFB boxes and stickers for branding of the process.

In the year 2019, a new project was initiated to monitor the activities of established zones and to give them further technical assistance to overcome practical issues with aim of promoting agro based industries in the country. Thirty four new fruit brands were introduced to the local market via the projects and good quality mango, banana, papaya and guava fruits are being supplied to the consumers at a reasonable cost while ensuring higher income not only for the farmer but also for other stakeholders (such as pickers, collectors, transporters, pack house owners, wholesalers and retailers) involved in the chain and subsequently giving assured quality and safety for consumers. By launching these regulated postharvest chains living standards of the beneficiaries have increased significantly.

TECHNOLOGY TRANSFER ACTIVITIES

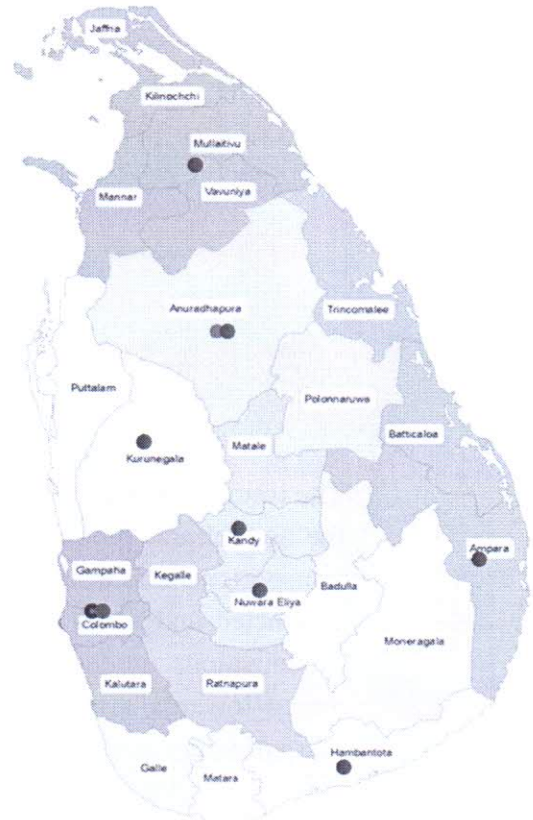
Extension division carries out its technology dissemination activities through island wide extension Centers in liaisons with government and non-government organizations. Technology dissemination through field level extension work, which is one of the major activities of the institute, was continued during the year 2019.

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 Post-Harvest Technology Centers located in the following major crop producing areas:

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



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

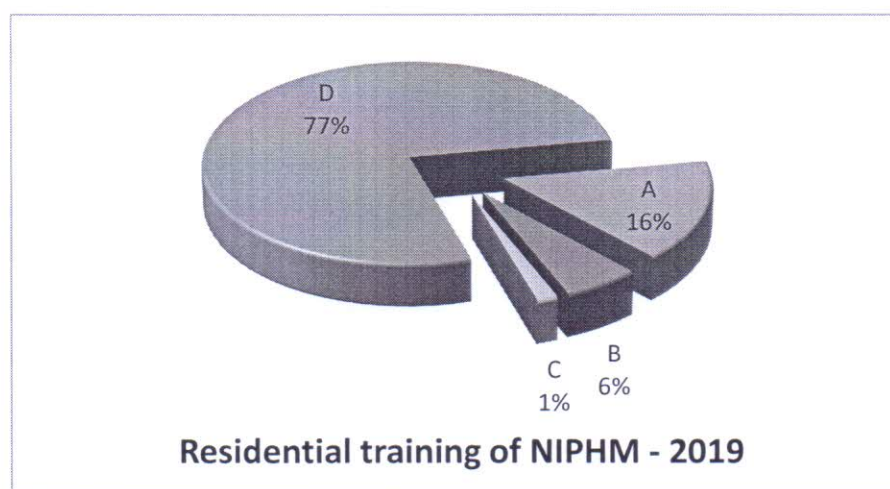
TRAINING

Training programs were conducted in following two strategies; conducting programs at the institute which are referred to as residential training programs and the programs conducted in the field as non residential training programs. All these programs are based on stakeholder requirement and were organized to cater to the training need of the beneficiary trained.

- Residential training programs
- Non-residential programs

Residential Training Programs

These training programs were conducted at Research and Development Center in Anuradhapura. During the year 2019, 50 short-term residential training courses were conducted and 1565 persons were trained in various disciplines of Post-Harvest Technology and the details are given in the figures.



The training programs were aimed towards all stakeholders of the supply and value chains of the agricultural produce. These stakeholders 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.

Group	Description	No. of programs	No of trainees
A	Farmers/farm women and members of farmer organizations	6	248
B	Project beneficiaries and small/medium scale entrepreneurs	16	89
C	Extension Officers from public, cooperative, private sectors and NGO	4	24
D	Students from Secondary schools, Universities, Schools of Agriculture and Technical Colleges	24	1204
Total		50	1565

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 2019, 141 field training programs and demonstrations were conducted and 3800 individuals were trained.

The training programs were aimed towards the stakeholders of the supply and value chains of the agricultural produce were mainly targeted towards farmers/farmwomen, collectors, transporters, whole sellers, retailers/traders and processors. Awareness creation on postharvest technology, entrepreneur development, loss reduction, process and product quality improvement etc. are covered under these programs.

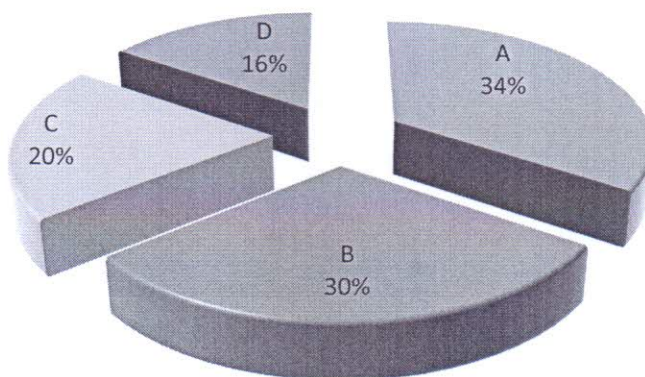


Many of these beneficiaries are using the technologies given in these training programs. Through the technical knowledge attained, knowledge improvement, quality enhancement of produce, income generation, rural empowerment and many other benefits were achieved. This directly contributes to the loss reduction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



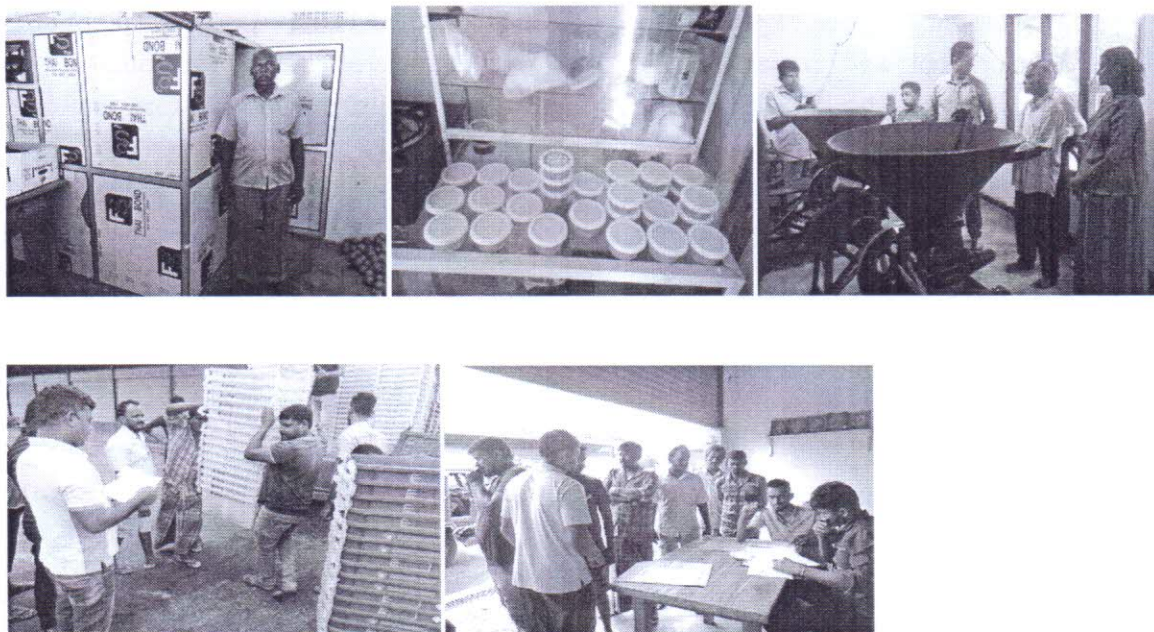
Group	Description	No. of training programs	No of trainees
A	Farmers/farm women and members of farmer organizations	49	1648
B	Project beneficiaries and small/medium scale entrepreneurs	48	497
C	Extension Officers from public, cooperative, private sectors and NGO	27	740
D	Students from Secondary schools, Universities, Schools of Agriculture and Technical Colleges	11	34
Total		141	3800

Non residential training programs of NIPHM - 2019



Further the training of stake holders had contributed to industrial development, economic development and social development with improved living standards as well. Some beneficiaries who had initiated/ developed their industries under these programs are listed below.

No.	Name	Address	Telephone No.
01	M.P.M.Nandasena	Abhayapura, Paragahakele	077-0598685
02	M.A. Ravindra Kumara	No.20, Baudha Janapadaya, Dheegawapiya	071-4898915
03	M.M.N. Madhubashini	1B/11A, NamalOya, Ampara	078-3359010
04	M.L. Priyadarshani	36A, Penigama, Hingurana	077-9580645
05	M.W.G. MalshaSudarshani	Jambugaslanda, Watawanagama, Uwa Gangodagama, Ambagalla	071-0495059
06	ChamindaSudesh	5 Post, Kolladeniya, Mariarawa	076-8950424
07	W.M.Susiripala	Watawanagama, Uwa Gangodagama, Ambagalla	076-7867260
08	M.L.Priyadarshani	36A, Peranigama, Hingurana	077-9580645
09	I.B. Hemantha Lalith Kumara	Bakmeegaha watta, Maho	071-3877069
10	R.P.Madura Lanka Dharmasiri	Welagedara, Nakkawatta, Narammala	071- 5695902
11	ThushariGeethika	Thunhela Rasahala, Athuruwala, Dambadeniya	076-6250594
12	A.H.M.R.K. Alahakoon	148/1, Kavisigamuwa, Morathiha	.070.3390009
13	P. Nirosha Chandani Premarathne	661/2, Kongahamula Watta, Hanhamunuwa, Maspotha	071-3480255
14	D.M.P.Nilmini Dissanayake	Mahawela Niwasa, Pahala Uvitigama, Wellagala	071- 5272681
15	K.M. Ramyalatha	Napatawala, Padiyapelella	0713804275
16	R.M.Jayathilake	Watarakgoda, Walapane	0717013312
17	H.A.D.Shiromika	23, Weerasekara Place, Pundaluoya	0710571546
18	R.M. Bandaramenike	158/1, Halgolla, Hapugasthalawa	0756049833
19	Saman fresh fruits	Central Market, Kegalle	0777807692
20	Anjala Nishanthi Ranathunge	Sisira Srores, Ihalagama, Maha Udagama	0776578095
21	K.G. Gunarathne	99, Mapakanda North, Nawalapitiya	0713520159
22	K.A.V. Sunil	Kongil Janapadaya, Pupuressa	0713380708
23	S.Sharmila	Thanneerutru, Mullaithivu	



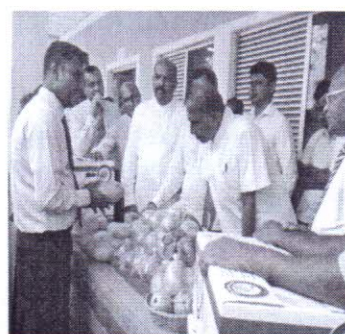
Technologies disseminated and related activities

Exhibitions

The institute participated in many exhibitions held island wide. Through participation to exhibitions the institute expected to disseminate the technology to many stakeholders in the country. The details of the exhibitions are given below.

