

# External Review Report of the Palmyrah Research Institute

*(including a synopsis of the governing  
Palmyrah Development Board)*



**August 2018**

**Prepared for the  
Sri Lanka Council for Agricultural Research Policy**



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## Prologue

The Palmyrah Research Institute (PRI) Review Team made its initial visit to PRI at Kandy Road, Kaithady, Jaffna on 10th April 2018 for a preliminary discussion with key research staff. The senior researchers and two junior researchers presented an overview of the organization, existing research focus and outcome. Palmyrah development and technology dissemination appeared distant from PRI emphasis.

The reviewers thereafter understood that the PRI exists as an integral component of the larger statutory organization, the Palmyrah Development Board (PDB) which controls administration, finance and oversee the research programmes of the PRI. Therefore, the reviewers in consultation and concurrence with the Chairman, Sri Lanka Council for Agricultural Research Policy (SLCARP) decided to differ from the given Terms of Reference to include a brief review of the PDB. The additional commitment by the 3-member team is voluntary for the enhancement of the report.

The report contains important recommendations for improvement of both PDB and PRI.

**Cover Photo: A young Palmyrah Tree growing happily in front of the Palmyrah Research Institute, Kandy Road, Kaithady, Jaffna. Photographed by Dr. Canute De Silva-11<sup>th</sup> April 2018**



## **ACKNOWLEDGEMENTS**

The review team gratefully acknowledges the Sri Lanka Council for Agricultural Research Policy (SLCARP), in particular its Chairman Dr. S.B.D.G. Jayawardena and Secretary/Director Dr. Hemantha Wijewardena for nominating them to conduct this review. Dr. Frank Niranjana of SLCARP was always at hand providing logistic support for this review and coordinating the long trips to Jaffna, and the team appreciates his courteous services.

The review team wishes to thank many officers who welcomed us at both the Palmyrah Development Board (PDB) and Palmyrah Research Institute (PRI), Jaffna and coordinated discussions and arranged meetings and visits sharing information and data to fulfill the task given to us. The assistance from Dr. R. Sivasangar, Chairman of the Palmyrah Development Board, Mr. M.B. Loganathan, General Manager of PDB and Mrs. S. Janarthanan, Manager (Research and Quality Control) of the PRI is especially acknowledged. The assistance and cordiality extended to the team by PRI research officers, Mrs. Mahirajan Subaini and Mr. Vinujan Shanmugalingam is greatly appreciated.

The Team appreciates the assistance given by all members of the PDB Board of Directors. Many thanks are due to various organizations involved in Palmyrah product development such as Toddy Tappers, Toddy Bottlers, and Handicraft training facilities, jaggery and pulp product manufacturers and Katpaham sales staff for their cordiality.



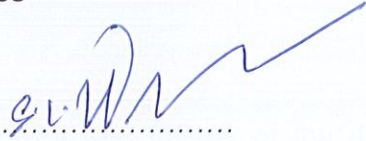
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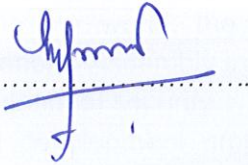
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## A. THE REVIEW

### 1. Introduction and Background

The Sri Lanka Council for Agricultural Research Policy (SLCARP), the apex organization for directing agricultural research in the country was established under the Ministry of Agriculture in 1987 and has been mandated to review the institutes of the National Agricultural Research System (NARS) at regular intervals to assess their performance and suggest improvements to ensure that agricultural research, development and innovations are directed towards national development goals through policy formulation, facilitation, coordination, monitoring and evaluation and impact assessment.

Other objectives of these external reviews are:

- To assess the quality, cost effectiveness, relevance and impact of the scientific programs carried out by the institute to ensure that funds allocated are effectively utilized to address the sector needs.
- To assess the appropriateness of the research agenda of the institute to meet the emerging future challenges, particularly with the view of achieving Sustainable Development Goals (SDGs) (SDGs: Transforming our world: the 2030 agenda for sustainable development adopted by the UN General Assembly in September 2015) and the national targets for ensuring food and nutritional security.
- To examine all aspects of the research and development programs, extension, advisory consultancy and other services offered by the institute and their effectiveness, impact and timeliness to the stakeholders.
- To identify the deficiencies and shortcomings in the procedures adopted in recognizing the research needs of the sector by the institute and
- To provide advice and guidance on effective planning and implementing of future programs of the institute.
- To make recommendations with regard to their priorities and funding to the Ministry of the Minister in charge of the subject of Finance and Planning.
- To make recommendations to the appropriate authorities on the financial, manpower and physical resources required by agricultural research institutions and



establishments and on the terms and conditions of service of the staff of such institutions and establishments.

## 2. The Review Team and the Review Process

SLCARP conducted a special briefing session for all review teams selected for reviewing several government research organizations. The Chairman explaining the value of the reviews and expected outcomes stressed on comprehensive recommendations for institutional reform and development. The open forum discussion led to amendments to draft TORs already prepared to include verifiable research outputs that would be of significance to the public.

SLCARP has appointed three consultants, Dr. Sarath L. Weerasena (team leader) and Dr. Canute De Silva (team member) and Mr. Siriweera Gamage (team member) to carry out the external review of the PRI.

The Terms of Reference (TOR) for the review is given in Annex 1.

On the first visit to PRI, on April 10<sup>th</sup>, 2018, the review team realized that PRI is a vital but somewhat veiled component of the statutory Palmyrah Development Board. Of the seven managers of important programmes of the PDB, the Manager (Research and Quality Control) is the one assigned to head PRI activities. It was realized that review of the PRI alone would be insufficient to understand the role played by the PDB in the policies, activities and R&D programmes of the PRI. PRI exists as an integral component of the broad structure of the PDB.

Therefore, the review team in consultation with the Chairman of SLCARP included the PDB for a synoptic review as well. A meeting was held with the Chairman of PDB in Jaffna the same day afternoon for an initial briefing. Both PDB and PRI were reviewed exclusively and mutually.

This review report may thus be considered as a composite review of the Palmyrah research and development efforts in the country.

Data and information gathering was performed by interviews, discussions, review of records publications and observations using the principles of SWOT analysis. This approach of review is very effective and has the advantage of each item-wise deliberation looking for performance achievements or shortfalls and discussing implementable remedial measures at the same time. Thus, the whole assignment was completed successfully with few visits and working days. A specific workshop to elicit a formal SWOT analysis table and to draw up remedial measures thereafter would have taken impractically long time and intricate logistics and strained the institution to arrive at the same output. The PDB and the PRI can follow up this review as the analysis is complete to the extent possible and is reasonably holistic.

Reviewers considered the following documents submitted by the PDB and PRI in addition to personal interview of PDB staff, PRI staff, few retailers, few civilians in mainland and in an island.

- (a) A successful year in review – 2017, published by the PDB.



- (b) Corporate development Plan 2018-2022 of the PDB.
- (c) Enhancement of Palmyrah industry through research -2016, by PRI/PDB.
- (d) SLAB-accredited PRI and its programs after rehabilitation and re-opening in 2012.
- (e) The CVs of research staff
- (f) Write up on Palmyrah international symposium
- (g) Brochures on PRI activities
- (h) TOR of the Research Management Committee
- (i) Outcomes of last five years:-handout

## **B. THE PALMYRAH DEVELOPMENT BOARD**

Palmyrah has been in existence for many centuries, especially in the north and eastern areas of Sri Lanka's landscape and is knitted with the social, economic and cultural heritage of the people. All parts of the plant, leaves, fronds, roots, stems, nuts, sap, fruit pulp and seedling tubers are used by human beings. Parts of the plant, sap, etc. is processed for general consumption and for medicinal purposes. The products are numerous and the economic potential is enormous to improve the livelihood of those engaged in crop culture and industrial processing. Its value added products are in demand locally and in foreign lands. The demand is increasing due to the efforts of PDB and PRI scientists including extension scientists.

### **1. Brief History of Palmyrah Development Board**

The Palmyrah Development Board had been constituted in 1978 under the Ministry of Plantation Industries through gazette notification of August 18<sup>th</sup> 1978 in terms of Amendment number 24 of 1975 to the Sri Lanka Coconut Development Act number 46 of 1971, to carry out all functions in relation to Palmyrah plantations.

It is a comprehensive coverage of assignments which includes establishment and conduct of Palmyrah research and all related development activities.

The first schedule of functions in the gazette has provided for the PDB to perform the following.

