

2017



வார्षிக வார்வ
ஆண்டு அறிக்ை
ANNUAL REPORT



தேன்னை ஆராய்ச்சி நிறையம்
COCONUT RESEARCH BOARD

வரவிலி கர்வான அலாநாண்டை
பெருந்தோட்ட கைத்தொழில் அமைச்சு
Ministry of Plantation Industries

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Our Vision

To be the centre of excellence in coconut research, technology development and technology transfer in the region.

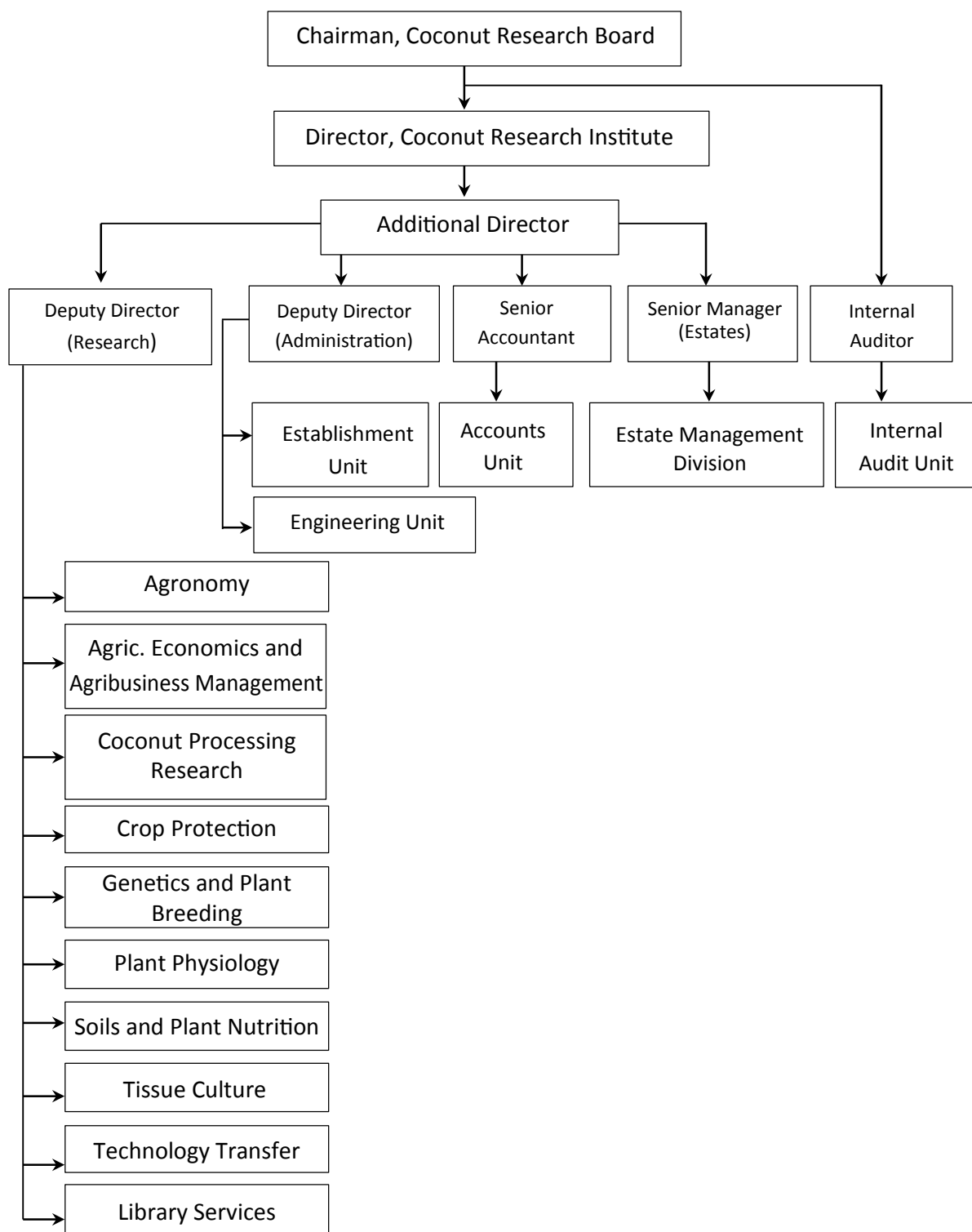
Our Mission

Generate knowledge and technology through excellence in research towards increasing productivity and profitability of coconut.

Our Mandate

1. Conduct and further scientific research on growth and cultivation of coconut palm, growing other crops and engage in animal husbandry in coconut plantations and prevent and cure of diseases and pests.
2. Conduct and further scientific research on processing and utilization of coconut products and value addition.
3. Establish and maintain institute's seed gardens and experimental stations.
4. Train advisory and extension workers to assist the coconut industry.
5. Guide and advise coconut industry on all matters of technical nature.
6. Conduct R & D activities for development of the oil palm industry.

ORGANOGRAMME OF THE INSTITUTE



MINISTRY OF PLANTATION INDUSTRIES

THE COCONUT RESEARCH INSTITUTE

SHORT ANNUAL REPORT – 2017

The Coconut Research Institute was founded in 1929 as the Coconut Research Scheme under the Coconut Research Ordinance No.24 of 1928. The scheme established its headquarters at Bandirippuwa Estate, Lunuwila with three Technical Divisions namely Genetics, Chemistry, and Soil Chemistry. Following the enactment of the Coconut Research act No.37 in 1950, it was renamed as the Coconut Research Institute of Ceylon. The Coconut Development Act, No.46 promulgated in 1971, the Coconut Research Board was set up in 1972 to function as the Board of Management of the Coconut Research Institute.

The Coconut Research Board

The governing body of the Institute is the Coconut Research Board. In terms of the Coconut Development Act, the Board consists of 11 members, appointed by the Minister-in-charge. One member is appointed as the Chairman of the Board. The members hold office for three years and are eligible for reappointment.

The Members of the Board

Record of Attendance

Mr. Jayantha Jayewardene, Chairman/CRB	11/11
Ms. Sureka Attanayake/Ministry Representative	09/11
Mr. H. K. U. K. Rupasinghe, Chairman/CDA	09/11
Mr. Y. L. K. Yakandawala, Chairman/CCB	09/11
Dr. Rohan Wijekoon, Director General/DOA	06/11
Dr. S. F. N. Silva, Representative from CGA	10/11
Dr. J. D. H. Wijewardena, Director/Secretary/CARP	08/11
Mr. C. H. S. Dangalle/Treasury Representative	10/11
Mr. Gamini Rupasinghe	10/10
Dr. K. P. Premaratne	09/11
Dr. (Mrs) L. C. P. Fernando, Director/CRI	11/11

Secretary-to-the-Board

Dr. (Mrs) Sanathanie Ranasinghe, Additional Director

CRB: Coconut Research Board

CRI: Coconut Research Institute

CDA: Coconut Development Authority

CCB: Coconut Cultivation Board

DOA: Department of Agriculture

CGA: Coconut Growers' Association

CARP: Council for Agricultural Research Policy

The Audit and Management Committee

Altogether 04 meetings were held during the year to discuss the Audit & Management activities of the Institute.

The members of the Audit committee are;

	Name	Record of attendance
Chairman & treasury Representator	Mr. C. H. S. Dangalle	4/4
Ministry Representative	Ms. Sureka N. Attanayake	3/4
Board member	Dr. K. P. Premarathne	3/4
Observer from AGD	Mr. L. P. Jayantha Pushpakumara	4/4
Director/CRI	Dr. (Mrs) L. C. P. Fernando	4/4
Internal Auditor	Mr. P. W. A. Fernando	4/4
Convener, Secretary to the Board	Dr. (Mrs) Sanathanie Ranasinghe	3/4

AGD: Auditor General Department

Chairman's Message



The Coconut Research Institute had one of the most successful years in recent times. The research staff produced a number of very useful research outputs which benefitted the coconut industry. These outputs have been converted to recommendations which were publicized and passed on to the coconut growers. These recommendations were appreciated by the coconut growers and many have adopted them.

In addition, there are many ongoing research programs at the CRI, which will result in useful outputs and recommendations to coconut growers in the near future. The CRI intends to continue high level research in the future as well. The CRI has intentions of collaborating in coconut related research with individuals and institutions outside Sri Lanka. Already the CRI has had several visiting researchers working here for short spells. It also has interns from many parts of the world working in our laboratories. Moves are foot to initiate a joint research programme with China. The Chinese have obtained approval for such a cooperative effort. This collaborative research includes the construction of a joint research laboratory.

The CRI has now been recognized by the Asian Pacific Coconut Community (APCC) as one of the foremost coconut producing countries in Asia and the Pacific Region. The APCC will transform itself into International Coconut Community by including South America, Africa and other non-Asian countries. Here too the CRI will play prominent role in this new apex international coconut body.

The APCC have requested the CRI to organize a two-month training programme on coconut cultivation and processing for participants from the international coconut community. This course will start in May 2018 and the course will be conducted by the CRI research staff. The CRI has 20 research staff with PhDs. The field training of this training programme will be on three or four of the CRI coconut estates. A short two-week training course will also be held for international participants.

The CRI now assists those Regional Plantation Company (RPC) estates, which have undertaken the cultivation of oil palm. Oil palm has now been planted in 12,000 ha. out of the government approved 20,000 ha. for oil palm cultivation. Some of the CRI staff, who are well versed in oil palm cultivation, assists oil palm plantations in an advisory capacity. Scientists from the CRI have visited Thailand, Malaysia and Papua New Guinea to ensure that the seed produced by companies in these countries are suitable for planting in the Sri

Lankan estates. It is intended that the CRI, would in the future, carry out more research, as necessary, on oil palm.

The staff of the CRI should be proud of the manner in which the institute has developed in recent times.



Jayantha Jayewardene

Chairman

Coconut Research Board

Director's Message



The Coconut Research Institute continued to serve the coconut industry in numerous ways in the year 2017 with its' many contributions. Many achievements in research and development were recorded.

Eight technologies were developed for recommendation. Trunk injection of a lower dose (5 ml) of Monocrotophos 1:1 ratio with water was effective in the management of Coconut Caterpillar. One hundred and fifty micro liters of Red Palm Weevil aggregation pheromone formulated in a gel efficiently trapped Red Palm Weevils than in the currently used glass dispenser. It was recommended to use fully mature (12 months of age) and seasoned (3 weeks) nuts for oil production due to its high oil content. A carbonated beverage from mature coconut water mixed with fruit juice having better sensory qualities and long shelf life was developed. Wild sunflower-based *in situ* green manure package with no addition of Urea and Muriate of Potash was also recommended for organic coconut farming systems. Also to use ash produced through full combustion of semi dry king coconut husk with various organic manures in different doses to supplement Pottasium. It was found that application of 5g and 10g / palm/ 6 month could correct Boron deficiency in non-bearing and bearing palms respectively. The institute also made recommendations to the Ministry on short- and long-term effects of importation of copra and fresh coconut on domestic coconut industry and did not recommend those due to possible risks of introduction of incurable diseases. For the first time in history of coconut tissue culture, ovary derived clonal coconut plants were planted in 01 ac. plot in the field.

The estimated Annual National Coconut Production for 2017 was 2,450 Mn. nuts, which was about 14% reduction compared to that of 2016 (2,845 Mn. nuts). The severe drought and the heat stress prevailed in June - October period in 2016 and up to August 2017 significantly reduced nut setting and resulted in low crop yield. Due to the low yield the coconut processing industry faced a severe shortage of nuts during the year. To overcome the crisis to some extent CRI recommended importation of frozen coconut kernel. However, a 4% higher yield is expected in first 8 months of 2018 compared to the national production for the same period in 2017.

Various research projects marked noteworthy achievements and the focus was more towards researching for nano fertilizers for higher nutrient use efficiency, biochar for moisture conservation and improving nutrient uptake efficiency, supplement of green manure to increase soil moisture and soil microbial activity, mitigating measures for climate effects,

microbial consortium for enhancing coir retting and plant volatiles for pest management.

The institute continued to support technology transfer activities through conducting the certificate course in coconut cultivation and value addition, training of trainers, Research Extension Dialogues, 'Kapruka' SMS Service to alert the coconut growers on various coconut related information and many other training programmes. A special crash programme was conducted to encourage and educate the managers of state owned plantation companies on increasing coconut yield.

CRI also continued to assist the coconut growers and processors by providing analysis/test reports of various substrates, soil and land suitability reports, supply of bio control agents, provision of yield prediction and meteorological data and demonstrating various farming systems which were in high demand.

A special Treasury grant was provided to the institute in 2017 to improve seed gardens of the institute to increase seed nut production, construction of incubators to assist small-medium scale coconut processors in setting up new processing plants and purchase of laboratory equipment to strengthen coconut research.

The 03 Genetic Resource Centres and 08 Research Centres of the institute continued to produce hybrid seed nuts for the national requirement, supported various research trials and maintained demonstrations for the use of coconut growers and the public. CRI jointly with the Coconut Cultivation Board continued to manage the Weligama Coconut Leaf Wilt Disease (WCLWD) successfully. Establishment of a mini seed garden was commenced to mass produce hybrid coconut seedlings tolerant to WCWLD.

In addition to various research outputs the CRI scientists actively contributed in fostering science. Ten research papers in international journals and 27 papers in conferences/workshops locally and internationally were published. Six scientists received an award at the National Awards for Excellence in Agricultural Research – 2017. The staff attended various training programmes locally and internationally in capacity and human resource development.

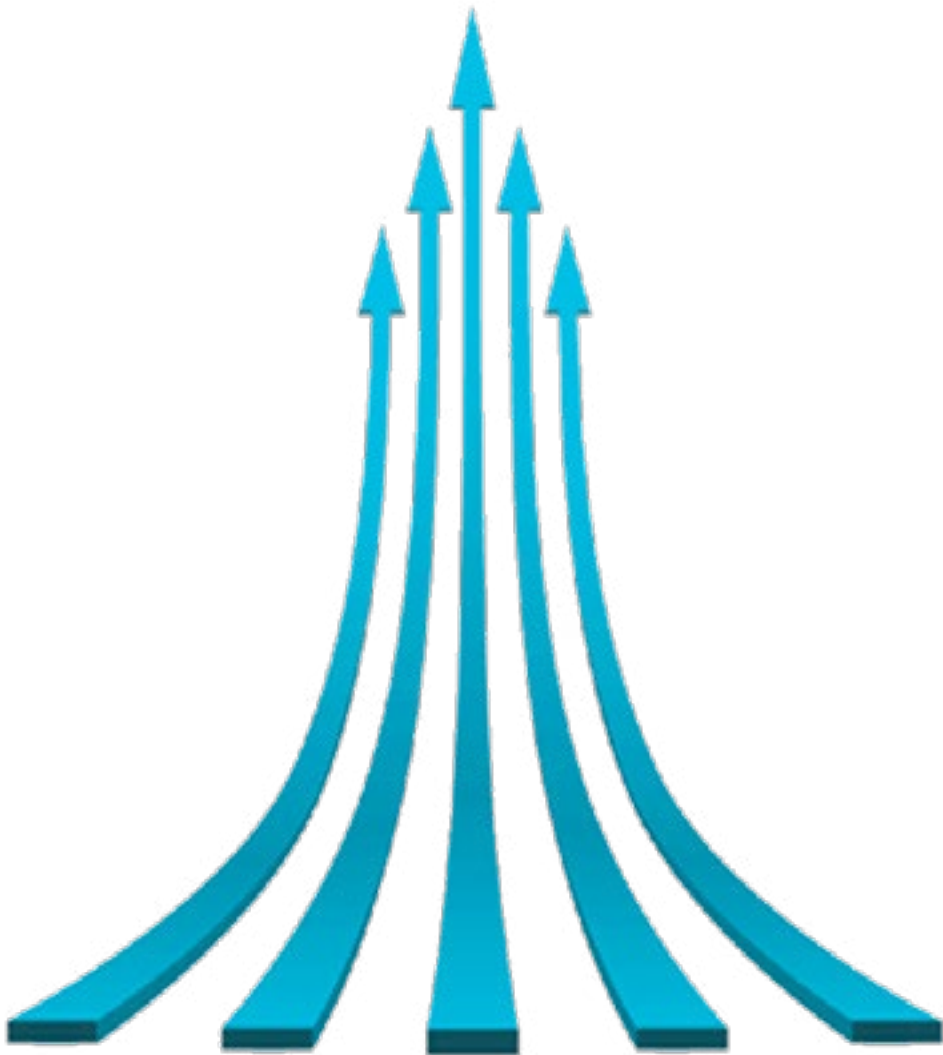
I wish to thank all staff of the institute and the estates for their untiring efforts to achieve the goals of the institute. I am grateful to the Hon. Minister of Plantation Industries, Secretary and the officials of the Ministry of Plantation Industries for their guidance and support extended to us during the year. I appreciate the Coconut Cultivation Board, Coconut Development Authority, Universities, government departments, institutes, coconut growers and industrialists collaborated with us to achieve the targets of 2017.



Dr. (Mrs) L. C. P. Fernando

Director, Coconut Research Institute

Research Recommendations



Interim recommendation of gel formulation of Red Palm Weevil aggregation pheromone

Red Palm Weevil (RPW) is the most devastating pest in young coconut plantations of the age group of 3 – 15 years. Currently an integrated pest management (IPM) method is recommended for the management of RPW and use of aggregation pheromone is one of the important components in IPM. The currently recommended RPW aggregation pheromone filled in glass vial dispensers do not give constant emission of pheromone and it emits high dose at the beginning and reduce rapidly with time.

A gel dispenser was tested for its efficacy in attracting RPW and the rate of release of pheromone. The gel dispenser with 150 µl of pheromone was efficient than glass vial pheromone dispensers in both constant release rate and trap catches. Installation of two pheromone traps per acre of land with gel dispenser is recommended for the management of RPW in coconut plantations



Gel dispenser and its package



Trap with gel dispenser

Crop Protection Division

Interim recommendation of low dose of Monocrotophos 60 SL for the management of Black Headed Caterpillar

Frequent Coconut Caterpillar outbreaks occur due to change in climatic parameters towards extremes. Dry weather is undesirable to parasitoids of Coconut Caterpillar. Although the CRI is continuously releasing parasitoids into areas with potential outbreaks, their establishment is minimal during dry weather. Therefore, application of Monocrotophos on large number of palms, escalates the requirement of the chemical. The current recommendation of Monocrotophos for the



Coconut Caterpillar affected palm

management of Coconut Caterpillar is injection of 8 ml into the trunk of an affected palm. A trial was conducted to reduce the amount of Monocrotophos required to manage Coconut Caterpillar out breaks.

Trunk injection of 10 ml of 1:1 mixture of Monocrotophos and water when caterpillar is in their 1st and 2nd larval instars is recommended for control of caterpillar.

Crop Protection Division

Quantity and quality improvement of coconut oil

A study was conducted to determine the quantity and quality of coconut oil produced from coconuts of different maturity levels; 11 months, 12 months (fully mature) and 12 months matured and three weeks seasoned nuts. Virgin coconut oil produced from nuts harvested at 11 month maturity stage had significantly lower oil yield compared to nuts harvested at 12 months with or without seasoning. Significantly high white coconut oil production (oil obtained from copra), was obtained from fully matured seasoned nuts. The quality of oil was not significantly different among the nuts from different maturity stages.

However, the fully matured fresh nuts without seasoning was not suitable for removal of shell and brown skin and fully matured seasoned nuts were suitable for production of virgin coconut oil and white coconut oil. Therefore, fully matured and three weeks seasoned nuts are recommended for coconut oil production.



Virgin Coconut Oil

Coconut Processing Research Division

Development of a value- added coconut water beverage

Coconut water is the most nutritious wholesome sterile liquid with complex blend of vitamins, minerals, amino acids, carbohydrates, antioxidants, enzymes and health enhancing growth hormones. Mature coconut water is considered as a waste in coconut processing plants and has a neutral taste which is not favorable as a palatable beverage. The coconut water also has therapeutic benefits similar to tender coconut water. Therefore, value addition of mature coconut water is a good option to increase the palatability of coconut water beverage.

At the collection point mature coconut water collected from the Desiccated Coconut (DC) mills contains coconut milk, oil and other suspending substances as impurities (this will give a thin fat layer on top of coconut water and considerable amounts of sediments). Next transport immediately in cool containers to the processing area, filter cold coconut

water through cheese cloth to remove the large particles, pasteurize filtrate at 70 °C for 20 minutes, transfer to a sedimentation bucket, keep for 24 h for sedimentation and filter through sand filter system monitoring the Brix value, pH and the turbidity of coconut water after each and every step.

Blend the filtered coconut water with concentrated fruit juice (Sun Quick brand - orange, black current) at 97:3 ratio, bottle in 250 ml bottles, heat process at 90 °C for 20 minutes, store at 4 °C temperature and carbonate the blend using dry ice (9 g/L). This beverage has a shelf life of 4 months and it has better sensory qualities than the commercially available product.

Coconut Processing Research Division

Wild Sunflower (*Tithonia diversifolia*) as a green manure for coconut plantations

Wild Sunflower (*T. diversifolia*) is recommended to be used as a green manure plant in the coconut plantations in the wet and intermediate zones for enhanced soil fertility and productivity. Two rows of *T. diversifolia* cuttings should be planted in between two rows of coconut palms, at a spacing of 1m x 2m (2,250 plants /ha) and the pruning frequency should be at 3 and 4 month intervals at a pruning height of 0.5m above the ground in wet and intermediate zones, respectively.



Wild Sunflower under coconut

Agronomy Division

***In situ* green manure package for organic coconut plantations**

Wild Sunflower-based *in situ* green manure package for organic coconut farming systems is recommended. Establish Wild Sunflower plants (double row, 1m x 2m) in between coconut rows, lop them and add to coconut palms. The schedule of applying Wild Sunflower green biomass based fertilizer mixture for mature coconut palms is given below.

Ingredients	Amount for adult palm /year
Wild Sunflower green biomass	35 kg
Eppawala Rock Phosphate (ERP)	425 g
Urea	-
Muriate of Potash (MOP)	-
Dolomite	500 g

Agronomy Division

Application of sodium chloride for adult coconut palms

Salt application has become a conventional practice among coconut growers with the belief of reducing drooping of coconut fronds and bunches. However, apart from those benefits, application of salt can reduce nitrification rates and thereby minimize N leaching losses. Therefore, salt application to coconut palms can enhance N use efficiency of coconut plantations. Hence, as an interim recommendation, it is recommended to continue application of common salt – NaCl (not iodized salt or muddy salt) at the rate of 1kg/palm/year with recommended dose of adult palm mixture to enhance N use efficiency in coconut plantations.



Application of sodium chloride

Soils & Plant Nutrition Division

King Coconut husk ash as an organic source of potassium for organic coconut farming

King coconut husk is a waste product from the king coconut water export industry as well as from the local consumption and it does not have an economic value. There has been a problem of unavailability of potassium source for organic source coconut growers. Ash was produced through full combustion of semi dried king coconut husks and that product had considerable potassium (K) content. Therefore, king coconut husk ash can be used as an organic K source for coconut cultivations.



Ash produced from full combustion of semi-dried tender husks

Fertilizer recommendations for young palms and adult coconut palms in wet zone, intermediate zone and dry zone including King Coconut husk ash as K source are given below.

Young Coconut Palms (In wet and intermediate zones)

Sources	Time after transplanting				
	6 months	1 year	2 years	3 years	4 years up to bearing (annually)
Cattle manure (moisture 20 - 30%)	5 kg	12 kg	16 kg	20 kg	25 kg
Eppawela Rock Phosphate	200 g	450 g	600 g	750 g	900 g
King Coconut husk-ash	135 g	890 g	1110 g	1445 g	1780 g
Dolomite	250 g	250 g	250 g	250 g	250 g
Goat manure (moisture 20 - 30%)	3 kg	7 kg	9 kg	11 kg	13 kg
Eppawela Rock Phosphate	200 g	450 g	600 g	750 g	900 g
King Coconut husk-ash	220 g	535 g	670 g	845 g	1000 g
Dolomite	250 g	250 g	250 g	250 g	250 g
Poultry manure (moisture 20-30%)	5 kg	12 kg	16 kg	20 kg	25 kg
King Coconut husk ash	120g	490g	580g	670g	845g
Dolomite	250 g	250 g	250 g	250 g	250 g

Young Coconut Palms (In the dry zone)

Sources	Time after transplanting				
	6 months	1 year	2 years	3 years	4 years up to bearing (every year)
Cattle manure (moisture 20-30%)	5 kg	12 kg	16 kg	20 kg	25 kg
TSP	85g	200g	270g	340g	420g
King Coconut husk-ash	135 g	890 g	1110g	1445 g	1780 g
Dolomite	250 g	250 g	250 g	250 g	250 g

Goat manure (moisture 20-30%)	3 kg	7 kg	9 kg	11 kg	13 kg
TSP	85 g	200 g	270 g	340 g	420 g
King Coconut husk-ash	220 g	535 g	670 g	845 g	1000 g
Dolomite	250 g	250 g	250 g	250 g	250 g
Poultry manure (moisture 20-30%)	5 kg	12 kg	16 kg	20 kg	25 kg
King Coconut husk-ash	120g	490g	580g	670g	845g
Dolomite	250 g	250 g	250 g	250 g	250 g

In adult coconut palm recommendation, all Nitrogen, Phosphorus and Magnesium requirements are met with this combination. Therefore, there is no need of adding urea, ERP or dolomite with organic manure for adult palms.

Adult Coconut Palms (In the dry, wet and intermediate zones)

Organic Manure	Amount (kg)	King Coconut husk ash (kg)
Poultry manure (moisture 20-30%)	30	3.3
Cattle manure (moisture 20-30%)	30	5.5
Goat manure (moisture 20-30%)	25	3.5

Soils & Plant Nutrition Division

Remediation of Boron (B) deficiency in young and adult coconut palms



Boron deficiency showing palm



Boron deficiency showing frond

Correction of B deficiency in young palms (upto bearing)

At the initial stage of B deficiency, soil application of Sodium Tetra Borate at a rate of 10 g/ palm/ 6 month and moistening the soil until disappearance of B deficiency symptoms and emergence of healthy new fronds.

Correction of B deficiency in adult palms (bearing palms)

At the initial stage of B deficiency, soil application of Sodium Tetra Borate at a rate of 20 g/ palm/ 6 month and moistening the soil until disappearance of B deficiency symptoms and emergence of healthy new fronds.

Soils & Plant Nutrition Division

Policy Proposals



Importation of copra

The effects of importation of copra on existing domestic industry can be identified as short run and long run effects as follows.

In the short run: Importation of copra will affect the sale of good quality coconut oil produced in the country using nuts purchased from local market, leading to the closure of many small-scale oil mills at village level. This will affect the livelihood of small-scale oil producers and employment of poor people working in the small-scale oil mills.

In the long run: This will reduce the farm-gate price of coconut and as a result, the income of coconut growers. This will then lead to poor management of coconut lands leading to further reduction in yield. In addition to the economic impacts, the most critical impact of importing copra is the possible introduction of pest and diseases.

Financial analysis shows that coconut oil production using the imported copra under normal tax is not a viable business. Furthermore, the quality of imported copra and the oil yield from the imported copra are not known. It is also necessary to consider the net foreign exchange gain either from DC or saving from edible oil imports and also from re-exporting the coconut oil before copra is imported. Even though importation of copra can fill the gap of coconut required for industry use, considering the negative impact on the local nut price and the coconut oil price, high risk of introduction of new pest and diseases and foreign exchange cost, CRI recommends that importation of copra is not a viable option to develop the coconut industry.