Date	Programme	Location	Institute
22.02.2019	Regional Entrepreneur Forum and Mini Technology Exhibition	Anuradhapura	Sri Lanka Export Development Board
01.03.2019	Regional Entrepreneur Forum and Mini Technology Exhibition	Vavunia	Sri Lanka Export Development Board
06.03.2019-08.03.2019	CenEx 2019 Sisu Kusalatha Dekma	Anuradhapura	Central College, Anuradhapura
29.03.2019-31.03.2019	Digamadulu Nawodaya Technology and Trade Exhibition DNTTE 2019	Ampara	Ministry of Primary Industries and Social Empowerment
24.07.2019-27.07.2019	V 2025 Enterprises Sri Lanka	Anuradhapura	Ministry of Agriculture, Rural Economic Affairs, Livestock Development, Irrigation and Fisheries and Aquatic Resources

			Development
22.08.2019	Krushimela	Anuradhapura	Rajarata University of Sri Lanka
17.09.2019- 10.09.2019	V 2025 Enterprises Sri Lanka	Jaffna	Ministry of Agriculture, Rural Economic Affairs, Livestock Development, Irrigation and Fisheries and Aquatic Resources Development
17.09.2019- 21.09.2019	Northern Provincial Agricultural Exhibition - 2019	Jaffna	Department of Agriculture -Northern province



CONSULTANCY AND OTHER SERVICES

The NIPHM has progressively been sought after for consultancy and other services by both public and private sector organizations, as well as the Cooperative sector, which are either directly or indirectly involved in postharvest operations. By providing these services, the institute was successful to provide 13 numbers of consultancies in 2019 to establishing several new processing plants, modernizing existing plants and to solve technological problems encountered by rice millers and food processors in their day-to-day operations.

Especially, from 2016, the institute has been working as a consultant to “Warehouse Receipt Project” of Department of Development Finance of General Treasury. Under this project, warehouses with pre cleaning and drying facilities were established in Embilipitiya, Medirigiriya and Kilinochchi areas.

In addition to that, the institute was able to conduct three certificate courses on Spice processing, Rice and Rice Flour processing and Dehydrations of Vegetables and Fruits.

Summarized details of consultancies are listed below.

No	Name of the Customers	Services
01	Warehouse Receipt Financing Project (WHRFP), Ministry of Finance, Colombo-01.	Consultancy on Warehouse
02	Nelum Ranathunga, 38/1, Dewala Road, Pagoda, Nugegoda.	Project report for pumpkin flour and Rice flake Production.
03	N.D.N.P. Kulasinghe, Nisadu rice mill, Wauleewa, Polpithigama.	Proving technical report for rice mill.
04	Multi-service Co-operative Society Ltd, Dimbulagala, Manampitiya.	Specification report for Dimbulagala MPCS.
05	N.M. Amrasinghe, Amara Production, Mahakanadarawa, Rambewa, Anuradhapura.	Technical report for rice based soup cube.
06	Deputy Director of Agriculture, North Central Anuradhapura.	Providing Specification for Provincial Agricultural Department.
07	Multi-service Co-operative Society Ltd, Palugasdamana, Polonnaruwa.	Specification report for quality of Rice flour Machines ,Palugasdamana MPCS.
08	J.A.R.Anuranga, Greenway Agriculture development center, Nuwaraelakanda, samurdi road, Yahalegama, Anuradhapura	Rice flour and Spices Processing
09	Madusha Naween Kodippiliarachchi, Colombo Road, Kotigala, Hadapangoda.	Grain flour Processing
10	L.A.D.PrasannaJayaraj, No 411/04/64 Nawahandurakketha, Thalawa.	Spices Processing
11	A.M. Janaka Thusara, Rukaththana, Maspotha	Paddy drying
12	Imesha Sewwandi, Oyagama, Rambewa	Spices Processing
13	P. Swarnalatha, Katiyawa Road, Pinthaliyaasala, Eppawala.	Rice Flour Processing

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 accreditation for some of its laboratory analyses. Fumigation of grain warehouses is another promising facility given through laboratory services to the stake holders.



CAPACITY BUILDING AND PRODUCTIVITY DEVELOPMENT

Institute takes a keen interest to enhance the knowledge 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 2019.

Postgraduate Degree Programmes

Completed Programmes

Dr.H.R.M. G.C. Thilakarathne
PhD in Food Science and Technology
University of Sri Jayawardhanapura

Miss. S.S.K. Weerasinghe
MSc in Organizational Management
Post Graduate Institute of Agriculture (PGIA)
University of Peradeniya

Miss T.M.A.N. Weerasinghe
MSc in Food Science and Technology
Post Graduate Institute of Agriculture (PGIA)
University of Peradeniya

Miss G.E.D.A.M. Jayarathne
MSc in Food and Nutrition
University of Kelaniya

Continued programmes

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

Mrs. C.A.K. Dissanayake
PhD in Agricultural Extension
Post Graduate Institute of Agriculture (PGIA)
University of Peradeniya

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

Eng. T.M.R. Dissanayake
PhD in Bio System Engineering
Post Graduate Institute of Agriculture (PGIA)
University of Peradeniya

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

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

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

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

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

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

Short term training/ Meetings/Conferences (Foreign training)

No	Name of the participant	Details of the Course / Workshop / Training Details	Participating country	period
01	M.M.Herath	Training course at the Egyptian International center for agriculture	Egypt	14.01.2019-02.04.2019
02	Dr.R.M.N.AWijewardhane	Training on Postharvest Technology of Fruit and Vegetable Crops for Developing Countries		14.05.2019-27.05.2019
03	Mrs. W.B.W.M.R.C.P. Aluvihare	Multicounty observational study mission on Good Agricultural Practices (GAP) and Advanced Postharvest Handling Technologies	Japan	10.06.2019-14.06.2019
04	Miss T.M.A.N.Weerasinghe	Rice Yield increasing Technologies for Sri Lanka-China	China	09.08.2019-19.09.2019
05	Mrs. C.K. Marasinghe	Rice Yield increasing Technologies for Sri Lanka-China	China	09.08.2019-19.09.2019
06	Mr.T.M.R.Dissanayake	Technical assistance to the modernization of agriculture-study tour	Vietnam	11.08.2019-17.08.2019
07	Mrs. G.D.N. Manike	Integrated Technology for Production , Processing and Value addition in tuber crops	India	16.09.2019-30.09.2019
08	Mr. K.D. Hettige	Integrated Technology for Production , Processing and Value addition in tuber crops	India	16.09.2019-30.09.2019
09	Mr. A.M.C.P. Kumara	Integrated Technology for Production , Processing and Value addition in tuber crops	India	16.09.2019-30.09.2019

10	Mr. D.M.A.K. Dasanayake	Integrated Technology for Production , Processing and Value addition in tuber crops	India	16.09.2019-30.09.2019
11	N.S.D.M. Senanayake	Management of rural employment projects and poverty alleviation	India	09.07.2019-05.08.2019
12	Mr.Y.G. Harishchandra	Strengthening the resilience and live hoods of vulnerable small holders farmers to climate related shocks in Sri Lanka	China	23.12.2019-28.12.2019

Short term training/ Meetings/Conferences (Local training)

	Name of the Participant	Details of the Course / Workshop / Training Details	Period
01	Mr. H.M.A.P. Rathnayake	Preparation of strategic plan for the agriculture sector	17.08.2019
02	Mr. W.M.C.B. Wasala	Workshop on Project Submission Format for Development Project Proposals	2019.07.02-one day programme
04	Mr. W.M.C.B. Wasala	Preparation of strategic plan for the agriculture sector	17.08.2019
05	Mrs. R.M.R.N.K.Ratnayake	Preparation of strategic plan for the agriculture sector	17.08.2019
06	Mr. C.R.Gunawardana	PBT Training programs on Laboratory accreditations – 03 no of programs	Jan-March 2019 3 days
07	Miss T.M.A.N.Weerasinghe	Training on Scientific Writing at Rice Research and Development Institute	
08	Mr. K.D.T.Hettige	Capacity strengthening of personnel engaged in the rice fortification program- Sigiriya Village Hotel	24.06.2019-27.06.2019
09	Mrs. G.D.N.Menike	Training of Trainers (TOT) – Biosafety Knowledge Development Resource Persons in the project “Implementation of the National Biosafety Framework in accordance with the Cartagena Protocol on Biosafety”	30.07.2019-one day programme
10	Mrs. G.D.N. Menike	Laboratory Excursion Programme by PTB for Lab Accreditation process	02.07.2019-03.07.2019
11	Mrs. G.D.N. Menike	A Practical Approach for Research Methodology Writing in Plant Protection Research	09.09.2019 one day programme

12	Miss G.E.D.A.M. Jayarathne	PBT Training programs on Laboratory accreditations – 03 no of programs	Jan-March 2019 3 days
13	Miss G.E.D.A.M. Jayarathne	Laboratory Excursion Program by PTB for Lab Accreditation process	02.07.2019-03.07.2019
14	Miss W.M.S.S.K. Weerasingha	Scientific writing –PGRC–Gannoruwa – Separate Two days	25.11.2019 and 02.12.2019
15	Miss W.M.S.S.K. Weerasingha	A Practical Approach for Research Methodology Writing in Plant Protection Research	09.09.2019
16	Mr. H.R.M.G.C.Thilakarathne	Capacity strengthening of personnel engaged in the rice fortification program- Sigiriya Village Hotel	24.06.2019-27.06.2019

AWARDS AND RECOGNITIONS

AWARDS

Mr. W.M.C.B. Wasala

- **First runner up for the research paper** presented at the thirty first annual congress held on 21-22 Nov. 2019 organized by Post Graduate Institute of Agriculture, Sri Lanka
- **Best Presenter** of food and nutrition session at the thirty first annual congress held on 21-22 Nov. 2019 organized by Post Graduate Institute of Agriculture, Sri Lanka

Eng. T.M.R. Dissanayake

- External member of faculty board of Faculty of Agriculture, Rajarata University of Sri Lanka.