- a. The conducting and furtherance of scientific research in respect of the growth and cultivation of Palmyrah palms, the growing of other crops and the engagement of animal husbandry in Palmyrah plantations and the prevention and cure of diseases and pests;
- b. The establishment and maintenance of research institutes, experimental stations and nurseries;
- c. The conducting of furtherance of scientific research in connection with the processing and utilization of Palmyrah products;
- d. The establishment and maintenance of pilot plants for the processing of Palmyrah products, and the fabrication of experimental processing equipment;
- e. The training of advisory and extension workers to assist the Palmyrah industry;
- f. The guiding and advising of the Palmyrah industry on all matters of a technical nature;



- g. The development and assistance in the development of the productivity of land in Palmyrah plantations;
- h. The cultivation and assistance in the promotion and regulation of the cultivation of land with Palmyrah;
- i. The identification of land in Palmyrah plantations suitable for inter-planting with the other crops and the promotion, direction carrying out assistance in the carrying out of inter-planting programmes on such land;
- j. The promotion and regulation of, assistance to and engagement in animal husbandry on land in Palmyrah plantations;
- k. The specification, popularization, promotion and direction of proper cultivation practices in respect of the growing of Palmyrah and other crops in Palmyrah plantations;
- l. The manufacture and assistance in the promotion and regulation of the manufacture of palm products;
- m. The promotion of new techniques in the processing of Palmyrah products;
- n. The promotion and direction of the modernization and assistance in increasing the efficiency of establishments manufacturing palm products;
- o. The prescription and maintenance of standards of quality of Palmyrah products manufactured in or exported from Sri Lanka;
- p. The purchase and sale, and the regulation of the purchase and sale of Palmyrah products and the formulation and implementation or assistance in the formulation and implementation of minimum and maximum price schemes and price stabilizing schemes for Palmyrah products in general and for small holders' Palmyrah products in particular;
- q. The export and import and the regulation of the export and import and the export price and the import price of Palmyrah products;
- r. The maintenance, promotion and creation of demand for Palmyrah products, both within and outside Sri Lanka by advertising by initiating, financing, supporting and supervising promotional work, by establishing, managing, supervising and supporting sales rooms and agencies by organizing, assisting and participating in exhibitions and fairs, and by any other means necessary for the purpose;
- s. The conducting of market research into all aspects of the transport and marketing of Palmyrah products within and outside Sri Lanka;
- t. The promotion of co-operative and collective forms of management and ownership of Palmyrah plantations and the establishments manufacturing or trading in Palmyrah products.



## 2. Vision and Mission of the PDB

The Stated Vision of the PDB is:

*“Develop the Palmyrah sector as a dynamic sector for livelihood development”*

The Stated Mission of the PDB is:

*“Develop, promote, popularize and regulate sustainable Palmyrah industry to be a significant contributor to the Gross domestic Product (GDP) of country”*

## 3. Objectives of the PDB

Given the natural and established wealth of over 11 million standing Palmyrah trees in the country and the legislative powers to develop the crop further for the improvement of the livelihood of the people involved and contribute to the GDP, the PDB has many responsibilities in hand. The objectives receiving current attention are as follows.

- i. Provide an organizational platform for utilization of Palmyrah for community upliftment. The crop offers many opportunities for value addition to its numerous products such as pulp, sap, fiber, leaves, roots, etc. which have been traditionally utilized by the communities.
- ii. Provide scientific base for sustainable development of the possible industries at micro, intermediate and macro industry levels.
- iii. Assist in crop conservation through available legal provisions and minimize felling of trees for timber extraction.
- iv. Promote strategic research and its application for high tech product development. Enormous opportunities and possibilities are available for production and marketing of quality, nutritionally superior Palmyrah products here and abroad that would boost utilization and livelihood improvement.
- v. Transfer of developed applied technologies to the Palmyrah stakeholders involved in value addition. This activity is challenging as the number of entrepreneurs involved in the process has expanded due to the increasing demand for health conscious consumers who value the hitherto hidden health-improving characteristics of the products.
- vi. To serve as a national repository for Palmyrah genetic resources and produce improved planting materials.
- vii. Optimize Palmyrah-based institutional development and strengthening. Many public and private entrepreneurs are investing in Palmyrah products and need technical backstopping and strengthening.
- viii. Develop Palmyrah crop and livestock integrated production systems.



- ix. Collate and disseminate technical information on Palmyrah for practical application.
- x. Popularize the use of food prepared from Palmyrah sap, and fruit pulp among consumers in Sri Lanka and foreign lands using the nutritional advantages of the products as a marketing tool in order to create a higher market demand.
- xi. Promote the planting of Palmyrah to minimize the human-elephant conflicts in vulnerable areas in collaboration with other agencies.

#### **4. Organization and Management of PDB**

##### **4.1 Governance**

The original Palmyrah Development Board with seven members was established under the Ministry of Plantation Industries in 1978. The current PDB is established under the Ministry of Prison Reforms, Rehabilitation, Resettlement and Hindu Religious Affairs as an appropriate arrangement to address the necessary rehabilitation following the protracted civil unrest.

A six member Board of Management is functional at present and is appointed by the above ministry. The Chairman of the PDB has been appointed by the ministry on 1<sup>st</sup> August, 2016 and heads the Board and is responsible for administrative and financial management. The Chairman is assisted by a Senior Management Committee under a General Manager and is performing routine decision making and administrative functions.

Following organization chart emphasizes the structure and management units created to implement research and development. PDB has an island-wide operational network, however, with emphasis in the northern province where Palmyrah is naturally abundant.

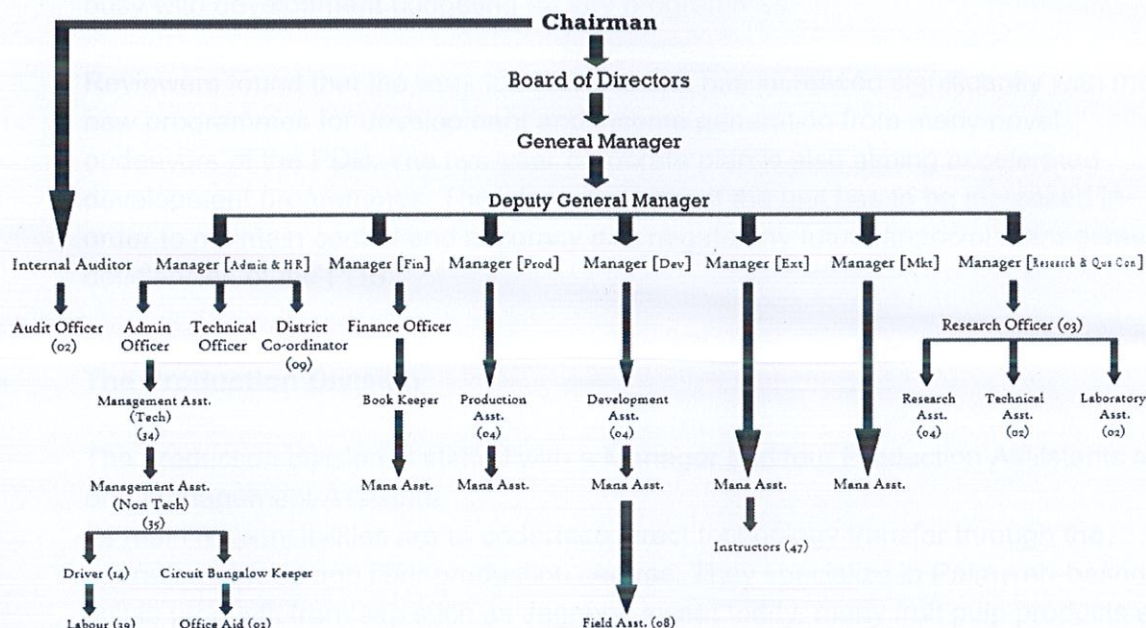
The Board meets regularly at monthly intervals to discuss policy matters and guides the Chairman.

The staff has free access to the manual of procedures, Administrative Regulations (AR) and Financial Regulations (FR) of the government. Staff recruitment, promotions and disciplinary procedures are according to government regulations. The organization is subject to annual government audit on performance efficiency.



## 4.2 The Management Organization

Organization chart of the PDB



### i. The Administrative Division

The administrative division is combined with human resource development and is headed by a Manager and staffed with an Administrative Officer, a technical officer and 9 District Coordinators. It has the largest number of staff within the PDB.

Its main responsibilities are assisting the hierarchy in general management and providing guidance for management improvement. A 5S file management system has been recently introduced. Staff is being trained on procurement procedures, Sinhala language and computer software utilization.

Reviewers observed certain lapses pertaining to management, due to the large number of units and difficulties of visiting them to interact on administrative matters. In addition, manpower and fund shortages seem to hamper peripheral unit management. Efficient management of the peripheral units is very important in order to safeguard the good name of the PDB and also prevent predatory intrusions by external organizations.



**ii The Finance Division**

The finance division is staffed with a Manager and ten supporting staff. Its main responsibilities are to assist the organization to manage capital and recurrent funds and maintain accurate accounts while adhering to Financial Regulations including fund disbursement follow tender procedures during procurement and prepare periodic and annual financial performance reports. In addition, the finance division is busy with development budgeting for key programmes.

Reviewers found that the work load for this unit has increased significantly with many new programmes for development and income generation from many novel endeavors of the PDB. The five-year corporate plan is also aiming accelerated development programmes. Therefore, capacity of the unit has to be increased in order to maintain control and accuracy and negate any future financial management deficiencies of the PDB.