Agricultural Economics & Agribusiness Management Division

Importation of fresh coconuts

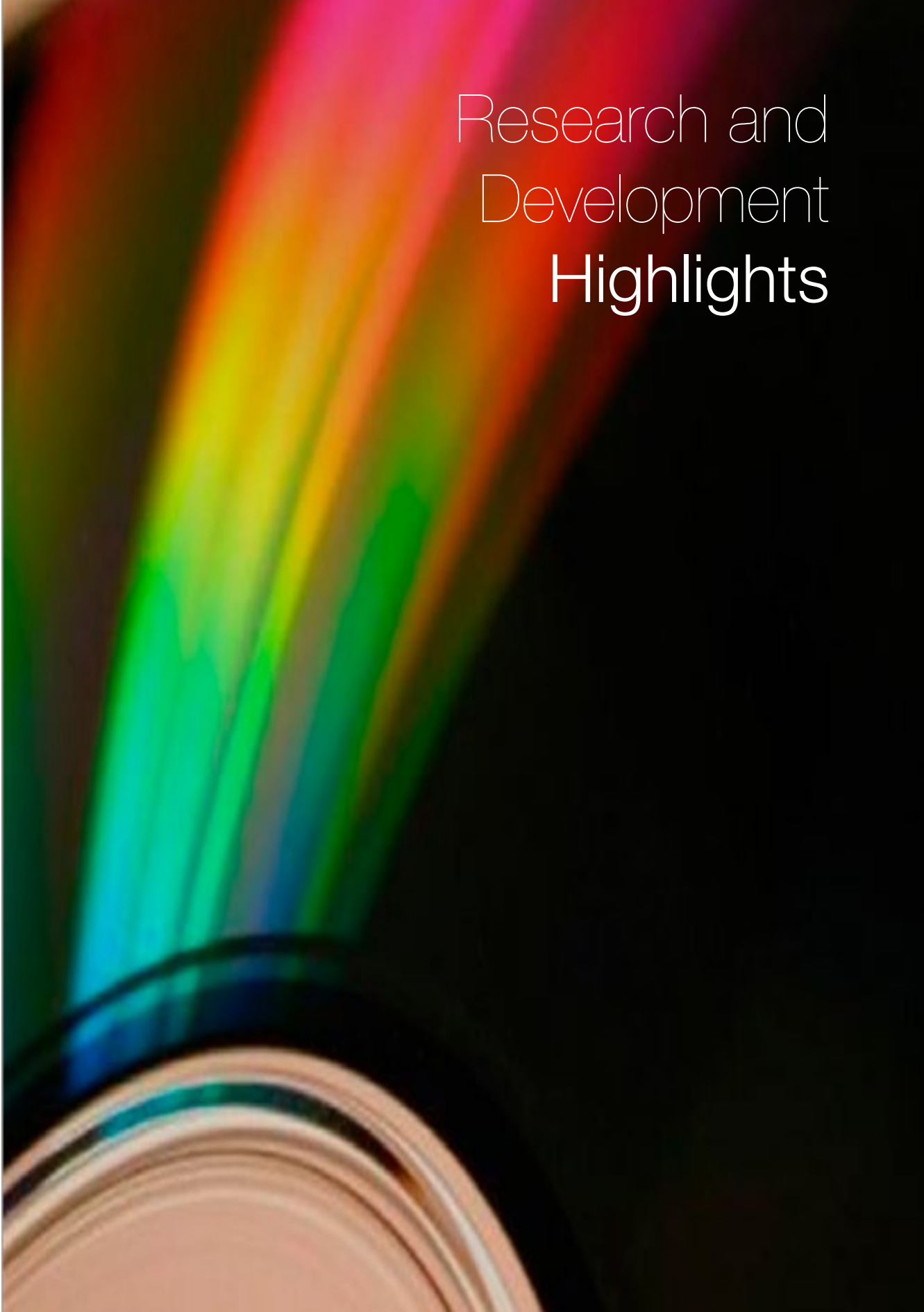
According to the current situation of coconut production, the processors confront with a nut shortage to meet their demand. Therefore, it can be expected that the processors will be benefitted from fresh nut imports during this drought period. Since this is considered only for the export processed products, the export processing industries are benefitted with the availability of imported raw material. This may help to reduce the loss of these industries which provide a considerable foreign exchange and employment. However, the quarantine regulations are a must and labeling is necessary to prevent export substitution. Therefore, institutional set up need to be strengthened beforehand and a stepwise procedure should be followed. Importation of intermediate processed products will be an alternative for processing of further value-added products. However, strict guidelines should be followed for labeling and sealing the local market.

Prolonged drought is the major reason for the yield drop and recurrence of these events

cannot be ignored. Hence, encouraging the growers to adopt moisture conservation practices and irrigation is imperative. Further, the land productivity needs to be improved by fertilizer application, soil rehabilitation and removal of unproductive palms to meet the future demand. The assurance of a reasonable price for the grower through a favorable policy set up is the key to progress of the coconut sector.

At present domestically produced nuts are fully utilized for the local consumption and the industrial purposes. Evidence suggests that the industry has the potential to accommodate higher level of production to meet the increasing demand in the international market. Even though importation of coconut fills the gap required for industry use, while taking into consideration the high risk of potential introduction of new pest and diseases, CRI seriously consider that the importation of coconut is not an option unless it is in compliance with the quarantine regulations.

Agricultural Economics & Agribusiness Management Division



Research and Development Highlights



COCONUT VARIETAL IMPROVEMENT

New exotic cross Sri Lanka Tall x Malayan Red Dwarf performs better under drought stress in the dry zone of Sri Lanka

Genetics & Plant Breeding Division



Young Sri Lankan Tall x Malayan Red Dwarf (SLT x MRD) palm

New coconut hybrid Sri Lankan Tall x Malayan Red Dwarf (SLT x MRD) recently developed using imported exotic pollen have shown promising results in terms of the nut yield and fruit components in the wet and intermediate zones of Sri Lanka. These results were reported earlier and this new hybrid has a very high potential for future recommendation. Evaluation of this hybrid together with CRIC60, CRISL98 and Kapruwana was initiated in 2017 in drought prone Wanathawilluwa area. Even under the long dry spells prevailed in 2016 and

2017, SLT x MRD out-performed other three recommended coconut cultivars. Data recording will be continued in the multi-locational trials to obtain comprehensive evidence.

Evaluation of the second generation of Ambakelle Special and CRIC60 under water limited environments

Genetics & Plant Breeding Division



Second generation Ambakelle Special palms at the Genetic Resource Centre, Ambakelle

Drought seems to be the major challenge for coconut cultivation in the face of climate change. Ambakelle Special is a selected form for drought tolerance from Ambakelle Tall at the Genetic Resource Centre, Ambakelle (GRC). Second generation of Ambakelle Special was generated by paired crossing of the first-generation palms and these were planted at the GRC

Ambakelle in 1992 together with the CRIC60 as the control. Continuous data recording of 150 second generation Ambakelle Special palms and 150 CRIC60 have shown significantly higher nut yields for Ambakelle Special palms even under extreme dry whether prevailed in year 2016-2017. Data recording will be continued in future for recommending a much-needed drought tolerant coconut cultivar for Sri Lankan coconut industry.

Cloning coconut

Tissue Culture Division

Unfertilized ovary was identified as an ideal explant for somatic embryogenesis of coconut in recent past due to its somatic nature and high regeneration potential. Suitable culture conditions have been identified for consistent callogenesis and shoot regeneration. But the low rate of shoot multiplication (highest so far achieved is about 300 plants per inflorescence) has been the major issues to be addressed to improve efficiency to develop a commercial ovary culture protocol. The experiments carried out during the year revealed that callus maturation in hormone free medium with 0.3% phytagel content (instead of 0.2%) favours somatic embryogenesis and addition of BAP in germination medium improves shoot regeneration. In order to increase success rate in acclimatization of clonal plants, possibility of providing photoautotrophic conditions were tested and a suitable polythene gauge was identified for closure of *in vitro* plants.

For the first time in history of coconut tissue culture, one-acre research plot planted with ovary derived clonal plants was established in a grower's field. More than 120 plants of the same clone are ready for field planting



Field established ovary derived clonal plants

Field performance and molecular evaluation of coconut palms regenerated from somatic embryogenic cultures (funded by NRC)

Tissue Culture Division, Plant Physiology Division, Coconut Processing Research Division, Genetics & Plant Breeding Division

Genetic fidelity of the tissue cultured palms were determined using twelve (12) SSR primers and the banding patterns proved that there are no genetical variation in the clonal palms.

Comparison between clonal plants and seed grown palms of the same cultivar revealed majority of the fruit components, morphological and agronomical parameters of micropropagated coconut clones were not significantly different from that of seed germinated palms. Only a very few parameters were significantly different and these values were significantly higher than the seed germinated palms.

Physiological parameters of micropropagated coconut clones were also not significantly different from the seed germinated palms. Rate of photosynthesis, stomatal conductance and stomatal resistance showed similar patterns indicating both micropropagated and seed grown palms have similar physiological behavioral pattern.

These evidences prove that there are no significant variations in the clonal palms for the test characters and hence *in vitro* culture procedure has not induced any inferior characters in clonal palms. Therefore, *in vitro* plant regeneration through somatic embryogenesis could offer a promising system for seedling production of coconut

in near future to meet the increasing demand for seedlings.

Production of homozygote (pure lines) coconut

Tissue Culture Division

Anther and isolated microspore culture provides an excellent system for the production of doubled haploid plants, which can be used to accelerate plant-breeding programs. So far characters such as, pollen developmental stage, pretreatment conditions, hormonal concentrations and anther density have been identified for coconut androgenesis. Conversion of embryos in to plantlets need to be optimized and the death of shoots due to tissue necrosis need to be minimized. Use of higher BAP concentrations (20 μ M) resulted in increased conversion (approximately double) of embryos in to haploid shoots. Furthermore, high efficiency of plant recovery (up to 72%) was achieved by the use of doubled concentration of CaCl_2 in Y_3 medium. Few anther derived plants were successfully acclimatized and ready for field planting.





Different stages of the production of homozygotes

COCONUT PRODUCTION TECHNOLOGY



Effect of nano fertilizer on soil microbial communities in coconut plantations

Soils & Plant Nutrition Division

With the large surface area and small size, nano fertilizers improve the efficiency of releasing nutrients to the soil dynamic pool and thus, enable the uptake of fertilizer by plants in a slow and sustainable manner. However, the effect of nano particles from the applied nano fertilizer on soil microbial community is less explored. Therefore, a study was conducted at the Bandirippuwa Estate to evaluate the effects of nano fertilizer on soil microbial community, before it is being recommended to use in coconut plantations.



K - nano fertilizer



N - nano fertilizer

Different rates of Urea modified nano fertilizer (N-nano) treated soils and Muriate of Potash (MOP) modified nano fertilizer (K-nano) treated soils were subjected to microbial analysis and compared against conventional fertilizer treated soils. Soil bacterial and fungal populations, soil microbial activity and population of nitrifiers were compared. There were no significant differences in all the microbial parameters assessed except for the increased population of ammonium oxidizers in K-nano fertilizer treatments. Nevertheless, it is evident that nano particles applied through nano fertilizers do not adversely affect soil microbial communities in coconut plantations.

Plant and soil fertility status of conventionally (with chemical fertilizer) and organically cultivated coconut plantations under growers' management conditions

Soils & Plant Nutrition Division

From the recent comparison of organically grown and conventionally grown coconut lands, it was revealed once again that organically managed lands show more depleted status of plant nutrition and soil fertility than conventionally managed land. According to the detail assessment of the past and present management situations of these two cultivations, two major issues in organically managed coconut lands have been identified to be the reason behind lower soil fertility and plant nutrition status compared to conventional land. The issues were,

- i. Coconut lands which were neglected/ poorly managed for a long period of time has been subjected to the Organic Certification, as the process of conversion of such lands are easy and rapid than converting coconut lands which were well managed with chemical fertilization and pest and disease management.
- ii. Shortage of organic based fertilizers to the farmers especially Sulphate of Potash (SOP) as the potassium fertilizer source for organic coconut plantations.

However, when comparing the improvements in the manure circle of coconut palms, a clear improvement in the soil properties were observed in organically cultivated land than conventionally cultivated land. This is a promising finding

for the organic cultivation indicating that continuation of proper organic fertilization management in long run will help to eradicate the depleted soil fertility and plant nutrition status in such plantations with the history of poor management.



Organically cultivated coconut estate

Sulphur (S) status of coconut estates in Gampaha District

Soils & Plant Nutrition Division



Coconut palm showing S deficient symptoms

Randomly selected coconut estates in Gampaha District were assessed for status of Sulphur. Leaf S contents of studied estates ranged from 0.08% to 0.48% and out of the samples, 33% showed lower S content than the sufficiency range (0.15-0.20%) suggesting that there is a possibility of having a risk of S deficiency in coconut estates in future.

Application of biochar in coconut estates

Soils & Plant Nutrition Division

A series of experiments were continued to study the rate and depth of application of biochar and plant remediation techniques if toxic substance are present after long time application of biochar to coconut palm. It was found that incorporation of biochar into soil at depth range of 10-40 cm has a potential in improving efficiency of nutrient uptake by the palms as the coconut root system is mostly concentrated at following depths in an order of 20 – 40 cm > 0-20 cm > 40-60 cm.



Primary and secondary roots of coconut
(between 10 - 40 cm soil depth)

Fertilizer placement techniques

Soils & Plant Nutrition Division

A long-term experiment was conducted to determine the effect of four different fertilizer placement techniques; currently recommended surface application, trench application at a width and depth of 45 cm and 10 cm, at 0.5 m away from the base of the palm, four pit application of 45 cm x 45 cm pits at 0.5 m away from the base of the palm, and basin method, 1.75 m basin towards the base, with inorganic fertilizer application. The palms to which fertilizer was applied by trench and four pits method

gave higher yields (65 nuts/palm/year and 62 nuts/palm/year, respectively) compared to surface application and basin methods (56 nuts/palm/year 55 nuts/palm/year, respectively).

A green manure-based fertilizer mixture for organic coconut farming

Agronomy Division



Tithonia diversifolia planted between
coconut rows

Tithonia diversifolia has high potential as a green manure. It contains high concentrations of nitrogen (N), phosphorus (P) and potassium (K) in the green leaf biomass. A study was conducted to develop an *in-situ* green manure based fertilizer mixture to replace urea and MOP requirements in organic coconut farming systems using *T. diversifolia* and *Gliricidia sepium*. Both plant species were established by different methods and their green biomass were lopped and added to the manure circle of coconut palms. Application of green manures increased soil moisture content by 52-74%, soil microbial activity by 42-56%, soil N by 28-41%, and nut yield by 14-22% after six years of green manure application.



***Gliricidia sepium* planted between coconut rows**

Mixed cropping systems to increase the nut yield in dry zone coconut plantations

Agronomy Division

Low yields in coconut plantations in the dry zone area are mainly due to the long dry spells associated with high heat stress during the year. *Artocarpus heterophyllus*, *Gliricidia sepium* and *Anacardium occidentale* forest species-based mixed cropping system was established with coconut at the Maduruoya Genetic Resource Centre to evaluate the change of micro-climatic conditions in a coconut plantation when mixed cropping system is established. Mixed cropping systems increased leaf production rate of coconut seedlings by 9%-40%, top soil K content by 40-46%, soil organic matter content by 80-93%, and soil N by 24-34% after five years of planting compared to mono-crop system.

Assessment of different leguminous cover cropping systems and agronomic practices on soil erosion

Agronomy Division

Application of different agronomic practices are very important to prevent

soil degradation and improve the soil fertility. This study compared the soil erosion under different leguminous cover cropping systems with other agronomic practices in coconut farming system. The ¹³⁷Cs technique was used to assess the soil erosion. Establishment of contour drains, cover cropping with *Pueraria phasioloides*, and *Gliricidia* live fence reduced soil erosion by 30%, 84% and 51%, respectively and therefore, cover cropping and establishment of contour drains were found to be the best agronomic practices to control soil erosion in coconut plantations.

Development of a sustainable moisture conservation method for coconut plantations by using bio-char

Agronomy Division

Soil moisture is considered as the most important cultural practice in coconut plantations under rain fed conditions, particularly in the intermediate and dry zones of Sri Lanka. Traditionally, mulching around the palm with different plant residues and burying husks are major techniques used to conserve soil moisture. The burial of coconut husk has shown beneficial effects but that recommendation is challenged with the performance of coir industry which has a higher market demand for coir fiber. Bio-char improves the performance of soil by retaining moisture and making it available during drought conditions because bio-char has a large surface area typically over 100 square meters per gram with good adsorption capacity. Burying of bio-char 15 kg and 10 kg per palm increased soil moisture content in the palm manure circle by 53%

and 37% respectively, when compared with normal mulch.

Evaluation of growth performance of CO-3 fodder grass under coconut

Agronomy Division

CO-3 is one of the highest yielding perennial tropical fodder grasses and considered as cut and carry forage for stall feeder system for ruminants. The study was conducted to determine the CO-3 fodder biomass production when CO-3 grass was established in between coconut rows by different methods and biomass was harvested at different intervals. The highest CO-3 dry biomass of 22.75 MT/ha/yr was obtained in five row planting system with 30 day lopping interval and it was followed by 13.78 MT/ha/yr in three row planting system with 30 day lopping interval.



CO-3 fodder grass planted between coconut rows

Evaluation of growth performance of fodder sorghum under coconut

Agronomy Division

Fodder sorghum is a perennial grass species, well known as high productive quality forage for livestock in tropics. This study was conducted to evaluate the growth

performance of fodder sorghum in different environmental conditions with different management practices under coconut, in the intermediate zone and the dry zone. Fodder sorghum seeds were established in between coconut rows with different spacing and different nutrient sources. The highest fodder biomass of 5.38 MT/ha was obtained from inorganic fertilizer treated 1ft x 1ft spacing system under a moderate drought condition.



Fodder sorghum cultivated between coconut rows

Potential of Dragon Fruit (*Hylocereus undatus*) as an Intercrop under mature coconut

Agronomy Division

Being a new fruit species recently introduced to the Sri Lankan agriculture, it is understood that Dragon Fruit has not been extensively studied under the local growing conditions. The main advantages of this crop are the plant starts producing a significant crop four years after planting, reaches full production after five years and the plant will continue this yield for about 20 years. Agronomic practices for this crop are easy and less expensive and get fewer pest and disease attacks. Under present conditions monoculture of Dragon Fruit has become much popular among farmers in Sri Lanka

due to high market price and demand. This experiment was established to evaluate the effect of organic and inorganic fertilizers, planting density and income security of coconut growing farmers with dragon fruit as an intercrop.



Intercropping Dragon Fruit (*Hylocereus undatus*)
under mature coconut

Preliminary evaluation of high value resin crops under coconut

Agronomy Division

Coconut-based agroforestry is one of the strategies to overcome low productivity by enhancing resource use and land productivity while raising return per unit land area. The rationale for intercropping on coconut lands is to maximize crop production per unit of land and time, without causing any adverse effects on coconut yields. Spaces under mature coconut plantations can be utilized with resin crops at low densities. Resin plants produce high priced plant products which can be used in fragrances, medicines, aromatherapy and religious ceremonies. There has been an increasing demand for natural plant resins

in the international market over the past decade. This experiment was conducted in Makandura Sub-Research Station with Red Sandalwood, Wallapatta (Agar wood) and Sandalwood intercropped with coconut.



Red Sandalwood (*Pterocarpus santalinus*)



Wallapatta (*Gyrinops walla*)



White Sandalwood (*Santalum album*)

Effect of buffalo grazing on soil physical and chemical properties on a silvo pastoral system under coconut

Agronomy Division

Silvo pastoral system comprises of pasture, livestock and coconut palms. This system increases the land productivity by recycling nutrients. Rearing buffaloes under coconut cut down the cost of weeding and also provide additional benefits such as milk,

drought tolerant ability and manure to coconut palms. However, buffalo grazing can increase soil compaction, which in turn adversely affects palm growth.

This experiment was established at Maduruoya Genetic Resource Centre, Bogaswewa in the dry zone with the objectives of determining the effect of incorporating animals on physical, chemical and biological properties of soil, and the effect of this silvo pastoral system on yield of coconuts. This data could be used to update/revise the present recommendation on organic/inorganic fertilization of coconut. There was no significant effect of buffalo grazing on the nut yield.



Buffalo farming under mature coconut at Maduruoya Genetic Resource Centre



CLIMATE CHANGE EFFECTS ON COCONUT PRODUCTION

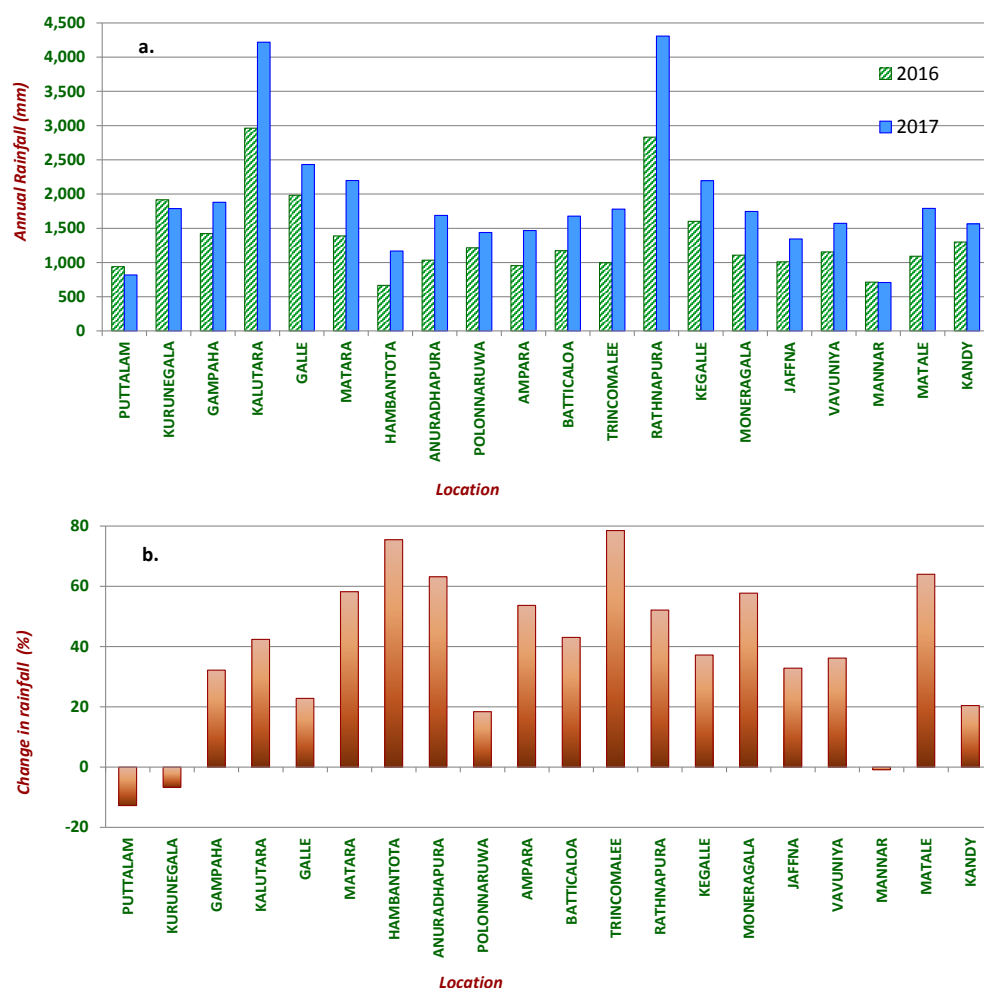
Changes in rainfall and maximum air temperature in coconut growing areas

Plant Physiology Division

There had been about 35% increase in average annual rainfall across all coconut growing districts in 2017 compared to that of 2016. Accordingly, annual rainfall in most districts was comparatively higher in 2017, except *Puttalam* and *Kurunegala* which are major contributory districts for national coconut production. Increase of annual rainfall was more than 60% in *Hambantota*, *Anuradhapura*, *Trincomalee* and *Matale*. Moreover, *Kalutara* and *Rathnapura* districts have recorded an annual rainfall of above 4000 mm within the year 2017. However, when the distribution of rainfall within the year (which is more important than total annual rainfall) was considered, rains were prominently concentrated towards the latter part of the year having the dry spell of 2016 continued up to August 2017 in most districts.

The average annual maximum air temperature ($T_{\max}$) across all stations covering all coconut growing districts has reduced by 0.5 °C in 2017 than in 2016. However, $T_{\max}$ has exceeded the critical temperature of 33 °C for coconut in first four months of the year in major coconut growing districts such as *Kurunegala*, *Puttalam* and *Gampaha*.

Districts generally with drier climates i.e. districts in North-Central, Eastern, Northern and Uva Provinces have experienced above critical temperatures during April to September period. Therefore, the nut setting of inflorescences opened during that period in those districts will be significantly affected resulting in low yields particularly in February – July in 2018. However, compared to the climatic conditions in 2016, the situation prevailed in 2017 was comparatively favourable for coconut production.



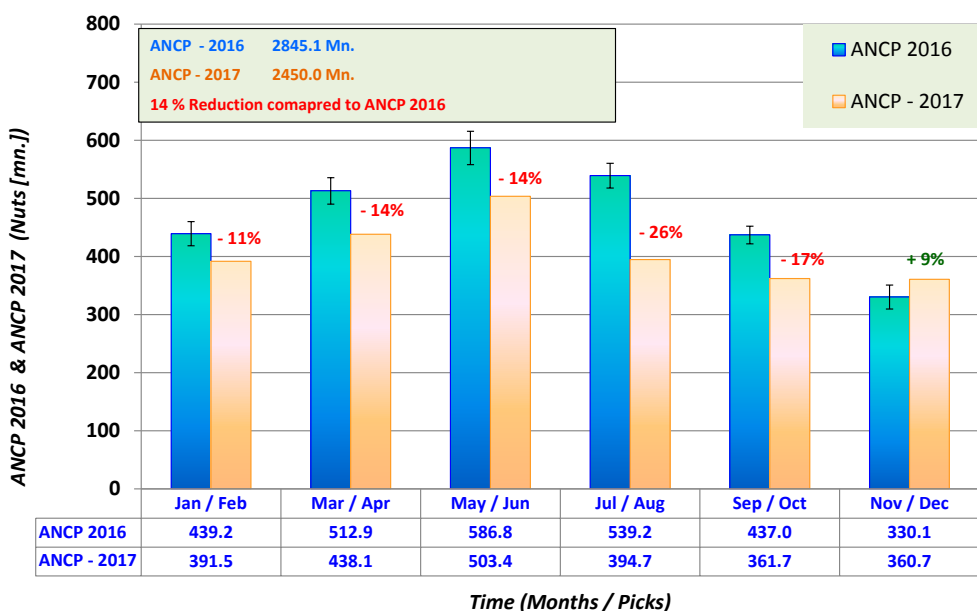
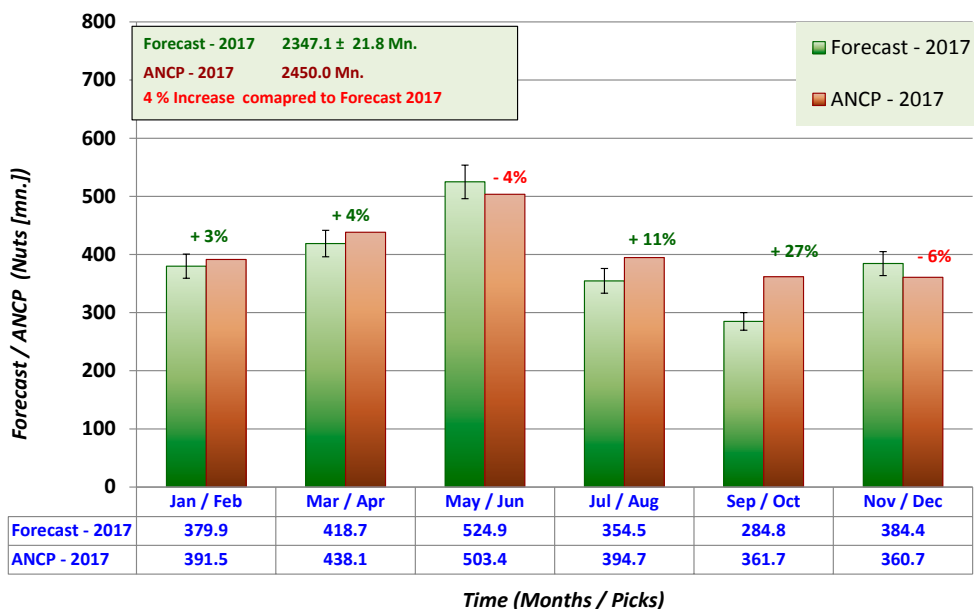
(a) Annual rainfall (mm) in 2016 and 2017 and (b) percentage change in annual rainfall in 2017 with respect to 2016 in different coconut growing districts

Effect of climatic conditions on yield variation of coconut

Plant Physiology Division

The Annual National Coconut Production (ANCP) for the year 2017 was estimated based on the yield data collected from more than 900 coconut plantations distributed in all coconut growing districts of the country. The ANCP was 2,450 Mn nuts in 2017 and this was about 14% reduction in

yield compared to that of 2016 (2,845.1Mn nuts). Severe drought and the heat stress prevailed from June to October period in 2016 and early part of 2017 (up to August 2017) significantly reduced the nut setting and crop yield in 2017. As a consequence, the gap between the forecast and estimated ANCP remained around 4% in 2017, yet the estimations were within the acceptable limits.