Eng. H.M.A.P. Rathnayake

- Committee Member of Agricultural and Plantation Engineering Sectional Committee of Institution of Engineers, Sri Lanka
- Member of the working committee of the Sri Lanka Standard Institution for Formulation of Standards for Paddy and rice Member of the national committee of developing policies for agriculture mechanization

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

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

PUBLICATIONS

- Aluwihare W.B.W.M.R.C.P. (2019). Identification and development strategies for enhanced quality and postharvest life of cut lotus flowers, National symposium on Floriculture Research NaSFLOr- 2019)
- Aluwihare W.B.W.M.R.C.P (2019). Strategies for extending the longevity of cut lotus (*Nelumbonucifera*) flowers, International Conference on Dry Zone Agriculture 19 th December 2019, Faculty of Agriculture, University of Jaffna, Kilinochchi, Sri Lanka.
- Bandara, R.G.U.S. ,Wasala, W.M.C.B., Chandramali, D.V.P. and Prasanna, P.H.P. Extending the shelf life of TJC mango (*Mangifera indica*) by the application of 1-methylcyclopropene (1-MCP), Proc. Of 11th Annual Research Symposium, 2019, Faculty of Agriculture, Rajarata University of Sri Lanka.
- Bandara, G. L. T. A., De Costa, D. M., Menike, G. D. N., & Priyadarshani, T. D. C. (2019). Effect of Eco-Friendly Nursery Management Measures of *Camellia sinensis* on Soil Microbial Density and Diversity. 11th Annual Research Symposium Proceedings, Rajarata University of Sri Lanka.
- Chandrasekera, C.M.C.V., Ratnayake, R.M.R.N.K. and Adikari, A.M.J.B. (2019). Application of ozone as a postharvest treatment for controlling bacterial soft rot in carrots. 11th annual research symposium proceedings. Faculty of Agriculture, Rajarata university of Sri Lanka p.57
- Champa, W.A.H., Gunasekera, N., Wilson, W.S., Hewajulige, I.G.N., Weerasinghe, W.M.S.S.K. and Kumara, B.A.M.S. (2019). Postharvest Treatment of Cinnamon (*Cinnamomum zeylanicum*) Bark Oil and Hexanal Incorporated Bio-Wax Maintains Quality and Extends Marketable Life of Lime (*Citrus aurantifolia* Swingle). International Journal of Fruit Science, pp.1-13

- Fernando, M.R.S.M., Wijewardana, R.M.N.A., Weerasinghe, T.M.A.N. Chandramali, D.V.P. and Prasanna, P.H.P. (2019). Development of a protocol for freeze preservation of green chilli (*Capsicum annum*). Proceedings of International Symposium 2019. University of Rajarata , Sri Lanka.
- Gunawardane C.R., Jayarathna G.E.D.A.M., Aluwihare W.B.W.M.R.C.P., Weerasinghe S.S.K., Hettige K.D.T., (2019). Determination of heavy metal contamination of economically important food commodities, 5 th International Conference on Dry Zone Agriculture-2019.
- Hettige,K.D.T., Jayarathna G.E.D.A.M., Wijewardane R.MMM.N.A., (2019). Study of Probiotic Activity of Selected Sri Lankan Traditional Rice Varieties when Inoculated by *Lactobacillus plantarum*, , 5 th International Conference on Dry Zone Agriculture-2019.
- Jayarathne, G.E.D.A.M., Hettige, K.D.T.,Ratnayake R.M.R.N.K and Gunawardana C.R. (2019).Analysis of antimicrobial effect of Cinnamon and Nutmeg oil extractions on preserving tomato sause. Proceedings of the 5 th International Conference on Dry Zone Agriculture, Faculty of Agriculture, University of Jaffna, Kilinochchi, Sri Lanka.
- Jayasekara, M.G.D.C. Kumari, D.W.M.M.M., Wijewardane, R.M.N.A. and Hettige, K.D.T. (2019). Quality assessment of Rice beverage made from traditional rice varieties fermented by *Lactobacillus plantarum*, Proceedings of International Symposium 2019. Rajarata University of Sri Lanka.
- Kumara, B.A.M.S., Wijewardane, R.M.N.A. and Samarasinghe, Y.M.P. (2019). Identification of Potential Treatments to Overcome the Browning of Dehydrated Guava. Proceedings of the 5 th International Conference on Dry Zone Agriculture, 19 th December 2019, Faculty of Agriculture, University of Jaffna, Kilinochchi, Sri Lanka.
- Kumara, B.A.M.S and Beneragama, C.K. (2019). Modified Atmospheric Packaging Extends the Postharvest Shelf Life of Mukunuwenna (*Alternanthera Sessilis*). Proceedings of the 31 st Annual Congress of the Postgraduate Institute of Agriculture, 22 nd November 2019, University of Peradeniya, Peradeniya, Sri Lanka.
- Lakmali, A.A.S.N., Ratnayake, R.M.R.N.K.,Kumari, M.A.A.P. and Champa, W.A.H.. (2019). Evaluation of the commercial applicability of organic ripening agent. 11th annual research symposium proceedings. Faculty of Agriculture, Rajarata university of Sri Lanka p.63

- Menike, G.D.N. and De Costa, D.M. (2019). Determination of Genetic Variation of Bemisiatabaci Species Complex Using PCR-RFLP Analysis of Mitochondrial Cytochrome c Oxidase Subunit- I (COI) Gene”, SLCARP International Agricultural Research Symposium.
- Kumari, K.G.N.H., Kumari, D.W.M.M.M., Wijelath, W.A.G.E., Wijewardana, R.M.N.A.(2019). Development of a protocol for Artificial Ripening of Ambul Banana (*Musa spp.*) in Sri Lanka. Proceedings of International Symposium 2019. University of Rajarata , Sri Lanka.
- Perera, M.T.D., Wijewardana,R.M.N.A., Jayawardane, N.W.I.A.(2019). Development of a protocol for Artificial Ripening of Papaya in Sri Lanka. Proceedings of International Symposium 2019. University of Rajarata , Sri Lanka
- Prasannath, K., Dharmadasa, N., Menike, N. et al. Evaluation of the effects of an eco-friendly crop protection system on management of whitefly-vectored chilli leaf curl virus disease in Sri Lanka. *Phytoparasitica* (2019) doi:10.1007/s12600-019-00773-8
- Rathnayake, R.M.R.N.K.,Danundasekara, W.A.M., Ariyaratne, H. M., Ganehenegge, M.Y.U., (2019). Root-application of rice husk ash as a natural silicon source enhances resistance against powdery mildew in bitter melon (*Momordica charantia* L.). National Research symposium of Sri Lanka Association for mycology and plant pathology.
- Samarasinghe, Y.M.P., Rathnaweera, D.T.H.P., Wasala, W.M.C.B. and Kumara, B.A.M.S., 2019. Efficacy of Citronella (*Cymbopogon nardus*) Leaf Extract on Maize Weevil (*Sitophilus zeamais*) Infestation for Stored Maize in Sri Lanka. Proceedings of the 5 th International Conference on Dry Zone Agriculture, 19 th December 2019, Faculty of Agriculture, University of Jaffna, Kilinochchi, Sri Lanka.
- Wasala, W.M.C.B., Benaragama, C.K. ,Sarananda,K.H. and Kumara, D.K.K. (2019) Effect of 1-MCP on physico-biochemical properties and delayed ripening of ‘Ambl’ banana at ambient conditions, Proc. Of 31st PGIA annual congress of the Postgraduate Institute of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka.

SOCIAL, WELFARE AND RELIGIOUS ACTIVITIES

SOCIAL AND WELFARE

The institute continued its welfare activities to build up employee relations and goodwill among staff and their families. Similar to the previous year the annual Poson Dansala was held in 27th June 2019. This was an occasion where everyone at the institute was happy.



RELIGIOUS ACTIVITIES

NIPHM celebrated 19 years of establishment as Institute of Post-Harvest Technology in 19th June 2000 as a successor to the Rice Processing Research and Development Centre of Paddy Marketing Board. To mark this, a dhamma sermon was held in 25th June 2019.

Participating in such religious activities helps to relieve stress and exhaustion of employees and make everyone in the organization happy. We strongly believe that employee satisfaction contribute to the betterment of the organization.



HUMAN RESOURCES

The total permanent staff of the Institute was 156. This total comprised of 52% in the technical divisions and 48% in the supporting divisions.

As at 31st December 2019

Position	Total Cadre Positions	Filled Cadre Positions
Higher Management Postions		
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	01
Principal Extension Officer	01	
Senior Research Officer	03	02
Senior Mechanical Engineer	02	
Senior Extension Officer	01	01
Research Officer	14	10
Mechanical Engineer	06	06
Extension Officer	05	04
Economist	01	01
Total	36	26

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	01
Librarian/ Publication Officer	01	-
Extension Assistant	10	06
Draughtsman	01	01
Technical Assistant	03	01
Technical Assistant (Civil)	01	-
Management Assistant (cashier)	01	01
Management Assistant	27	23
Laboratory Assistant.	04	01
Equipment Operator	02	01
Driver	13	10
Electrician	01	01
Welder/ Forman	01	01
Mechanic / Technician	02	02
Mill / Machine Operator	3	03
Boiler Operator	02	-
Cook	01	01
Office Aide	18	18
Boiler Assistant	01	01
Labourer (Sanitary)	03	03
Labourer (Canteen)	02	02
Security Guard	06	06
Maintenance Helper	08	08
Total	116	94

Expertise of Research and Technology Transfer 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.

EXECUTIVE STAFF

As at 31st December 2019

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 | Principle Research Officer

Dr. (Mrs.) Nilanthi Wijewardhane
BSc. Agric, MSc. Agric, MPhil, PhD

Research Officers

Mr. H.R.M.G.C. Thilakarathna
B.Sc. in Food Science & Technology. Ph.D in Food sci. & Tech.

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 | Mechanical Engineer

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)

Senior Mechanical Engineer

Mrs. D.M.S.P.Bandara
BSc. Eng, MPhil. CEng.MIE (SL) PhD(Reading)

Mechanical Engineers

Mrs. C. K. Marasinghe
B.Sc. Eng., M.Phil.(Eng.), AMIE (SL)

Mr. A.P.D.L. Athapaththu
B.Sc. Eng., M.Sc (Eng.)