**iii The Production Division**

The production division is staffed with a Manager and four Production Assistants and one Management Assistant.

Its main responsibilities are to undertake direct technology transfer through the operation of food and fiber production centres. They specialize in Palmyrah-based edible products from sap such as Jaggery, sweet toddy, many fruit pulp products and a range of fiber products.

Reviewers observed certain lapses pertaining to this division, such as slowness in the adoption of new processing technologies and updating equipment which would meet modern day quality aspirations of consumers.

Given the shortfall of capital in the government sector, the production division should seek opportunities of public-private partnership (PPP) development by which modernization could be accelerated.

**iv The Development Division**

The development division is staffed with a Manager, four Development Assistants and eight Field Assistants.

Its main responsibilities are to increase the extent under Palmyrah and maintain the populations. It is responsible for minimizing felling of Palmyrah trees. It also produces Palmyrah seedlings for distribution.

Reviewers observed certain lapses pertaining to this division, such as inability to stop the indiscriminate felling of trees in several locations in the country. Seed selection and seedling development programme has to be more scientific and an evaluation of



the quality of seedlings should be carried out before distribution. Quality criteria development is needed as soon as possible for seeds and seedlings.

v **The Extension Division**

The extension division is staffed with a Manager, one Management Assistant and forty seven Instructors for field work.

Its main responsibilities are to train villagers in Palmyrah based handicraft products and to organize them into production groups. Trainees undergoing training programmes lasting three to six months are eligible for certificates.

Extension staff itself seems to lag behind in technology and therefore, in-service training for them at a higher level is needed.

Reviewers observed certain lapses pertaining to this division, such as low emphasis on empowerment of the Palmyrah farmers, who are the mainstay of PDB and PRI. Farmers and villagers who directly work with the crop need sustained support for further development. Extension should play a key role in crop development and support crop improvement research. Farmers are the best source of information on good trees with higher quality sap and other sources which could be earmarked for further research.

In addition, connectivity with external organizations for product development such as the Export Development Board and the Sri Lanka Design Centre for superior quality product development to rapidly reach internationally acceptable levels is the responsibility of both the research and extension divisions. However, since research division is under-staffed, the responsibility of coordination should be given to the extension division which has direct links to grassroots level.

Emphasis on improved ethical designs using natural pigments to radiate the ordinary Palmyrah with Sri Lanka brand identity is important.

vi **The Marketing Division**

The marketing division is staffed with a Manager and just one Management Assistant. Its main responsibilities are procurement of Palmyrah products from village level producers and marketing them together with PDB's own products. Sales are executed through PDBs' own Katpaham marketing network, island wide.

Reviewers observed certain lapses pertaining to the division, such as grossly inadequate staff strength although the number of products and revenue earned has increased over the last two years (turn over LKR 28.2 million in 2015 increased to LKR 40.9 million in 2017). If sales are further improved through strengthening, the entire industry and livelihood improvement at base level would be significant.

The number of new franchise sales units to be facilitated per year, according to the 5-year Corporate Plan stands at 4, which seems inadequate in a market driven-economy.



**Vii The Research and Quality Control Division**

The Research and Quality Control Division: This division under the PDB is the core of the PRI. The PRI was established in 1986 in order to conduct applied research and quality control of Palmyrah products for enhancement of their quality and economic value. This division is discussed in section C of this report as the main body of the report.

**4.3 Availability of Human Resources: scientific, accounting and administrative staff of the Institute**

The summarized staff situation given below includes both PDB and PRI. Almost the entire staff cadre is filled compared to the very much deficient situation in comparable government organizations. Therefore, both organizations need not be complacent with the existing situation and overall, both PDB and PRI should be satisfied. The top level cadre is fulfilled. Highest deficit is in Management Assistants cadre. It became clear to the review team that several cadres have to be increased for improvement of both the PDB and PRI.

No.	Staff	Total approved cadre	Existing cadre	Vacancies
1	General Manager	1	0	1
2	Deputy General Manager	1	1	0
3	Manager	7	7	0
4	Internal Auditor	1	1	0
5	Administrative Officer	1	1	0
6	Audit Officer	2	2	0
7	Finance Officer	1	1	0
8	Technical Officer	1	1	0
9	Regional Coordinator	9	9	0
10	Research Officer	4	3	1
11	Management Assistant	69	59	10
12	Book Keeper	1	1	0
13	Development Assistant	4	2	2
14	Production Assistant	4	2	2
15	Research Assistant	6	3	3
16	Laboratory Assistant	2	2	1
17	Technical Assistant	2	1	1
18	Instructors	47	52	+5

Institutional staff is the indisputable asset of the organizations. PDB and PRI have appreciably managed large development programmes under difficult situations and delivered the best because of staff dedication. However, they have yet to realize the full potential of the Palmyrah and improve further the livelihood of the farmers, product manufacturers, retailers, etc.



They are mostly utilized for Palmyrah seedling production. PDB has commenced to use them for intercropping trials and planting Palmyrah as a deterrent for elephant crossing.

PDB/PRI is encouraged to use Model Farms for crop improvement and agronomic research as large land extent (228 acres) is available.

#### 4.4.3 Katpaham retail outlets

There are 15 outlets distributed in 9 districts as outlined below.

District	Number of outlets
Jaffna	5
Colombo	1
Mannar	2
Batticaloa	2
Trincomalee	1
Vavuniya	1
Ampara	1
Puttalam	1
Hambantota	1

### 4.5 Action Plans and Codes for Good Governance

PDB has prepared commendable detailed action plans for 2018 under the following thrust areas. They have goals, strategies, activities, costs, duration, and expected output targets per quarter.

- (a) Palmyrah Resources Development
- (b) Technology Transfer in Handicrafts/Sap/Pulp/Timber/TOT
- (c) Enhancement of Palmyrah Production
- (d) Improvement of Marketing Network Through Katpaham
- (e) Research and Development
- (f) Institutional Strengthening

Appropriate monitoring and evaluation mechanisms and fixing responsibilities for each of the activities have been identified.

The reviewers found several areas which need fresh thinking. These suggestions are perhaps needed especially to an organization which has suffered long due to the war situation. It is hoped that the authorities would recognize the urgent need for staff, and infrastructure improvement. PDB/PRI, in the meantime is encouraged to look afresh at immediate actions which could be implemented without capital inputs.

- i. Gross inadequacy of staff in all the units of PDB. Some Managers had no subordinate staff to implement important programmes. Given the enormous potential of the crop for economic development of the entire country, the government should be encouraged to adequately staff the PDB. However, the initiative must be taken by the PDB itself.



- ii. The shortage of quality personnel available for recruitment who are willing to serve long in the northern areas of the country. This is a large challenge for the organization.
- iii. Lack of publicity and awareness creation given to the importance of palmyrah as a multi-use crop for economic development and environment conservation in the country should be stressed. This void is due to the lack of a publicity unit in the PDB (also discussed in the section C: PRI). Most of the staff woes of the PDB/PRI could be overcome if there is awareness creation first within the government hierarchy to win attention and redress. In this struggle for publicity, the many stakeholders in the palmyrah industry (land holders, toddy tappers, toddy processors, pulp product manufacturers, handicraft manufacturers, jiggery and treacle makers, Palmyrah arrack manufacturers, etc. scattered throughout the country may be cited as economically and politically important statistics.
- iv. According to the original gazetted objectives of the PDB, creation of new plantations of Palmyrah to enhance the population of the crop is a vital task. The emphasis given by the PDB to this activity was slack. On the other hand, the felling of trees with and without permits has significant impact on the plant population. It is also recorded that during the war time, many of the plants in Jaffna peninsula were destroyed. Therefore, an energetic programme of re-plantation cannot be over stressed, while preserving the existing plant population.
- v. The organization is fairly detached from the mainstream and is isolated to some extent from other national organizations with similar development agendas. As examples we cite the following.
  - Affiliations with the Coconut Development Board (CCB) and Coconut Research Institute (CRI) which deal with another member of the palm family are inadequate. The collaborative inadequacy is surprising in a situation where the PDB itself was created through an Amendment of the Coconut Development Act as far back as 1978. The CRI has taken major strides in coconut breeding and is recognized by the public as the source for superior coconut germplasm. PDB/PRI should immediately make formal contact to establish collaborative linkages in plant breeding, establishment of Palmyrah clonal nurseries/gardens and seedling improvement programmes. It should be mentioned that the PDB has earmarked itself in the objectives as the national repository of Palmyrah genetic resources, although no evidence to indicate of such activity was available.
  - The Department of Agriculture and its Regional Agricultural Research Stations are principle crop improvement organizations with well-trained plant breeders, crop specialists and plant protection specialists whose services could be harnessed for Palmyrah improvement. The Regional Agricultural Research Station at Killinochchi is proximate and an ideal collaborator for Palmyrah improvement.