Comparison of the Annual National Coconut Production (ANCP) on bi-monthly basis for 2017 with the forecast (above) and its comparison with ANCP of 2016 (below)

Forecast of coconut yield of 2018

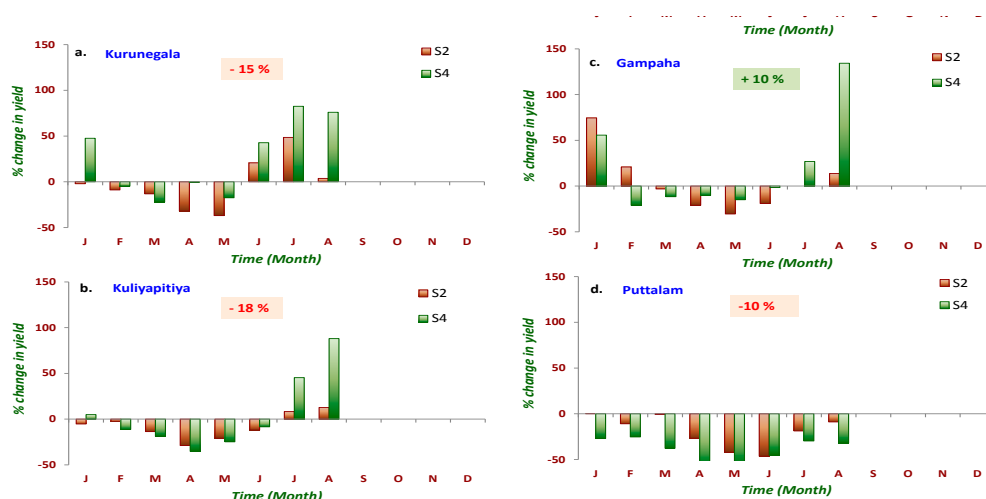
Plant Physiology Division

The expected change in monthly yield in 2018 compared to 2017 was predicted for the main coconut growing areas; *Kurunegala*, *Kuliapitiya*, *Gampaha* and

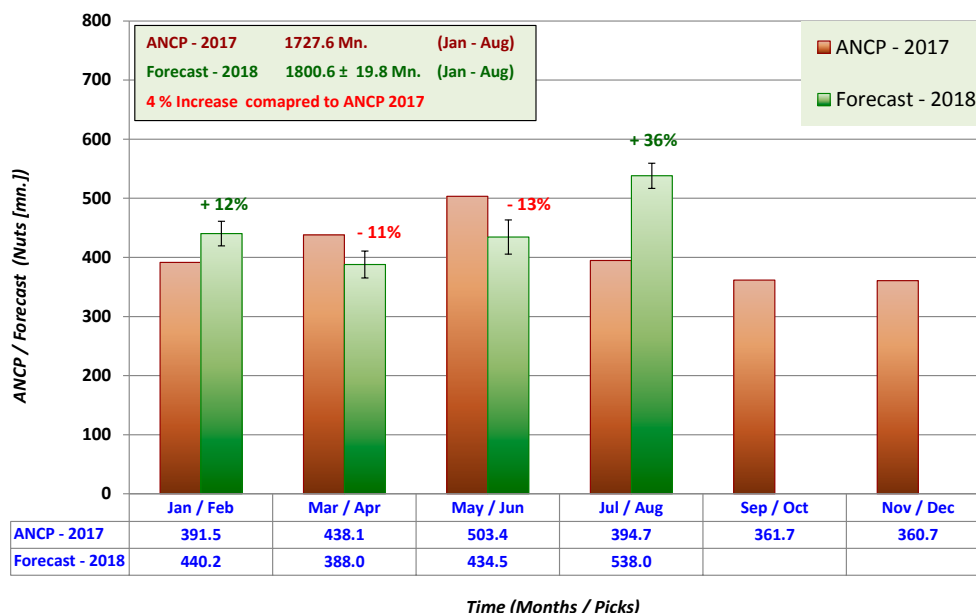
Puttalam CCB Regions based on the fruit set data and the rate of survival of set fruits. Accordingly, there would be reductions in yield in *Kurunegala* (-15%), *Kuliapitiya* (-18%) and *Puttalam* (*Marawila*) (-10%) Regions while *Gampaha* district will show an increase of 10% for the period from

January – August 2018. Although reductions in yield were expected in *Kurunegala* and *Gampaha* districts in the first half of 2018, marked increases are expected from July onwards. Accordingly, the bi-monthly coconut yield predictions for 2018 (up to August) are 440.2 ± 18.1 for January/February (Pick 1), 388.0 ± 19.8 for

March/April (Pick 2), 434.5 ± 23.9 for May/June (Pick 3) and 538.0 ± 21.0 for July/August (Pick 4) which amounts to a total of $1,800.6 \pm 19.8$ Mn nuts for the period from January – August 2018. Thus about 4% higher yield is expected in first 8 months of 2018 compared to the national production for the same period in 2017.



Monthly changes expected in coconut yield from January to August 2018 in Kurunegala, Kuliapitiya, Gampaha and Puttalam CCB Regions (S₂-suitable soils, S₄-Marginal soils)



Bi-monthly coconut yield forecast for the period from January to August 2018

Assessing the stability and degree of influence of weather fluctuations on hybrid seed coconut production

Plant Physiology Division

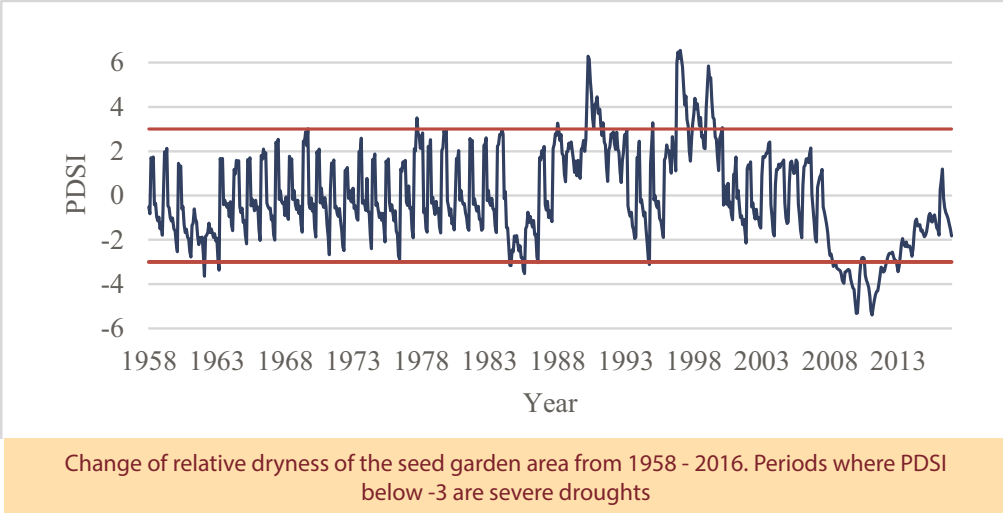
Data on female flower production and setting of button nuts in ~2000 mother palms of Yellow Dwarf (DY) and Green Dwarf (DG), which have been emasculated regularly for seed nut production of CRIC65 Yellow and CRIC65 Green hybrids respectively, from 2009 onwards were analyzed along with weather data to determine the effect of environment on the stability of seed nut production of specific hybrids.

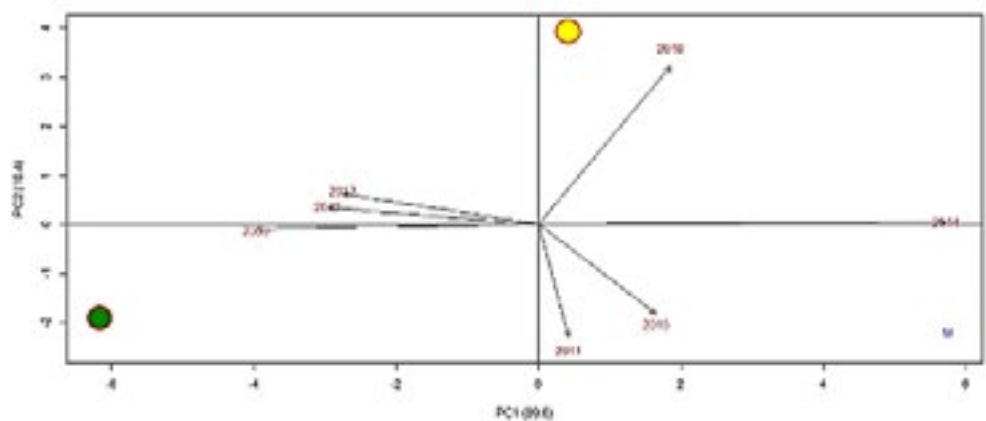
According to Palmers’ Drought Severity Index (PDSI), it was identified that the area, where the seed gardens are, has become

vulnerable for droughts in recent years due to increase of dryness. Consequently, CRIC65 hybrid seed nut production is found not stable due to high sensitivity of both DG and DY mother palms to droughts. DG, the most important female parent in breeder’s point of view is highly vulnerable for climate changes, hence seed gardens need to be well taken care of with all necessary high inputs including irrigation.

It was further recommended to maintain required male to female ratio in drought prone seed gardens as pollen can be a limiting factor in drought periods. It is recommended to select high yielding DY mother palms to multiply parental population as different phenotypic groups were found within the same variety.

Optimizing experimental designs in





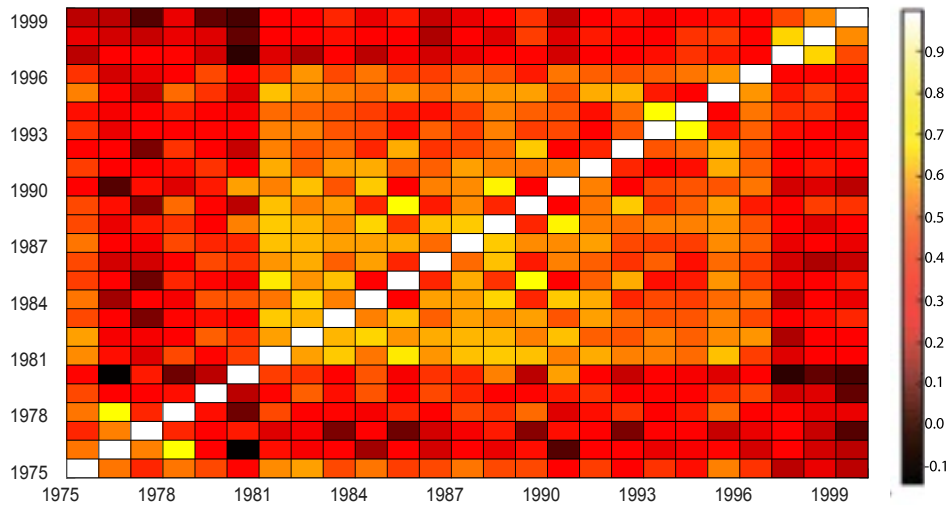
Both DY (yellow circle) and DG (green circle) are not stable in weather fluctuations (According to AMMI Analysis genotypes should be closer to the center of the biplot if they are stable)

coconut research

Plant Physiology Division

Fine-scale spatial and temporal variations cause failures in experimental designs used in coconut research. Therefore, existing field data from 500 coconut palms, distributed over 13 ac., were used in this study to evaluate spatial and temporal variability of coconut palms over 25 years.

Evaluation of individual palms along 25 years period revealed that weather parameters cannot explain the variability of individual palms as weather effect is different on palms in extreme conditions. Different behavioral patterns among individual palms may, therefore, mask the treatment effect causing experimental failure. Data analysis is in progress with spatial analysis.



Correlation matrix of individual palm behavior on a heatmap shows that palm to palm behavior cannot be assumed similar in extreme conditions.



CROP PROTECTION

Improvement of Weligama Coconut Leaf Wilt Disease (WCLWD) phytoplasma detection

Crop Protection Division

Experiments were continued to improve the detection of WCLWD phytoplasma by Real Time Polymerase Chain Reaction (RT PCR) and nested PCR and the storage period of diseased samples. DNA was extracted from 190 samples and part of it was used for testing with P1/P7 and Pc399/P1694 primer pairs and remaining part stored to test the shelf life of phytoplasma under storage conditions. Appearance of unstable bands in gel electrophoresis continued during dry period.



WCLWD affected coconut palm

A study was carried out with an objective of improving Indirect- ELISA protocols developed by Plant Virus Indexing Centre

(PVIC), Homagama and University of Colombo for finer detection of WCLWD phytoplasma. Ninety-six diseased coconut bud leaf and 06 inflorescence samples were tested with anti-serum developed in PVIC and only 27% of bud leaf samples gave positive results for the presence of phytoplasma. None of the diseased inflorescence samples were shown positive. Also, 35 healthy coconut bud leaf samples were tested and 63% gave negative results.

Integrated management of Coconut Mite

Crop Protection Division



Releasing predatory mites on to a palm

Multiple releases of the predatory mite, *Neoseiulus baraki* at 3-4 month interval on to Tall coconut palms in a block in the Genetic Resources Centre, Ambakelle was

continued in 2017. To study the residual effect, data were collected on total nuts, infested nuts, large-sized nuts, small-sized nuts, fresh nut weight, husked nut weight and kernel thickness of the harvest, at 45 day intervals. Release of *N. baraki* resulted in 6% and 45% reduction in the infested and

small-sized nuts respectively in the released palms compared to the unreleased palms. It also increased the percentage of normal-sized nuts, fresh and husked nut weights and kernel thickness by 6, 14, 15 and 6% respectively.

Effect of releasing *N. baraki* on the percentages of infested, large-sized and small-sized nuts and fruit components

Crop Protection Division

Component	<i>N. baraki</i> released palms	Unreleased palms
Infested nuts	87%	92%
Normal-sized nuts	92%	87%
Small-sized nuts	7%	12%
Fresh nut weight	1.35kg	1.18kg
Husked nut weight	0.65kg	0.57kg
Kernel thickness	13.5mm	12.9mm

The study conducted to evaluate the integration of spraying palm oil + Sulphur mixture and the release of the predatory mite, *Neoseiulus baraki* to manage the coconut mite was continued in Puliyankulama Estate in the Puttalam district. None of the treatments significantly changed the percentage of infested nuts in the harvest. Significant differences were not observed among the percentages of normal-sized harvested nuts in the palms that were sprayed with the palm oil + sulphur mixture alone ($92.1 \pm 1.1\%$), released with *N. baraki* alone ($89.3 \pm 1.6\%$) and the integration of the spraying of palm oil + sulphur mixture and the release of *N. baraki* ($93.9 \pm 1.1\%$). However, significantly lower percentage of normal-sized nuts was reported from the palms that did not receive any of the above treatments ($83.5 \pm 1.2\%$). Spraying of palm

oil + sulphur mixture alone ($7.5 \pm 1.2\%$) and its integration with the release of *N. baraki* ($6.3 \pm 1.1\%$) resulted in lower percentages of small-sized nuts in the harvest than the palms that did not receive any of the treatments.

Evaluation of different coconut cultivars for the resistance to Coconut Mite damage

Crop Protection Division

The National Research Council granted project to understand the searching behaviour of coconut mites and *N. baraki* in relation to resistant and susceptible coconut varieties was continued in 2017. Five-arm poly acrylic runway arena was found to be suitable for testing the searching behaviour of the Coconut Mite. A

new method was developed using button nuts wrapped with Clingwrap® to study the reproductive performance and survival of the coconut mite. Results of the preliminary experiments revealed that more than 5 eggs/female/day is produced by the coconut mites irrespective of the feeding substrate (different coconut varieties). Head-space collection of volatile organic compounds and extraction of surface lipids and phenolic compounds of coconut varieties were completed.



Collection of head-space volatiles from button nuts of coconut

Biological control of Plesispa Beetle, *Plesispa reichei*

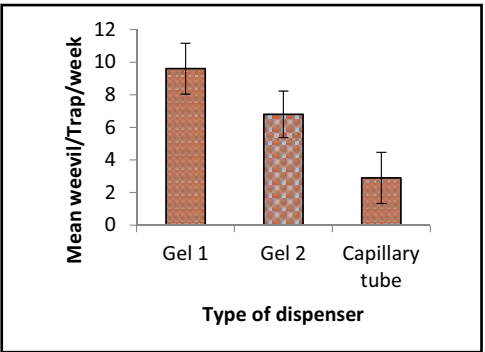
Crop Protection Division

A study was conducted to determine the effect of releasing parasitoids on reducing damage of the Plesispa Beetle infested estate in Mawila area. The level of damage in freshly emerged frond was categorized depending on necrotic size of the patch over the total frond area as 25%, 50 %, 75% and 100% at two months intervals. A total of 60,633 parasitoids have been released to this site at weekly intervals from January 2016 to September 2017. Approximately 10-12% damage reduction was observed in all categories and parasitism levels varied between 15-25% during the study period.

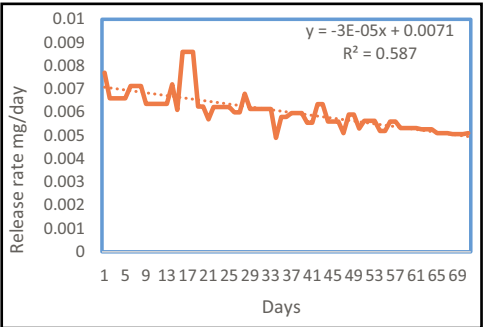
Improving the effectiveness of Red Weevil pheromone

Crop Protection Division

Experiments were continued to improve the trap catches of the Red Weevil pheromone by blending it with different chemicals, plant volatiles and to identify better material as pheromone dispenser. Two gel type dispensers (Gel 1, Gel 2) were developed and evaluation completed. Both dispensers performed better than the capillary tube dispenser, which is recommended by CRI. Further, the trap catches were more than doubled by using the new gel dispensers than the capillary tube dispenser, and the pheromone release rate was lower and steadier with new gel dispensers than capillary tube dispenser.

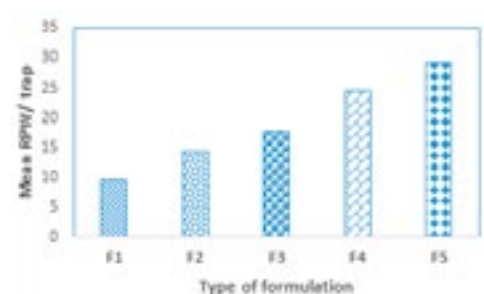


Red Palm Weevil trap catches by using three different dispensers



Pheromone release rate of Gel 1 dispenser under field condition

Different ratios of the pheromone components 4-methyl-5-nonanol (major pheromone component) and 4-methyl-5-nonanone (minor pheromone component) were evaluated to improve the Red Palm Weevil trap catches. The trap catches with pheromone formulations F_4 and F_5 were higher than other tested formulations. The evaluation of the plant volatile incorporated pheromone formulation was initiated and experiments are being continued.



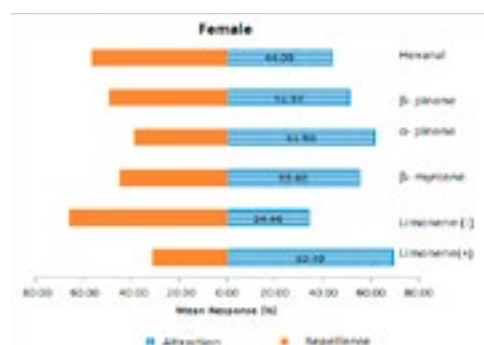
Red Palm Weevil catches per trap during 3 month period (F_1 = only minor pheromone component in Gel 1 dispenser, F_2 = Major pheromone component in Gel 2 Dispenser, F_3 = Major pheromone component in Gel 1 dispenser, F_4 = Major pheromone component and Minor pheromone components (1:1) in Gel 1 dispenser, F_5 = Major pheromone component and Minor pheromone components (9:1) in Gel 1 dispenser).

Identifying the potential plant volatiles for management of *Plesispa reichi*

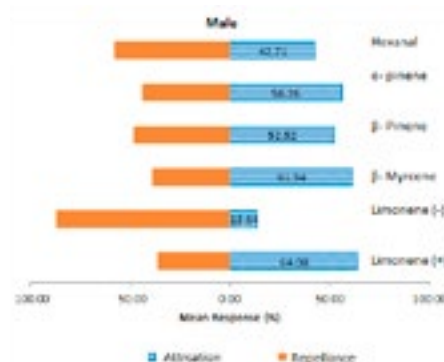
Crop Protection Division

Behavioral studies were initiated to identify the coconut leaf volatiles for formulation of a Kairomone lure for management of *Plesispa* Beetle. Olfactometer studies indicated that, Limonene (+), α -pinene

and β -myrcene were the leaf volatile chemicals to which both male and female beetles attracted. Dose response studies and different combinations of the selected volatiles will be evaluated for formulation of a kairomone lure.



Response of female *Plesispa* Beetle to selected coconut leaf volatiles in olfactometer studies



Response of male *Plesispa* Beetle to selected coconut leaf volatiles in olfactometer studies

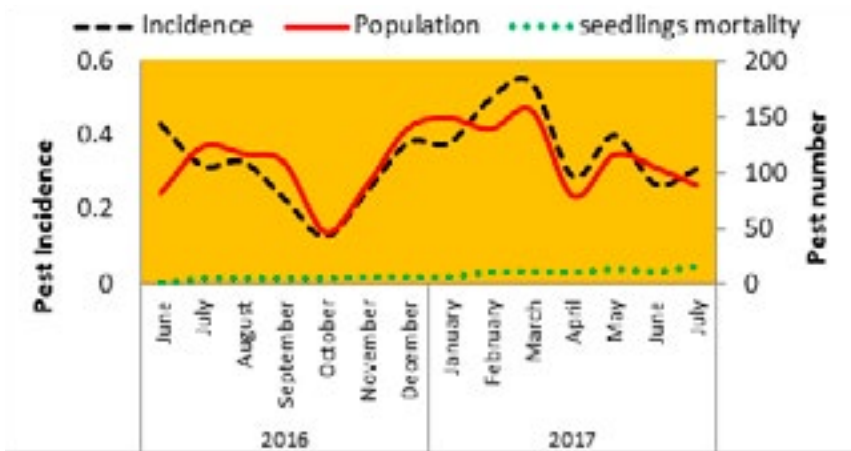
Population dynamics of *Plesispa* Beetle

Crop Protection Division

Study on population dynamics of *Plesispa* Beetle is being continued in Pallama estate (DL1) and Hettipola estate (IL1). At each estate, pest population was monitored monthly and pest incidences were

calculated. In Pallama estate both pest incidence and pest population showed similar pattern. However, pest incidence

was slightly higher than total pest population during January to May 2017.



Pest incidence and total pest population at Pallama estate during June 2016 to July 2017

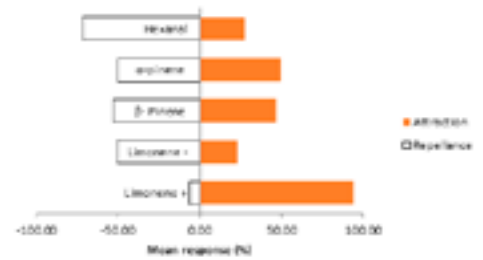
Laboratory screening of potential essential oils (EOs) for controlling Plessispa Beetle

Crop Protection Division

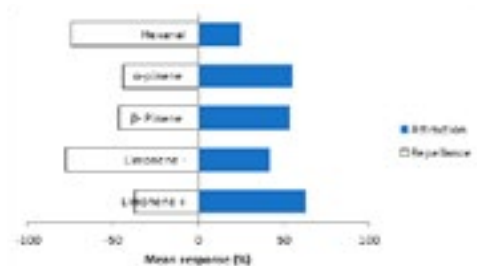
A study was initiated to explore the possibility of using selected essential oils (EOs), to control plesispa beetle in organic coconut cultivation. Laboratory olfactory assay was conducted on plesispa beetle using (R)-(+)-Limonene, (S)-(-)-Limonene, α -pinene, β -pinene, 1-haxanal. Out of those compounds (S)-(-)-Limonene and 1-haxanal showed higher rate of repellence for both male and female Plesispa Beetles.



Olfactometer setup



Response of male beetles against different essential oils (%)



Response of female beetles against different essential oils (%)

Evaluation of mechanical methods for the control of Black Beetle

Crop Protection Division

Two sites of 2.5 ac. in extent were selected from Weeraketiya area in Hambantota district. Seventy-one and sixty seedlings were selected from two sites and application of river sand into bud region and covering the bud region with a piece of fishing net were tested as two treatments. Treatments were applied to two categories of seedlings, with and without Black Beetle damage and untreated seedlings were kept as controls. Three cycles of treatment application were completed in 2017.

Effect of application of Trichoderma spore suspension on growth of coconut seedlings

Crop Protection Division

An experiment was initiated to test the effect of application of Trichoderma spore

suspension (10^5 spores/ml) on growth of seedlings and nematode population in soils of coconut nurseries. Initially plant parasitic nematode populations in the nurseries were assessed and very low borrowing nematode populations were found in many locations.

Efficacy of different fungicides for the management of Bud Rot Disease.

Crop Protection Division

Fungicide solutions of Tebuconazole 250g/l (Foliker) 4ml /l; Metalaxyl 4g+ Dithane 64g (Ridomil Gold) 4g/l; Tebuconazole 50g/kg + Trifloxystrobin 25g/kg (Nativo) 10g/l were tested for their efficacy in controlling Bud Rot Disease. One liter of the fungicide solution was drenched on to the crown of surrounding palms of a bud rot affected palm. All fungicides protected treated palms for one year after two applications with one month interval while untreated palms got bud infections.

Fresh incidences of Bud Rot in coconut palms treated twice with different fungicide solutions.

Fungicide	Palms treated	Fresh incidences
Metalaxyl 4 g+ mancozeb 64 g (Ridomil Gold)	264	1
Tebuconazole 250 g/l (Foliker)	64	0
Tebuconazole 50 g/kg + Trifloxystrobin 25 g/kg (Nativo)	13	0



COCONUT PROCESSING & PRODUCT DEVELOPMENT

Improvement to the extra virgin coconut oil process and quality evaluation

Coconut Processing Research Division

Traditional kitchen method (TKM) of producing extra virgin coconut oil (EVCO) through wet process was improved as Modified Kitchen Method (MKM) to obtain higher oil yield which is comparable with dry process for virgin coconut oil. Significantly higher milk extraction was obtained by addition of water at 60 °C into scraped coconut at 2:1 ratio. The best cream separation treatment was achieved by leaving coconut milk for 3 hours followed by keeping in a refrigerator for overnight to facilitate separation of cream from water. The best temperature for the separation

of VCO from cream obtained from above step is the heating coconut milk/ cream sample at 80 °C for 10 min until the oil separation is just initiated, followed by lowering the temperature to 60 °C and letting complete separation of oil at 60 °C.