Mr. Y.G. Harischandra
B.Sc. Eng. AMIE (SL)

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

EXTENSION DIVISION**HOD | Senior Extension Officer**

Mrs. Chamindi Dissanayake
BSc. Agric, PGDIP Agric, Mphil. Agric, PhD (reading)

Extension Officer

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

Mr. M.M. Herath
B.Sc Agric., Dip. in Counseling

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. PhD (Reading)

LABORATORY SERVICE DIVISION**HOD | Research Officer**

Mr. Chaminda Gunawardhane
BSc (Chemistry) special.

Technological Officer

Mr. Champika Kumara
NCT (Electrical)

PLANNING AND MONITORING DIVISION**HOD | Senior Research Officer**

Mrs. Ruwanka Rathnayake
BSc.Sp. (Botany), MSc., PhD in post-harvest Technology (Reading)

Economist

Ms. K.A.T.S. Kumari
BSc. Agric,

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.

FINANCE DIVISION**HOD | Accountant**

Mr. Niluka Illangasinghe

B.Com (Sp.), APFA, ACPM, MBA (Reading)

ACADEMIC DIVISION**HOD | Mechanical Engineer**

Eng. (Mr.) Daminda Athapaththu

BSc. Eng, MEng.

Librarian

Mrs. Keshala Priyadarshani

BSc (Library Science)

INTERNAL AUDIT UNIT**HOU | Internal Auditor**

Mr. R.M.D.Rathnayake

BSc (Accounting)

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
STATEMENT OF FINANCIAL PERFORMANCE FOR THE YEAR ENDED
DECEMBER 31, 2019

	NOTES	2019 RS.	2018 RS.
REVENUE			
General Treasury Fund - Recurrent	6	118,500,000.00	115,993,467.18
Transfers from other agencies	7	38,792,448.09	35,067,444.60
Amortization of Capital Grants	8	26,334,537.85	27,020,326.74
Self Generated Income	9	7,056,094.90	13,537,858.79
Other Income	10	4,796,052.34	6,281,145.40
TOTAL REVENUE		195,479,133.18	197,900,242.71
EXPENSES			
Wages, salaries and employee benefits	11	95,352,922.61	95,516,861.02
Supplies and consumables used	12	13,440,400.97	25,274,466.74
Depreciation and amortization expense	13	34,861,760.67	27,020,326.74
Other expenses	14	26,184,636.91	30,237,412.52
Asset Revaluation Loss	14.1	5,975,317.41	
Project Expenses	15	38,792,448.09	35,067,444.60
Finance costs	16	25,060.37	22,603.37
TOTAL EXPENSES		214,632,547.03	213,139,114.99
SURPLUS / (DEFICIT) FOR THE PERIOD		(19,153,413.85)	(15,238,872.28)

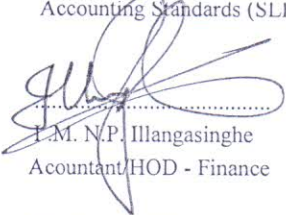
The accounting policies and notes from page 05 To 23 an integral part of these Financial Statements.

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
STATEMENT OF FINANCIAL POSITION AS AT DECEMBER 31, 2019

	NOTES	2019 RS.	2018 RS.
ASSETS			
NON - CURRENT ASSETS			
Property, Plant and Equipment	17	207,494,662.90	210,805,889.78
Investments	18	20,000,000.00	30,000,000.00
Other non-current assets	19	14,342,667.31	9,724,265.61
TOTAL NON CURRENT ASSETS		241,837,330.21	250,530,155.39
CURRENT ASSETS			
Cash and cash equivalents	20	26,806,890.93	12,096,343.75
Receivables	21	30,016,367.81	59,998,784.09
Inventories	22	4,771,303.98	954,445.90
Advances	23	185,583.00	167,795.50
Other current assets	24	1,931,925.00	1,973,986.97
TOTAL CURRENT ASSETS		63,712,070.72	75,191,356.21
TOTAL ASSETS		305,549,400.93	325,721,511.60
EQUITY AND LIABILITIES			
EQUITY			
Initiate Capital	25	69,907,594.42	69,907,594.42
Government Grant		8,368,214.00	8,368,214.00
Foreign Loan		72,750,229.02	72,750,229.02
General Capital Fund		101,772,730.74	131,636,167.28
Assets Revaluation Surplus - Vehicle		34,702,988.00	34,702,988.00
Assets Revaluation Surplus - Plant & Machinery		11,316,204.17	
Assets Revaluation Surplus - Computer		938,717.46	
Accumulated Surplus / (Deficit)		(79,166,491.33)	(98,340,039.30)
TOTAL EQUITY		220,590,186.48	219,025,153.42
LIABILITIES			
NON-CURRENT LIABILITIES			
Provision for Gratuity Fund	26	32,982,464.34	29,144,228.80
TOTAL NON-CURRENT LIABILITIES		32,982,464.34	29,144,228.80
CURRENT LIABILITIES			
Payables	27	51,976,750.11	77,552,129.38
TOTAL CURRENT LIABILITIES		51,976,750.11	77,552,129.38
TOTAL LIABILITIES		84,959,214.45	106,696,358.18
TOTAL EQUITY AND LIABILITIES		305,549,400.93	325,721,511.60

The accounting policies and notes from page 05 To 23 an integral part of these Financial Statements.

These Financial Statements are in compliance with the requirements of the Sri Lanka Public Sector Accounting Standards (SLPSAS).


T.M. N.P. Illangasinghe
Accountant/HOD - Finance


R.K.A.P. Ramanayake
Additional Director (Admin & Finance)

The Board of Directors is responsible for the preparation and presentation of these financial Statements.
These Financial Statements were approved by the Board of Directors and Signed on their behalf.


H.M.A.P. Rathnayake
Director /CEO(Actg)


Prof. W.A. P. Weerakkody
Chairman

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NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
CASH FLOW STATEMENT FOR THE YEAR ENDED DECEMBER 31, 2019

	NOTES	2019 RS.	2018 RS.
CASH FLOWS FROM OPERATING ACTIVITIES			
Surplus /(Deficit)		(19,153,413.85)	(15,238,872.28)
Effect to Cash flow from Adjustments of Accumilated Surplus	29	1,582,657.18	6,110,060.45
Non - Cash Movements			
Depreciation		34,861,760.67	27,020,326.74
Amortization of Capital Grants		(26,334,537.85)	(27,020,326.74)
Asset Revaluation Loss	14.1	5,975,317.41	
Interest Income	10.1	(3,249,390.49)	(3,876,197.39)
Increase/(Decrease) in payables (Operating)	29	(26,438,557.88)	(5,971,795.68)
Increase/(Decrease) in Provisions for Gratuity Fund	30	3,838,235.54	(4,801,433.65)
(Increase)/Decrease in other current assets (Receivables-Operating)	31	26,189,832.67	12,805,859.52
Net cash flows from operating activities		(2,728,096.60)	(10,972,379.03)
CASH FLOWS FROM INVESTING ACTIVITIES			
Purchase of Property,Plant and Equipment	32	(29,257,697.48)	(28,598,047.09)
(Increase)/Decrease non current assets	33	5,381,598.30	(100,617.94)
Net interest Received	10.1	3,249,390.49	3,876,197.39
Net cash from investing activities		(20,626,708.69)	(24,822,467.64)
CASH FLOWS FROM FINANCING ACTIVITIES			
Capital Grants	34	38,065,352.47	20,029,336.82
Net cash flows from financing activities		38,065,352.47	20,029,336.82
Net increase/(decrease) in cash equivalents		14,710,547.18	(15,765,509.85)
Cash and cash equivalents at beginning of period	36	12,096,343.75	27,861,853.60
Cash and cash equivalents at end of period	37	26,806,890.93	12,096,343.75

The accounting policies and notes from page 05 To 23 an integral part of these Financial Statements.

STATEMENT OF CHANGES IN EQUITY FOR THE YEAR ENDED DECEMBER 31, 2019

The accounting policies and notes from page 05 To 23 an integral part of these Financial Statements.

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT

NOTES TO THE FINANCIAL STATEMENTS

Accounting Policies

1 Reporting Entity

1.1 Corporate Information

Institute of Post Harvest Technology is a body corporate, 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. And, Institute's name has been revised as "National Institute of Post Harvest Management" on 17th October 2018 by the Extraordinary Gazette of the Democratic Socialist Republic of Sri Lanka No.2093/26

1.2 Principal Activities and Nature of Operations

The Institute carrying out post harvest research and development activities pertaining to cereals, pulses, oil seeds, other field crops, fruits, vegetables and spice crops.

1.3 Approval of Financial Statements by the Board of Directors

The Financial Statements of the Institute have been authorized for issue by the Board of Directors

2. Basis of Preparation

2.1 Statement of Compliance

The Financial Statements of the Institute have been prepared and presented in accordance with Sri Lanka Public Sector Accounting Standards (SLPSAS).

2.2 Responsibility of Financial Statements

The Board of Directors is responsible for the preparation and fair presentation of the Financial Statements of the Institute as per the Sri Lanka Public Sector Accounting Standards.

The Board of Directors acknowledges this responsibility in the Statement of Financial Position of the Institute.

2.3 Basis of Measurement

The Financial Statements have been prepared on the historical cost basis.

2.4 Functional and Presentation of Currency

The Financial Statements are presented in Sri Lankan Rupees which is the Institute's functional and presentation currency except when otherwise indicated.

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
NOTES TO THE FINANCIAL STATEMENTS

2.5 Presentation of Financial Statements

The assets and liabilities of the Institute presents in its Statement of Financial Position are grouped by nature and listed in an order that reflects their relative liquidity and maturity pattern. No adjustments have been made for inflationary factors affecting the Financial Statements.

2.6 Materiality and Aggregation

Each material class of similar items is presented separately in the Financial Statements. Items of dissimilar nature or function are presented separately unless they are immaterial as permitted by Sri Lanka Public Sector Accounting Standards SLPSAS 1 'Presentation of Financial Statements'.

2.7 Offsetting

Assets and liabilities and income and expenses are not set-off unless permitted by the Sri Lanka Public Sector Accounting Standards.

2.8 Significant Accounting Judgements, Estimates and Assumptions

2.8.1 Going Concern

The Institute's management has made an assessment of its ability to continue as a going concern and is satisfied that it has the resources to continue in operations for the foreseeable future. Furthermore, management is not aware of any material uncertainties that may cast significant doubt upon the Institute's ability to continue as a going concern. Therefore, the Financial Statements continue to be prepared on the going concern basis.

2.8.2 Useful Lifetime of the Property Plant and Equipment

Useful economic lives of Property, Plant and Equipment are estimated as disclosed in Note 3.1 to the Financial Statements.

3. Significant Accounting Policies - Recognition of Asset and Liabilities

Accounting policies set out below have been applied consistently to all periods presented in the Financial Statements of the Institute unless otherwise indicated. Further, comparative year's information has been presented.