- The Ministry of Environment; especially the potential of palmyrah for environment conservation cannot be overstated. In a situation where the country is battling daily with soil erosion, extreme cycles of drought and excessive rain and the threat of Tsunami like phenomena, the crop has great potential for mitigation of the climate effects.
  - Department of Coast Conservation (CCD) Sri Lanka. The coastal plains are subject to erosion with the rising sea levels. Palmyrah is known as the sustainable natural architect of coastal conservation. Palmyrah would mesh with the mandate of the CCD: Improve the status of coastal environment and develop and manage the shoreline in conducive locations.
  - Department of Wildlife Conservation; for minimizing human-elephant conflict. Use of the palm to create natural barriers as alternatives to non-sustainable electrified fencing needs further research and implementation. Peoples' collaboration in such ventures would be spontaneous because of accrued socio-economic benefits.
  - Forest Department as a collaborator for promotion of Palmyrah cultivation and facilitator of Palmyrah product exports.
  - PDB has installed connections with the Export Development Board for export promotion of Palmyrah products. However, there is no evidence for similar collaboration with the Department of Export Agriculture.
  - Collaborative linkages with other organizations have to be long lasting and should be formalized through MOUs for mutual benefit.
- vi. The reviewers found lapses in code of ethics, especially for the research and development staff which is generally required (although a code of ethics exists for the members of the Research Management Committee).
- vii. Some diminish in staff enthusiasm and motivation in the PDB was noted but could not be fully assessed or quantified. There seems to an environment of uncertainty among staff.
- viii. A tendency for some senior R&D staff to leave the organization due to attractions in other organizations such as universities was also apparent. A system of rewarding through performance indicators and patenting of creations had not received adequate attention. A system to motivate and reward best practices with a feedback mechanism is needed. This and other means of recognizing the services of employees will motivate employee efficiency and build harmony among staff of the organization (also discussed in section C:PRI)



## 4.6 Initiatives for Strengthening Good Governance

The Review Team found that the commitment of the PDB officials with the able leadership of the Chairman to improve good governance and transparency is commendable. PDB has installed the following committees to strengthen the administration of the organizations.

- i. A High Command Committee: the Chief Executive Officer and all the executive managers participate at the meeting to rectify any shortcomings and to make new suggestions to improve the functioning of the Board.
- ii. Price Fixing Committee: to fix justified retail prices for Palmyrah products for the benefit of producers.
- iii. Central Purchasing Committee and Establishment of a Planning Unit: to streamline procurement activities, operation of livelihood fund and capital expenditure to regulate the purchase of goods and services.
- iv. Research management Committee: responsible for providing leadership to strategic research planning, streamline research activities, management of the PRI and dissemination of the findings through training.

PDB has developed a detailed Corporate Plan for 2018-2022 complete with action plans, which exhibits dedicated commitment and good governance.

PDB had implemented the following significant public activities in the recent past.

- i. Organized an International Symposium and Exhibition—2017 under the theme, “Let’s Globalize the Glory of Palmyrah”. August 25-27, 2017 at Galle Face Hotel, Colombo.
- ii. Formation of International Palmyrah Association in 2017. Mr. M.B. Loganathan, General Manager of PDB was appointed the 1<sup>st</sup> Chairman of the Association.
- i. Procurement and distribution of machineries for improvement of Jaggery production by rural entrepreneurs registered by the PDB.
- ii. PDB operated 40 training centres around the country imparting training to over 2000 individuals on handicraft production, Palmyrah Pulp Production, “Naar” based products and sap production during 2017. Systemic training opportunities are offered to the public. The duration of the certificate courses vary which facilitates flexibility and increased opportunities to the public. Women folk showed good enthusiasm to learn handicraft under trained staff of PDB although training infrastructure facilities were minimal.



## 5. Other achievements of PDB in 2017

- i. Survey of Palmyrah trees using GPS had been initiated. This activity will verify the published 11.1 million Palmyrah palms in the country.
- ii. Palmyrah seed planting programme of 150,000 seeds.
- iii. Establishment of a Planning Unit to streamline procurement activities, operation of livelihood fund and capital expenditure.
- iv. Production of documentary on Palmyrah-based products for public knowledge.
- v. Introduction of 5S system for the staff and streamlining document administration.
- vi. Introduction of new packaging systems for Palmyrah fruit drinks.
- vii. Introduction of Palmyrah products to foreign markets through exhibitions.

## 6. The Financial Component

PDB receives Treasury funds for recurrent expenditure which is expended as salaries of the cadre and some development activities. PDB is empowered to utilize its own funds generated through Katpaham for working capital.

Following is the summary expenditure and performance statement for 2017.

Components	Expenditure LKR millions
Revenue	46.35
Treasury Grant-Recurrent	111.5
Turnover	40.95
Others	5.4
Total	157.85

Summary statement of development expenditure for 2017

Components	Expenditure LKR millions
Research	59.60
Development	20.06
Training	51.39
Total	131.05

It is noteworthy that development expenditure has been substantial for research and training components.



## C. THE PALMYRAH RESEARCH INSTITUTE

Palmyrah Research Institute (PRI) is the hub of the Applied Research and Quality Control Division of the PDB, the major technical division of the PDB. It was initially established in 1986 under the mandate of "Palmyrah Development Board Act". It was deserted in 1996 due to civil unrest. A modern PRI was reinstated in 2012 with financial and technical assistance from Government of India, which supplied laboratory equipment, instruments, chemicals, glassware, furniture and vehicles. Though PRI depends on PDB for policy directions, human and material resources and for financial support; effectively it is a semi-autonomous body to deliver mandated research outputs.

### 1. The Mission, Vision and Objectives

It commenced with an ambitious goal and to realize it PRI specific Mission and Vision had been drafted, which can be considered as a rational strategy for effective administration of the Institute.

The Mission of the PRI is: *"Enhancing the practice of research for the innovative technology transfer to develop, promote, popularize and regulate sustainability of palmyrah industry to be a significant contributor to GDP of Sri Lanka"*

The Vision of the PRI is: *"Achieve excellence in the palmyrah research for enhancing sector contribution to national economic development of Sri Lanka"*

Based on the conceptualized Mission and Vision, the PRI had outlined eight broad objectives it strives to achieve. They are:

- I. Maintenance and improvement of the quality and standards of palmyrah based products through palmyrah products producers
- II. Enhancing the promotion and direction of the PRI activities
- III. Conducting and furthering of scientific research in connection with the processing and utilization of palmyrah products
- IV. Introduction of new techniques in the processing of palmyrah products
- V. Strengthening the PRI by collaborating with other research institutes of Sri Lanka and International Research Institutes and the Universities of Sri Lanka
- VI. Provide data and facts based on research to palmyrah stakeholders in order to increase the utility of palmyrah palm
- VII. Handling research to increase the resources relating to the growth and cultivation of crops and predicting the results
- VIII. Enhancing research activities by consultation of experts in various scientific fields.

The objectives of PRI are overwhelmingly comprehensive and ambitious. While it is credible to charter farsighted objectives and milestones, they could remain as 'considered opinions' if unachieved over time. An Institute striving for very responsible deliverables for major national outcomes should be equipped with well integrated human, technical and logistical resource base sustained and sustainable over a very long period of time. The current



The purpose of RMC includes among others (synoptically):

- i. Oversee and lead the implementation of research
- ii. Provide leadership and advice for strategic research
- iii. Facilitate joint research with universities, research institutes, donor institutes both internal and external
- iv. Provide advice and support for research communication and dissemination of results
- v. Facilitate PRI capacity building

The PRI is effectively only 6 years old and by judging the contents of research conducted so far, the research problem identification and prioritization had worked effectively. It is hoped the instilling of proficient advice from the recently nominated PRC would enhance the scope of the research programme of the PRI. However it was observed that this objective is still constrained by having members proficient in limited fields of biochemistry and microbiology to match the specific subject oriented laboratories, hence the nature of research. The research is overly oriented towards value addition product development from the output of the existing plantations and there are good reasons for this bias. Currently the palmyrah crop is exploited for traditional products only as there is a need to improve their standards and introduce a variation. Palmyrah plant takes around 25 years for harvesting, thus there is no sustained interest to cultivate it as commercial plantations and hence to do research on agronomy aspects. There is no direct recurrent income from palmyrah tree and only around ten percent of fallen fruits are currently used for income generation. This situation is same in all other palmyrah growing countries as well and PRI research effort and research volume is far greater than any other palmyrah growing country.

Yet it is logical to commence and continue carefully selected research (discussed elsewhere) on agronomic aspects. PRI need influence and guidance from a specialized agronomy institution for a change in research outlook. This aspect was discussed with PRI and PDB and it is recommended that Director, Agricultural Research Institute, Kilinochchi should be a member of RMC. His overall role would be same as that of other members but he would instill new thinking on possible agronomic research and linking of research assistance with other agricultural institutions.