The VCO yield, with respect to the fresh kernel weight, was 27.30% with the application of above three modification steps. Reported values for oil yield of existing MKM is 19% with respect to the fresh kernel weight. Therefore, 45.7% higher oil yield was obtained with the modification steps. Furthermore, there was no significant difference between VCO yield of improved MKM method and currently available dry method for preparation of VCO.

Comparison of VCO samples of improved method and dry method

Parameter	Dry method	Improved MKM	Sri Lankan standard values
Oil yield % (kg per 100kg of coconut meat)	27.58±0.00	27.30 ± 0.53	-
Oil recovery %	90.00±0.00	81.33 ± 0.83	-
Moisture %	0.08 ± 0.06	0.09 ± 0.03	< 0.5
FFA %	0.05 ± 0.01	0.03 ± 0.00	< 0.2
Peroxide value (meq/kg)	0.69 ± 0.04	0.99 ± 0.09	< 3
Colour	0.6 ± 0.06	0.7 ± 0.00	< 1
Relative Density (RD)	0.919±0.000	0.921 ± 0.000	0.915 - 0.922
Refractive Index (RI)	1.4494±.0000	1.4494 ± 0.0000	1.4480 – 1.4494



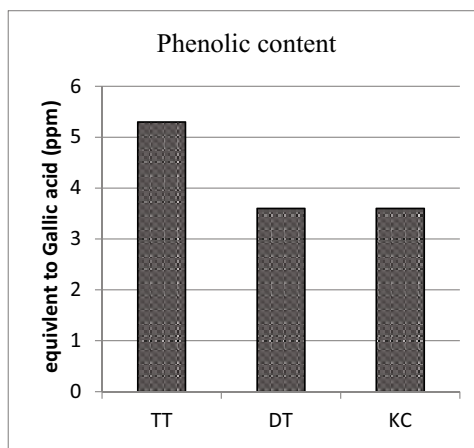
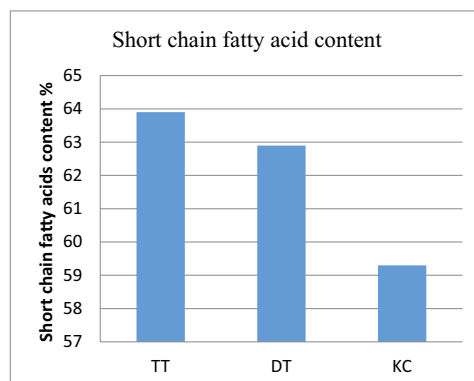
VCO produced from MKM at the laboratory

Effect of varietal differences, maturity level and extraction method on the quality of virgin and white coconut oil

Coconut Processing Research Division

The quality parameters of virgin coconut oil (VCO) obtained from three different coconut varieties; CRIC60 (TT), CRIC65 (DT) and King Coconut (KC) were evaluated. Virgin coconut oil was produced using nuts seasoned for 21 days following CRI recommended method. Average fresh and dry weights of kernel were higher in TT and DT varieties compared to KC. The quality of virgin coconut oil (moisture content, free fatty acids content) obtained from all three varieties were not significantly different. However, significantly higher Lauric fatty acid, phenolic contents and short chain fatty acid composition were observed in the VCO obtained from TT variety. Lauric is the most

important fatty acid in coconut oil. Phenolics are important group of compounds which has a therapeutic value. The VCO from King coconut contained significantly higher iodine value and oleic fatty acids contents than other two varieties. Therefore, these parameters can be used to identify king coconut oil from other coconut oils.



Short chain fatty acid content and phenolic content of VCO produced from three coconut varieties Tall x Tall (TT), Dwarf x Tall (DT) and King Coconut (KC)

The study conducted to determine the quality of coconut oil produced from coconuts of different maturity level; namely 11 months maturity stage, 12 months maturity stage (fully matured) and 12 months matured and 3 weeks seasoned nuts, revealed that virgin coconut oil

produced from nuts harvested at 11 month maturity stage had significantly lower oil yield compared to nuts harvested at fully mature with or without seasoning. For white coconut oil production (copra processing), copra processed with fully mature seasoned nuts were suitable. The quality of oil was not significantly different. However, it was difficult to remove the shell and brown skin of matured fresh nuts without seasoning. Therefore, fully matured and three weeks seasoned nuts were the most suitable for coconut oil production.

Improvements to preservation technique for coconut water discarded from DC industry

Coconut Processing Research Division

Improvements to preservation technique for coconut water obtained from DC industry for beverage purpose were continued. Mature coconut water, pre-processed according to the recommended procedure, was subjected to addition of different fruit flavours followed by carbonation. Batch pasteurization of mature coconut water at 90 °C for 20 minutes was sufficient to achieve commercial sterility of the product. Further, addition of 3% fruit juice (orange, black current and mango) and 97% coconut water followed by 2.5 g/ L carbon dioxide gave a product with good overall acceptability with six- month shelf life at refrigerated conditions.

Improvement of the quality of coconut sap and its products

Coconut Processing Research Division

Fresh sap was collected using modified sap collection method recommended by

CRI and diluted by three different ratios of water (40%, 50% and 60% v/v). Then the best dilution ratio was selected from sensory evaluation (five-point hedonic scales) with 20 numbers of semi-trained panelists. Different types of fruit pulp and their volumes were tested on trial and error to select the best flavoring agent for coconut sap. Natural lemon flavor (0.56% v/v) and artificial mandarin flavor (0.8% v/v) were tested through sensory evaluation for selected diluted samples.

Unfermented sap was filtered through muslin cloth and pasteurized at 70 °C for 15 minutes. Then the contents were diluted as selected ratio with 0.4% (w/v) of common salt, selected volumes of flavors were added into the pasteurized coconut sap, treated coconut sap was filled into 200 ml sterilized glass bottles and sealed, pasteurized the beverage at 95 °C for 7 minutes and stored at refrigerated temperature (4 ± 2 °C) until cooling. Then carbonization was done using 2.4 g/l of dry ice in sterilized plastic bottles. The final products were stored at refrigerated temperature (4 ± 2 °C) and it was microbiologically safe up to 4 months under refrigerated condition (4 ± 2 °C).



Collection of sap in the field



Fresh sap



Bottling of beverage

Nutritional effect of virgin coconut oil (VCO) and white coconut oil (WCO) on blood serum parameters of Wistar Rats - collaborated study with University of Kelaniya and Medical Research Institute

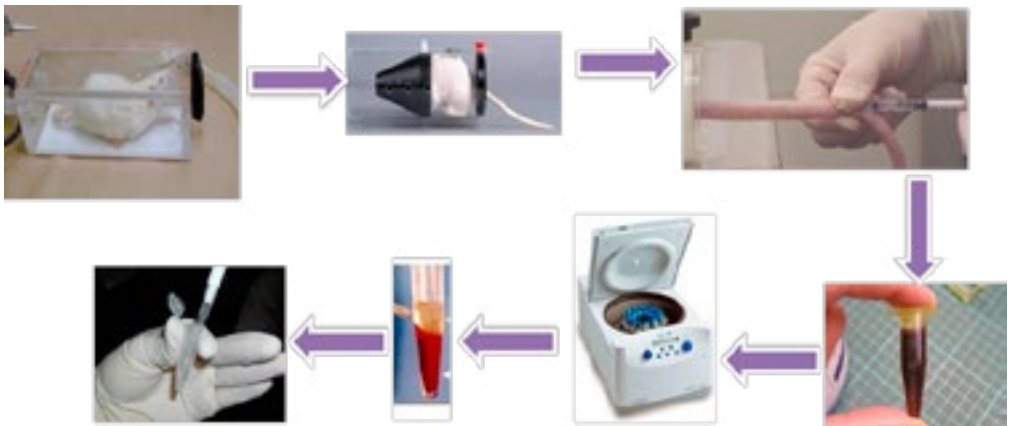
Coconut Processing Research Division

The study was carried out to determine the effect of white coconut oil (Oil obtained from copra) and virgin coconut oil (oil

obtained from fresh dehydrated coconut oil) on serum glucose concentration and the factors responsible for cardiovascular diseases using Wistar Rats. The ethical approval was obtained from the ethical committee of Medical Research Institute.

Serum triglyceride (TG) concentration of the hypercholesterolemic rats fed with 2% VCO (HCVCO2%) and the normal rats fed with 2% soya oil (Soya 2%) was significantly low in the 36th week. The normal rats fed with 2 % white coconut oil (WCO2%), 2% virgin coconut oil (VCO2%) and hypercholesterolemic rats fed with 2% WCO (HCWCO2%) did not show significant change on serum TG in 36th week. The oil type (VCO) and the amount of oil (2%, 4%) in the feed did not show a significant effect on serum TG of rats. VCO showed a protective effect on controlling total cholesterol than WCO. Further, the results did not show significant variation of high density lipoprotein cholesterol (HDL) in the normal rat groups fed with different proportions of soya oil, VCO and WCO. However, the hypercholesterolemic group showed a lower HDL concentration.

With the increase of VCO from 2% to 4% in the diet, the hepatic Malonaldehyde (MDA) levels significantly decreased (18.7 vs 14.9). The livers of the rats on WCO diets showed significant fatty liver when compared with rats on VCO diets.



Research steps of nutritional effect of virgin coconut oil (VCO) and white coconut oil (WCO) on blood serum parameters of Wistar Rats

The role of Virgin Coconut Oil in the Treatment of Alzheimer's Disease (VCO-AD Study) - collaborated study with University of Kelaniya

Coconut Processing Research Division

The study aims to look at the usefulness of virgin coconut oil in improving memory and other cognitive functions in early dementia of Alzheimer's type. Initial reports suggested that virgin coconut oil may have certain properties that may improve the symptoms of dementia such as poor memory. Coconut oil is a rich source of polyphenolic antioxidants and lauric acid. Lauric acid, a medium chain fatty acid has the potential to provide energy to the brain cells in Alzheimers disease.

The research is being conducted for the first time in the world with real patients in Sri Lanka. The research trial has ethical approval and is registered with the Sri Lanka Clinical Trials Registry (Reg. no: 2015/018). The trial is ongoing and already 56 patients are enrolled. The study centres are the North Colombo Teaching Hospital and the Lanka Alzheimer's Foundation.



Clients at Lanka Alzheimer's Foundation, Colombo 10.

Experts in Alzheimer's Disease research in Australia are also collaborating in this study and a Sri Lankan PhD student Ms. Mallika Fernando is analysing the blood samples in MacQuarie University in Sydney, Australia, on a prestigious endeavour scholarship.



Ms. Mallika Fernando with the eminent team in a state of the art laboratory in MacQuarie University in Sydney, Australia

The study team consists of scientists from the Faculty of Medicine, University of Kelaniya, Centre of Excellence for Alzheimer's Disease Research and Care, Edith Cowan University, Australia, Faculty of Livestock, Fisheries & Nutrition, Wayamba University of Sri Lanka and GENETECH Molecular Diagnostics and School of Gene technology in Colombo, Sri Lanka.

The research findings are still being analysed. 'ARMS-PCR analysis of APO E gene mutations in patients with Alzheimer's disease in Sri Lanka' is an oral paper that was presented in June 2017 at the Annual Academic Sessions of the Sri Lanka College of Psychiatrists. This was the first time a gene test for Alzheimer's disease was initiated in Sri Lanka by GENETECH.

Feasibility study of using virgin coconut oil in ameliorating Type 2 diabetes in human

Coconut Processing Research Division

The findings of this may demonstrate that the increasing incidence of type 2 diabetes in Sri Lanka is related to the increased consumption of vegetable oils since recently, instead of the traditionally eaten coconut oil. Relevance between the consumption of coconut and coconut oil and alleviation of hyperglycemia may be elucidated. The virgin coconut oil may increase glucose uptake in vitro and in vivo and increase the dose effectiveness and may make it possible to reduce dose of current medications for hyperglycemia.

Improvements to Ceylon Drum System for extraction of bristle fibre

Coconut Processing Research Division

Bristle fibre of coconut husk is extracted from Ceylon Drum System which consists of breaker drum and cleaner drum. The feeder of the traditional Ceylon Drum System was modified by Industrial Technology Institute (ITI) by replacing a rubber belt instead of spiked, iron roller bar aiming no risk to the worker. However, its processing rate was lower than the existing traditional Ceylon Drum System. Therefore, increasing the processing speed of the machine was required to achieve higher producing rate.

The improvement to the speed of husk feeding was achieved by applying different sizes of pulleys. The production capacity increased with increasing of pulley sizes. However, at very high speed, husks did not retain enough time for delivering of coir fibre.

In the improved machine, the husks were fed in a horizontal position for the breakage of husks by means of rotating spiked drum and it damaged the fibre. Therefore, feeding of husks in angular positions of 0°, 8° 44', 14° 57' and 19° 13' were experimented for quality variations. The qualities were significantly similar at the angular positions of 0° and 8° 44'. Length of the fibre at feeder angle of 14° 57' was higher compared to other angular positions. When husks were fed at horizontally (0°), the breakage was slightly high as the spikes strike husk perpendicularly. Qualities of the coir fibre at angular positions of 19° 13' was the lowest. At this angular position de-fibered husks was difficult because of the gap in between the husk and the spiked drum was high. Therefore, coconut husks were

needed to feed three or four times for proper de-fibering. It caused the breakage of fibre resulting low quality. Accordingly, 8 cm diameter of the pulley and 14° 57' angle feeding was found to be the most efficient system.

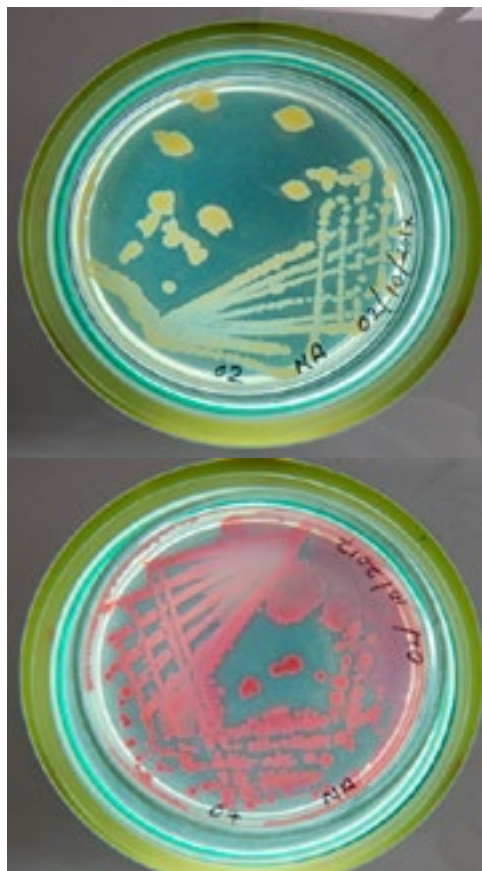


Extraction of fibre using improved machine

Development of a technology for coconut coir retting using consortium of micro organisms

Coconut Processing Research Division

Ret liquor and partially retted coconut husks samples were collected from 6 coir mills located in Puttalam districts. Twenty-one of isolates of microorganisms were found in collected samples and they were identified using gram staining and morphological characteristic features. The ability of growing these isolates in filter sterilized ret liquor Agar medium was evaluated and stock cultures were prepared from these isolates in glycerol media. The colony forming unit (CFU) was determined by inoculating these isolates in Nutrient broth and compared it with the CFU of fresh ret liquor samples taken from current retting pits at Dunkannawa, Walahapitiya and Sagaragama. At present pilot scale retting experiment is being conducted by inoculating 21 isolates grown in ret liquor media with nutrient broth, in under 10 treatments of coconut husks.



Streaking of bacteria on Agar plates for isolation

Improvement of cushion/mattress using coir fibre

Coconut Processing Research Division

Different types of coir fiber; Omat and mix fiber in different percentages were twisted to achieve resilient property followed by untwisted and laid as a layer. Compounded rubber latex was sprayed on the layer of coir fibre and then another layer of coir fibre was kept on the 1st layer and the process repeated until the required thickness was achieved. The coir fibre and latex composite was heat treated for removing water for proper bonding of rubber latex with the fibers. Then the sheets were cut into required sizes.

There was no difference with respect to the qualities of resistance to aging (percent) and pH due to mix fibre and different proportion of Omat fibre. However, the mattress samples made by 100% Omat fibre (70 Kg/m^3) had lower indentation hardness and compression set. Low compression values gave high resilience and low indentation hardness gave soft mattress compared to other samples. These mattress samples will be further tested for the qualities after one year from fabrication, for the determination of durability. The Quality improvement will be done as a next step by making composite mattress using Omat fibre and polyurethane.



Preparation of cushion mattress samples



SOCIO- ECONOMICS

Overall sector performance of kernel, fibre, and other products

Agricultural Economics & Agribusiness Management Division



The coconut industry has been at the forefront of Sri Lankan agricultural industry over the years and by any measure, it is a major agriculture industry in both domestically and internationally. This is

proven by the tremendous growth in the coconut exports especially in the sub category of kernel products during the recent years. However domestic coconut production has dropped down drastically due to prolonged drought in major coconut growing areas. Therefore, Ministry of Plantation Industries in consultation with respective institutes adopted different policy alterations to cope up with the prevailing yield reduction for keeping the country's share in the international market while fulfilling the domestic demand. Coconut industry being multi-industrial in nature; these policy adjustments have different implications on different sub-sectors.

During 2017, registration fee for small scale fresh nut exporters (export less than 30,000 nuts per month) was Rs. 50,000.00 and the CESS charge for fresh nut exports remained at Rs. 7 per nut. Special commodity levy for imported kernel was revised effected from 14 December 2017 as Rs. 1.00 per kg.

Timeline of tariff policy changes on imported edible oil in 2017

Crude palm oil 1511.10 Rs./kg	Palm oil (refined/ packaged) 1511.90.20 Rs./kg	Crude Palm kernel oil 1513.21 Rs./kg	Coconut oil VCO 1513.11.11 Rs./kg	Date (dd/mm)
110	135	130	130	24.02.2017
105	110	105	105	09.11.2017
110/	135	130	130	15.12.2017

Land use intensification in coconut triangle through intercropping: potential, constraints, possibilities and strategies for improvement

Agricultural Economics & Agribusiness Management Division



Intercropping systems

Despite the several programs implemented by the relevant agencies, adoption rate of intercropping is yet far below the anticipated outcome. Therefore, this study aimed at understanding the factors affecting adoption on intercropping under coconut.

The study revealed that level of adaptation of the growers with any form of government support is 2.5 times higher than that of growers without support. Based on the analysis, age of the grower, land size, labor necessity, and marketing of intercrops and influence of other growers were

identified as important factors in promoting intercropping while farming experience and personal capital influence the adoption of intercropping. Increased land size increases the possibility of adopting intercropping.

The appropriate policies and institutional support contributed significantly in enhancing the adoption of new agricultural technologies. The criteria in the decision making process were also revealed to be interconnected and, consequently, a comprehensive integrated solution was required to increase the adoption of coconut intercropping. Putting these factors and processes into policy and technical implementation may increase the effectiveness of intercropping and may increase the number of adopters of intercropping.

Farmer's valuation of fuel wood growing in smallholder coconut plantations

Agricultural Economics & Agribusiness Management Division



Gliricidia as a fuel wood

Biomass based energy generation is an emerging sector in Sri Lanka owing to the recent technological advancements in biomass gasification and electricity generation. Even though several studies have identified the potential of coconut

small holders in promoting fuel wood plantation of *Gliricidia sepium*, the low popularity of fuel wood plantations among coconut growers suggests that this has not been well accepted by the grower's side. Hence the objective of this study was to assess the coconut small holders' willingness to accept (WTA) in growing fuel wood crops under coconut plantations.

The results showed that respondents' selection of cropping system was independent from their coconut cultivation method. Coconut smallholders preferred the buyer's support in collecting fuel wood rather than buyer's complete support method and the base level self-harvest method. Major reason for this was the labor scarcity faced by smallholders. Respondents highly valued certified fuel wood over uncertified fuel wood as certification provides a secure market to their product. Moreover, coconut small holders preferred to come into a term with buyers. The reason for this may be unsatisfactory price ranges and lack of a ceiling price for the product they offer. This study indicated that the willingness to grow fuel wood will increase when the price per kilogram of fuel wood increases.

In terms of monetary value (price per kilogram) respondents valued *Gliricidia* more than *Acacia*. This revealed that coconut smallholders considered diverse benefits provided by *Gliricidia* than any other fuel wood type. Respondents valued intercropping than mono cropping as it generates an additional income to the small holder.

Attributes such as fuel wood species, purchasing method, authenticity and subjecting into a term significantly affect

the utility of growing fuel wood plantations. Small holders valued these attributes in a higher rate with respect to the price they received by selling their product. Therefore, this matter should be seriously taken up in the policy context by the authorities who are planning to promote growing plantations for fuel wood under coconut as a solution to meet the increasing demand for fuel wood by the industry. In conclusion, it was found that even though growers prefer to grow *gliricidia*, it is necessary to organize the value chain properly for formal functioning of the industry.

Dairy farming in the coconut triangle: potential, constraints, possibilities and strategies for improvement

Agricultural Economics & Agribusiness Management Division



Dairy farming under coconut

Dairy products are one of the main sources of protein for most of the Sri Lankans and increase in the population has created an increasing demand on dairy products. Hence, domestic production is not yet sufficient to cater to the local market demand; considerable amount of foreign exchange has to be spent on importing dairy products. Coconut based cattle farming systems has been identified as one

of the most viable options for expanding the existing dairy industry. The farmers in coconut triangle have a greater potential of adopting these farming systems. The main objective of this study was to identify the factors that influence the adoption of livestock integration in coconut triangle.

The data were collected using a structured survey schedule. Determinant of relationship between adoption of cattle coconut integration and explanatory variables (attitudes, social factor and perception on environment) was analyzed. Attitudes represented interest to behave in particular way or their own feeling to adapt. Mostly the attitudes were associated with extrinsic outcomes like rewards and money. In farming context, it was the desire for higher yield and profits.

Farmers were aware of importance of cattle coconut integration and market accessibility. Analysis suggested that the adaption on cattle farming depends on attitudes of a person, objective norms and perception on environment. In cattle coconut integration system, reduced risk in mono-cropping, attitudes towards the animals, previous working experiences and pressure created from the veterinary officer affected positively and significantly while transport cost and time consuming negatively contributed to change the attitudes, social pressure and perception on environment. Extension services should change the attitudes and perception on environment to increase the adoption behavior of the farmers. The policy should be addressed to implement effective extension services in coconut triangle to change attitudes and perception of the growers.

Analysis of organic coconut (OC) value chain in Sri Lanka

Agricultural Economics & Agribusiness Management Division

In recent years, organic coconut farming has been increasingly gained greater importance and is being recognized by producers, consumers and policy makers due to growing demand in the international market. Hence, the objective of this study was to provide the industry with a comprehensive analysis of the existing organic coconut value chain in order to facilitate effective policy interventions in future.

Primary data were collected from different value chain actors including input suppliers, growers, collectors, processors and exporters in Kurunegala, Puttlam and Gampaha districts as organic coconut industry is yet heavily confined in those areas. According to the content analysis of collected data, fresh organic coconut nut producer base was consisted of both small and estate holdings. Most of them were engaged in out-grower systems while a few producers worked individually. In addition, there were vertically integrated large companies who have acquired the roles of all actors along the value chain. Price premium was one of the most important considerations in organic farming and growers received Rs. 2 - 3 per nut as the price premium. The main constraint of the growers was that during the conversion, farmer has to face lower productivity and income.

Producers supply organically produced fresh nuts with or without husk, either on weight or nut basis to organically certified collectors or processors/exporters.

Collectors supply collected nuts to the processors/exporters. Several private sector companies are involved in processing and exporting organically produced and processed value-added coconut products including desiccated coconut, virgin coconut oil, coconut cream, coconut water etc. They have adopted different international organic standards along with fair trade concept. These exporters are linked to the producers or group of producers as the farmers themselves are less familiar with the organic production methods, export trade and different quality requirements requested by different certification bodies and clients. Organic regulations are formulated based on the guidelines or basic standards provided by the International Federation of Organic Agriculture Movements (IFOAM) and Codex Alimentarius. Destinations of the OC products are dominated by USA, European countries and Japan.

World market is already established due to unique taste of Sri Lankan coconut products and the potential for value addition is high. The main constraints faced by the exporters include difficulties face in traceability and low-cost production of competing products especially from Philippines which undercuts Sri Lankan OC products. Even though OC is now becoming a new sector of the Sri Lankan coconut industry, there are no proper policies in place to ensure proper implementation and functioning of the system. Therefore, it is necessary to include the policies related to research and development, training and extension, market development, certification and financial support to strengthen the organic coconut farming systems.

Current status of Desiccated Coconut (DC) producers in Sri Lanka: a quantitative SWOT analysis

Agricultural Economics & Agribusiness Management Division



Desiccated Coconut (DC) sector plays an important role in the Sri Lankan economy through export earnings and employment generation. Nearly 11% of the annual coconut production is utilized for DC processing. Even though there is a high export demand for the Sri Lankan DC, the industry has not been adequately evaluated. The main objective of this study was to evaluate the current status of DC producers in the country and the secondary objectives were to identify current trends in the DC industry, to determine the attitudes of DC producers towards DC production and to identify strength, weaknesses, opportunities and threats of DC producers towards DC production.

The production and export volumes of DC are fluctuating annually and intra-annually mainly related to the coconut production. The nominal and real prices followed a similar pattern. Currently, Sri Lanka holds the third place in world DC exports. Middle East and Europe are the priority destinations. The factory owners are male and educated up to advanced level or a higher level. They perceive the industry is environmentally

friendly, improves living standards, existence of a good export market and possibility of reducing cost of production using high technology of machineries. Further, they were in disagreement with the availability of subsidies and attractiveness of return from DC with compared to other value-added products. The indicated that the industry is having internal strengths and facing external threats. The threats are mainly for the raw material or the fresh coconut supply and retaining of skilled labour force. Therefore, changes are required to strengthen the industry. The industry will be benefited by the strategies for improving productivity of existing coconut lands, promotion of efficient use of culinary nuts, prohibition of establishing new DC mills and retaining the work force providing satisfactory facilities and improving social acceptance.

Contribution to the Sri Lankan economy through importation of coconut kernel, de-husked nuts and copra

Agricultural Economics & Agribusiness Management Division

Coconut industry is facing a competition due to increasing demand from local consumption and export processing while the fresh nut production is in more or less stagnation. The condition in the market is aggravated by extreme climate events especially prolonged droughts, which further reduce the coconut supply. Export bans for fresh coconuts and tariff reductions for substitute edible oil imports were the common practices in addressing severe nut shortages, which facilitated releasing more nuts for other industries and local consumption. However, due to the

prolonged drought of nearly two years, the reduction of yield was significant enough to temporary closure of processing industries and soaring nut prices. Even with the onset of rainfall in October last year, it will take about 9-12 months to obtain a higher yield. Therefore, importation of coconut was explored as a short term strategy to overcome this situation.

According to the findings, it is economically viable for the processing industries to recover their losses, however, still there are concerns for the existence of markets produced from foreign material and export substitution. Moreover, the compliance with the quarantine regulations especially for the risk of pest and disease outbreaks remains unresolved. Therefore, importation of de-husked-coconut is still not an option for a severe coconut shortage while other semi-processed products may remain as potential alternatives.

Assessing the occurrence of Tapering Disorder among CRIC60 (TxT) palms

Agricultural Economics & Agribusiness Management Division

Tapering Disorder of coconut was first reported in Sri Lanka in 1950 from Seeduwa to Negombo area (Cooke, 1950). This was found that it is not directly associated with any disease-causing agent. But environmental conditions including soil, cultivation type and management practices. A survey conducted to analyze the incidence of coconut decline disorders has revealed that Tapering Disorder (TD) is the most prominent among other disorders in coconut triangle. It was nearly 7.4 percent and Gampaha district had the

highest incidence (Ranasinghe *et al.*, 2006). The planting material obtained from CRI as well as the growers' own planting material were equally prone to the disorder. Further to these findings, field observations in Makandura seed garden by CRI researchers have shown that the incidence of TD is comparatively higher in that estate compared to adjoining coconut lands and other coconut estates. This seed garden was mainly cultivated with CRIC60 (TxT) cultivar. There are concerns of the growers regarding CRIC60 palms being more susceptible to TD and a study was requested to fill this knowledge gap. Therefore, this study aims to identify whether TxT palms are more susceptible to TD.