3.1 Property Plant & Equipment

Property, plant and equipment are tangible items that are held for use in the production or supply of goods or services, for rental to others or for administrative purposes and are expected to be used during more than one period. The Institute applies the requirements of Sri Lanka Public Sector Accounting Standard – SLPSAS 7 - 'Property, Plant and Equipment' in accounting for these assets.

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT

NOTES TO THE FINANCIAL STATEMENTS

Basis of Recognition

Property, Plant and Equipment are recognised if it is probable that future economic benefits service potential associated with the asset will flow to the Institute and the cost of the asset can be reliably measured. The institute policy recognition of property, plant and equipment is the value higher than Rs.5000. But Library books are recognised even less than Rs.5000.

Measurement

An item of Property, Plant and Equipment that qualifies for recognition as an asset is initially measured at its cost. Cost includes expenditure that is directly attributable to the acquisition of the asset. The cost of self constructed assets includes the cost of materials and direct labour, any other costs directly attributable to bringing the asset to a working condition for its intended use and the costs of dismantling and removing the items and restoring the site on which they are located. Purchased software that is integral to the functionality of the related equipment is capitalised as part of computer equipment. When parts of an item of property or equipment have different useful lives, they are accounted for as separate items (major components) of property and equipment.

Cost Model

The Institute applies cost model to all Property, Plant and Equipment, and records at cost of purchase or construction together with any incidental expenses there on less accumulated depreciation and any accumulated impairment losses. Such cost includes the cost of replacing part of the equipment when that cost is incurred, if the recognition criteria are met.

Subsequent Cost

The subsequent cost of replacing a component of an item of Property, Plant and Equipment is recognised in the carrying amount of an item, if it is probable that the future economic benefits embodied within that part will flow to the Institute and it can be reliably measured. The costs of the day-to-day servicing of Property, Plant and Equipment are charged to the statement of Financial Performance as incurred. Costs incurred in using or redeploying an item is not included under carrying amount of an item.

Depreciation

Depreciation is recognised in profit or loss on a straight-line basis over the estimated useful lives each part of an item of Property and Equipment since this method most closely reflects the of expected pattern of consumption of the future economic benefits embodied in the asset. Freehold land is not depreciated. Depreciation rate of Plant & Machinery is changed. The new estimated useful life time are as follows:

<u>Asset Category</u>	<u>Period</u>	
	<u>Purchased</u>	<u>Revalued</u>
Building	40 Years	20 Years
Plant & Machinery	10Years	05 Years
Office Equipment	10 Years	05 Years
Lab & Research Equipment	10 Years	05 Years
Other Equipment	10 Years	05 Years

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
NOTES TO THE FINANCIAL STATEMENTS

<u>Asset Category</u>	<u>Period</u>	
	<u>Purchased</u>	<u>Revalued</u>
Furniture	10 Years	05 Years
Electrical & Other Fittings	10 Years	05 Years
Library Books	10 Years	05 Years
Computer & Accessories	4 Years	4 Years
Vehicles	5 Years	5 Years
Software	5 Years	5 Years

Assets Revaluation

Class of vehicle was revalued as at 31/12/2017. Revalued amount of vehicle is shown in the books. Revaluation surplus was credited to revaluation surplus A/C. Plant & Machinery, Office Equipment, Lab & Research Equipment, Other Equipment, Electrical & Other Fittings, Computer & Accessories were revalued also as at 31/12/2017. They were accounted as at 01/01/2019. The adjustments for depreciations were done as well.

Assets Disposal

Tollaly depreciated assets which were not physically, sold and can not be identified were removed from the books.

3.2 Events after the Reporting Period

Events after the Reporting period are those events, favorable and unfavorable, that occur between the Reporting date and the date when the Financial Statements are authorized for issue. In this regard, all material and important events that occurred after the Reporting period have been considered and appropriate disclosures are made in the the Financial Statements where necessary.

3.3 Inventories

Inventories are valued at lower of cost and net realizable value. Cost is dertermined on the FIFO basis and includes expenses incurred in acquiring the inventories and bringing them to their existing location and condition.

3.4 Employee benefits

Defined contribution plans - Employees' Provident Fund and Employees' Trust Fund

All employees who are eligible for Employees' Provident Fund contribution and Employees' Trust Fund contribution are covered by relevent contribution funds in the line with respective statutes and regulations. Employees contribute 10% and, Institute contributes 12% and 3% of gross emoluments of employees to Employees' Provident Fund and Employees' Trust Fund respectively.

Defined Benefits Plan - Gratuity

A Defined Benefit Plan is a post-employment benefit plan other than a Defined Contribution plan as defined in Sri Lanka Accounting Standard LKAS19 on "Employee Benefits". The Institute is liable to pay retirement benefits under the Payment of Gratuity Act, No.12 of 1983. Provision has been made in the Financial Statements for retirement gratuity as Employee benefit liability after the one year of service for all employees. Gratuity plan defines an amount of benefit that an employee

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT

NOTES TO THE FINANCIAL STATEMENTS

will receive on retirement, usually dependant on one or more factors such as years of service and compensation. The liability recognised in respect of employee benefit liability in the Statement of Financial position is the present value of the defined benefit obligation at the reporting date together with adjustments for unrecognized past service costs. The employee benefit liability is calculated annually.

3.5 Provisions

Provisions are recognised if, as a result of a past event the institute has a present legal or constructive obligation that can be estimated reliably and it is probable that an outflow of economic benefit will be required to settle the obligation. Provisions and liabilities are recognised in the Statement of Financial Position.

4. Significant Accounting Policies - Income and expense

4.1 Revenue Recognition

Revenue is recognised to the extent that it is probable that the economic benefits will flow to the Institute and such revenue can be reliably measured. All Government and other grants are recognised initially as Recurrent Grant and are then transferred into the Capital Grant which used for Capital needs. The Capital Grants are recognised initially as deferred income and are then recognised in profit or loss as Amortization of deferred income on a systematic basis over the useful life of the assets. Average useful life time is considered as 7 years.

4.2 Borrowing Cost

All borrowing costs are expensed in the period in which they occur. Borrowing costs consist of interest and other costs that an entity incurs in connection with the borrowing of funds.

4.3 Tax Expense

As per the Sri Lanka Accounting Standard-LKAS 12 on 'Income Taxes', tax expense (tax income) is the aggregate amount included in determination of profit or loss for the period in respect of current and deferred taxes. Income tax expense is recognized in the Statement of Financial Performance except to the extent it relates to items recognised directly in equity or in Other Comprehensive Income (OCI), in which case it is recognised in equity or in OCI.

4.4 Research and Development Expenses

Research and Development expenses are allocated from capital budget. But Capital nature expenses are only recognised as assets. Recurrent nature expenses are charged to profit and loss.

5. Statement of Cash Flow

The Statement of Cash Flow has been prepared by using the 'Indirect Method', in accordance with Sri Lanka Public Sector Accounting Standards – SLPSAS 2 on 'Cash Flow Statements'

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
NOTES TO THE FINANCIAL STATEMENTS

	2019 (Rs.)	2018 (Rs.)
6 General Treasury Fund - Recurrent	118,500,000.00	115,993,467.18
7 Transfers from Other Agencies		
MOA - For Research Projects		
Freeze Drying & Vacuum Packaging	163,671.45	304,163.04
Post Harvest Diseases of Mango	344,385.25	458,465.52
Traditional Rice Varieties	163,193.10	337,512.53
Influence of pretreatments	136,712.60	362,021.94
Oil Extraction of nutmeg & cinn.	73,106.85	316,300.22
Tunne Type Forced air Cooler	120,338.67	133,500.06
Legum Based Granular bar	366,210.60	246,713.63
Fressze Prevention of Vegetables	79,738.00	249,402.85
A Case Study of Omaragolla Mango	228,558.40	141,202.00
Enha.quality & PH Life of Lotus	166,406.27	129,977.28
Low Cost Fruit Matu.Iden.Lns	158,767.50	236,152.00
Citronella Grass Leaf Extracts	34,256.75	84,422.40
Green Chillies	-	24,670.95
Edible Oil	-	64,953.15
Quality impro.of fresh leafly ve	152,973.14	
Mitigating Rice Stickiness	12,563.31	
Investigation of Nutritional	9,540.00	
Redu. of Post har. Loss Big Oni	62,050.00	
Dev. of Ready to Use Formulatio	100,470.00	
Enha. of Quality Characteristic	416,117.32	
Dev. of Heat Pump Dryer	59,404.00	
Evalu. of the chemical residue.	559,086.27	
field Appli. of rice husk silic	147,639.04	
detemination of energy output	20,897.00	
Economic evalua. of pricing str	130,836.97	
	3,706,922.49	3,089,457.57
MOA - Development Projects		
- Mango Project	104,950.00	4,700,887.79
- Supply chain	-	519,408.95
- Banana Project	509,700.00	9,479,505.07
- Papaya Project	570,200.00	10,263,656.31
- Guava Project	421,298.25	5,604,349.67
- Receipts for Dstri.Net Work	-	164,971.67
- Lab Updrading Project	1,293,790.60	297,890.25
Quality and Process Enhancement	4,535,797.13	
Introduction of Safe Packaging	27,242,122.75	
- Awareness Creation for PHI	-	912,317.32
	34,677,858.73	31,942,987.03

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
NOTES TO THE FINANCIAL STATEMENTS

		2019	2018
		(Rs.)	(Rs.)
Other Projects			
- NSF		-	35,000.00
Reciepts for Enter. SL Anuradha		128,428.51	-
Reciepts for Enter. SL Jaffna		279,238.36	-
		407,666.87	35,000.00
		38,792,448.09	35,067,444.60
8 Amortization of Capital Grants		26,334,537.85	27,020,326.74
9 Self Generated Income			
Machinery Sales Parboiling Vessels	9.1	44,044.00	(57,346.93)
Hostel Income - Accomodation	9.2	2,861,105.00	4,183,865.00
Hostel Income - Food & Beverage	9.3	1,127,378.13	2,886,614.14
Training Program	9.4	621,857.77	488,674.62
Consultancy fees	9.5	(332,180.00)	2,129,095.15
NVQ & Machinery Certificate Training Course	9.6	28,700.00	(15,969.50)
Receipts From Foreign Students		-	776,112.31
Auditorium fees		1,816,700.00	2,344,800.00
Sale of Publications		17,000.00	22,100.00
QC Certification of Fruits		442,265.00	459,714.00
Income from Laboratory Services		429,225.00	320,200.00
		7,056,094.90	13,537,858.79
10 Other Income			
Interest Income	10.1	3,249,390.49	3,876,197.39
House Rent		334,150.00	343,550.00
General Income		587,463.09	1,454,888.63
No Pay		110,708.56	100,316.35
Fines		6,399.99	45,013.44
Late Charges		507,940.21	461,179.59
		4,796,052.34	6,281,145.40