#### **4. Research Projects and Research Outcomes**

Since inception in 2016, PRI had conducted many research projects and has several publications to their credit. Almost all the research are in practically needed fields to develop the palmyrah industry. They had been undertaken prior to the establishment of RMC in late 2017 and future research could be expected to be of even higher quality and usefulness.

During the period 2012-2017, fifty valuable researches had been carried out based on the action plan of PDB through the research identification and prioritization process (20 researches) and as collaborative research with universities as university staff and student research (30 researches).

Some important outcomes can be listed as follows.



PRI has MOUs with the laboratory instrument suppliers for regular maintenance and repairs. PRI had availed this service, though keeping records need to be more systematic.

### 3. Research Process and the Research Management Committee

The PRI has over time formulated and refined an effective research problem identification and prioritization process which has culminated in user oriented adaptive research with less bias towards academic oriented research. The research process starts with reviewing of research problems identified or observed in the field by field staff, cooperative societies, production units of PDB and private entrepreneurs in quarterly meetings of PDB. All Divisions of PDB attend the quarterly meeting and participate in formulating the researchable problem and prioritize the research topics and agenda. Inherent limitations of availability of research staff, laboratory instruments and chemicals (which cannot be acquired in short notice) and capital funds are also taken into consideration. The outcome is the internally but collectively prioritized research agenda, a positive outcome. Until end 2017, PRI had very effectively adopted the above research process as reflected by past research topics.

PRI adopted a very rational research process in 2018 by submitting the internally prioritized research problems and research methodologies to a recently formulated Research Management Committee for further evaluation, opinions and modifications. Formulation of RMC is very commendable and is the most recent milestone in continuous improvement of the PRI. The RMC is still in infancy stage as it was established only in December 2017. It consists of highly proficient academics of various fields that pool their experience and skills to review individual proposals, advise on research methodology and review the progress of achievement. The RMC is also tasked to review the direction of research and its alignment with the strategic plan and the research plan of the PDB and PRI which confound any research undertaken for self esteem of researchers and have low priority for stakeholders. Currently RMC consists of a Senior Lecturer on biochemistry of faculty of medicine, UOJ, Dean of faculty of graduate studies, UOJ, a Lecturer, University College of Jaffan, former chairman, PDB, Former vice Chancellor, UOJ. From the DB the Manager of the Research Division, Senior Research officer and the GM PDB attends (as an observer). The MRC meets once in three months.

The role of RMC is "to provide leadership in relation to strategic decision making and management of research and research training". It is mandated with carefully carved out crucial functions and purposes. The creation of RMC itself can be considered as very professional.

The functions of RMC includes (synoptically):

- i. Overall responsibility for direction of research and their alignment with strategic and research plan for 2017-2023
- ii. Guidance, advice and direction to research leaders
- iii. Develop, approve and correct research plans
- iv. Foster a research culture including the development of a research strategy



human resource base within the context of PRI and PDB for research and dissemination of results is inadequate and has inconsistencies (discussed elsewhere). However they can be rectified to realize a rational level of the planned objectives. It is recommended that PDB together with RMC (discussed elsewhere) review the charted objectives vis-s-vis the current resource base and take rectifying actions towards achieving the objectives.

## 2. The Laboratories and Research Themes

PRI is essentially four modern laboratories to which thematically anchored are its research programmes. The four specialized laboratories are the: i. Analytical laboratory, ii. Food and technology laboratory, iii. Microbiology laboratory and vi. Hi-tech laboratory. Inherently this has led to a somewhat subject-wise restriction of research as each laboratory and its capacity influence the research themes that would be undertaken by PRI. Collectively the four laboratories exert a broad analytical capability to the PRI to conduct very divergent research.

The analytical laboratory has modern equipment to undertake analysis of nutrient quantities, inspect the standards of the palmyrah products manufactured by small-scale entrepreneurs and advising and counseling them on required standards as per Sri Lankan Standard Ordinance. It also can evaluate chemical changes during processing of palmyrah products and find ways to regulate such changes. It contributes to value addition of non-food palmyrah products also.

The food and technology research includes inventing new palmyrah based food items, undertaking visits to cooperative unions for upgrading structure and standards of already manufacturing foods to SLS standards, introducing exceptionally good manufacturing procedures and health related procedures.

The microbiological research involves microorganism and palmyrah related research to evaluate the health benefits of palmyrah products, extending the quality of existing products, new manufactured products and identifying and use of different microorganisms for the product improvement. It also renders assistance to academic activities of universities.

The hi-tech laboratory which is equipped with liquid chromatography and gas chromatography instruments carry out research to identify and determine quantities of nutritional components which are in traceable amounts in the food using the HPLC instrument. Using the gas chromatography instrument research is conducted to determine the alcohol and fatty acids in food.

The pride of the PRI is its analytical laboratory which has acquired the "Laboratory Accreditation ISO 17025" status for "Chemical Testing" under the number TL 061-01. Accreditation is a third party attestation of conformity of laboratory standard and its ability to demonstrate competence in carrying out the analytical tasks to accepted standards. The Sri Lanka Accreditation Board Conformity Assessment (SLAB) which is the national accreditation authority for Sri Lanka under the Act No. 32 of 2005 has granted the accreditation. PRI is now authorized to use the international logos; "ilac.MRA" (International Organization for Accreditation – Mutual Recognition Arrangement) and SLAB ACCREDITED. The award is valid from August 2017 to August 2020.



**a) Research on edible products of Palmyrah**

- i. Upgrading the quality of Palmyrah jaggery
- ii. Identifying adulterants in jaggery
- iii. Nutrient quality in palmyrah food products
- iv. Glycemic index and insulin index in palmyrah food products
- v. Quality upgrading of treacle
- vi. Preservation of palmyrah pulp
- vii. Quality upgrading of toddy (raw)
- viii. Pectin extraction from palmyrah fruits
- ix. Quality upgrading of sugar candy
- x. Quality upgrading of bottled toddy
- xi. Phenolic and nutrient contents of palmyrah food products
- xii. Antioxidant bio active components of palmyrah products

**b) Research on non-edible products**

- i) Composting of palmyrah waste
- ii) Effect of natural dyes on palmyrah leaves as antifungal
- iii) Cattle feed from palmyrah leaves
- iv) Activated charcoal
- v) Reducing microbial effect on palmyrah leaves to extend shelf life
- vi) Simultaneous haustorium and tuber harvest timing

**c) Research on new products**

- i. Yoghurt from palmyrah pulp
- ii. Sponge cake from palmyrah related products
- iii. Instant soup mix
- iv. Upgrading quality of 'Palmposha' cereal mix
- v. Bakery products from tuber flour
- vi. Jelly and pudding preparations
- vii. Fruit pulp leather based nut-bar preparation

**d) Research programme during 2017**

- i. Extraction of ethanol from palmyrah waste
- ii. Vitamins in Palmyrah jaggery
- iii. Quality characteristics of palmyrah and other palm treacle
- iv. Nutrient variants between fresh and preserved pulp
- v. Pulp incorporated ice cream
- vi. Nutrients in iced apple and preserved ice apple
- vii. Nutrients in fresh haustorium and preserved haustorium
- viii. Usability of climber, pulp extractor and pulp leather dryer
- ix. De-bittering enzyme to remove the bitterness of palmyrah pulp



Some examples of research on special area of interest completed in 2017 are; Formulation of moisturizing facials cream from palmyrah fruit pulp, designing a water filter with charcoal, palmyrah toddy vinegar, wine from fruit pulp and development of palmyrah and pineapple mixed toffees.

PRI had been enthusiastically involved in publishing the research results in valuable journals and conferences. As of 2017, seven research outcomes had been published in International Journals, such as Journal of Agriculture and Veterinary Research, International Journal of Scientific Research in Agricultural Sciences, Scholars Research Library Journal of Natural Products Plant Resources, International Journal of Multidisciplinary Studies, Biomed Central Biological Research, Journal of Environmental Science, Toxicology and Food Technology and Journal of Biotechnology and Biochemistry. During this period 15 research articles had been published in international conferences of various themes, mostly in Sri Lankan Universities and another 9 in national conferences. Seven articles were in pipe-line for publication. Both by number of publications and research topics which were needed research problems, the achievement is impressive.

## 5. Research Staff and Qualifications

The PRI has a limited research staff with a cadre of 4 Research Officers of which one post is vacant, 6 Research Assistants of which 3 posts are vacant, 2 Technical Assistants filled and 2 Laboratory Assistants with none filled. It is credible for PRI to have specifically qualified personal to carry out the research programme including; i. the senior ROIC having PhD in Applied Science and MSc on Food Safety and Quality Management from University of Greenwich, UK, ii. an RO with MPhil in Biochemistry and specialized in Botany at BSc. iii. an RO specialized in chemistry at BSc. Recently a RO with BSc Agriculture and MSc in Environmental Forestry had joined the team. One of the Research Assistants has a MSc in pharmacology from University of Bedfordshire, UK and BSc in chemistry from Institute of Chemistry, Ceylon, Rajagiriya. Another RA has BSc in botany and zoology. All the staff has additional merits such as membership in professional associations, past professional experiences, short term training and various publications. Assessing overall, the PRI research team is academically and skillfully of better caliber.