A palm showing Tapering Disorder symptoms

TD is mostly observed in palms aged above 15 years (Ranasinghe *et al.*, 2006). Therefore, the growers who obtained CRIC 60 seedlings from CCB and CRI nurseries during the period of 1980 to 2000 will be considered. Gampaha district will be the study area. There are 19 CDO regions in the District and the sample size will be 190 estates. The incidence of TD among TxT palms or the susceptibility of TxT for TD, effectiveness of husk burial and mulching as a remedy for TD and the relationship between

occurrence of TD and land suitability class will be identified.

Socio-economic impact assessment of the oil palm cultivation in Sri Lanka

Agricultural Economics & Agribusiness Management Division

Oil palm cultivation has been identified as one of the potential sources to fulfil country's edible and industrial oil demand and it can generate income for the marginal landowners. However, several groups are concerned on environmental impacts of oil palm particularly on soil water and environmental pollution. Hence a comprehensive study on social and economic issues are important for further expansion activities. Data were collected from respective plantations to calculate the cost of production and socio-economic survey was conducted to assess the impact of oil palm cultivation. In addition to that, secondary data were used for the study.

Cost of production: Total cost per kilogram of palm oil was Rs. 274.18 (up to 4th year) and with time this was gradually decreased. From 5th year onwards total cost per kilogram of palm oil was around Rs.166.00.

Foreign exchange savings: The imported quantity of palm oil is around 80,000 Mt at present and this could be achieved by growing about 20,000 ha of oil palm with the annual production capacity of 4 Mt/ha. This will offset the foreign exchange expenditure of 7,994 million rupees (as at 2016 value) and intensify land use, besides the product diversification as small/medium industries.

Efficiency of land use: According to the

production figures of coconut oil and oil palm, land equivalent ratio, which indicates the efficiency of land use palm oil to coconut oil, was around 4.6 to 4.7 indicating that oil palm cultivation is highly productive business.

Household survey: Analysis of data collected from inhabitants in the vicinity of large plantations confirmed concerns about the environmental impact of oil palm plantations. However, at the same time the results of the survey pointed out significant economic gain from the oil palm plantations, although these were not available to all stakeholders and were not distributed evenly.

Environment and social issues: Majority of the respondents have expressed common views on the possible negative impact of oil palm plantations with regard to availability and depletion of water resources. Even though the perceived degree of effect varied among the respondents, they have experienced the depletion of the ground water table through the decline in the water level in their wells.

The use of agrochemicals, such as fertilizers and pesticides, might represent a potential risk for the sustainability of aquatic ecosystem and hydrological functions when agricultural practices are not optimized. As rainfall is high in oil palm cultivating areas these agrochemicals can be easily washed in to the down streams, which are used as the water source for all household needs. At the same time effluents of the processing sites caused pollution of water resources.

In conclusion, even though oil palm cultivation is profitable and economically viable there are negative impacts to the surrounding people. Further oil palm cultivation has confined to the plantation companies, and has not been contributed significantly to uplift the living standard of the surrounding people. Therefore, it is necessary to establish proper policies to regulate the industry.



DEVELOPMENTAL RESEARCH

Increase the coconut hybrid seed production through high-input seed garden management

Genetics & Plant Breeding Division

Increasing the coconut production in Sri Lanka is a high national priority. As hybrid coconut cultivars produce over 40% yield than the conventionally cultivated Sri Lankan tall, enhancing the hybrid coconut seed production in Sri Lanka is an urgent need. Yet, the recent climate change driven long droughts has reduced the hybrid seed nut production by nearly 50%. As all the seed gardens where hybrid seed nuts produced are situated in the dry and intermediate zones of Sri Lanka, effect of climate change on seed production is unavoidable even in future. Therefore, measures have to be taken immediately to overcome the effects of unfavorable weather conditions on the hybrid seed nut production.

To mitigate the effect of climate change and double the hybrid seed nut production with the available palm pool, high input management practices were carried out in these seed gardens. Two deep wells and a drip irrigation system were established for 75 ac. area where especially dwarf coconuts were planted at the Genetic Resource Centre, Ambakelle. Additionally, a 200 ac. hose irrigation system was established with two tube wells at the Pallama Genetic Resource

Centre. Furthermore, flood irrigation system was regularized at the Maduru-Oya Genetic Resource Centre. Three mite predator breeding laboratories were activated in all three seed gardens to reduce the damage caused by coconut mite. Predatory mite sachets were placed on $\frac{1}{4}$ of the palms at all three seed gardens, thereby it is expected to decrease the rejected seed nuts owing to mite damage. Organic fertilizer application and soil moisture conservation with husk pits were practiced in all three seed gardens. These progressive activities that were carried out in 2017 will definitely increase the hybrid seed nut production from 2018 onwards.



Newly developed hose irrigation system at the Pallama Genetic Resource Centre

Improved coconut seed production and seedling certification

Genetics & Plant Breeding Division

During the year a total of 975,473 and 32,892 CRIC60 and CRIC65 seed nuts were produced respectively, from the three Genetic Resource Centres and 15,706 CRISL98, 3,226 Kapruwana, 2,803 Kapsetha and 9,799 Kapsuwaya improved seed nuts were produced by hand pollination. CRI assisted the Coconut Cultivation Board by selecting of 6,162 new Plus Palms for seed nut production. Under the seedling certification programme, 297,487 seedlings were certified by the staff of the Seed and Seedling Certification Unit.



CRI certified coconut seedlings

Establishment of a mini seed garden at Weligama for the production of Weligama Coconut Leaf Wilt Disease tolerant hybrid seedlings

Genetics & Plant Breeding Division

Activities at the Weligama mini coconut seed garden for the mass production of hybrid coconut seed nuts tolerant to Weligama Coconut Leaf wilt Disease (WCLWD) was initiated. Fencing, land clearance and seed-hole preparations were completed in the year 2017. Planting Green Dwarf seedlings was commenced. Once

this mini seed garden start to function with its full potential, it is expected to produce around 25,000 WCLWD tolerant hybrid seed nuts from this seed garden.

Demonstrations of farming systems.

Agronomy Division

Bioenergy Production.

Bio-energy generation in a model designed in one hectare of coconut lands comprised with 150 coconut palms, 2,500 trees of *Gliricidia* and externally supplied paddy straw fed to six buffaloes in Ratmalagara was studied. In this system *Gliricidia* wood was used for gasification and buffalo dung was used for generation of bio-gas.



Bio-energy production unit at Ratmalagara Research Station

Livestock integration.

Agronomy Division

The demonstration of goat, sheep and buffalo farming systems under

coconut with the objective of increasing profitability of small holder farmers through livestock integration under coconut was continued. Goat and sheep breeding and demonstrations at Ratmalagara Research Station were also continued successfully to popularize this farming system in coconut plantations. Both farming systems are very effective to control problematic weeds and improve soil fertility level in coconut .



Goat and sheep farming demonstrations at Ratmalagara Research Station

Pasture and fodder demonstrations.

Agronomy Division

To upgrade the knowledge and awareness of local community, coconut growers, and university, agriculture and school students on livestock management in coconut lands, two field pasture and fodder demonstrations containing fodder, pasture and cover crops were established in Ratmalagara and Bandirippuwa estates.



Pasture and fodder grass demonstrations at Ratmalagara Research Station

Vermicompost production

Agronomy Division



Vermicomposting demonstration at Ratmalagara Research Station

Vermicompost is the product or process of composting using various worm species. In this technology, the commonly available waste biomass in coconut plantations (weed and plantation residues and animal wastes) can be converted to compost fertilizer within 5 to 6 weeks by the mediation of worms. There is a need for

paying attention to low cost environmental friendly nutrient replenishment systems and soil improvement methods in present day coconut farming system. Under this project, one compost production unit was established to multiply worms. Worms were distributed among thirty two coconut growers and two farmers have started to produce vermi-compost at commercial level. These units were also used as demonstration for farmers, university, agriculture school and students.

Intercropping demonstrations

Agronomy Division



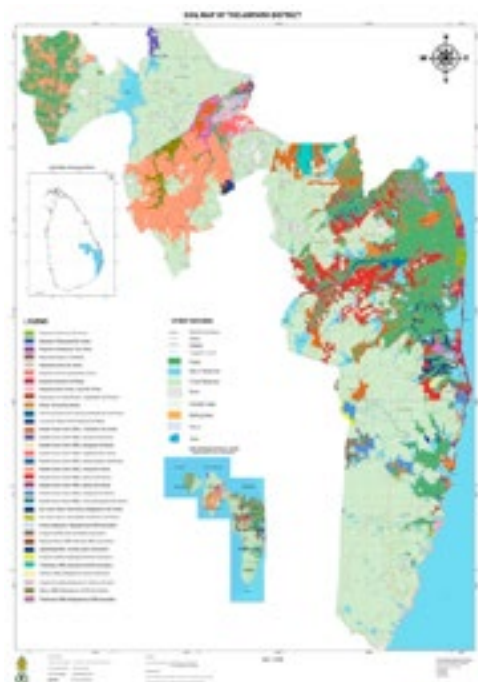
Intercropping demonstrations (Cocoa and Avocado) at Makadura Research Station

To disseminate the knowledge and awareness of local community, coconut growers and university, agriculture and school students on inter cropping practice in coconut lands, three field demonstration blocks with intercropping including export agricultural, fruit, timber, fodder and tuber

crops were maintained at Makandura, Rathmalagara and Bandirippuwa Research Centres. Large number of students and farmers benefited through these demonstrations.

Identification of suitable areas for coconut in the non-traditional areas: preparation of soil and land suitability maps

Soils & Plant Nutrition Division

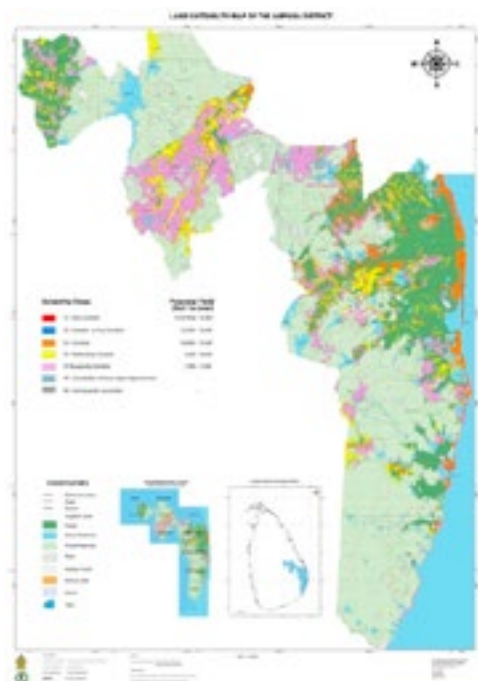


Ampara soil map

Printed 1: 50,000 scale soil maps and land suitability maps for Ampara, Kalmunai, Batticaloa, Kalkudah, Nilavali, Paddiruppu, Panama, Pothuvil & Komari, Thrukuvil & Tampaddai in Ampara district. Digitized 1: 50,000 scale soil maps and soil suitability maps for Padaviya, Pankulam, Tantrimale, Vavuniya and Wilpattu in Anuradapura district.

Out of the total surveyed area of 100,460

ha. in Ampara district, 94% was identified as suitable for coconut cultivation. In this district, highly suitable (S_1) and suitable to highly suitable (S_2) lands with a potential yield of $>15,000 \text{ ha}^{-1}\text{yr}^{-1}$ and 12,500 to $15,000 \text{ ha}^{-1}\text{yr}^{-1}$ were not identified. Suitable (S_3) lands with a potential yield of 10,000 to $12,500 \text{ ha}^{-1}\text{yr}^{-1}$, moderately suitable (S_4) lands with potential yield of 5,000 to $10,000 \text{ ha}^{-1}\text{yr}^{-1}$ and marginally suitable (S_5) lands with potential yield of 2,500 to $5,000 \text{ ha}^{-1} \text{ yr}^{-1}$ were identified that covered 8,621, 29,206 and 56,775 ha respectively.



Ampara land suitability map

Production of predatory mites for the control of Coconut Mite

Crop Protection Division

Mass production and issue of the predatory mite (*Neoseiulus baraki*) of the coconut mite were continued from the laboratories at Bandirippuwa estate and Makandura Research Station. In 2017, a total of 17,091

sachets containing predatory mites were produced and 13,976 were issued to the growers. The Crop Protection Division also provided technical guidance to the predator mite laboratories maintained by the Coconut Cultivation Board and Kurunegala Plantation Ltd. During the year one visit was made to the laboratories managed by the Kurunegala Plantations Ltd and 3 sets of mother cultures were issued to the Coconut Cultivation Board.

Inspection of the WCLWD buffer zone

Crop Protection Division

Crop Protection Division staff inspected a total of 20,435 lands in the buffer zone and removed 247 WCLWD affected palms. Assistance was given to CCB in identification of WCLWD palms in initial stage.

Inspection of oil palm seed production facilities at PalmElit, Thailand

Crop Protection Division

Oil palm seed production facility at PalmElit, a subsidiary of CIRAD in Krabi, Thailand was inspected by the Chairman, Director and Dr. N.S. Aratchige from 30-6-2017 to 2-7-2017. Seed garden and seed production units are maintained in good conditions and could be recommended for importation of both pre-heated and sprouted seeds from them in to Sri Lanka.

Inspection of oil palm net houses, seedling nurseries and recommendation

Crop Protection Division

Dr. (Mrs) N.S. Aratchige, Principal Research Officer of the Crop Protection Division

inspected and recommended oil palm seedlings in the 1st stage nursery for transferring them to the second stage nursery. During the year more than 350,000 seedlings were recommended. In addition, as quarantine requirement net houses of the 1st stage nurseries of Elpitiya Plantations PLC, Namunukula Plantations PLC, Watawala Plantations PLC, Horana Plantations PLC, Lalan Rubber Industries Ltd., Malwatte Valley Plantations PLC and Bogawanthalawa Tea Estates PLC were certified for raising oil palm seedlings for the year 2017.

Advisory visits to manage pest and disease problems in oil palm plantations

Crop Protection Division



Inspection of oil palm seedlings in the 1st stage nursery of Lalan Rubber Industries Pvt. Ltd

Advisory visits were made to oil palm plantations providing advices on pests and disease management, soil and moisture conservation. During the year, 4 visits to oil palm plantations were made and major problems that received advices were on Black Beetle management, poor nutrient management, Bud Rot and fungal disease management in the 1st stage nursery and land preparation.

Dunkannawa Coir Research and Development Centre

Coconut Processing Research Division

The centre for Coir Research and Development at Dunkannawa was managed by the Coconut Processing Research Division until September 8th, 2017 and it was handed over to the Coconut Development Authority.

Research and development for coir and coir based products and improvements to machinery used in coir industry were the main functions of the center. Machinery in the continuous system of bristle fibre extraction process was renovated in 2017 by the staff. The research program for coir development work included "Increasing efficiency and the quality of traditional Ceylon drum, fabrication of a flash dryer system for drying coir pith in rainy season, acceleration of retting process by microbial and physical methods and development of coir composite boards for partitioning purpose". In addition to the research and development work, production of coir and coir ropes (Twin robes) was carried out in the center. Daily coir production and twine making were done without interfering research activities.

Production of coir products from 1st January to 7th September, 2017

Item	Production (Kg)
Wet Bristle fibre	4,092.3
Dry mattress fibre	2,305
Coir pith	5,525
Twine	1,426

The twine ropes and coir pith were used by the research stations of Coconut Research Institute.

Technology Transfer activities

Technology Transfer Division

Certificate Course on Coconut Cultivation and Value Addition

In order to maintain a close interaction between the researchers of CRI and the coconut growers, the most famous training programme series among the growers “Certificate Course on Coconut Cultivation and Value Addition” was conducted in this year too. The training series was designed to fulfill the knowledge needs, upgrade the technical knowledge of coconut growers and to have direct interactions with researchers in various disciplines. At the beginning of the year, the programme

schedule was advertised in newspapers requesting interested coconut growers to register for the programme in advance. The certificate course includes eight one-day programmes on specific subject areas on coconut cultivation, management of estates and value addition. Based on different subject categories, coconut growers have the choice to select the suitable programmes for them. According to the subject categories, these programmes were held in different substations of CRI. Technical presentations and field demonstrations relevant to the specific subject were the major components of each programme. The course was conducted from April to November and the details of eight programs are as follows.

Date	Venue	Topic	Participants
28 April	GRC, Ambakele	Replanting of coconut	247
26 May	Ratmalagara	Soil and moisture conservation	232
30 June	Head Office, CRI	Fertilizer recommendations	217
28 July	Ratmalagara	Rehabilitation of coconut estates	219
25 August	Head Office, CRI	Pest and diseases of coconut	227
29 September	Makandura	Intercropping/ animal keeping	193
27 October	Head Office, CRI	Labor law and Estate Management	215
30 November	Head Office, CRI	Coconut based products and value addition	216



Field demonstrations for coconut growers

Workshop on increasing productivity of coconut plantations

Conducting workshops on increasing productivity of coconut plantations is a new approach to build direct contacts between the research personnel and the stakeholders. Productivity increase workshops were organized in such a way that coconut growers could discuss their field problems directly with the experts in the respective technical areas, identify strategies to solve the problems and increase the productivity of the plantations. During the year, one workshop was held with the field staff of Coconut Research Institute, Coconut Cultivation Board, National Livestock Development Board, Chilaw Plantations and Kurunegala Plantations.



Training of Trainer (TOT) Programmes

During the year, 12 Training of Trainer programmes were conducted for grass root level trainers and extension personnel from different organizations to enhance the technical capabilities.

Date	Institute / Farmer group	No of Participants
14/01/2017	Field officers of CDA	25
21/02/2017	Organic growers from Silver Mills (Pvt.) Ltd.	50
29/03/2017	Coconut growers from Makandura Kapruka Society	25
18/05/2017	Programme on WCLWD for coconut growers from Ingiriya AGA division	85
15/09/2017	A programme on WCLWD for coconut growers from Embilipitiya AGA division	55
18/09/2017	Farmer group from Jaffna	24
16/10/2017	Farmer group from Kobeigane	35
16/10/2017	Two programmes on WCLWD for coconut growers from Mathugama AGA division	90
07/11/2017	Organic growers from Silver Mills (Pvt.) Ltd.	50
17/11/2017	Assistant superintendents and field officers from Kegalle Plantations	35
05/12/2017	Organic coconut growers from Renuka group	65



Conducting TOT programmes

Conducting RED programmes

Research Extension Dialogues

Two research extension dialogues were conducted during the year for Coconut Development Officers (CDOs) of Kurunegala, Gampaha, Marawila, Kuliyaipitiya areas on 31/08/2017 and Anuradhapura, Polonnaruwa, Galle, Matara, Kaluthara, Rathnapura, Monaragala areas on 09/10/2017. The main aim of the Research Extension Dialogue (RED) was to update the technical knowledge of CCB extension staff and solve their field problems. Further, it provided a platform to develop interaction to identify researchable problems in the coconut industry.

Training Programmes on Value Added Coconut Products

Three training programmes were conducted for rural entrepreneurs jointly with the Vidhatha Centers.

Date	Venue	Participants
26 th May	Kirindawa	32
12 th June	Kuliyaipitiya	34
26 th Aug.	Wennappuwa	25



Conducting programmes on value added coconut products

School educational programmes

During the year, educational programmes were conducted at the institute for 1,009 students and teachers who visited CRI from 19 schools. In addition, the CRI provided necessary information and guidance for 25 students who visited the institute for the preparation of their GCE O/L and A/L projects on coconut related fields.



Conducting programmes for school children

Educational programmes for universities and higher educational institutions

Seventeen practical training programs were conducted for students from universities and higher educational institutions.

Universities	Agriculture Schools
Ruhuna	Labuduwa
Jayewardenepura	Walpita
Wayamba	Homagama
Jaffna	Paranthan
Uva Wellassa	Naiwala
Peradeniya	Aquinas
Open University	Kuruwita
Rajarata	



Conducting programmes for university students

Exhibitions and crop clinics

The division participated in nine exhibitions and crop clinics in Colombo, Mahawewa, Wekada, Mathugama, Kuliyapitiya and

Makandura areas during the year to promote coconut cultivation, management and processing technologies.

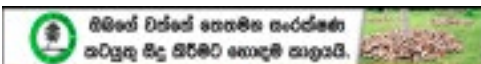


Crop clinics

Technology dissemination through mass media

TV advertising

Two crawling messages on 'moisture conservation' and 'inorganic and organic fertilizer application' were telecast on Rupavahini TV channel for three weeks.



Radio programmes

Six "Sara Praba Gira" radio discussions were broadcast on Commercial service and one "Govithenata Peyak" discussion was broadcast on Swadeshiya service of Sri Lanka Broadcasting Corporation.



Newspaper articles

Three articles were published on Dinamina newspaper supplement. These articles covered the correct method of planting a coconut seedling, control of Black Beetle in coconut lands using *Metarhizium* fungus and ways and means of increasing productivity in coconut lands.

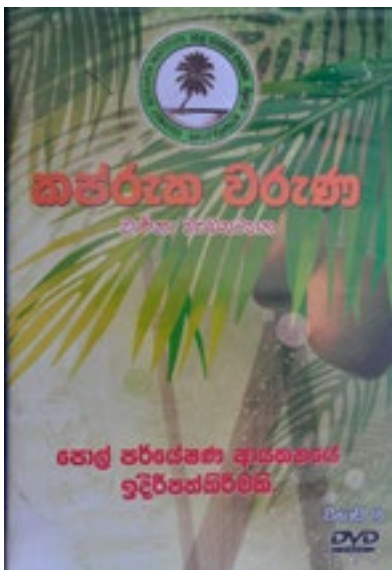


Newspaper article on 'Rivira'

Production of "Kapruka Waruna" video documentary

"Kapruka Waruna" video documentary which runs 18 minutes was produced. It includes details about Coconut Research Institute, current research programme of

CRI and the services given to the coconut growers and general public. The video documentary could be used for the growers, visitors, school and university students to familiarize on the institute.



Kapruka Waruna video documentary

Printing and Publications

The Technology Transfer Division is responsible for printing and publishing all the printed materials of CRI. During the year, the division published following printing materials.

1. A booklet on "Planting and management of young plantations"
2. A booklet on "Soil and moisture conservation"
3. A booklet on "Plant nutrients and fertilizer management"
4. A booklet on "Rehabilitation of low yielding coconut lands and animal husbandry"
5. A booklet on "Management of coconut pests and diseases"

6. A booklet on "Intercropping in coconut lands"
7. A booklet on "Estate management and labor regulations"
8. A booklet on "Coconut based products and value addition"
9. CRI Annual Reports for 2014 and 2015
10. Leaflets on "Moisture conservation"
11. Leaflets on "Planting of seedlings"
12. Leaflets on "New recommendation to overcome Mg deficiency"
13. Leaflets on "Predatory Mite"
14. Technology update (July- December issue) – English

In addition, the printing unit of the division undertook 85 printing jobs and binding jobs of other divisions. This included booklets, leaflets, official forms, circulars, various kinds of forms, datasheets, survey questionnaires, certificates, folders and handouts etc.



Printing section of CRI

Coconut Technology Park (CTP)

The Coconut Technology Park (CTP) established at the premises of the Coconut Research Institute, Lunuwila with direct access from the Colombo – Kuliyaipitiya road for demonstration of proven technologies on coconut cultivation and processing. This centre serves as one-stop educational, training and information centre for coconut growers, processors, entrepreneurs, traders, students and general public. Further, it provides information and display technical recommendations to the growers. During the year, CTP received 17,350 visitors.



Coconut technology park

Familiarization programmes for foreign visitors

Many foreign scientists, university students and guests visited CRI due to its

international research collaborations. Many foreigners were interested to visit Coconut Technology Park as it added recreational and educational value to their tour. During the year, eight tourist groups visited CRI and Technology Park.



Conducting programmes for foreign visitors

Date	Country	No. of visitors
14 th Feb.	Germany	27
20 th Mar.	UK	25
05 th May	China	6
31 st May	Bangladesh	6
17 th June	Canada	5
21 st June	UK	4
24 th July	Chili	7
14 th Aug.	UK	10

Technology transfer on pest and disease management

Crop Protection Division

Crop Protection Division conducted two special training programmes on Acarology for two groups of students from the Rajarata University on 15-6-2017 and 8-12-2017.

The staff of the Crop Protection Division involved in conducting several technology transfer activities to the stakeholders such as coconut growers, students from the universities and Agriculture schools and groups of foreign delegates.



Undergraduate students from Rajarata University getting practical experience at CPD

Several students from various institutions studying for diploma in agriculture received in-plant training on crop protection. Training was provided to several officers that were recruited for predatory mite breeding laboratories managed by the Coconut Cultivation Board as well as the private companies. Altogether 17 extension activities were carried out by the Crop Protection Division during 2017.

Mr. Naveen Dissanayaka, Honourable Minister of Plantation Industries visited Crop Protection Divisional laboratories to get familiarized with the biological control of coconut pests. APCC delegates,

Bangladesh Agricultural Research Council officials and local visitors acquainted with the activities of Crop Protection Division.



Hon. Minister observing Coconut Caterpillar cultures in the insectary of Crop Protection Division



APCC delegates discussing predatory mite breeding activities with CPD staff

Training of WCLWD

Crop Protection Division

Four training sessions were conducted to new Field officers and field inspectors of CCB and CRI on identification of WCLWD affected palms.

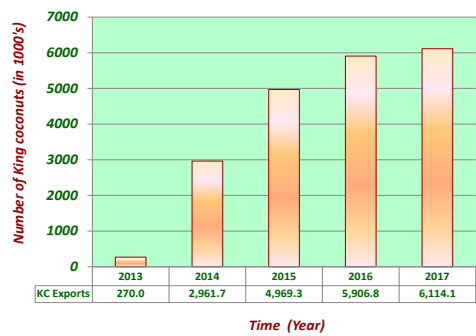


Training of field inspectors in identification of WCLWD affected palms

Disseminate the protocol for improvement of shelf-life of tender king coconut for export market

Plant Physiology Division

The protocol developed for the improvement of shelf-life of king coconut was given to 17 exporters during the year. The number of king coconuts exported to more than 25 countries have shown a steady growth in previous five-year period of which the export volume has exceeded the 6 Mn. king coconuts (6.1Mn) in 2017.



Export of King Coconuts in previous five years using the protocol developed by CRI



Prepared King Coconuts for exportation

CONTRIBUTION TO NATIONAL DEVELOPMENT THROUGH SERVICES TO STAKEHOLDERS



Production of Red Weevil aggregation pheromone

Crop Protection Division

The division produced and sold 6,068 Red Weevil pheromone vials. Main customers were Regional offices of Coconut Cultivation Board.

Production of predatory mites for the control of Coconut Mite

Crop Protection Division

Mass production and issue of the Predatory Mite (*Neoseiulus baraki*) of the Coconut Mite were continued from the laboratories at Bandirippuwa estate and Makandura Research Station. A total of 13,976 sachets containing predatory mites were issued to the growers. The Division also provided technical guidance to the predator mite laboratories maintained by the Coconut Cultivation Board, Chilaw Plantation Ltd. and Kurunegala Plantation Ltd. During the year, three sets of mother cultures were issued.



Checking purity of predatory mite culture bags before releasing to growers

Production and issue of parasitoids for the management of Coconut Caterpillar

Crop Protection Division

Mass production of parasitoids for the management of Coconut Caterpillar continued in the insectary of the Crop Protection Division. A total of 1,154,500 parasitoids were released during 2017 to manage the Coconut Caterpillar out breaks which occurred due to the unfavourable weather conditions prevailed during the year.