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
NOTES TO THE FINANCIAL STATEMENTS

	2019 (Rs.)	(Rs.)
9.1 Machinery Manufacturing Trading Account		
Machinery Sales Parboiling Vessels		484,484.00
Opening Stock as at 1.1.2019	-	
Add: Purchases	1,401,125.00	
	1,401,125.00	
Closing Stock as at 31.12.2019	960,685.00	
Machinery Cost of Sales C/F		<u>440,440.00</u>
Gross Profit		44,044.00
		2019 (Rs.)
9.2 Hostel Income - Accomodation		
Income		2,861,105.00
Expenditure		<u>-</u>
		2,861,105.00
9.3 Hostel Income - Food & Beverage		
Income		3,644,398.00
Expenditure		<u>2,517,019.87</u>
		1,127,378.13
9.4 Training Program		
Income		801,380.00
Expenditure		<u>179,522.23</u>
		621,857.77
9.5 Consultancy fees		
Income		351,560.00
Expenditure		<u>683,740.00</u>
		(332,180.00)
9.6 NVQ & Machinery Certificate Course		
Income		28,700.00
Expenses		<u>-</u>
		28,700.00

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
NOTES TO THE FINANCIAL STATEMENTS

	2019 (Rs.)	(Rs.)
10.1 Interest Income		
NSB 1-0005-04-9129-2 A/pura	33,759.78	
NSB 1-0001-07-3208-7 Kollu	138,972.03	
NSB 2-0001-21-28187 Kollu	1,030,358.90	
NSB 2-0001-21-28195 Kollu	1,030,358.90	
NSB 2-0001-21-28179 Kollu	742,191.78	2,975,641.39
With Holding Tax		
NSB 1-0005-04-9129-2 A/pura	1,687.98	
NSB 1-0001-07-3208-7 Kollu	6,948.60	
NSB 2-0001-21-28187 Kollu	51,517.94	
NSB 2-0001-21-28195 Kollu	51,517.95	
NSB 2-0001-21-28179 Kollu	37,109.59	148,782.06
Bank Net Interest Income		2,826,859.33
Interest Income Other		
Special advance Interest	10,085.16	
Distress Loan Interest	378,377.70	
Special Loan Interest	34,068.30	422,531.16
		3,249,390.49

EXPENSES

	2019 (Rs.)	2018 (Rs.)
11 Wages,salaries and employee benefits		
Salaries & Wages - Permanent staff	54,423,246.99	55,385,289.80
Casual staff	4,236,765.61	3,664,603.81
E.P.F.	8,258,890.72	8,188,375.74
E.T.F.	2,064,722.75	2,047,094.05
Cost of Living	12,543,260.07	13,107,740.00
Professional Allowance	2,433,833.33	2,547,000.00
Overtime and Holiday Pay	3,892,827.20	4,533,126.71
Other allowance	254,000.00	383,200.00
Research Allowances	2,897,082.90	356,152.65
Incentives	-	588,667.81
Gratuity	4,348,293.04	4,715,610.45
	95,352,922.61	95,516,861.02

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
NOTES TO THE FINANCIAL STATEMENTS

	2019	2018
	(Rs.)	(Rs.)
12 Supplies and consumables used		
Printing and Stationery	1,091,760.61	1,918,591.84
Office Needs & Sundry expenses	1,945,146.51	2,037,766.34
Consumable for Research projects	110,671.95	22,761.70
Consumable for Laboratory	75,231.00	896,256.81
Lab Equipment Maintenance	141,330.60	1,418,134.00
Safety Measures	1,400.00	450.00
Running expenses of Hostel and kitchen	975,957.74	1,102,252.23
Research Projects		159,355.18
Running expenses vehicles	4,549,019.42	6,512,325.23
Vehicles maintenance	2,879,639.72	4,026,354.90
Buildings Maintenance	869,705.72	6,092,687.85
Machinery Maintenance	800,537.70	1,087,530.66
	13,440,400.97	25,274,466.74
		Page No.17
13 Depreciation		
Buildings	3,349,243.99	3,183,373.06
Plant & Machinery	3,091,597.10	466,805.71
Office Equipment	370,618.86	413,577.82
Laboratory & Research Equipment	12,615,770.31	8,322,112.29
Other Equipment	5,131,206.76	3,984,612.88
Furniture & Fittings	773,870.29	844,272.26
Electric & Other Fittings	53,122.68	53,673.70
Computer & Accessories	1,352,383.75	1,622,358.13
Telephone & Fittings	-	10,536.30
Library Books	108,446.93	103,504.60
Vehicles	7,963,000.00	7,963,000.00
Software	52,500.00	52,500.00
	34,861,760.67	27,020,326.74
14 Other Expenses		
Traveling expenses-Domestic	1,098,383.73	1,139,513.10
Traveling expenses-Foreign	1,515,341.17	1,434,725.82
Staff tea	908,456.00	668,644.50
Periodicals, journals and news papers	108,478.75	300,466.50
Seminars	7,500.00	121,829.00
Training Programs	109,364.85	-
Entertainment	441,681.58	887,266.00
Contract Labour	169,800.00	361,789.75
Welfare	9,813.50	-
Insurance and licenses	624,460.83	488,535.29
Telecommunication	2,755,259.46	2,988,760.74
Postal charges	164,697.00	161,807.00
Electricity	2,615,255.83	2,316,268.76
Water,	1,363,991.23	1,087,442.39
Rent	4,770,650.00	6,103,080.00
	16,663,133.93	18,060,128.85

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
NOTES TO THE FINANCIAL STATEMENTS

	2019	2018
	(Rs.)	(Rs.)
Lease rental for vehicles	16,663,133.93	18,060,128.85
Rates and Taxes	3,629,400.00	7,258,800.00
Exhibition	207,535.12	185,550.98
Publicity	148,575.77	339,960.94
Human Resources Development		242,506.25
Research Symposium	300,657.09	405,078.50
Audit fees		483,927.00
Leagal Charges	600,000.00	350,000.00
Uniform Allowances	140,375.00	-
Transport	631,900.00	-
Cleaning Service	224,260.00	207,760.00
Security Service		-
	3,638,800.00	2,703,700.00
	26,184,636.91	30,237,412.52

14.1 Assets Revaluation Loss

5,975,317.41

15 Project Expenses

MOA - For Research Projects

Freeze Drying & Vaccum Packaging	163,671.45	304,163.04
Post Harvest Diseases of Mango	344,385.25	458,465.52
Traditional Rice Varieties	163,193.10	337,512.53
Influence of pretreatments	136,712.60	362,021.94
Oil Extraction of nutmeg & cinn.	73,106.85	316,300.22
Tunne Type Forced air Cooler	120,338.67	133,500.06
Legum Based Granular bar	366,210.60	246,713.63
Fressze Prevention of Vegetables	79,738.00	249,402.85
A Case Study of Omaragolla Mango	228,558.40	141,202.00
Enha.quality & PH Life of Lotus	166,406.27	129,977.28
Low Cost Fruit Matu.Iden.Lns	158,767.50	236,152.00
Citronella Grass Leaf Extracts	34,256.75	84,422.40
Green Chillies	-	24,670.95
Edible Oil	-	64,953.15
Quality impro.of fresh leafly ve	152,973.14	
Mitigating Rice Stickiness	12,563.31	
Investigation of Nutritional	9,540.00	
Redu. of Post har. Loss Big Oni	62,050.00	
Dev. of Ready to Use Formulatio	100,470.00	
Enha. of Quality Characteristic	416,117.32	
Dev. of Heat Pump Dryer	59,404.00	
Eval. of the chemical residue.	559,086.27	
field Appli. of rice husk silic	147,639.04	
determination of energy output	20,897.00	
Economic evalua. of pricing str	130,836.97	
	3,706,922.49	3,089,457.57

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
NOTES TO THE FINANCIAL STATEMENTS

	2019 (Rs.)	2018 (Rs.)
MOA- Development Projects		
- Mango Project	104,950.00	4,700,887.79
- Supply chain	-	519,408.95
- Banana Project	509,700.00	9,479,505.07
- Papaya Project	570,200.00	10,263,656.31
- Guava Project	421,298.25	5,604,349.67
Receipts for Dstri.Net Work	-	164,971.67
Lab Updrading Project	1,293,790.60	297,890.25
Quality and Process Enhancement	4,535,797.13	
Introduction of Safe Packaging	27,242,122.75	
Awareness Creation for PHI	-	912,317.32
	34,677,858.73	31,942,987.03
Other Projects		
Expenses for NSF Project	-	35,000.00
Reciepts for Enter. SL Anuradha	128,428.51	-
Reciepts for Enter. SL Jaffna	279,238.36	-
	407,666.87	35,000.00
	38,792,448.09	35,067,444.60
 16 Finance Costs	 25,060.37	 22,603.37
	25,060.37	22,603.37

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
NOTES TO THE FINANCIAL STATEMENTS

17. Property Plant and Equipments

Description	Building	Plant & Machinery	Office Equipment	Lab. & Research Equipment	Other Equipment	Furniture	Electric & Other Fittings	Library Books	Computer & Accessories	Telephone & Fittings	Vehicles	Software	Rs.	
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Total
Balance at the beginning of the period	132,583,937.15	56,943,847.08	6,359,585.65	100,807,997.12	40,098,214.75	17,225,933.20	1,672,704.37	2,155,603.55	13,377,583.56	504,047.66	39,815,000.00	-	411,544,454.09	
Adjustments to Opening Balance	784,154.64		576,863.60	(2,887.50)	(608,050.75)		121,400.00		11,302.50	-	-		882,782.49	
Additions during the year	5,850,682.53	202,575.00	52,135.00	15,436,184.95	7,629,223.75	54,280.00	141,266.83	378,623.26	62,000.00	-	-	262,500.00	30,069,471.32	
Revaluation		14,807,870.00	1,091,850.00	53,635,586.14	10,378,741.13		123,930.00		2,794,610.00	-	-		82,832,587.27	
Written off during the year		55,846,191.08	4,758,258.50	97,354,763.82	16,564,802.50		1,652,004.37		10,798,761.06	504,047.66			187,478,828.90	
Balance at the end of the year	139,218,774.32	16,108,101.00	3,322,175.75	72,522,116.89	40,933,326.38	17,280,213.20	407,296.83	2,534,226.81	5,446,735.00	-	39,815,000.00	262,500.00	337,850,466.18	
Accumulated depreciation														
Balance at the beginning of the year	53,927,135.77	52,821,330.96	3,754,137.01	50,337,184.55	6,400,228.86	11,710,929.09	1,421,300.79	1,553,512.99	10,565,226.65	494,577.65	7,963,000.00	52,500.00	201,001,064.32	
Adjustments to Opening Balance	19,603.87	2,604,533.89	(48,172.47)	2,750,039.52	383,671.50		(14,677.70)		(376,174.38)	-			5,418,824.23	
Charge for the year	3,349,243.99	3,091,597.10	370,618.86	12,615,770.31	5,131,206.76	773,870.29	53,122.68	108,446.93	1,352,383.75	-	7,963,000.00	52,500.00	34,861,760.67	
Written off during the year		52,354,525.25	3,340,559.19	42,015,072.26	2,415,615.98		1,362,627.09		8,942,868.52	494,577.65			110,925,845.94	
balance at the end of the year	57,295,983.63	6,162,936.70	736,024.21	23,687,922.12	9,499,491.14	12,484,799.38	97,118.68	1,661,959.92	2,698,567.50	-	15,926,000.00	105,000.00	130,355,803.28	
Carrying value as at 31st December 2019	81,922,790.69	9,945,164.30	2,586,151.54	48,834,194.77	31,433,835.24	4,795,413.82	310,178.15	872,266.89	2,748,167.50	-	23,889,000.00	157,500.00	207,494,662.90	