This situation also has created an administratively anxious situation. The RAs too conduct research, independently or by carrying out a major part of the research supervised by the ROs and they are also qualified and experienced. Both ROs and RAs work in the same lab side by side. The ROs are drawing the salary scale of AR1-1 and the RAs the lesser scale of MAS-1. Though this situation is tolerated at present, as the work load increases with more research frontiers being explored, a situation of quality deterioration is bound to happen. This is a difficult situation as designations are bound by the salary code, yet being an institution there could be other compensation ways or altogether 'dividing the labour' anew. One of the tasks of the RMC is to smoothly facilitate the research process and to advise the PDB. It is recommended that the RMC and PDB address this situation early.

It was also understood that there is a tendency for research staff to leave PRI for better pastures, though an exact quantification could not be made as there was no possibility to interview the officers who had left to find out the reasons. The research staff is all well qualified and experienced and can conveniently relocate to better positions elsewhere. It is



recommended that RMC and PDB study the background situation and implement ways and means to retain the staff without bonding clauses in recruitment conditions.

## **6. Need for Recognizing New Research Frontiers**

The diverse habitat along the northern and eastern coast has naturally evolved ecosystems. The palmyrah wild plantations along the coast were part of sandy beaches, estuaries, lagoons sea grasses, mudflats and mangroves comprising the ecosystem. The palmyrah in the midlands were also the key crop of the northern and eastern biodiversity. Apart from creating the habitat for fauna and flora, they also protected the soil from erosion by their intricate root system.

Due to civil events in the past, this ecosystem is now without or with a lesser role played by the wildly grown palmyrah trees. An Indian source of literature estimates that nearly 250,000 palmyrah palms would have got destroyed during the conflict years.

Sri Lanka is a partner to "Sustainable Development Goals", a collection of 17 global goals set by UN in 2015. The goals are broad and somewhat interdependent. It is also called the 2030 agenda. Following two goals are relevant for the PDB and PRI to accomplish.

### **A. "Goal 13. Take urgent action to combat climate change and its impacts"**

The need for a coastal green belt especially in the northern, eastern and southern coastal areas became more sensible after the tidal wave devastations accompanying the cyclone of 1978 in the eastern coast and the Tsunami of 2004 in a large area of the coastal belt. Though the projected occurrences of tidal wave related phenomenon are once in five years, the climate change resulting from global warming has created an unpredictable situation with frequent adverse weather conditions.

The World Conservation Union (IUCN) and the Coastal Conservation Department of Sri Lanka propose Coastal Green Belts as wind breaks among other benefits to combat such disasters. Palmyrah is considered as a good candidate for such a purpose based on numerous criteria. The PRI may take the lead from the IUCN documentation and workout productive research programme to further what has been suggested by IUCN to achieve this goal.

### **B. "Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss"**

Though much effort is done now to remedy the destroyed palmyrah plantation in inland, some in association with PDB, the efforts could have long time benefits if a productive research programme is also attached to it. Since the crop itself is an unexplored economic entity with people having no interest to cultivate it systematically but only to exploit less than 10 percent of fallen fruits; to have a national goal programme for the sake of UN goal 15 may not be very enthusiastic. A socio-economic research and agronomic research programme is necessary to have a bio diversity restoration national programme with public participation. This would complement other research already being done at PRI.



With the strong mandate of the RMC, its professional membership and with the suggested inclusion of an agricultural professional to the RMC, research on crop oriented themes for above goals may be initiated. Since the need is desperately urgent and palmyrah takes a fairly long time to mature evaluating with orthodox research layouts be not possible. A short-time approach has to be devised. One option is to explore past documentations, field observations, key-informants, international literature etc. and to decide the best layout(s) of replanting. RMC is certainly capable of putting forward other options.

Varietal crossing and selection is generally considered out of question for palmyrah as it takes a significant number of years to get results for analysis. No palmyrah growing country has man created varieties. The Cotton Research Station, Srivilliputtur, India established in the year **1950 for cotton research diversified its activities subsequently and a palmyrah research scheme was established during 1981-1994 period. It claims a release of a variety SVPR1 in 1991, but subsequent literature does not consolidate the claim.**

Though traditional research methods may not appear feasible to develop a variety with desirable traits, especially on early bearing and dwarfism apart from other characteristics like fruiting and sap contents, one may postulate the possibility of existence of such natural mutants. If such variants exist, the local community would be aware of it and a national hunt for such variants would be very beneficial. It should be noted that such a procedure is commonly used in other agricultural institutions, and some varieties having names of a locality has originated from such mutant hunting. The review team observed healthy young palms aged approximately 10 years bearing good yield of fruits. They are promising materials for future crop improvement research.

## 7. Patenting of High Quality Research Outputs

There is no policy within the PDB (hence PRI) to patent any research conducted by PRI. Promoting patenting may create disorientation of research focus towards self-career development at the cost of national priorities if the management of an institute is weak and activities underexposed. At present the research prioritization and guidance procedure at PRI is of high caliber and RMC is mandated to align the research proposals with long term research agenda of the PDB, thus chances of selfish research is nonexistent. On the other hand all researchers like to have some of their research patented along with the shares to the institute and assistants.

It is a complex process to initiate a patenting policy and procedures to follow and shares to own for research conducted with state funds using state owned laboratories. There are institutes like Universities following the patenting policy and departments like DOA not following. Usually the ownership of patents are with the institute. The patents can be commercialized by the Institute and a procedure has to be developed for sharing benefits arising from commercialization between the owner and the inventors. If RMC favors patenting and if PDB accepts it as a policy it is recommended to initially study the procedure effectively adopted in another institute before embarking on a programme for PRI. It should take into consideration the current anxiety due to staff of different grades doing research and any reward scheme or ownership scheme should not aggravate the situation.



## 8. Rewarding Research Excellence

Though very valuable research had been conducted by the PRI, apart from some publications receiving recognitions, no research officer had received any national rewards for their work. The ROs have only a scanty knowledge on national reward systems such as presidential awards. Unlike the patenting which is a matter of institute policy, contesting for a national reward or the institute nominating a RO for such an award is an entitled benefit. The RMC may further explore this issue.

## 9. Dissemination of Research Outputs

A noteworthy feature of research conducted by PRI is (also mentioned elsewhere) its focus on applied research and problem oriented (identifying the industry problems) research and problem solving research. There was no indication of basic research conducted purely for career development gain which has no immediate commercial potential. Yet much of the practical research has not disseminated to the public or not disseminated sufficiently.

Currently the PRI staff as well the staff of extension division undertake dissemination of research outputs, PRI is overstrained with conducting research and can handle demonstrations on a limited scale only. The extension division is grossly understaffed and under qualified. PRI classifies about 20 of 30 researches, mostly the research conducted in partnership with universities, during 2012-2017 as "applied" and others as "no industrialist" to use the results. However the extent of usage is unknown and possibly not very widely applied as even the application is dependent on the need for it and marginal increase in profits due to application. In one of the awareness creation brochures the PRI lists under "Technologies ready to transfer" 20 edible products as new products, 7 edible products as quality improved products 4 non-edible value added products, 2 non-edible quality improved products and 3 machines/apparatus as the research outcome to their credit and asking for takers.

## 10. Need for Publicity Division

PRI is straddled with a situation of conducting quality research as well as attending to disseminate them to end users. While the research arm is strong the dissemination is a hassle. The extension division with instructors who are semi technical cannot effectively communicate the high profile research results to potential industrialists. The user friendly web site only lists the technologies available for transfer and nothing further. All these avenues are scattered efforts each working with its own level of ability. There is no central body to take the responsibility of creating and nurturing awareness in the outside world on all activities of PRI and PDB. A Publicity Division is required for such media-type exposures.

A Publicity Division within PDB would have following general and specific functions.



- Assembling PDB and PRI specific technical materials (research outputs, research reports, news on new engineering designs and innovations etc.) to edit and recast them as publications or mass media material on a day-to-day basis.
- Publishing of such reformulated scientific, technical and extension related materials on media easily accessible to society.
- Providing wide publicity on the Institute's activities to specific stakeholders as well as to society at large regularly and repetitively to create a highly demanded environment for PRI research outputs, advocacy and custom tailored services.
- Providing PDB and PRI information to other Institutes for liaison services and to media houses for public broadcasting.
- Covering PDB events with photography on social media and conducting on-site opinion interviews from those who participate in the events.
- Providing support services to PDB and PRI on exhibitions, fairs, field days, technology transfer division training and other work and gathering feedback and field situation information to feed the research division, technology transfer division to mould their work accordingly.
- Storage and updating of publications produced by the publicity division.

## 11. R & D linkages with Other Institutes

It is an accepted practice in research institutions worldwide to foster research and development links with other research institutions for mutual benefit. Such linkages provide scientific interaction, sharing of resources and information exchanges. It will also elevate the status of an institution when linked with a recognized institution.