Bracon hebetor cocoons and parasitized larvae of Coconut Caterpillar

Sale of electronic detectors for detection of Red Weevil infestations

Crop Protection Division

Crop Protection Division sold 50 Red Weevil Detectors to coconut growers who have young coconut plantations. The detector assists the coconut growers for early detection of the red weevil infestations, which, is of paramount importance for the management of the pest.

Synthesis of Black Beetle aggregation pheromone

Crop Protection Division

Synthesis of Black Beetle aggregation pheromone was commenced in collaboration with Faculty of Science, University of Peradeniya. Field evaluation of the 1st batch of chemical commenced.

Coordination of importation of Monocrotophos 60% SL

Crop Protection Division

The Division facilitated the importation of 2,000 l of Monocrotophos 60% SL for Red Weevil control and the consignment was handed over to the Coconut Cultivation Board for distribution among the coconut growers.

Issuing pest free certificates

Crop Protection Division

The Division tested coir pith products for the presence of insect pests and pathogens and issued pest free certificates to exporters during the year.

Analytical services to stakeholders

Coconut Processing Research Division

The division extended its services to stakeholders by analyzing 245 VCO samples, 50 white coconut oil samples, 4 DC samples, 03 coconut flour and 05 poonac samples.

Dissemination of technology

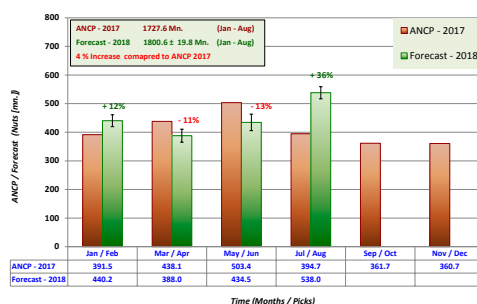
Coconut Processing Research Division

The technologies for production of coconut water beverage, coconut ice cream and coconut oil were obtained by stakeholders. Virgin coconut oil and coconut water were the mostly sought technologies.

Estimation of national yield of 2017 and prediction of national yield for 2018

Plant Physiology and Agricultural Economics & Agribusiness Management Divisions

Bi-monthly updates for the National Coconut Production and the yield forecast were issued. At the end of each year Annual National Coconut Production (ANCP) and the yield forecast up to August of the next year were issued. Accordingly, the estimated national coconut production in 2017 was 2,450 Mn nuts. It was about 14% reduction compared to the production in 2016 (2,845 Mn. Nuts). The predicted coconut production for the first eight months (January-August) of 2018 was $1,800 \pm 19.8$ Mn nuts; which will range from 1,780 to a maximum of 1,820 Mn nuts. The information was provided to stakeholders through e-mail (monthly), CRI web site (monthly update) and through a special publication twice a year.



Estimated national coconut production on bi-monthly basis in 2017 and coconut yield forecast for 2018 (up to August)

Supply of meteorological data

Plant Physiology Division

Daily data of rainfall, air and soil temperature, relative humidity, wind velocity and sunshine hours of five research stations of CRI; Bandirippuwa Estate, Ratmalagara

Estate, Ambakelle Genetic Resources Centre, Maduru oya Genetic Resources Centre and Makandura Research Station were provided to the national database at the Meteorology Department. Monthly rainfall and temperature data were provided to growers, industry personnel, scientists, students and Divisional Secretariats of Wennappuwa, Mahawewa, Madampe and Dankotuwa, on their request.



Agro-meteorological station at Bandirippuwa Estate

Site specific fertilizer recommendation for coconut (Differential Fertilizer Recommendation - DFR)

Soils & Plant Nutrition Division

In this programme, site specific fertilizer recommendations are given according to the leaf nutrient status of a specific coconut estate. Identification and corrections of hidden deficiency condition in coconut palms, supply required amount of fertilizer and avoid excess application of fertilizers are the important aspects of this programme. This service is provided on request of coconut growers. A nominal fee of Rs. 1000/- is charged per leaf sample. Coconut growers have to do the leaf sampling on their estates and submit the samples to Soils & Plant Nutrition Division (SPND). Training

on leaf sampling can be obtained from the division. Thirty eight recommendations were given during the year.

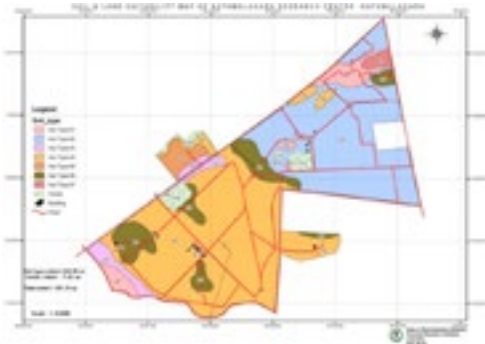


Leaf sample analysis for DFR using Atomic Absorption Spectrophotometer

Soil suitability assessment for coconut

Soils & Plant Nutrition Division

Soil suitability of the coconut estates is one of the main factors affect the land productivity. Knowledge on soil condition and limitations in the coconut estates are very important for application of suitable management practices on the estate. This service was provided on request. Charges for this service varies with the extent of the estate. During the year, 35 lands were tested for soil suitability for coconut.



Soil suitability map for coconut

Issue analysis reports

Soils & Plant Nutrition Division

Sample Type	No. of samples
Coir pith for quality assurance	489
Inorganic fertilizer for quality assurance	325
Organic fertilizer for quality assurance and to recommend organic manure package	28
Water for suitability for irrigation	8
Soil for nutrient status	30
Leaf for nutrient status	09

Supply of information to other institutions and stakeholders

Agricultural Economics & Agribusiness Management Division

1. Provided information to update research database of Council for Agricultural Research Policy (CARP)
2. Provided coconut statistics to Central Bank of Sri Lanka, Sri Lanka Treasury and many other institutes and stakeholders
3. Provided valuation reports to value coconut tress removed for different purposes
4. Provided statistics and information on coconut for the Budget speech and the library of Sri Lanka Parliament
5. Served as a Centre for Coconut Based Socio-Economic Statistics
6. Issued policy recommendations to the industry

"Kapruka" SMS Service

Technology Transfer Division



Communication through mobile phones is considered very important in enhancing farmers' access to agricultural market situation. Therefore, the division introduced an e-agriculture project to disseminate coconut related information to the growers with the support of the Agricultural Economics division and Plant physiology division. Coconut growers receive messages on farm gate price of a coconut, DC price, Copra price, Coconut oil price bi weekly, yield prediction for the following month and information on training programmes on monthly basis and weather forecast details weekly. There are 1,000 growers registered as the recipients for the year 2017.

Provide advisory services to growers

Technology Transfer Division

The division received a large number of requests from coconut growers to obtain advice on rehabilitation, pest problems and productivity improvement in their plantations. Requests of coconut growers for general advice and problems that can be addressed by the Coconut Development Officers, were referred to the CCB Regional Managers of respective regions. During the year, seventeen field inspections were made on special requests and reports were submitted with necessary recommendations. There were totally 1,578 growers visited the institute, contacted us through our hotline and inquired through mails. They were provided with the necessary advisory assistance by the staff of the division.



Giving technical assistance to the growers

Library services

The library provided its services to the institute's staff and university students throughout the year. Lending and reference services were provided with limited staff throughout the year for the information

needs of internal and external clientele using in-house and outside resources. A number of literature searches were made by users on kernel-based food products and non-kernel-based products on coconut.

Collection of books

Four new books were purchased and eight books were further ordered, seven books were received from various donors on a complimentary basis. The total stock recorded as 5,917 books as at 31 December 2017.

Literature searches

In addition to the quick reference queries made by the staff, a total of 45 literature searches were made on the coconut database to cater to the information needs of users. Of these, 6 searches were made on behalf of the staff while 39 were made for outsiders and university students who were attached to the divisions of the CRI.

Inter library loan service

The library received requests for the supply of 11 articles from which 07 were supplied. From the 04 articles requested from outside libraries on behalf of the staff, all were received. Membership increased by 06 users. Fifty (50) people visited the library throughout the year for information purposes.

Resource sharing and networking activities

The library continued to be a member of the Agricultural Information Network (AGRINET) with a view to share resources. Under the network, 03 searches on various subjects were done from member libraries on behalf of the research staff. The Council

for Agricultural Research Policy, Industrial Technology Institute contributed in making the searches.

Engineering services

Following major renovations and maintenance works were conducted by the Engineering Unit during the year.

Repairs under capital Funds

1. Repairing of HO/Gr.01/08 quarters
2. Repairing of HO/Gr.03/02 quarters
3. Repairing of HO/Gr.03/15 quarters
4. Repairing of HO/Gr.03 19 quarters
5. Extension to Agriculture Economics Division

Routine maintenance works of the buildings, quarters, vehicles, electricity, air conditioners and telephone etc., were completed under recurrent expenditure.



NATIONAL COLLABORATIONS

Studies on behavioral and reproductive responses of Coconut Mite to coconut varieties

Crop Protection Division

Dr. (Ms) N. S. Aratchige and Dr. A. D. N. T. Kumara collaborated with Dr. P. Ranasinghe of the Industrial Technology Institute and Dr. (Ms) S. A. C. N. Perera of the University of Peradeniya in the project on "Assessment of behavioural and reproductive responses of coconut mites to coconut varieties and relationship of volatile organic compounds, lipid profiles and phenolic compounds of coconut varieties with their susceptibility levels to coconut mite".

Studies on health effects of virgin coconut oil

Coconut Processing Research Division

The following studies were continued in collaboration with three universities.

1. Randomized control trial of virgin coconut oil in the treatment of Alzheimer's Dementia with the University of Kelaniya
2. Feasibility study of virgin coconut oil in ameliorating Type 2 diabetes in human with the University of Peradeniya
3. Determination of the efficacy of adjunctive extra virgin coconut oil / coconut products use in people with mild cognitive impairment and mild to serve Alzheimer's disease; community based randomized, double blind, placebo controlled, pragmatic study with the Kotalawala Defense University



LOCAL & INTERNATIONAL

Science Citation Indexed (SCI) Journals

Drake, J. E., Tjoelker, M. G., Varhammar, A., Medlyn, B. E., Reich, P. B., Leigh, A., Pfautsch, S., Blackman, C. J., Lopez, R., Aspinwall, M. J., Crous, K., Y., Duursma, R. A., Kumarathunaga, D., Kauwe, M. G. de, Jiang, M., Nicotra, A. B., Tissue, D. T., Choat, B., Atkin, O. K. and Craig, V. M. B., (2017). Trees tolerate on extreme heatwave via sustained transpirational cooling and increased leaf thermal tolerance, *Global Change Biology*, 2018: 00: 1-13.

Drake, J.E., Vårhammar, A., Kumarathunge, D., (2017). A common thermal niche among geographically diverse populations of the widely distributed tree species *Eucalyptus tereticornis*: No evidence for adaptation to climate-of-origin, *Global Change Biology*, 23: 5069–5082.

Meegahakumbura, M.K., Wambulwa, M.C., Li, M.M., Thapa K.K., Sun Y.S., Möller M., Xu J.C., Yang, J.B., Liu, J., Li, D.Z. and Gao, L. M., (2017). Domestication origin and breeding history of the tea plant (*Camellia sinensis*) in China and India based on nuclear microsatellites and cpDNA sequence data, *Frontiers in Plant Science* (Accepted), [doi: 10.3389/fpls.2017.02270].

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Ranasinghe, C.S., Kumarathunge, D. and Kiriwandeniya, K., (2017). Genotypic differences in cardinal temperatures for in vitro pollen germination and pollen tube growth of coconut hybrids, *Experimental Agriculture*, 1-13.

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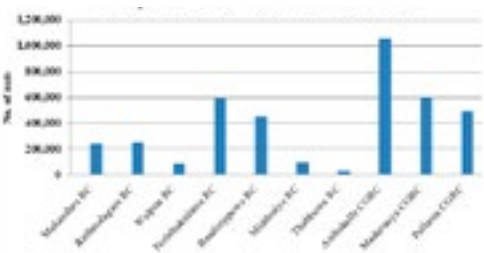
ESTATE MANAGEMENT ACTIVITES



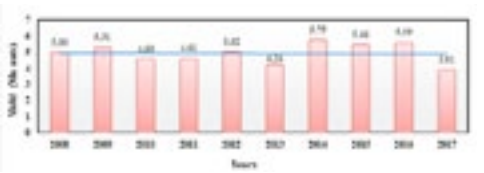
ESTATE MANAGEMENT ACTIVITES

Estate Management Division (EMD) of the Coconut Research Institute (CRI) manages all the Genetic Resources Centres (CGRC, seed gardens) and Research Centers (RC, estates) with the objective of providing quality seeds to the National Replanting Programme (NRP) and facilitating the field level infrastructure facilities for conducting the research programme of the institute. There are four CGRC's and seven RC's located in different Agro Ecological Regions and maintained as self financed estates. The total extent of all CRI estates is 3,148 ac, out of which 1,980 ac. are Genetic Resource Centers and 1,168 ac. are Research Centers.

When considering the progress as a group of estates, the total yield of all CRI estates in 2017 was nearly 3.91 million nuts. Seed nut production was 1,073,707 from six coconut cultivars introduced as improved varieties. The individual estate level nut production was highest in the Ambakelle CGRC. It was 1.05 Mn. nuts in 2017. According to the annual census of the estates, the total no of bearing palms was 78,638. Average cost of production per nut was Rs. 31.05



Nut production of individual estates in 2017

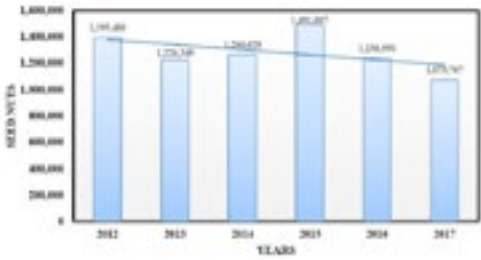


Total coconut yield 2008 - 2017

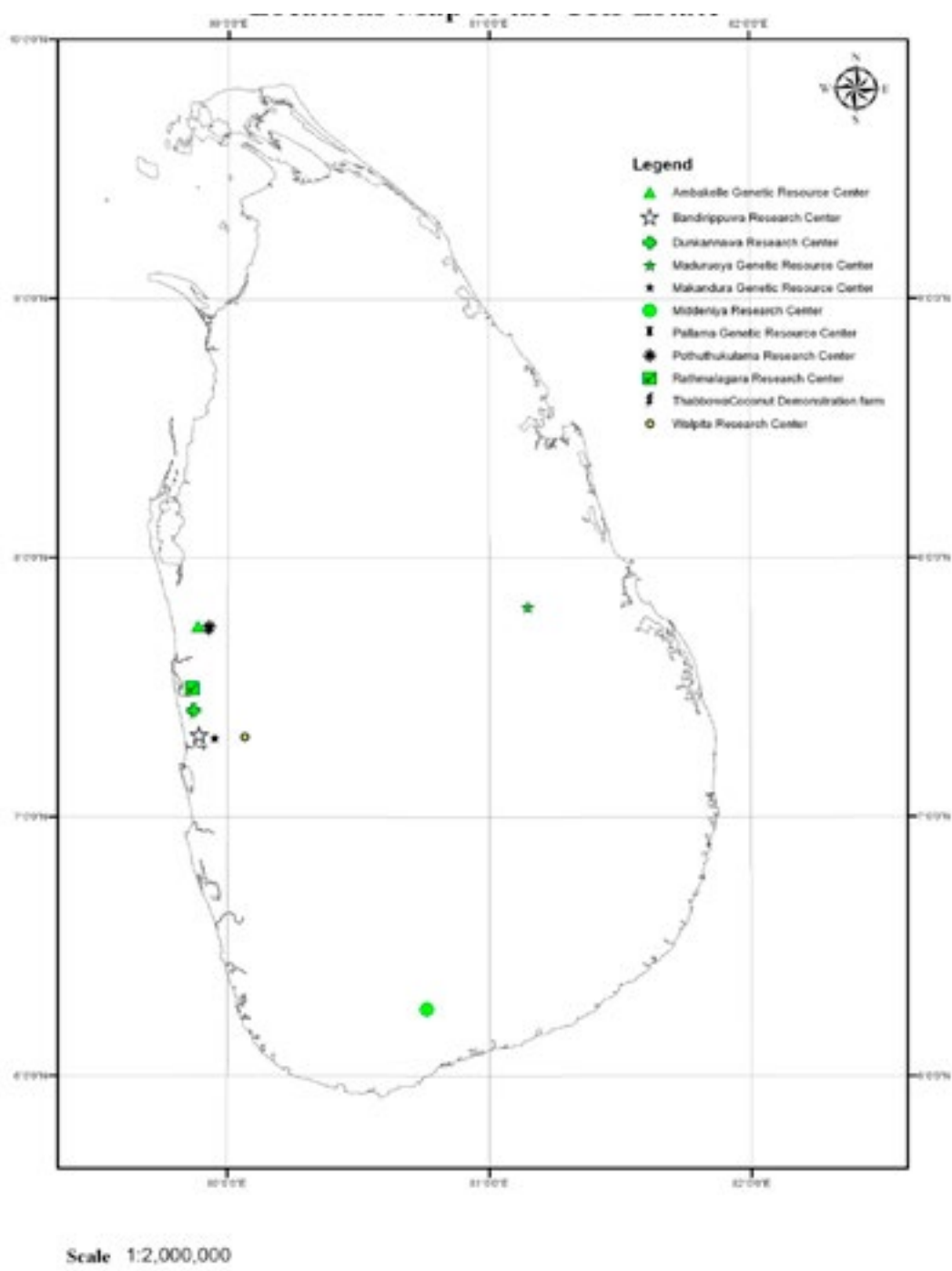
Cost of production (COP) per nut and net sale average (NSA) of individual estates in 2017.

Seed Garden/ Estate	COP / Nut (Rs)	NSA/ Nut (Rs)
Ambakelle	24.41	41.57
Pallama	37.39	40.30
Maduruoya	15.39	52.51
Makandura	35.14	36.22
Bandirippuwa	33.59	51.22
Rathmalagara	46.70	45.00
Poththukulama	15.57	37.21
Walpita	28.59	42.84
Middeniya	34.74	32.88
Thababowa	38.98	44.30

Production of quality seed nuts to the National Replanting Programme (NRP) is one of the major objectives of the Estate Management Division (EMD). Ambakelle, Maduruoya and pallama Genetic Resource Centres produce different types of quality coconut seeds to the plantation sector. Average seed nut production from all three seed gardens is 1.2 Mn/year.



Total seed nut production of 2012 - 2017



Location map of the CRI estates

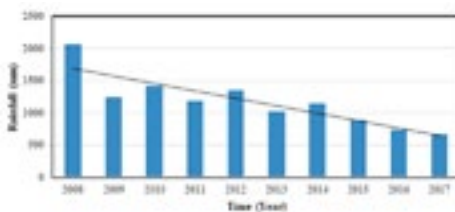
Makandura Research Station (MRS), Makandura

Superintendent - W.M.U. Rathnayake (Dip. Plantation Management)

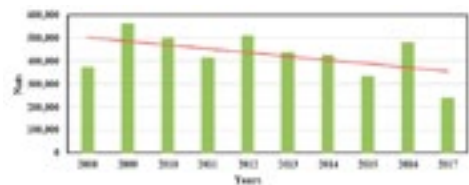


Makandura Research Station was established in 1985, with the objective of increasing the supply of coconut seeds to the NRP. Open pollinated CRIC60 planting material has been used to establish this estate. In the middle of 90th decade, some palms in the estate have shown declining symptoms. Because of this reason, use of this estate for seed nut production has been completely terminated. Now this estate is maintained as a demonstration farm of inter crops and agro forestry systems.

There is a gradual decreasing trend of rainfall over the years and the rainfall in 2017 was nearly a three-fold reduction compared to that in 2008. Crop data also showed a decreasing trend over the years. But there were some peaks in 2009, 2012 and 2016.



Rainfall of Makandura Research Station during 2008 - 2017



Total crop of Makandura Research Station during 2008 - 2017

Bandirippuwa Research Station (BRS), Bandirippuwa

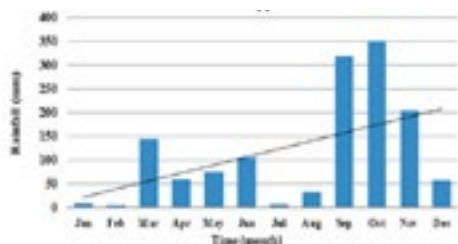
Superintendent - W. A. H. Upali (Dip. Plantation Management)



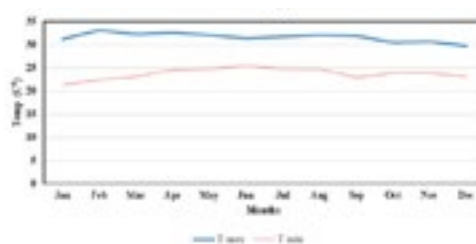
Bandirippuwa Research Centre is the main research station of the CRI and the extent is 370 ac. This is not only a coconut land, but also a coconut genome conservation area. All the endemic coconut varieties and some improved varieties are conserved in the estate. The oldest CRIC65 plantations in the country is cultivated in the 50-acre block of the Estate, the palms are nearly

55 yrs old and still productive and it is a good example for coconut growers to see the productive life span of hybrid coconut. Animal husbandry and treacle production are also functioning in Bandirippuwa Research Station.

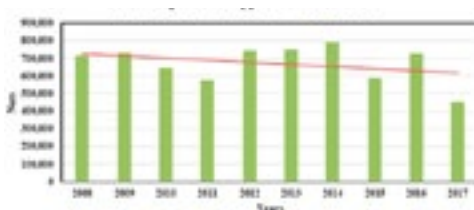
The estate received a very limited rainfall in yala season. But Maha season received comparatively much higher rainfall.



Rainfall of Bandirippuwa Research Station - 2017



Temperature data of Bandirippuwa Research Station - 2017



Total crop of Bandirippuwa Research Station - 2008 - 2017

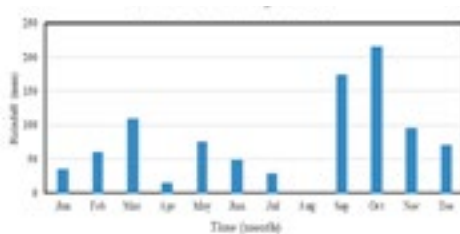
Rathmalagara Research Station (RRS), Madampe

Superintendent - D. P. S. K. Hettiarachchi (Dip. Agri. & EM)

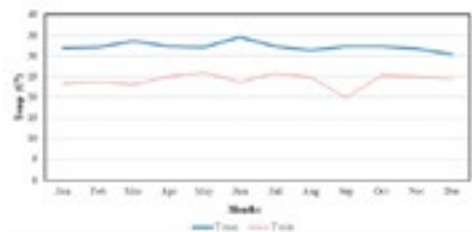


Rathmalagara is one of the oldest Research Centers of CRI and very significant research findings have been initiated from the field trials in this estate. Currently, animal husbandry and inter cropping trials are conducted in this estate. Extent of the estate is 280 ac.

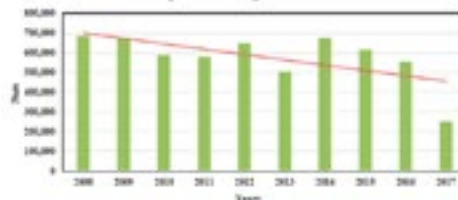
There is a sharply decreasing trend in the crop over last 10 years and the lowest crop was recorded in 2017. This was a combined effect of the weather pattern, over-age plantation and continuously depleted soil fertility.



Rainfall of Rathmalagara Research Station - 2017



Temperature data of Rathmalagara Research Station - 2017



Total crop of Rathmalagara Research Station - 2008-2017

Poththukulama Research Station (PRS), Pallama

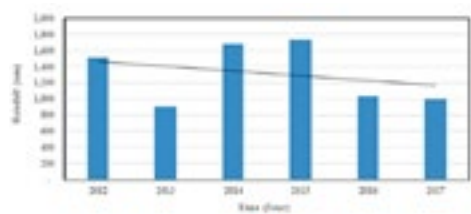
Officer in Charge - W. W. A. P. R. Fernando



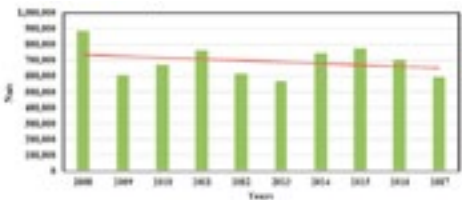
Poththukulama Research Station recorded the second lowest COP per nut out of all the estates. More than 95% of the plantation of this estate is in bearing stage. With the objective of conserving the germplasm, different coconut accessions have been planted in this estate. Most of the accessions were collected in 1990 decade and all the accessions are now in bearing stage. In addition to that, oldest San Ramon palm collection is also in this estate. Those palms

were one of the sources of San Ramon mother palms for establishment of Pallama Seed Garden.

The estate received a very low rainfall during last two consecutive years; 2016 and 2017. Although the Poththukulama Research Center is situated in the Dry Zone, the yield reduction of the estate was comparatively lower, because of the favorable soil condition of the estate.



Rainfall of Poththukulama Research Station - 2012 - 2017



Total crop of Poththukulama Research Station - 2008 - 2017

Walpita Research Station (WRS), Walpita

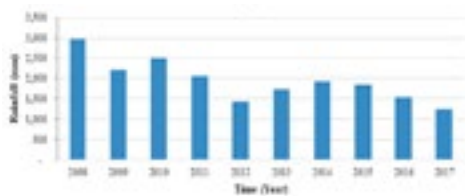
Superintendent - W. M. U. Rathnayake (Dip. Plantation Management)



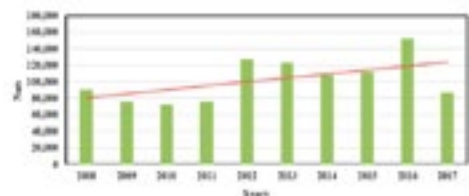
Walpita Research Centre is located in the Wet Zone. Most of the first-generation plantation of the estate is over age now, but due to the favorable soil condition, over age palms also still produce high number of nuts. A trial established with brown dwarf crosses by the Genetics and Plant Breeding Division is performing well due to

the interaction of favorable soil condition, irrigation and the high genetic potential for nut production.

There is a decreasing trend in the rainfall over last ten years, however, the estate showed an increasing trend in the crop production.



Rainfall of
Walpita Research Station - 2008 - 2017



Total crop of
Walpita Research Station - 2008 - 2017

Middeniya Research Station (MRS), Middeniya

Officer in Charge - E. A. Sanjeewa Kumara

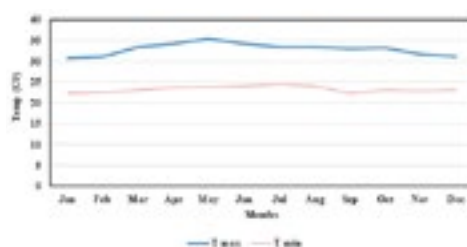


Middeniya Research Station was established in 2005 and therefore the plantation is still young and not yet giving a stable yield. Most of the palms are not in the bearing stage. This estate functions as a demonstration

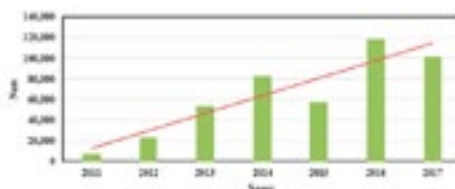
field to the coconut growers in the Southern area and CRI conducted several farmer training programmers in this estate. There is an increasing trend in the crop yield with the plantation attaining maturity.



Rainfall of
Middeniya Research Station - 2008 - 2017



Temperature data of
Middeniya Research Station - 2017

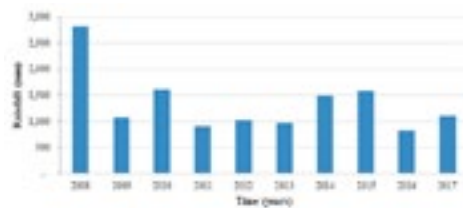


Total crop of
Middeniya Research Station - 2011-2017

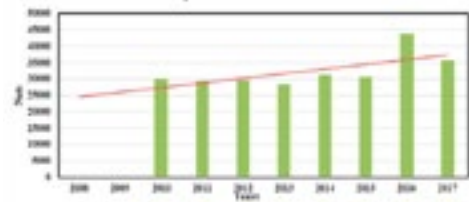
Thabbowa Research Station (TRS), Thabbowa

Officer in charge – H. M. Chinthaka Bandara

Thabbowa Research Station is the smallest estate belongs to CRI. This is maintained as a demonstration block for inter cropping under coconut. The estate is planted with high potential hybrid coconut variety, DG x Tall (CRIC65).