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
NOTES TO THE FINANCIAL STATEMENTS

	2019	2018
	(Rs.)	(Rs.)
18 Investments - Deposits		
National Saving Bank 2- 0001- 21-28195 -Kollupitiya	10,000,000.00	10,000,000.00
National Saving Bank 2- 0001- 21-28187 -Kollupitiya	10,000,000.00	10,000,000.00
National Saving Bank 2- 0001-21-28179 -Kollupitiya	-	10,000,000.00
	20,000,000.00	30,000,000.00
19 Other Non - Current Assets		
Distress Loan	13,334,056.52	8,831,982.45
Special Loan	1,008,610.79	892,283.16
	14,342,667.31	9,724,265.61
20 Cash & Cash Equivalents		
Bank of Ceylon - Torinton	9,030,171.51	5,530,171.51
People's Bank -Anuradhapura	11,225,879.21	3,171,927.26
National Saving Bank 1- 0005- 04-9129-2-Anuradhapura	861,466.61	829,394.81
National Saving Bank 1- 0001- 07-3208-7-Kollupitiya	5,689,373.60	2,564,850.17
	26,806,890.93	12,096,343.75
21 Receivables		
Debtors Control Account	489,577.39	489,577.39
Accrued Income	29,526,790.42	59,509,206.70
	30,016,367.81	59,998,784.09
21.1 Debtors Control Account		
Others	488,358.39	488,358.39
Sale -stole	1,219.00	1,219.00
	489,577.39	489,577.39
21.2 Receivables		
Accrued Income - General	777,397.67	5,158,863.09
Income Recievable	1,330,575.00	-
Income Recievable - Before 31/12/2018	79,010.00	-
Receivables for Mahaweli	504,800.00	504,800.00
Receivables for NSF		190,000.00
- Receivables for Research Projects	1,754,500.17	-
- Receivable for Supply & Value Chain		6,364,408.95
- Receivable for Mango Project		2,074,156.44
- Receivable for Guava Project		6,132,374.67
- Receivable for Papaya Project		14,867,806.81
- Receivable for Banana Project		17,983,252.02
- Receivable for Research Project		2,934,526.56
- Receivable for Lab Upgrading Project		3,299,018.16
- Receivable for Acc In - Qua. & Process En	3,125,553.75	-
- Receivable for Acc. In. - Safe Packaging	21,954,953.83	-
	29,526,790.42	59,509,206.70

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
NOTES TO THE FINANCIAL STATEMENTS

	2019	2018
	(Rs.)	(Rs.)
22 Inventories		
Stores -Paddy		
Research projects	101,500.00	101,500.00
Machinery - Raw material	79,837.00	62,975.07
Machinery	125,395.00	125,395.00
- Generator	151,840.98	131,111.48
Stationary Stock	264,352.00	332,359.11
Consumable Stock	73,749.00	201,105.24
Chemical Stock	3,013,945.00	
Parboiling Vessels Stock	960,685.00	
	4,771,303.98	954,445.90
23 Advances		
Festival	36,250.00	40,000.00
Traveling	33,138.90	33,138.90
Special Advance	10,900.00	4,800.00
Interim Advance	88,187.50	49,750.00
Interim Advance - Head Office	17,106.60	17,106.60
Petty Cash Advance	-	23,000.00
	185,583.00	167,795.50
24 Other current assets		
Services	675.00	675.00
House Rent Deposit	431,250.00	950,000.00
Work in Progress	-	930,492.51
Salary Over Paid	-	92,819.46
Cash Transfer Control A/C	1,500,000.00	
	1,931,925.00	1,973,986.97
25 Equity		
Initiate Capital	69,907,594.42	69,907,594.42
Government Grant	8,368,214.00	8,368,214.00
Foreign Loan	72,750,229.02	72,750,229.02
General Fund - Capital	101,772,730.74	131,636,167.28
Assets Revaluation Surplus - Vehicle	34,702,988.00	34,702,988.00
Assets Revaluation Surplus - Plant & Machinery	11,316,204.17	
Assets Revaluation Surplus - Computer	938,717.46	
Accumulated Surplus / (Deficit)	(79,166,491.33)	(98,340,039.30)
	220,590,186.48	219,025,153.42
26 Provision For Gratuity Fund		
Gratuity fund	32,982,464.34	29,144,228.80
	32,982,464.34	29,144,228.80

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
NOTES TO THE FINANCIAL STATEMENTS

		2019 (Rs.)	2018 (Rs.)
Current Liabilities			
27 Payables			
Advances	27.1	2,115,710.61	1,902,113.24
Accrued Expenses	27.2	35,046,624.21	64,170,364.55
Deposits	27.3	409,250.00	443,250.00
Retention	27.4	1,423,400.62	1,055,898.38
Creditors Control Account	27.5	12,385,409.04	9,593,877.58
Reciepts in advance	27.6	596,355.63	386,625.63
		51,976,750.11	77,552,129.38
27.1 Advances - Suspense Account - General			
- EPF		201,090.56	201,090.56
- ETF		1,258,754.91	1,212,618.88
- Stamp Fees		171,648.46	165,357.14
- Payee/WHT		9,550.00	10,025.00
Special Salary Advance		169,918.51	303,612.48
Salary Control A/C		9,409.18	9,409.18
		295,338.99	
		2,115,710.61	1,902,113.24
27.2 Accrued Expenses -Accrued Tax for Interest			
-Accrued Expenses- General		78,251.60	95,606.12
-Provisions for Audit Expenses		5,872,804.72	19,763,790.09
-Head Office creditor		1,200,000.00	
- Payable for Wap Magula Event		130.00	130.00
- Payable for NSF Project			-
- Payable for Organic Method			213,384.11
- Payable for Supply & Value Chain			-
- Payable for Mango Project			33,250.00
- Payable for Guava Project			1,690,899.42
- Payable for Papaya Project			5,954,027.92
- Payable for Banana Project			12,750,079.51
- payables for Lab Upgrading Project			17,842,036.37
- Payables for Research Projects			3,299,018.16
Payables for Quality Control		1,171,250.33	2,528,142.85
Payables for Safe Packaging		3,112,203.75	
Other Payables		21,772,748.72	
		1,839,235.09	
		35,046,624.21	64,170,364.55
27.3 Deposits			
Tender - R&D		409,250.00	443,250.00
		409,250.00	443,250.00
27.4 Retention			
Contract Works		1,129,116.88	761,614.64
Cancelled cheques		155,011.74	155,011.74
Regional Economic Advancement Project 2 -Matale		139,272.00	139,272.00
		1,423,400.62	1,055,898.38

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
NOTES TO THE FINANCIAL STATEMENTS

	2019	2018
	(Rs.)	(Rs.)
27.5 Creditors Control Acc. Other creditors - Various products	329,295.00	329,295.00
Plastic crates-Fund - Before 31/12/2018	16,500.00	16,500.00
New Plastic Creates Fund	7,628,130.00	
Paboling Vassals-Fund	4,318,284.04	4,318,284.04
Noodles Plant Sale	-	3,058,500.00
Bond Recovery	93,200.00	1,871,298.54
	12,385,409.04	9,593,877.58
27.6 Reciepts in Advance		
Reciepts in advance - Deyata kirula	285,486.80	285,486.80
Reciepts in advance - Saarc	101,138.83	101,138.83
Reciepts in advance - Training Programs	209,730.00	
	596,355.63	386,625.63

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
NOTES TO THE FINANCIAL STATEMENTS

		2019 (Rs.)	2018 (Rs.)
28 Effect to Cash flow from Adjustments of Accumilated Surplus			
Cash flow increase due to adjustments to Accumilated Surplus		1,582,657.18	6,110,060.45
29 Payables			
Advances	27.1	2,115,710.61	2,130,036.42
Accrued Expenses	27.2	35,046,624.21	64,417,565.77
Deposits	27.3	409,250.00	443,250.00
Retention	27.4	1,423,400.62	1,443,952.59
Creditors Control Account	27.5	12,385,409.04	9,593,877.58
Reciepts in advance	27.6	596,355.63	386,625.63
		51,976,750.11	78,415,307.99
Balance as at 1.1.2019		78,415,307.99	65,328,092.46
Less : Balance as at 31.12.2019		51,976,750.11	59,356,296.78
Increase / (Decrease) Liabilities		(26,438,557.88)	(5,971,795.68)
30 Non- Current Liabilities			
Provision For Gratuity Fund			
Balance as at 1.1.2019	26	29,144,228.80	33,945,662.45
Less : Balance as at 31.12.2019		32,982,464.34	29,144,228.80
Increase / (Decrease) Liabilities		3,838,235.54	(4,801,433.65)
31 Current Assets			
Stocks	22	4,771,303.98	954,445.90
Advances	23	185,583.00	167,795.50
Other Current Assets	24	1,931,925.00	1,973,986.97
Debtors Control Account	21.1	489,577.39	489,577.39
Accrued Income	21.2	29,526,790.42	59,509,206.70
		36,905,179.79	63,095,012.46
Balance as at 1.1.2019		63,095,012.46	51,964,186.57
Less : Balance as at 31.12.2019		36,905,179.79	39,158,327.05
Increase / Decrease Current Assets		26,189,832.67	(12,805,859.52)
32 Property,Plant and Equipment			
Additions during the year		30,069,471.32	46,793,879.69
Asset Revalued Amount		-	-
Less :-Assets acquired on credit basis		(811,773.84)	(18,195,832.60)
Assets acquired on cash basis		29,257,697.48	28,598,047.09