Currently the main linkages PRI foster are the universities mainly to conduct joint research making use of the laboratory facility or as a research location for the undergraduate students. Such links though important are currently the regular work of the PRI. Mission suggest PRI to work out a scheme of collaboration, exchange of materials and knowledge with several other agricultural research institutions in Sri Lanka such as the CRI, HARTI, Industrial Technology Institute (ITI) and National Engineering Research and Development Center (NERD) as well as institutions in other countries. The establishment of formal linkages under Memoranda of Understanding (MOUs) is an accepted method of establishing viable partnerships as they are more binding with greater commitment of the partners and assures sustainable outputs.

## 12. Inadequate Visibility and Limited Public Image

The PRI (together with PDB) has a high profile research programme on adoptive research with outcomes applicable in the palmyrah related industries. They are diverse under three broad categories of edible products, non-edible products and new technology appliances. PRI has a regular and established research sharing programme with several universities. It is armed with three high quality laboratories with sophisticated equipment. The outcomes are disseminated by internal programmes which are (apparently) weak and thinly spread. However the extent of public awareness of the institute and its research achievements is inadequate. Its visibility in the public eye is low.



Several reasons can be attributed to this situation. The reinstated PRI is young and still evolving; a qualified research advisory body was functioning only for few months. The palmyrah tree in significant numbers is confined to few districts. Though economic potential of the crop is known, there is no extensive exploitation of it and its current utilization is mostly limited to the few major palmyrah districts. PRI (and through PDB) has no well consolidated research outcome dissemination programme. From the industrialist's side, inclusive of the cottage level industries, the market is sluggish with existing types of products and existing levels of quality. There is a need of a major shock to change the demand to high quality and variable products. A strong external promotional programme is necessary for a market change.

Under above circumstances there is a tendency for the PDB and PRI to operate within a comfortable zone. This is the very reason mission suggests a publicity division to the PDB inclusive of PRI activities.

*In this context a commendable event organized by PDB and PRI was the 3-day "International Symposium and Exhibition – 2017" under the theme "Let's Globalize the Glory of Palmyrah" at Galle Face Hotel, Colombo. Scientists, academics, manufacturers and exporters, local and foreign invitees had participated. Among them were participants from India, Indonesia, Thailand and Malaysia. Concurrently was the palmyrah exhibition for three days with stalls representing all divisions of PDB and 20 stalls from Palmyrah-dependant beneficiaries. The symposium had very valuable discussions of mutual interest for the palmyrah countries and had taken farsighted decisions for the industry.*

### **13. Stakeholder Services**

The PRI provides through its laboratories, research and analytical services to stakeholders. The primary service is the partnership with universities to conduct research for the university staff and for undergraduates. Universities of Jaffna, Uva-Wellassa, Wayamba, Sabaragamuwa and Sri Jayawardena are the main universities. Currently the majority of research is on this stakeholder partnership basis. Additionally the laboratories are open to public to obtain paid physico-chemical parameter analytical services. Currently PRI offers services for 40 parameters of which 39 parameters cost less than LKR 5000 each inclusive of tax. Due to low visibility of PRI the demand for stakeholder analytical services is not significant. With the suggested publicity division, the availability of this service can be popularized and through PDB outlets throughout country or through courier services a scheme to collect samples can be arranged. There is more room to profit from the certificate of accreditation for chemical testing of PRI laboratories.

### **14. Library**

For all practical purposes PRI lacks a library. A very small room houses few cupboards with an assortment of books, not necessarily related to palmyrah research. There is no proper listing and handling with no officer in charge. It seems that ROs hardly use the "facility" as it is grossly inadequate. This is a grave shortcoming for the PRI complex.



Mission recommends that RMC take notice of this soon and a proper library would be installed in the premises. PRI needs a new large room(s) or a building for the library and books, journals and subscriptions to fill the library. The universities had been using the PRI facility for much research and hence they could contribute immensely to build up and sustain a library.

## 15. Commendations and Recommendations

### a) Commendations

- i. PRI has its own Mission and Vision within the context of PDB; a rational strategy for effective administration of the Institute. Based on the conceptualized Mission and Vision, it had outlined eight broad objectives to strive. They can be considered as far thinking management decisions.
- ii. PRI has four modern laboratories, well maintained and used liberally for thematically anchored research programmes. The four specialized laboratories are the: i. Analytical laboratory, ii. Food and technology laboratory, iii. Microbiology laboratory and vi. Hi-tech laboratory.
- iii. Though each laboratory and its capacity influence the research themes that would be undertaken by PRI, collectively the four laboratories exert a broad analytical capability to the PRI to conduct very divergent research.
- iv. The pride of the PRI is its analytical laboratory which has acquired the "Laboratory Accreditation ISO 17025" status for "Chemical Testing" under the number TL 061-01. PRI is now authorized to use the international logos; "ilac.MRA" (International Organization for Accreditation – Mutual Recognition Arrangement) and SLAB ACCREDITED.
- v. The PRI has over time formulated and refined an effective research problem identification and prioritization process which has culminated in user oriented adaptive research with less bias towards academic oriented research.
- vi. All Divisions of PDB attend the quarterly review meeting and participate in formulating researchable problems based on inputs from the field and prioritize the research topics and agenda.
- vii. Formulation of RMC is very commendable and is the most recent milestone in continuous improvement of the PRI. It consists of highly proficient academics of various fields that pool their experience and skills to review individual proposals, advise on research methodology and review the progress of achievement.



- viii. It is credible for PRI to have specifically qualified personal to carry out the research programme including; i. the senior RO having PhD in Applied Science and MSc on Food Safety and Quality Management from University of Greenwich, UK, ii. an RO with MPhil in Biochemistry and specialized in Botany at BSc. iii. an RO specialized in chemistry at BSc. Recently a RO with BSc Agriculture and MSc in Environmental Forestry has joined.
- ix. All the staff has additional merits such as membership in professional associations, past professional experiences, short term training and various publications.
- x. During the period 2012-2017, fifty valuable researches had been carried out, of which 20 are from PDB identification and 30 from university partnership.
- xi. A noteworthy feature of research conducted by PRI is its focus on applied research and problem oriented (identifying the industry problems) research and problem solving research. There was no indication of basic research conducted purely for career development gain which has no immediate commercial potential.
- xii. PRI had been enthusiastically involved in publishing the research results in valuable journals and conferences. As of 2017, seven research outcomes had been published in International Journals, 15 research articles had been published in international conferences of various themes, mostly in Sri Lankan Universities and another 9 in national conferences. Seven articles were in pipe-line for publication. Both by number of publications and research topics, the achievement is impressive.

## **b) Recommendations**

- i. Need for enabling legal provisions for Palmyrah development: The PDB was constituted by Gazette notification of 18 August 1978 published in terms of Amendment No. 24 of 1975 to the Sri Lanka Coconut Development Act No 46 of 1971 (please also see page 9 of this report). The Sri Lanka Coconut Development Act (SLCD Act) has 62 paragraphs in total. In 1978, an addendum of a small paragraph to the end, No. 63 which merely says "Reference to coconut to be construed as including reference to palmyrah, and certain other palms" qualified palmyrah to the Act (Ref: LАWNET, Ministry of Justice). Thus palmyrah development has no exclusive Ordinance but goes by the full compel of the Coconut Development Act. This would have been the easy way in 1978 when the role of palmyrah in the national economy was very trivial and an exclusive Act would have been superfluous. However, after 40 long years, the potential and role of palmyrah in the national economy has vastly changed. The turnover of PDB alone in 2017 was LKR 41 million, not accounting for the monetary contribution to the national economy by direct and indirect value additions by the private sector. Contributions to the environment in Sri Lanka by the palmyrah have been invaluable and its potential toward this aspect is now being internationally recognized. The country and its policy makers could be proud to have recognized the importance of the plant to the



economy and installed the first and only dedicated research and development institute for its care in Sri Lanka.

Further, in recent times, the PDB/PRI created new milestones by (a) hosting the first International Symposium on Palmyrah and (b) the first International Exhibition on palmyrah in 2017. The PRI through dedication won the first SLAB-accreditation for its research laboratories in 2017. In order to uphold the momentum of development of palmyrah industry and its stakeholders in Sri Lanka, there is a felt need to divest from the dependency on regulations drafted for coconut and to have an Ordinance or Act drafted exclusively to fulfill the current needs of Palmyrah development. Thus, the review mission recommends that the ministry in charge of the subject in consultation with the PDB appoints a committee of learned members to study further this requirement, and if conclusive, make appropriate requests for necessary exclusive legal provisions.