Rainfall data of
Walpita Research Station - 2008 - 2017



Total crop of
Walpita Research Station - 2008 - 2017

Coconut Genetic Resource Centre Ambakelle (CGRC), Ambakelle

Asst. Superintendent - Sumudu Wanasingha, (BSc Agric.)



Ambakelle is the only coconut seed garden in the world that produce coconut seeds with 'isolated seed garden concept'. This was established in 1955 with the objective of supplying quality coconut planting material to the National Replanting Programme (NRP). Total extent of this seed garden is 1,140 ac (456.2 ha). Seed production area of this seed garden is totally covered by a natural forest as a barrier to the alien pollen which can come from the outside area.

Four varieties of improved seed nuts are produced in the seed garden. CRIC60 and CRIC65 are produced at mass scale by control pollination and Kapruwana, and Kapsuwaya are produced by hand pollination. Seed production in 2017 was as follows,

Variety	No of seeds
CRIC60	975,473
CRIC65	32,892
Kapruwana	1,568
Kapsuwaya	6,125

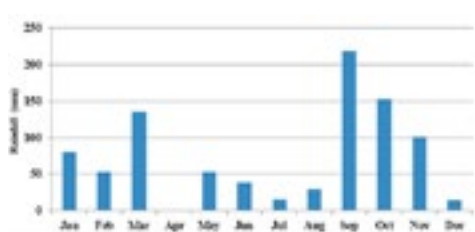
Field No	Year of Planting	Extent/ac
1	1955	4.5
2	1956	4
3	1956	4
4	1956 - 2013	34
5	1984 - 1992	7
6	1960	20
7	1961	20
8	1962 - 2015	20
9	1966 - 1969	25
10-A	1972	25
10-B	1973	25
11-A	1985 - 2005	30
11-B	1985	30
12	1985	22
13	1984	37
14	1992	37

The seed garden received a very limited rainfall in Yala and there was no rainfall in April. Because of this situation, there was a severe dry spell from April to August. During this five month long dry season, few mother palms were dead and appreciable numbers of Dwarf mother palms were declined due to their high susceptibility

to water deficit condition. This severely affected the seed nut production, specially the CRIC65. Manual irrigation was arranged and it helped to survive the seed palm pool.

There was a decreasing trend of rainfall over the years and the lowest rainfall in last 15 years was received in 2015. This has severely

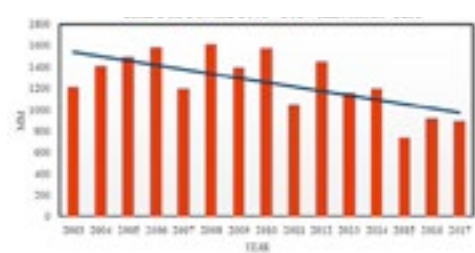
affected the production of seeds in 2015, 2016 and 2017 consecutive years. There was only a small increasing trend in the seed nut production for last ten years period. Except for 2013 and 2015, the yield fluctuation was low because of the stabilized vegetation in the seed garden.



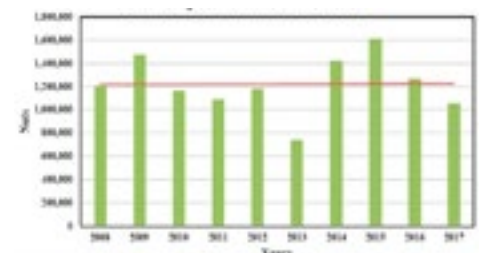
Rainfall of Amabakelle Genetic Resource Centre - 2017



Temperature data of Amabakelle Genetic Resource Centre - 2017



Rainfall pattern of Amabakelle Genetic Resource Centre - 2003-2017



Total crop of Rathmalagara Research Station - 2008-2017

Coconut Genetic Resource Centre Pallama (CGRC), Pallama

Superintendent - Nimal Hemasiri



Pallama Seed Garden is technically categorized as an Indonesian Type coconut seed garden. This was planned to produce CRISL98 (TSR) hybrid variety in mass scale. With this objective, there are two mother palm varieties in this estate as Sri Lankan Tall (SLT) and San Ramon (SR). Sri Lankan Tall is the maternal parent and San Ramon is the pollen parent. Because of this combination, seed garden is covered with San Ramon exotic variety as a pollen barrier. Extent of this seed garden is 601 ac (243.32 ha) and the Estate has divided in to 11 fields as follows. Field no 1, 2, 3, 4 and small part of field no. 6 is the seed garden area. Although the initial objective of the estate was to produce CRISL98 variety, later the estate initiated to produce another three coconut hybrid varieties, Kapruwana, Kapsuwaya and Kapsetha.

In 2017, the CRI initiated a special project to increase the production of hybrid coconut seeds using another 1000 mother palms to supply hybrid coconut seedlings specially to North and East. Funds were released from the national Budget of 2017, and this project will continue up to end of 2019. Under this project, hose irrigation system was installed in field no. 01, 02 and 03 and



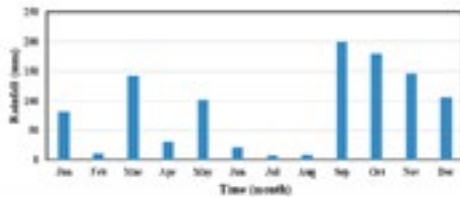
two tube wells were also established in the same area.

Field No.	Extent/ac.
1	49
2	51
3	55
4	81.5
5	Forest
6	41
7	112.75
8	44.75
9	22.5
10	41
11	27.5
Total	526

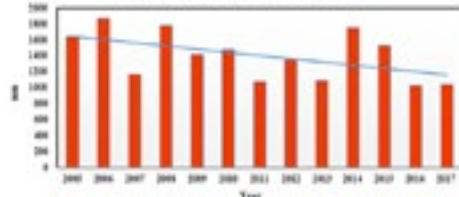
The seed garden received a very limited rainfall in Yala season and as a result, three months dry spell was prevailed in June, July and August. However, a comparatively higher rainfall was received in Maha season. Nevertheless, 60.88% of the total rainfall was received during the last four months of the year.

There was an increasing trend in the coconut yield over the years, because this seed garden was established in 1996

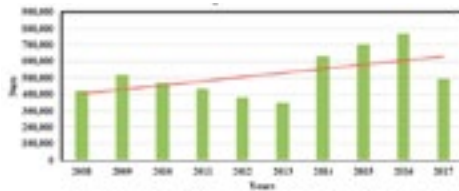
and thereafter the newly planted areas were gradually came in to flowering. But outer fields of this seed garden were not attained a rapid development due to some management difficulties.



Rainfall of Pallama Genetic Resource Centre - 2017



Rainfall pattern of Pallama Genetic Resource Centre - 2005-2017



Total crop of Pallama Genetic Resource Centre - 2008-2017

Coconut Genetic Resources Centre Maduruoya (CGRC), Maduruoya

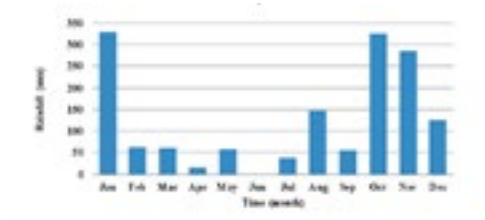
Superintendent – L. S. Bharatha Liyanage (BSc Agric.)



Maduruoya Seed garden was established in 1985 to produce CRIC60 improved coconut seeds to the National Replanting Programme. This is also an Indonesian Type coconut seed garden and it is situated in Mahaweli System B area. There are seven fields in the estate as follows. The seed garden is being irrigated using Mahaweli water and 312,709 CRIC60 seeds were produced in 2017.

The rainfall during yala season was very limited but during Maha season rainfall was distributed over October - December three month period. In this seed garden, rainfall has a minimum effect on crop yield because the flood irrigation is functioning throughout the year. However, the day temperature (T_{max}) in April to July which was well above the critical level of 33° C for pollination affected the pollination and fruit formation negatively.

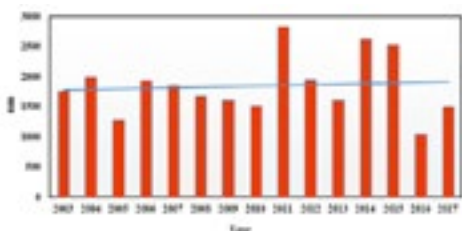
Field No.	Extent/ac.
01	21
02	30
03	34
04	30
05	36
06	16
07	27
Total	194



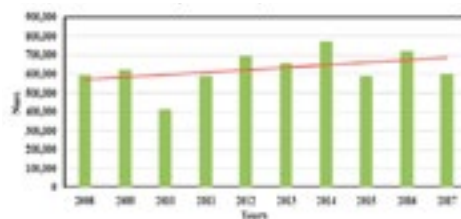
Rainfall of Maduruoya Genetic Resource Centre - 2017



Temperature data of Maduruoya Genetic Resource Centre - 2017



Rainfall pattern of Maduruoya Genetic Resource Centre - 2003-2017



Total crop of Maduruoya Genetic Resource Centre - 2008-2017

Weligama Genetic Resources Centre (WGRC), Weligama

Officer in Charge - Sudath Bandara



Earlier this estate belonged to the Coconut Cultivation Board and functioned as a coconut nursery. At the end of year 2016, this land was leased by Coconut Research Institute to establish a seed garden to produce resistant/ tolerant Varieties to Weligama Coconut Leaf Wilt Diseases (WCLWD). In 2017, several development activities were initiated with the funding of WCLWD project.

Total extent of this seed garden is 16 ac. Most of the areas are covered with a Cinnamon plantation. As infrastructure development, ground preparation, fencing and renovation of OIC's quarters were finished in 2017.

STAFF





STAFF ACHIEVEMENTS

Awards

Dr. (Ms.) N. S. Aratchige, Dr. (Ms.) L. C. P. Fernando, Dr. A. D. N. T. Kumara, Ms. N. I. Suwandharathne, Mr. P. H. P. R. de Silva and Mr. K. F. G. Perera received the 3rd place at the National Awards for Excellence in Agricultural Research - 2017 for the research project on 'Biological control of coconut mite, *Aceria guerreonis* using predatory mite, *Neoseiulus baraki*'.

Dr. (Ms.) V. R. M. Vidhanaarachchi, Dr. (Ms.) H. D. D. Bandupriya, Mr. E. S. Santha and Ms. T. R. Gunathilake received Certificate of Commendation at National award for Excellence in Agricultural Research 2017 awarded by Sri Lanka Council for Agricultural Research Policy.

Ms. G. S. Nirukshan received Dr. A. W. R. Joachim Memorial Prize award by the Postgraduate Institute of Agriculture, University of Peradeniya for obtaining the highest G.P.A during the academic year of the Master's degree program.

Ms. G. S. Nirukshan received Scholarship award by the Special Research Fund of University of Ghent, Belgium (BOF) Doctoral grants given for 15 candidates from Developing countries for the year 2017 (North-south sandwich type grants).

Dr. (Ms.) C. S. Ranasinghe received a NRC Merit Award in 2017 for Research publication in a SCI journal In 2015.

Research Grants

The grant received by Dr. (Ms.) N. S. Aratchige from National Research Council for the project on "Assessment of behavioural and reproductive responses of coconut mites to coconut varieties and identification of volatile organic compounds, lipid profiles and phenolic compounds in coconut varieties with different susceptibility levels to coconut mite" for Rs. 2.2 Mn was continued in 2017.

The grant received by Dr. (Ms.) H. M. I. K. Hearth and Dr. (Ms.) D. M. D. I. Wijebandara from National Research Council for the project on "Use of king coconut husk to produce an organic potassium source for agricultural use" in 2016 was continued in 2017.

Coconut Processing Research Division received an Equipment grant from NSF for purchasing of a fat extractor in 2017 – Rs 1.2 Mn.

Crop Protection Division received an Equipment grant from NSF for purchasing a electrophysiological laboratory equipment (GC EAD+ SSR set up) in 2017 – Rs 5.0 Mn.

Coconut Processing Research Division received special Treasury funds (Rs. 10 Mn.) for the project on ‘Modernization of coconut Processing Research division’ in 2017.

Genetics and Plant Breeding Division received special treasury funds (Rs. 59 Mn.) for the project on ‘Production of genetically superior high yielding coconut planting materials for national replanting programme’ in 2017.

Crop Protection Division received special treasury funds (Rs. 16 Mn.) for the project on ‘Management of Weligama Coconut Leaf Wilt Disease’ in 2017.

Postgraduate Degrees Completed

Dr. (Ms.) H. D. M. A. C. Dissanayaka, Senior Research Officer, Genetics and Plant Breeding Division successfully completed her postgraduate studies leading to PhD degree at the University of Tsukuba, Japan on 20th March 2017.

Ms. Dilani Hewa Pathirana, Research Officer, Coconut Processing Research Division successfully completed her MSc in Bio Technology Conducted by Post Graduate Institute of Agriculture, University of Peradeniya.

Ms. G. S. Nirukshan, Research Officer, Soils and Plant Nutrition Division successfully completed her MSc degree at the Postgraduate Institute of Agriculture, University of Peradeniya on 5th January, 2017.

Ms. D. M. P. D. Dissanayake, Research Officer, Soils and Plant Nutrition Division

successfully completed her MSc degree at the Postgraduate Institute of Agriculture, University of Peradeniya on 13th November, 2017.

Postgraduate Degrees Undertaken

Ms. K. V. N. N. Jayalath, Senior Research Officer, Agricultural Economics and Agribusiness Management Division continued the MPhil degree at the University of Queensland, Brisbane, Queensland, Australia from January, 2016.

Mr. M. D. P. Kumarathunga, Research Officer of Plant physiology Division continued his PhD degree at Western Sydney University, Australia from November 2016.

Ms. G. S. Nirukshan, Research Officer, Soils & Plant Nutrition Division commenced her PhD at University of Ghent, Belgium from October 2017.

Ms. M. K. F. Nadeesha, Senior Research Officer, Soils & Plant Nutrition Division continued for PhD degree at the Postgraduate Institute of Science, University of Peradeniya, Peradeniya from 15th December, 2014.

Mr. E. M. T. Bandaranayake, Assistant Extension Officer, Technology Transfer Division continued his MPhil degree at the Postgraduate Institute of Agriculture, University of Peradeniya from December 2015.

Mr. A. A. J. Atapattu, Research Officer, Agronomy Division commenced his PhD at University of Chinese Academy of Sciences, China from August 2017.

Overseas Training

Ms. N. I. Suwandaradne successfully completed an international short course in Integrated Pest Management and Food Safety at the Wageningen University, Netherlands.

Ms. D. M. P. D. Dissanayake attended the seminar on Soybean production and processing technology and institutional capacity building for Asian and African countries held from 14th April to 4th May 2017 in China.

Mr. D. P. S. K. Hettiarachchi / Estates Superintendent, Mr. I. A. N. Hemasiri / Estates Superintendent, Mr. W. M. U. Rathnayake/ Estates Superintendent, Mr. L. M. S. R. Jayathilake/ Seedling & Seed Production & Certification Officer, Mr. S. D. J. N. Subasinghe/ Experimental Officer, Ms. C. P. A. Kurundukumbura/ Experimental Officer, Mr. S. S. Rajapaksha/ Experimental Officer, Mr. K. P. A. Pathirana/ Experimental Officer, Mr. W. A. S. Wickramaarachchi/ Experimental Officer, Ms. W. S. R. Fernando/ Human Resources Officer attended a Training Programme on Capacity Building at the Indian Institute of Plantation Management, India from 08.10.2017 to 17.10.2017.

Mr.K.W.B.M.P.Wijesundara/Deputy Director (Administration) & Mr. W. A. H. Upali/ Estates Superintendent attended the International Training Programme on Enterprise Project & Organization Management in Thailand from 10.12.2017 to 16.12.2017.

Overseas Visits

Mr. Jayantha Jayewardene/ Chairman, Dr. (Ms.) L. C. P. Fernando/ Director and Dr. (Ms.) N.S. Aratchige/ Principal Research Officer

visited Oil Palm Lab & Plantation of Siam Elite Palm, Krabi, Thailand from 30.06.2017 to 02.07.2017.

Mr. Jayantha Jayewardene/ Chairman participated in the APCC Review Committee Meeting in International Coconut Community in Jakarta, Indonesia from 23.07.2017 to 29.07.2017

Mr. Jayantha Jayewardene/ Chairman participated in the resumption of the above meeting and Inauguration of the Philippine Coconut Week & International Coconut Festival in Manila, The Philippines from 17.08.2017 to 21.08.2017.

Mr. Jayantha Jayewardene/Chairman & Dr. A. A. F. L. K. Perera/ Deputy Director (Research) attended the 53rd APCC Session/ Ministerial Meeting in Tarawa, Kiribati from 23.10.2017 to 28.10.2017.

Dr. A. A. F. L. K. Perera/ Deputy Director (Research) attended the COGENT Steering Committee Meeting in Fiji from 29.10.2017 to 04.11.2017.

Dr. (Ms.) L. W. C. Yalegama participated in International Conference on Coconut oil held in Thailand from 15-18th March 2017.

Dr. (Ms.) D. M. D. I. Wijebandara participated for 13th International Conference of East Southeast Asia Federation of Soil Societies (ESAFS 13) organized by Soil Science Society of Thailand and held on 11th to 15th December, 2017 at Nong Nooch, Pattaya, Thailand.

Dr.(Ms.)V.R.M.Vidhanaarachchi participated in 1st International Symposium on Coconut Tissue Culture, Bangkok, Thailand, held on 13-14 March 2017, to present a country paper.

Local Training (more than 7 days)

Mr. R. M. N. K. Rathnayake & Ms. H. A. N. Subhashini (Management Assistants) commenced a Certificate Course on Book Keeping & Plantation Accounting at National Institute of Plantation Management for a period of one year from 15th July 2017.

Mr. S. M. R. B. Subasinghe, Experimental Officer, commenced one year English Diploma course conducted by Wayamba University of Sri Lanka.

Mr. P. C. P. K. Fernando, Management Assistant commenced one year English Diploma course conducted by Wayamba University of Sri Lanka.

Mr. G. M. N. Imbulegama, Technical Officer, commenced one year English Diploma course conducted by Wayamba University of Sri Lanka.

Mr. H. M. I. C. Ekanayake, Book Keeper commenced one year English Diploma course conducted by Wayamba University of Sri Lanka.

Ms. T. M. D. Aberathne, Management Assistant commenced one year English Diploma course conducted by Wayamba University of Sri Lanka.

Mr. W. M. Malith Gihan, Lab & Field Assistant, completed one year English Diploma course conducted by Wayamba University of Sri Lanka.

Mr. L. A. T. S. Liyanarachchi, Research Officer commenced one year English Diploma course conducted by SLIDA.

Mr. S. W. G. C. Ruwan Kumara, Research Officer commenced one year English Diploma course conducted by SLIDA.



ACADEMIC AND PROFESSIONAL ACHIEVEMENTS

Served in External Committees

Dr. I. M. S. K. Idirisinghe served as a Committee Member of the National Committee on Socio Economics and Policy Analysis, Sri Lanka Council for Agricultural Research Policy.

Dr. I. M. S. K. Idirisinghe served as the Board Member of Board of Study of Agricultural Economics and Business Management, Postgraduate Institute of Agriculture, University of Peradeniya.

Dr. I. M. S. K. Idirisinghe served as the member of Pricing Committee appointed by Secretary to the Ministry of Plantation Industries.

Dr. I. M. S. K. Idirisinghe served as the member of Cost of Living Committee, Ministry of Economic Development.

Dr. I. M. S. K. Idirisinghe served as the sector team member of the processed food and beverage strategy developed by the Sri Lanka Export Development Board.

Dr. H. T. R. Wijesekara served as a member of steering committee appointed to manage Weligama Coconut Leaf Wilt Disease.

Dr. H. T. R. Wijesekara served as a member of the Plant Protection Committee of the Sri Lanka Council for Agricultural Research Policy.

Dr. (Ms.) N. S. Aratchige served as a member of the Pesticide Sub-Committee of the Department of Agriculture.

Dr. (Ms.) N. S. Aratchige represented the Coconut Research Institute in the committee on 'Identification of Environmental and Social Impacts of Oil Palm Cultivation in Sri Lanka'.

Dr. (Ms.) N. S. Aratchige served as a Judging Panel member at the Annual Symposium of the Department of Agriculture.

Dr. (Ms.) L. W. C. Yalegama served as a member of the committee for Revision of Coconut oil Standards conducted by Standard Institute of Sri Lanka.

Dr. (Ms.) L. W. C. Yalegama served as a member of the committee for to draft guide lines for fresh coconut kernel processing for virgin oil and coconut milk conducted by Coconut Development Authority.

Dr. M. K. Meegahakumbura served as a member of the National Plant breeding Committee, Council for Agriculture Research Policy Sri Lanka (SLCARP).

Dr. M. K. Meegahakumbura served as a member of the Steering Committee, Young Scientists Forum (2016-2017), National Science and technology Commission (NASTEC).

Dr. N. P. A. D. Nainanayake served as the judging panel member of the 16th Agricultural Research Symposium (AGRES) of the Faculty of Agriculture and Plantation Management of Wayamba University, held on 9th and 10th November 2017.

Dr. N. P. A. D. Nainanayake served as a panel member of the evaluation team of external degree student intake of the Faculty of Agriculture and Plantation Management of Wayamba University.

Dr. (Ms.) K. P. Waidyaratne served as a member of the reviewing panel of MODSIM conference organized by Modelling and Simulation Society of Australia and New Zealand.

Dr. (Ms.) K. P. Waidyaratne served as a member of the Research and development committee of Applied Statistics Association of Sri Lanka (ASASL).

Dr. (Ms.) K. P. Waidyaratne served as a member of the academic training committee of Applied Statistics Association of Sri Lanka (ASASL).

Dr. (Ms.) K. P. Waidyaratne served as a member of the judging panel of AGRESS Conference, Department of Agribusiness Management, Wayamba University of Sri Lanka.

Dr. (Ms.) K. P. Waidyaratne served as a session chair at the international conference on Climate Change held in Feb 2017 in Colombo.

Dr. (Ms.) H. D. D. Banduprya served as a Steering Committee member of the Young Scientist Forum of National Science and Technology Commission.

Dr. (Ms.) C. S. Ranasinghe served as coconut sector counterpart in the working group on 'Food security with the changing climate: possible adaptations for sustainable food supply', conducted by the Presidential Secretariat, Colombo.

Dr. (Ms.) C. S. Ranasinghe served as coconut sector counterpart in the preparation of 'Third National Communication report on Climate Change, Sri Lanka' prepared by the Ministry of Mahaweli Development and Environment for the United Nations Framework Convention on Climate Change (UNFCCC).

Dr. (Ms.) C. S. Ranasinghe served as a member of the Scientific Advisory committee for Plant Physiology Division, Tea Research Institute, 2017.

Supervision of Postgraduate Students

Dr. (Ms.) N. S. Aratchige, Dr. A. D. N. T. Kumara and Dr. (Ms.) S. A. C. N. Perera supervised MPhil research project of Mr. N. T. P. Wijewardana, a student of the Postgraduate Institute of Science, University of Peradeniya on "Assessment of behavioural and reproductive responses of coconut mites to coconut varieties and identification of volatile organic compounds, lipid profiles and phenolic compounds in coconut varieties with different susceptibility levels to coconut mite".

Dr. Ms. Yalagama supervised the MPhil project of Ms. H. H. E. Samaranayake, Research Officer, Coconut Processing Research Division of CRI on "Determination of the composition of coconut oil and health benefits of coconut products".

Dr. (Ms.) D. M. D. I. Wijebandara supervised the MPhil research project of Ms. M. K. F. Nadeesha, Research Officer of Soils & Plant Nutrition Division, Coconut Research Institute on "Risk assessment and removal of polycyclic Aromatic Hydrocarbons (PAHs) and trace metals (Cu, Zn, Fe, Mn and Cd) using biochar incorporated coconut growing soils".

Supervision of Undergraduate Students

Dr. I. M. S. K. Idirisinghe supervised the Undergraduate Research Project on "Farmer's valuation of fuel wood growing under smallholder coconut plantations, of S. D. Nanayakkara, Faculty of Agriculture, University of Wayamba".

Dr. (Ms.) P. M. E. K. Pathiraja supervised the Undergraduate Research Project on "Evaluation of current status of desiccated coconut producers in Sri Lanka", of A. N. S. M. Samarajeewa, Faculty of Agriculture, University of Sabaragamuwa.

Dr. S. H. S. Senarathne supervised a BSc(Agriculture) final year research project of Ms. A. M. Augustin, at Uva Wellassa University of Sri Lanka on "Germination characteristics of rhizomes of *Panicum maximum* in coconut plantations of Sri Lanka".

Dr. S. H. S. Senarathne supervised a BSc (Agriculture) final year research project of Ms. P. K. G. Perera, at Eastern University of Sri Lanka on "Effect of moisture absorbent hydro polymer (Zeba) on growth of coconut seedling in the nursery".

Dr. (Ms.) S. C. Somasiri supervised a BSc (Agriculture) final year research project of U.

M. S. A. M. Bandara at Faculty of Agriculture and Plantation Management, Wayamba University of Sri Lanka, Makandura on "Soil organic carbon levels in hard laterite coconut growing soil having medium rotation agro forestry trees".

Dr. (Ms.) Chandi Yalgama supervised final year research project of M. F. M. Fazil, a student of University of Wayamba (Food Science and Technology), on "Development of coconut butter".

Ms. Dilani Hewa Pathirana supervised final year research project of R. A. Nipunika, BSc Student of Uva Wellassa University on "Production of VCO : Effect of Temperature"

Ms. H. A. E. Samaranayake supervised final year research project of Navodini Lakshika, a BSc Student of Uva Wellassa University on "Production of VCO and CO: Effect of maturity level".

Dr. M. K. Meegahakumbura supervised the final year research project of Ms. W. L. H. Wijewikrama of Uva Wellassa University of Sri Lanka.

Dr. M. K. Meegahakumbura supervised the industrial training component of the BSc Agriculture degree of Mr. M. S. B. W. T. M. N. S. Tennakoon of Wayamba University of Sri Lanka.

Dr. M. K. Meegahakumbura supervised the industrial training component of the BSc degree of Ms. M.T. Nipuli Indrachapa of Sri Jayawardenepura University.

Dr. (Ms.) D. M. D. I. Wijebandara and Ms. D. M. P. D. Dissanayake supervised the undergraduate research project of Ms. S. A. S. Imaya, a student of Faculty of Applied Sciences, Sabaragamuwa University of Sri

Lanka on "Assesment of nutrient status in non traditionally coconut growing soils in Trincomalee distrct of Sri lanka".

Dr. (Ms.) D. M. D. I. Wijebandara and Ms. D. M. P. D. Dissanayake supervised the undergraduate research project of Mr. R. Nishanthiss, a student of Sabaragamuwa University of Sri Lanka on "Evaluation the quality of poultry manure in different poultry farming systems use in coconut (*Cocos nucifera* L.) cultivation".

Dr. (Ms.) D. M. D. I. Wijebandara and Ms. D. M. P. D. Dissanayake supervised the undergraduate research project of Ms. W. R. A. Wanasinge, Wayamba University of Sri Lanka on "Phosphorus availability in goat manure and inorganic phosphorus treated coconut growing soils in dry zone".

Dr. (Ms.) D. M. D. I. Wijebandara supervised the undergraduate research project of Ms. H. B. C. Madushanie, Department of Natural Resources, Faculty of Applied Sciences, sabaragamuwa University of Sri Lanka on "Boron status of coconut grown with different fertilizer practices in coconut triangle of Sri Lanka".