NATIONAL INSTITUTE OF POST HARVEST MANAGEMENT
NOTES TO THE FINANCIAL STATEMENTS

	2019	2018
	(Rs.)	(Rs.)
33 Investment - Deposits		
National Saving Bank 2- 0001- 21-28195 -Kollupitiya	10,000,000.00	10,000,000.00
National Saving Bank 2- 0001- 21-28187 -Kollupitiya	10,000,000.00	10,000,000.00
National Saving Bank 2- 0001-21-28179 -Kollupitiya	-	10,000,000.00
	20,000,000.00	30,000,000.00
Distress Loan	13,334,056.52	8,831,982.45
Special Loan	1,008,610.79	892,283.16
	14,342,667.31	9,724,265.61
Total Non - Current Assets	34,342,667.31	39,724,265.61
Balance as at 1.1.2019	39,724,265.61	39,623,647.67
Less : Balance as at 31.12.2019	34,342,667.31	39,724,265.61
Increase / Decrease Non Current Assets	5,381,598.30	100,617.94
34 Capital Fund	38,439,016.22	43,966,022.23
Less :- Fund Receivables	(373,663.75)	(23,936,685.41)
	38,065,352.47	20,029,336.82
35 Cash & Cash equivalents at the beginning of period		
Cash at Bank		
Bank of Ceylon - Torinton	5,530,171.51	4,780,171.51
People's Bank -Anuradhapura	3,171,927.26	13,215,927.11
Patty Cash	-	5,000.00
National Saving Bank 1- 0005- 04-9129-2-Anuradhapura	829,394.81	798,133.30
National Saving Bank 1- 0001- 07-3208-7-Kollupitiya	2,564,850.17	9,062,621.68
Cash & Cash equivalents as at 01.01.2019	12,096,343.75	27,861,853.60
36 Cash & Cash equivalents at the ending of period		
Cash at Bank		
Bank of Ceylon - Torinton	9,030,171.51	5,530,171.51
People's Bank -Anuradhapura	11,225,879.21	3,171,927.26
National Saving Bank 1- 0005- 04-9129-2-Anuradhapura	861,466.61	829,394.81
National Saving Bank 1- 0001- 07-3208-7-Kollupitiya	5,689,373.60	2,564,850.17
Cash & Cash equivalents as at 31.12.2019	26,806,890.93	12,096,343.75
37 That plastic crates given to farmers traders and collectors at 50% subsidy for promote packaging methods to transportation reduction to Post Harvest Losses in Fruits and Vegetables That stock not yet given to them Plastic crate stock 2019.12.31 at Cost		
Old Stock (Before 31/12/2018)		177,463.10
New Stock (From 01/01/2019)		726,363.00
38 The initiate Capitals of the INSTITUTE OF POST HARVEST TECHNOLOGY shown Rs 500,000,000.00		
39 Capital Grants recognised as amortization of deferred income on systematic basis over 7 years . Previous years adjustments were done through accumulated surplus account. Current year adjustment was done against profit or loss.		

Chairman
National Institute of Post Harvest Management

Report of the Auditor General on the Financial Statements and Other Legal and Regulatory Requirements of the National Institute of Post Harvest Management for the year ended 31 December 2019 in terms of Section 12 of the National Audit Act, No. 19 of 2018.

1. Financial Statements

1.1 Opinion

The audit of the financial statements of the National Institute of Post Harvest Management for the year ended 31 December 2019 comprising the statement of financial position as at 31 December 2019 and the statement of financial performance, statement of changes in equity and the cash flow statement for the year then ended, and the notes in relation with the financial statements, including a summary of significant accounting policies was carried out under my direction in pursuance of provisions in Article 154 (1) of the Constitution of the Democratic Socialist Republic of Sri Lanka read in conjunction with provisions of the National Audit Act No. 19 of 2018 and Finance Act No. 38 of 1971. My report to Parliament in pursuance of provisions in Article 154 (6) of the Constitution will be tabled in due course.

In my opinion, the accompanying financial statements give a true and fair view of the financial position of the National Institute of Post Harvest Management as at 31 December 2019 and of its financial performance and its cash flows for the year then ended in accordance with Sri Lanka Public Sector Accounting Standards.

1.2 Basis for Qualified Opinion

I conducted my audit in accordance with Sri Lanka Auditing Standards (SLAuSSs). My responsibilities, under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of my report. I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my opinion.

1.3 Responsibilities of Management and Those Charged with Governance for the Financial Statements

Management is responsible for the preparation of financial statements that give a true and fair view in accordance with Sri Lanka Public Sector Accounting Standards, and for such internal control as Management determine is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, Management is responsible for assessing the Institute's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless Management either intends to liquidate the Institute or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Institute's financial reporting process.

As per Section 16(1) of the National Audit Act No. 19 of 2018, it is required to maintain proper books and records of all its income, expenditure, assets and liabilities, to enable annual and periodic financial statements to be prepared of the Institute.

1.4 Auditor's Responsibilities for the Audit of the Financial Statements

My objective is to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes my opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Sri Lanka Auditing Standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with Sri Lanka Auditing Standards, I exercise professional judgment and maintain professional scepticism throughout the audit. I also:

- Identifying and assessing the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for my opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.

- Though an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances was obtained, it was not for the purpose of expressing an opinion on the effectiveness of the Institute's internal control.
- Evaluated the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the Management.
- Concluded on the appropriateness of the Management's use of the going concern basis of accounting and based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Institute's ability to continue as a going concern. If I conclude that a material uncertainty exists, I am required to draw attention in my auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify my opinion. However, future events or conditions may cause to cease to continue as a going concern.
- Evaluated the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

I communicated with those charged with governance regarding, among other matters, significant audit findings, including any significant deficiencies in internal control that I identify during my audit.

2. Report on Other Legal and Regulatory Requirements

Specific provisions for following requirements are included in the National Audit Act, No. 19 of 2018 .

- I have obtained all the information and explanation that required for the audit and as far as appears from my examination, proper accounting records had been kept by the Institute as per the requirement of Section 12 (a) of the National Audit Act, No. 19 of 2018.
- The financial statements presented by the Institute is consistent with the preceding year as per the requirement of Section 6 (1) (d) (III) of the National Audit Act, No. 19 of 2018 .
- The financial statements presented includes all the recommendations made by me in the previous year as per the requirement of Section 6 (I) (d) (iv) of the National Audit Act, No. 19 of 2018 .

Based on the procedures performed and evidence obtained were limited to matters that are material, nothing has come to my attention to make declaration on following;

- to state that any member of the governing body of the Institute has any direct or indirect interest in any contract entered into by the Institute which are out of the normal cause of business as per the requirement of Section 12 (d) of the National Audit Act, No. 19 of 2018 .
- to state that the Institute has not complied with any applicable written law, general and special directions issued by the governing body of the Institute as per the requirement of Section 12 (f) of the National Audit Act, No. 19 of 2018 except for the observations appear below;

	Reference to Laws , Rules Directives -----	Description -----
(a)	Establishments Code of the Democratic Socialist Republic of Sri Lanka	
	Paragraph 13.2 of Chapter II	It had been revealed that a management assistant who had employed in the Accounting Division of the Institute had changed the documents and made a fraud of Rs.787,932 in February 2019 and an investigating officer had been appointed at the same time for preliminary investigations. As a result it had not been mentioned in the letter of appointment that the period of the completion of preliminary investigation, the Preliminary Investigation Report had not been submitted to the Institute even by 30 September 2020 .

(b)	Public Finance Circular No. 2015/01 dated 14 July 2015	Although the advances should be settled within 10 days of the completion of the relative task, the advances obtained by 21 officers at 35 occasions had been settled in delay in a period ranging from 01 days to 135 days.
(c)	Paragraph 11 of the Management Services Circular No. 03/ 2018 of 18 July 2018	Eleven employees had been recruited in September 2018 on the approval of the Governing Council in contrary to the Circular provisions and a sum of Rs. 1,459,978 had been paid as salaries for them from the funds of the Institute by 31 December 2019 .

- to state that it had not performed according to Institute's powers, functions and duties as per the requirement of Section 12 (g) of the National Audit Act, No. 19 of 2018 .
- to state that the resources of the Institute had not been procured and utilized economically, efficiently and effectively within the time frames and in compliance with the applicable laws as per the requirement of Section 12 (h) of the National Audit Act, No. 19 of 2018 .

3. Other Audit Observations

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- (a) Actions had not been taken to completely pay off 11 unsettled balances totalled to Rs. 2,520,053 that had remained ranging from the year 2011 to 2018 or to take into income in accordance with Financial Regulations.
 - (b) Despite 3,007,000 stickers that had been purchased in the year 2017 for pasting on mangoes when the mango harvest issued to the market under the Mango Project had remained at the beginning of the year under review, as a result of the purchase of a stock of 200,000 stickers again in the year under review, a number of 3,105,000 stickers valued at Rs. 841,900 had remained in the stores by the end of the year . It was observed that the most of the stickers out of that were unusable.
 - (c) A number of 100 Gps Trackers units incurring a sum of Rs. 1,290,000 and 130 tempered data loggers incurring a sum of Rs. 4,680,000 had been purchased in the year 2018 for the Supply and Value Chain Management Project

on Agricultural Crops in Sri Lanka which had been planned to be implemented from 2017 to 2019 . Even though the Project was scheduled to be completed in the year 2019 , 98 Gps Trackers units and 70 tempered data loggers had remained in the stores even by 25 January 2020 . As a result of the relevant equipment had not been used effectively, the amount of Rs. 7,292,332 spent on this Project had become an uneconomic expense.

- (d) Even though a sum of Rs. 9,572,715 had been spent on obtaining a patent for the invention of induction of fruit ripening by organic method, which was implemented from the year 2016 to August 2019 and for the dissemination of the research results in commercial level, the Project was not at operational level even by 30 August 2019 .
- (e) A number of 500 sample tests had been had been carried out incurring a sum of Rs. 1,956,120 in the year 2017 for the Project that was launched to test whether there were 04 heavy metals included in 07 foods import under the National Food Production Programme using the provisions of the Ministry of Agriculture. According to the Project Report , it had been ascertained that some foods were found to contain heavy metals such as cadmium, arsenic and leaf, exceeding the maximum safety level. Nevertheless, the money spent on research had become a useless expenditure , as a result of failure to provide information to all responsible parties to take appropriate action in this regard by conducting further testing by the Institute on heavy metal content foods based on the conclusions and suggestions of the report.
- (f) Although the Institute had obtained Patents for 08 new inventions as the result of its researches carried out since 2009 and due to the fact that the non – submission of any information to audit to confirm the contribution of these new discoveries to the economy of the country through the field of agriculture and post- harvest, it was observed that the results of the researches were limited only to obtain Patents.
- (g) Although the Gas Chromatograph Mass Spectrometer (CGMS) machine which had been purchased in the year 2015 for Rs. 15,216,575 for laboratory researches has been maintaining in a full air conditioning atmosphere by incurring a maintenance cost of Rs. 275,000 in a year , it had remained in idle even by November 2020, without using for any purpose.

W.P.C Wickramarathne
Auditor General