- ii. Internal review of PRI by RMC and PDB: It is recommended that PDB together with RMC review the charted objectives for the PRI with current resource base and take rectifying actions towards achieving the objectives. The current human resource base within the context of PRI and PDB for research and dissemination of results is inadequate and has inconsistencies.
- iii. Reconstitute the RMC: Though research is confined to value addition by product development and improvement, yet it is logical to commence and continue carefully selected research on agronomic aspects. PRI needs influence and guidance from a specialized agronomy institution for a change in research outlook. It is recommended that Director, Agricultural Research Institute, Kilinochchi should be a member of RMC. His overall role would be same as that of other members but he would instill new thinking on possible crop improvement and agronomic research and linking of research assistance with other agricultural institutions.
- iv. Research positions and commensurate tasks: There is an administratively anxious situation as both ROs and RAs conduct research side by side but drawing different salary scales. Though this situation is tolerated at present, as the work load increases with more research frontiers being explored, a situation of quality deterioration is bound to happen. This is a difficult situation to solve as designations are bound by the salary code. It is recommended that the RMC and PDB address this situation early.
- v. Staff retention initiatives: The research staff is all well qualified and experienced and can conveniently relocate to better positions elsewhere. It is recommended that RMC and PDB study the background situation and implement ways and means to retain the staff *without bonding clauses in recruitment conditions*.
- vi. Recognize and prioritize new research frontiers: PRI should recognize new research frontiers highlighted in this report. It is recommended that RMC would seriously consider the need and counsel the PRI immediately.



Sri Lanka is a partner to "Sustainable Development Goals", a collection of 17 global goals set by UN in 2015. Following two goals are relevant for the PDB and PRI to accomplish.

***"Goal 13. Take urgent action to combat climate change and its impacts" and***

***"Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss".***

PRI should actively reorient some of its research to achieve above goals in northern, eastern and southern districts.

Varietal crossing and selection is usually considered out of question for palmyrah as it takes long years (15-20) to get results for analysis. However, reviewers were made to understand by stakeholders that some trees as young as 10 years old were already bearing healthy Palmyrah fruits in northern locations. These plants may be natural mutants which have not yet been brought to the attention of researchers. Such variants would be starting material in an island-wide search programme for similar short duration selections from among the 11 million plant population. A national hunt for such desirable traits should be much beneficial for the crop improvement research programme. The local community may be aware of such variants and the Extension Division and the researchers should prioritize and collaborate to work on this important project.

- vii. Patenting research findings: There is no policy within the PDB (hence PRI) to patent any research conducted by PRI. Promoting patenting has two sides of outcome. It may create disorientation of research focus towards self-career development if the management is weak. At the same time it recognizes the institution and gives pride to the researchers. If RMC favors patenting and if PDB accepts it as a policy it is recommended to initially study the procedure effectively adopted in another institute before embarking on a programme for PRI.
- viii. Canvass national recognition of scientists: Though very valuable research had been conducted by the PRI, apart from some publications receiving recognitions, no research officer had received any national rewards for their work. The ROs have only a scanty knowledge on national reward systems. The RMC may further explore this issue for ROs to have access to national and international reward schemes.
- ix. Publicity Division: There is a strong need to have a publicity division. PRI is straddled with a situation of conducting quality research as well as attending to disseminate them to end users, which is a hassle. The extension division cannot effectively communicate the high profile research results to potential industrialists. There is no central body to take the responsibility of creating and nurturing awareness in the outside world on all activities of PRI and PDB. A Publicity Division is required and recommended for such media-type exposures.



- x. Improve collaborations: PRI has limited opportunity at present to participate in national level seminars and symposia because of the inadequate collaborations with other scientific organizations other than universities. The review team proposes linkages which would open great opportunities for PRI officers to enlarge their publication opportunities.
- xi. Create own periodical: PDB/PRI may consider launching its own quarterly research and development publication on Palmyrah similar to the Ceylon Coconut Quarterly of the CRI. This may be a task assigned to the proposed publicity division.
- xii. Formalized linkages with several institutions: It is an accepted practice in research institutions worldwide to foster research and development links with other research institutions for mutual benefit. Reviews suggest PRI to work out a scheme of collaboration, exchange of materials and knowledge with several other agricultural research institutions in Sri Lanka such as the CRI, HARTI, Industrial Technology Institute (ITI), Sri Lanka Design Centre and National Engineering Research and Development Center (NERD) as well as institutions in other countries.
- xiii. Improve visibility: The PRI (together with PDB) has a high profile research programme on adoptive research with outcomes applicable in the palmyrah related industries. However, the extent of public awareness of the institute and its research achievements is inadequate. Its visibility in the public eye is low. Mission suggests a fully equipped and manned, a powerful Publicity Division to the PDB inclusive for PRI activities.
- xiv. Promote income generation through laboratory services: The PRI provides through its laboratories, research and analytical services to stakeholders. Due to low visibility of PRI, the demand for stakeholder analytical services is not significant. There is more room to profit from the certificate of accreditation for chemical testing.
- xv. Modernize reference library: Practically speaking, PRI has no library. What is available is a heap of books and journals. Mission suggests to PDB to initiate a project to have a most modern library at PRI premises which can be used by outside researchers as well.



## Annex 1.

### **Terms of Reference (TOR) External Review of the Research Institution in the National Agricultural Research System (NARS)**

Objectives of this independent review are;

- To assess the quality, cost effectiveness, relevance and impact of the scientific programmes carried out by the Institute to be reviewed in order to ensure that Government funds are being effectively utilized to address the sector needs.
- To look into the appropriateness of the Institute research agenda to meet the emerging challenges in the future and in particular in meeting with 2030 sustainable developmental goals and also national targets ensuring food and nutritional security.
- To look into all the aspects of the Institute functions directed towards research and development, dissemination of technology through extension and services offered to its stakeholders and its impact and usefulness to address the timely needs.
- To identify any deficiency in the procedures adopted by the Institute in recognizing the research needs of the particular sector
- To give advices on effective planning and implementing of future programmes of the Institute.

#### *Scope*

To achieve the above objectives the Review Panel is expected to pay particular attention to the following aspects:

1. The mission of the Institute and its interpretation with respect to;

- Research and development focuses on immediate and long term needs in Sri Lanka
- Transferring technological recommendations/Research outcomes to relevant stakeholders.
- The policies and directive of the SLCARP and the relevant Ministry regarding the appropriateness of Institution's Mission in the light of important changes taking place in production and product development in Sri Lanka
- Appropriateness of the roles of relevant partners in the formulation and implementation of the Institution's research strategy and priorities
- Conservation of the natural resources, impact of Institution's practices on natural



environment and long -term environmental sustainability

2. The objectives and relevance of the present programme of work, budget and its forward plans for the next five years in relation to;
  - The Institution's mandate and its criteria for allocation of resources and planning procedures adopted by the Institution and the mechanisms for their formulation
  - The Institution's rationale for its presents allocation of resources among research, extension, information exchange and other activities
3. The content and quality and relevance of the scientific work with particular reference to:
  - The results of research during the past 5 years and their practical applicability and economic feasibility including the impact on the Relevant Sector
  - The current and future research plan and the role of the various scientific disciplines therein
  - The degree and extent to which the specific needs of the various stakeholders were studied and analyzed in the formulation of the past and current research plans
  - The information exchange and extension programmes and the participation of the research staff therein
  - The adequacy of research support and facilities
  - The management of the scientific and financial resources of the Institution and the coordination of its activities
  - Level of national and international recognition of the Institution and its scientific staff
  - Cooperation/collaboration with universities, regional and international research organizations
  - Adequacy of publications of research findings
4. The impact and usefulness of theInstitute activities in relation to:
  - The recorded and potential impact of the Institution's research
  - Cooperation with other research institutes and with national development programmes, private sector organizations and other stakeholders
5. Examine the extension programme of the Institution to determine;



- Its effectiveness in the relevant sector
- The effectiveness of its information exchange programmes and the timelines, quality and relevance of the technologies generated and its publications
- The effectiveness of transferring technological recommendations based on research outputs
- Mechanism adopted to get the feedback of stakeholders on research outputs and then planning future R&D
- The identification of problems and constraints impeding the extension programmes/ dissemination of technological recommendations to the stakeholders.

6. The quality and effectiveness of the management of the Institution in relation to;

- Constitution of research, advisory or sub-committees of the Board
- Adequacy in coordination to ensure excellence of the research programme and related activities
- Competency and professionalism of the directorate and the senior management of the Institution and the definition of roles, organization and quality of the leadership of the Institution and rapport with staff
- Nature of the budgetary review and evaluation processes and the involvement of important stakeholders in the above stability of funding and the relationships between budget, institutes policies and plans and the effectiveness of utilization of resources
- Procedure for determining staffing requirement at all levels for selection evaluation and compensation of staff
- Administrative of fiscal, purchasing and supply, personal computers, housing and other facilities including transport and general management services and their effectiveness in supporting the scientific staff

7. Services provided by the Institution

- Consultancy and Advisory Services
- Laboratory Services
- Pest Control and Fumigation of warehouses

8. Overall analysis through;

- A *SWOT* analysis to identify internally controllable and uncontrollable factors