Dr. (Ms.) D. M. D. I. Wijebandara supervised the undergraduate research project of Ms. K. Priyalath Madushanie, Department of Chemistry, University of Kelaniya on "Leaf Boron status in organically fertilized coconut palms".

Dr. (Ms.) D. M. D. I. Wijebandara supervised the undergraduate research project of Ms. H. Koshila Hiruni, Department of Chemistry, University of Kelaniya on "Leaf Boron status in inorganically fertilized coconut palms".

Dr. (Ms.) D. M. D. I. Wijebandara supervised the undergraduate research project of Ms. Chathuri de Alwis, Department of Chemistry, University of Kelaniya on "Analysis of phosphorus status in coconut soils treated with Triple Super Phosphate, Eppawela Rock Phosphate and Eppawela Rock Phosphate with organic manure".

Ms. M. K. F. Nadheesha and Dr. (Ms.) S. C. Somasiri supervised the undergraduate research project of Ms. U. M. S. A. M Bandara, a student of University of Wayamba on "Assessment of soil organic carbon levels in hard laterite coconut growing soil having medium rotation agro forestry trees".

Ms. M. K. F. Nadheesha and Dr. A. D. Nainanyake supervised the undergraduate research project of Ms. I. N. N. D Somadasa of University of Wayamba on "Assessment of root distribution pattern of coconut (*Cocos nucifera* L.) palm with respect to different fertilizer application techniques".

Ms. M. K. F. Nadheesha supervised the undergraduate research project of Ms. W. N. Jayasinghe of University of Peradeniya on "Comparison of Cu and Zn sorption of two coconut growing soils with respect to manure circle and center of square."

Ms. M. K. F. Nadheesha supervised the undergraduate research project of Ms. B. D. V. Jayamini of University of Peradeniya on "Comparison of Mn and Cd sorption of two coconut growing soils with respect to manure circle and center of square".

Ms. D. M. P. D. Dissanayake supervised the undergraduate research project of Ms. W. A. M. S. Wickramaarachchi, Department of Agricultural Engineering and Soil Sciences, Faculty of Agriculture, Rajarata University of

Sri Lanka on "Investigation of sulphur status in coconut estates in wet zone of Sri Lanka".

Ms. G. S. Nirukshan supervised the undergraduate research project of Ms. I. D. M. Nuwanthi a student of Rajarata University of Sri Lanka on "Changes in soil microbial populations as affected by soil amendments".

Ms. G. S. Nirukshan supervised the undergraduate research project of Ms. B. L. I. Jayathma of Sabaragamuwa University of Sri Lanka on "Effects of nano fertilizer on soil microbial communities in coconut (*Cocos nucifera* L.) plantations".

Ms. G. S. Nirukshan supervised the undergraduate research project of Ms. K. A. I. K. M. Kodikara of Sri Jayawardanapura University of Sri Lanka on "Comparison of soil properties and plant nutritional status of organically and conventionally fertilized coconut lands".

Dr. (Ms.) D. M. D. I. Wijebandara supervised the industrial training Programme of Mr. N. Nishantha, a student from Sabaragamuwa University of Sri Lanka.

Supervision of Diploma Students

Dr. I. M. S. K. Idirisinghe supervised the Industrial training program of A. H. M. S. Hansana, Diploma in Agriculture Production Technology, Sri Lanka Agriculture School, Labuduwa.

Dr. A. D. N. T. Kumara supervised an implant training student from Kuliyapitiya Technical College.

Ms. N. I. Suwandarathne supervised two implant training students from Kuliyapitiya Technical College.

Dr. (Ms.) H. D. M. A. C. Dissanayaka supervised Mr. Roshan Maduwantha of the Technical College Anuradhapura on his industrial training component of the HNMT Agriculture Diploma.

Served as Referees

Dr. I. M. S. K. Idirisinghe served as reviewer for the Journal of Sri Lanka Agricultural Economics Association.

Dr. (Ms.) N. S. Aratchige served as a referee for the journal Experimental and Applied Acarology.

Dr. H. T. R. Wijesekara served as a referee for Proceedings of the Conference of Agricultural Sciences' of the Faculty of Agricultural Sciences, Sabaragamuwa University of Sri Lanka.

Dr. (Ms.) C. Yaegama served as a Reviewer for Journal of Food Chemistry.

Dr. (Ms.) H. D. D. Bandupriya served as a reviewer for Plant Biotechnology Journal.

Dr. (Ms.) H. D. D. Bandupriya served as a reviewer for the 6th YSF symposium organized by NASTEC Sri Lanka.

Dr. C. S. Herath served as a referee for the Journal of "Tropical Agricultural Research and Extension", an International Journal published by the Faculty of Agriculture, University of Ruhuna, Sri Lanka.

Served as Visiting Lecturers

Dr. (Ms.) C. Yalagama served as a visiting lecturer for MSc in Plantation Crop Management (Coconut based product development) conducted by Postgraduate Institute of Agriculture of University of Peradeniya.

Dr. (Ms.) C. Yalgama served as a visiting lecturer for BSc in Plantation Management (Value addition to coconut products) conducted by University of Wayamba.

Ms. Kumudu Fernando served as a visiting lecturer for the BSc undergraduate course on latex and palm technology at the Uva Wellassa University of Sri Lanka.

Dr. (Ms.) K. P. Waidyaratne served as a visiting Lecturer on bio-statistics at the Kelaniya University of Sri Lanka.

Dr. (Ms.) H. D. D. Bandupriya served as a Visiting Lecturer at the Department of Aquaculture & Fisheries, Faculty of Livestock, Fisheries and Nutrition, Wayamba University of Sri Lanka, Makandura.

Dr. (Ms.) H. D. D. Bandupriya served as a visiting lecturer for the BSc Program courses in Advanced Plant Tissue Culture and Plant Cell Culture conducted by the Department of Botany, University of Sri Jayewardenepura, Sri Lanka.

Dr. (Ms.) H. D. D. Bandupriya served as a Visiting Lecturer for the BSc Program in Plant Cell and Tissue Culture conducted by the Department of Plant Sciences, University of Colombo, Sri Lanka.

Served as External Examiner of Postgraduate Thesis

Dr. C. S. Herath served as an evaluator and the examiner of the PhD thesis of Mr. B.A.D. Samansiri, a student of Board of Study Agric. Extension, Faculty of Agriculture, University of Peradeniya on "Development of an integrated information dissemination system for effective delivery of extension services in tea plantation sector in Sri Lanka".

Invitation as Resource Speaker

Dr. (Ms.) N. S. Aratchige served as an invited speaker at the Oil Palm Seminar 'Oil Palm: From Malaysia to the Pearl of the Indian Ocean' held in Colombo on 23-10-2017 and made a presentation on 'Overview of the oil palm industry in Sri Lanka and regulatory issues in importing oil palm seeds from Malaysia'.

Dr. (Ms.) N. S. Aratchige was invited as a resource speaker at the 1st National Conference on Bio-fertilizer and Bio-pesticides held at the Institute of Water Management, Colombo on 30-11-2017 and made a presentation on 'Current status in the development and application of bio pesticides in plantation sector of Sri Lanka'.

Dr. (Ms.) N. S. Aratchige served as a resource speaker at the Annual General Meeting of the Coconut Growers Association (Gampaha Chapter) and made a presentation on 'Pest management in coconut' on 4-3-2017.

Dr. (Ms.) N. S. Aratchige served as a resource speaker and made a presentation on "Some aspects of oil palm research and development in Sri Lanka", at the workshop organized by the National Institute of Plantation Management, Athurugiriya on 19-5-2017.

Dr. (Ms.) N. S. Aratchige served as a resource speaker at the Basic Course in Oil Palm Cultivation conducted by the National Institute of Plantation Management and made presentations on "Global oil palm industry" and "Pests and diseases management in oil palm" on 23rd and 24th of June, 2017.

Dr. (Ms.) N. S. Aratchige served as a resource speaker at the Basic Course in Oil Palm

Cultivation conducted by the National Institute of Plantation Management and made a presentation on "Pests, diseases and stress management in oil palm" on 6-7-2017.

Dr. (Ms.) N. S. Aratchige served as member of the panel at the discussion held on oil palm cultivation in Sri Lanka at the National Institute of Plantation management on 7-7-2017.

Other Academic activities

Dr. I. M. S. K. Idirisinghe served as an evaluator for the SLCARP to evaluate the research proposals for funding and for evaluation of project progress reports and presentations.

Dr. I. M. S. K. Idirisinghe served as an evaluator for the National Science Foundation (NSF) to evaluate the research proposal on Development of an efficient coconut de-husking machine for industry.



STAFF MEMBERS OF THE COCONUT RESEARCH INSTITUTE

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Jayantha Jayewardene

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Ms. L. C. P. Fernando

BSc (Agric.), PhD (University of Queensland, Australia)

Additional Director

Ms. C. S. Ranasinghe

BSc (Sci), PhD (University of Sussex, UK)

Deputy Director (Research)

A. A. F. L. K. Perera

BSc (Agric.), MSc (Agric.), PhD (University of Dundee, Scotland)

Deputy Director (Admin.)

K. W. B. M. P. Wijesundera

BCom (Special), MBA (University of Goa, India)

AGRONOMY DIVISION

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R. P. H. S. H. S. Senaratne

BSc (Agric.) MSc (Agric.), PhD (University of Peradeniya, Sri Lanka)

Senior Research Officer

Ms. S. C. Somasiri, BSc (Agric.), MSc, PhD
(Massey University, New Zealand)

Research Officers

A. A. A. J. Atapattu, BSc (Agric.)*
S. A. S. T. Raveendra, BSc (Agric. & Tech. Mgt)
Ms. Shermila Udumann, BSc (Agric.)

Experimental Officer

P. G. P. Fernando, BSc (Chem.)

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A. M. D. H. Abayakoon, BSc (Plantation
Management)
Ms. K. G. A. Jayamali, BSc (Food Science &
Nutrition)

Lab & Field Assistants

M. A. I. A. Kumara
B. A. A. Ranganath

Senior Lab & Field Attendant

H. K. Prasanna

Office Attendant

A. K. D. L. Jayathissa

General Worker

A. A. C. Dhammika

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BSc (Sci), MSc (Bio), PhD (Chinese Academy of Sciences, China)

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MSc, PhD (University of Tsukuba, Japan)

Research Officer

S. V. G. C. R. Kumara, BSc (Agric.), MSc
(Environmental Forestry)

Seed & Seedling Production & Certification Officer

L. M. S. R. Jayathilake, BSc (Agric.), MSc
(Agric.)

Assistant Seed & Seedling Production & Certification Officers

P. G. R. S. Premathilake, BSc (Agric.)

R. I. B. C. T. Herath, BSc (Agric.), MSc (Crop
Science)

M. N. Nadeeranga, BSc (Agric.)

R. C. M. Wijayaratne, BSc (Agric.)

L. J. Saman, BSc (Agric.)

A. S. Jayasundara, BSc (Agric.)

D. M. L. Amarasiri, BSc (Agric.)

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U. D. C. S. Kumara, HNDT (Agric.)

M. M. Hettiarachchi, Dip. (Food Technology)

M. K. H. T. K. Peiris, HNDT (Agric.)

Management Assistant

Ms S. S. R. Fernando, Dip. (Management)

Lab & Field Assistant

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Senior Lab & Field Attendant

W. Wimalasiri

Lab & Field Attendants

G. D. A. Milroy

J. M. A. S. Kumara

T. A. S. R. T. Thenuwara

M. M. T. Kumara

Office Attendant

Ms. D. M. R. Chandani

SOILS AND PLANT NUTRITION DIVISION

Head

Ms. D. M. D. I. Wijebandara
BSc (Sci), MPhil (Peradeniya),
M I Biol, PhD (University of Agric. Sci., Dharwad, India)

Senior Research Officer

Ms. M. K. F. Nadheesha, BSc (Chemistry),
MSc (Food Technology, USA)

Research Officers

Ms. P. G. Scynthiya, BSc (Agric.), MSc
(Environmental Soil Science)

Ms. D. M. P. D. Dissanayaka, BSc (Agric. Tech.
Mgt), MSc (Soil Science)

L. A. T. S. Liyanarachchi, BSc (Agric.)

Experimental Officers

Ms. C. P. A Kurundukumbura, BSc (Agric.)

K. P. I. E. Ambagala, Dip. (Agric.)

K. P. A. Pathirana, Dip. (Agric.)

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B. S. V. J. Perera, Dip. (Agric.)

Ms. H. L. A. Padmini, Dip. (Agric.)

Ms. M. Y. G. Perera, HNDD (Agric.)

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Production Technology)

Ms. K. G. S. Imasha, HNDD (Agric.)

I. H. D. U. Dasanayake, HNDD (Agric.)

Management Assistant

Ms T. M. D. Abeyratne

Lab & Field Assistants

J. A. R. T. Jayasinghe, BSc (Chem.)

Ms. B. M. A. U. Amarathunga

Ms. R. K. K. H. J. Jayasinghe, Dip. (Agric.)

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E. A. Chandradasa

R. M. N. Sandasiri

Lab & Field Attendants

W. R. P. Tissera

H. M. S. Nayanakumara

L. M. G. D. Liyanage

M. A. G. Pathiraja

CROP PROTECTION DIVISION

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H. T. R. Wijesekara

BSc (Agric.), PhD (University of IARI, Delhi, India)

Principal Research Officer

Ms. N. S. Aratchige, BSc (Agric.), PhD
(University of Amsterdam, The Netherlands)

Research Officers

A. D. N. T. Kumara, BSc (Agric.), MSc (Crop
Protection), PhD (University of Agricultural
Sciences, Bangalore, India)

P. H. P. R. De Silva, BSc (Agric.)

Ms. N. I. Suwandarathne, BSc (Agric.), MSc
(Zoological Science)

Mr. N. Jeyadharshan, BSc (Agric.)

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K. A. S. Chandrasiri

K. F. G. Perera

P. H. A. P. Siriwardena, BSc (Agric.)

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Mr. T. B. K. H. Neranjana, HNDDT (Agric.)

Ms. G. A. N. P. Perera, HNDDT (Agric.)

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P. M. G. S. Shelton

J. A. S. Niroshan

Ms. T. S. Abeyratne

A. M. P. Sanjaya

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Ms. H. D. Suseetha

Driver

A. K. Pemadasa

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Ms. V. R. M. Vidanaarachchi

BSc (Agric.), PhD (University of Kagoshima, Japan)

Experimental Officer

E. S. Santha

Ms. T. R. Gunathilake, Dip. (Sci.)

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Ms. T. D. A. A. Keerthisinghe

Ms. E. M. N. Maduwanthi

Lab & Field Attendants

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R. S. Nalin Kumara

Ms. M. S. M. Dharmaratne

COCONUT PROCESSING RESEARCH DIVISION

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Ms. L. L. W. C. Yalegama

BSc (Chem.), MSc (India), PhD (University of Peradeniya, Sri Lanka)

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Ms. H. A. E. Samaranayake, BSc (Food Sci. & Tech)

Ms. H. P. D. T. Hewapathirana, BSc (Agric.), MSc (Molecular and Applied Microbiology)

Research Officer (Chemical)

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S. S. Rajapaksa, Dip. (Agric.)

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N. A. C. Udayasiri

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M. M. N. Jayathissa

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Office Attendant

J. A. R. Malintha

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BSc (Agric.), MSc (Peradeniya), PhD (Tomas Bata University, Czech Republic)

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(Peradeniya)*

Ms. P. M. E. K. Pathiraja, BSc (Agric.) MPhil
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Australia)

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Ms. M. G. D. Abeysekara, BSc (Agric.)

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S. D. J. N. Subasinghe, Dip. (Agric.)

Lab & Field Assistant

Ms. W. A. S. Fernando

Lab & Field Attendant

Ms S. M. A. Chiranthi

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BSc (Agric.), MSc (Peradeniya), PhD (Tomas Bata University, Czech Republic)

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K. M. R. T. Wijekoon, BSc (Sci), MSc (Molecular and Applied Microbiology)

Ms. W. G. R. Subhathma, BSc (Agric.), MSc (Molecular Biology and Biotechnology)

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E. M. T. Bandaranayake, BSc (Agric.), MSc (Agricultural Extension)

Technical Officer

M. D. M. Perera. Dip. (Plantation Management)

Field Supervisor

W. L. T. Liyanage

Senior Lab & Field Assistant

N. A. W. Jayasiri

Lab & Field Attendants

Ms. W. S. S. Fernando

Book Binder

I. H. D. Senarath

Senior Office Attendant

K. A. S. C. N. Fernando

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K.A.A. Kumara

S. A. A. Viraj

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Librarian

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BLE, MSsc (University of Kelaniya)

Lab & Field Attendants

Ms. K. R. M. P. Gayadari, Dip. (Animal Husbandry)

G. A. S. Nuwanpriya

ESTABLISHMENT UNIT

Assistant Director (Administration)

A. S. Nanayakkara

Procurement Officer

M. C. H. N. Fernando, BLE, Dip. in HRE-ACBRE

Personal Assistant to the Chairman

Ms. H. M. A. Herath

Administrative Officer

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Human Resource Officer

Ms. W. S. R. Fernando, Dip. (HRM)

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Ms. U. I. Abeysinghe

Ms. I. N. Jayawardena

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P. C. P. K. Fernando, BCom

P. D. Kathriarachchi

Ms. W. A. H. Shenali, AAT

Ms. M. A. N. Dilrukshi, BA (Special)

Ms. U. A. D. N. K. Chathurani

Ms. D. T. D. Dhanapala

Ms. P. D. Wickramanayake

Telephone Operator/Receptionist

Ms. W. M. S. M. Rathnayake

Lab & Field Assistant

W. M. M. Gihan

Lab & Field Attendant

Ms. R. A. P. Jayamanna

Guest House Keeper

K. K. A. Mendis

Office Attendant

J. K. G. Perera

General Workers

D. K. S. Senarath

Ms. H. A. T. Thilakumari

D. W. K. Madushanka

K. A. M. Indika

M. P. S. Fernando

Ms. R. D. Shiroma

P. V. N. W. Kumara

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J. M. C. Appuhamy

C. N. Luxman

K. P. S. Dissanayaka

J. A. D. B. D. Appuhamy

I. P. K. P. Perera

P. G. . S. Karunarathna

H. M. Jayathunga

E. G. N. Bandara

E. G. A. P. Jinadasa

T. P. J. Chamendra

C. S. Basnayaka

W. M. Jayarathna Banda

W. M. S. Kumara

H. C. P. Thirimanna

M. A. R. Rupasinghe

S. Krishnathas

B. M. W. G. S. N. Abeysingha

H. D. S. Dammika

S. M. Chaminda

L. Thirugnamoorthy

Vehicle Attendants

D. W. Nevil

T. M. A. P. Kumarasinghe

S. H. A. M. Premarathna

INTERNAL AUDIT UNIT

Internal Auditor

P. W. A. Fernando

BBMgt (Accounting), MBA (University of Wayamba)

Senior Management Assistant Management Assistant (Auditng)

Ms. M. M. J. R. Fernando

G. P. K. Madhusanka

M. M. L. Silva, BSc (Entrepreneur)

Management Assistant (Auditing)

H. S. S. De Seram, AAT

Office Attendant

R. P. Nevil

Senior Management Assistant

Ms. S.N. Gunathilake

ACCOUNTS UNIT

Senior Accountant

R. M. U. Chandranath

BSc [Management (Public)], PgD (Public Administartion), Fellow of APFA

Accountant

Ms. B. A. D. C. S. Bulathsinhala, BCom (Special)

Management Assistant (Shroff)

Ms. R. D. S. Priyadarshani, AAT

Senior Management Assistant (Accounting)

Ms. A. S. M. S. Abeywickrama

Management Assistant (Store-Keeping)

S. M. R. B. Subasinghe, AAT

Management Assistants (Book Keeping)

A. H. M. J. S. Abeyrathne, HNDBS

Ms. W. D. P. Fernando, AAT, BSc (Accountancy & Business Finance)

H. P. S. V. Herath

Ms R. M. R. D. Rathnayake, BSc (Business Management)

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J. A. S. Indika

Office Attendants

P. K. C. Sampath

R. K. S. Wimalasiri

Management Assistant (Accounting)

Ms. W. A. N. K. Wijesinghe

Ms K. A. R. Priyadarshani, B.BA. Administration

General Worker

K. M. V. C. P. Kumarasinghe

K A A Kumara

ENGINEERING UNIT

Resident Engineer

A. L. D. K. Amarasinghe
Dip. (Eng. Science), NDES (Civil)

Works Superintendent

P. H. D. T. S. Wimalarathne, Advance Dip.
(Construction Technology)

Tinker

C. M. S. F. Leslipulle

Technological Officer (Electrical)

S. T. Rajapaksha

Electrical Helper

H. M. N. Jayarathna

Management Assistant

Ms. P. P. D. T. N. Dayanisious
Ms. H. M. Mallikarachchi

Building Helper

K. J. J. Appuhamy

Senior Motor Mechanic

R. M. S. G. Rathnayaka, NTC, NAB

Plumber

B. R. D. Silva

Motor Mechanic

Y. P. N. D. Wijesinghe

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R. P. S. J. Manchanayake

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W. A. S. S. Weerasinghe
P. D. Perera

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W. M. R. Sisira
B. M. L. Dharmasiri

Linesman

M. M. D. C.w Munasinghe

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V. P. M. Prasantha
BSc (Agric.)

Senior Management Assistant

Ms. M. G. Karunawathie

Management Assistant

Ms. H. A. N. Subhashini

Management Assistant (Book Keeping)

M. A. G. Priyankara, BB Management
(Accountancy)

Office Attendants

M. A. G. Ananda
W. A. T. Arunasiri

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Superintendent

W. A. H. Upali, Dip. (Plantation Management)

Management Assistant

Ms. J. A. D. R. U. Jayasinghe

Senior Supervisor

A. G. B. G. Silva

Lab & Field Attendant

H. A. C. P. Hettarachchi

Ms. R. M. S. S. Rathnayaka, Dip. (Agric.)

Ms K P A Sanjeewani

Office Attendant

W. A. S. Jayathilake

RATMALAGARA RESEARCH STATION

Superintendent

D. P. S. K. Hettiarachchi, Dip.(Agri. & EM)

Field Supervisor

W. M. D. R. Wijesinghe

Management Assistant

D. M. Jayawardena

Lab & Field Attendant

J. C. P. Jayamanna

AMBAKELLE GENETIC RESOURCES CENTRE

Estate Superintendent

I. P. S. A. Wanasinghe, BSc (Agric.)

Supervisor

T. M. N. Menaka

Senior Pollination Labour

J. A. D. N. Stanly

Lab & Field Attendant

W. M. G. Jayawardena

Driver

W. D. C. S. Thushara

Watcher

D. M. L. Jayarathna

MADURUOYA GENETIC RESOURCES CENTRE

Estate Superintendent

L. S. B. Liyanage, BSc (Agric.)

Office Attendant

W. G. Mallika Manike

Watcher

S. M. U. D. Singhabahu

MIDDENIYA RESEARCH STATION

Officer-in-Charge

E. A. S. Kumara, Dip. (Plantation Management)

Supervisor

K. G. Wasantha

WELIGAMA RESEARCH STATION

Officer-in-Charge

S. A. S. Kumara

WALPITA RESEARCH STATION

Officer-in-Charge

S. A. S. Kumara

General Worker

D. M. T. Sampath

POTHTHUKULAMA RESEARCH STATION

Officer-in-Charge

W. W. A. P. R. Fernando, Dip. (Plantation Management)

Management Assistant

R. M. N. K. Ratnayaka

Lab & Field Attendant

H. J. M. P. Nilanga

MAKANDURA RESEARCH STATION

Estate Superintendent

W. M. U. Ratnayake, Dip. (Plantation Management)

Supervisor

W. M. N. G. Wijayatunga

Office Attendant

Ms. P. M. Kamalawathie

Lab & Field Attendant

S. M. R. C. Subasinghe

Driver

K. K. Piyatissa

PALLAMA GENETIC RESOURCES CENTRE

Superintendent

I. A. N. Hemasiri

Lab & Filed Attendant

Ms. S. A. Sumanawathie

Driver

H. M. D. N. Herath

THABBOWA RESEARCH STATION

Officer-in-Charge

H. M. C. Bandara, BA

* Study Leave

** No pay Leave



STAFF : RECRUITMENTS, RESIGNATIONS, RETIREMENTS, PROMOTIONS & TRANSFERS

Recruitments

Name	Designation	Division / Unit	Date
Ms. S. S. R. Fernando	Management Assistant	Establishment	02.01.2017
Ms. K. A. R. Priyadarshani	Management Assistant (Accounting)	Accounts	02.01.2017
Ms. M. M. L. Silva	Management Assistant (Accounting)	Internal Audit Unit	09.01.2017
Dr. (Ms.) P. M. E. K. Pathiraja	Senior Research Officer	Agriculture Economics	23.01.2017
Dr. M. G. M. K. Meegahakumbura	Senior Research Officer	Genetics & Plant Breeding	23.01.2017
Ms. T. R. Gunathilake	Experimental Officer	Tissue Culture	23.01.2017
Ms. R. K. K. H. J. Jayasinghe	Lab & Field Assistant	Soils & Plant Nutrition	23.01.2017
Mr. P. G. P. Fernando	Experimental Officer	Agronomy	25.01.2017
Dr. A. A. F. L. K. Perera	Deputy Director (Research)	Establishment	17.04.2017
Ms. R. M. R. D. Rathnayake	Management Assistant (Book Keeper)	Accounts	22.05.2017
Mr. M. M. D. C. Munasinghe	Linesmen	Engineering	01.06.2017
Dr. (Ms.) H. D. D. Bandupriya	Principal Research Officer	Tissue Culture	23.05.2017
Mr. L. A. T. S. Liyanarachchi	Research Officer	Soils & Plant Nutrition	05.06.2017
Ms. M. G. D. Abeysekara	Research Officer	Agriculture Economics	12.06.2017
Ms. Shermila Udumann	Research Officer	Agronomy	03.07.2017
Ms. J. A. K. M. Fernando	Research Officer (Chemical)	Coconut Processing Research	01.08.2017

Name	Designation	Division / Unit	Date
Mr. K. K. A. Mendis	Guest House Keeper	Establishment	01.08.2017
Mr. L. S. B. Liyanage	Estates Superintendent	Estate Managment (MOGRC)	01.08.2017
Mr. I. P. S. A. Wanasinghe	Estates Superintendent	Estate Managment (AGRC)	01.08.2017
Mr. H. D. Sisil Dhammika	Driver	Establishment	10.08.2017
Mr. W. D. C. Saman Thushara	Driver	Establishment	10.08.2017
Mr. S. M. Chaminda	Driver	Establishment	10.08.2017
Mr. B. M. W. G. S. N. Abesingha	Driver	Establishment	14.08.2017
Mr. M. A. T. R. Marasinghe	Driver	Establishment	14.08.2017
Mr. L. Thirugnanamoorthy	Driver	Establishment	14.08.2017
Ms. G. A. N. Prarthana Perera	Technical Officer	Crop Protection	16.08.2017
Ms. K. G. Asanki Jayamali	Technical Officer	Agronomy	16.08.2017
Mr. I. D. Udayanga Dasanayake	Technical Officer	Soils & Plant Nutrition	16.08.2017
Ms. M. M. Isuru Thilinka	Technical Officer	Coconut Processing Research	16.08.2017
Ms. K. D. C. Premarathna	Technical Officer	Soils & Plant Nutrition	21.08.2017
Mr. M. K. H. T. Kantha Peiris	Technical Officer	Genetics & Plant Breeding	21.08.2017
Mr. A. M. D. H. Abayakoon	Technical Officer	Agronomy Division	28.08.2017
Mr. S. Dulaj Gunawardana	Technical Officer	Agriculture Economics	28.08.2017
Ms. K. G. Sarani Imasha	Technical Officer	Soils & Plant Nutrition	04.09.2017
Mr. M. A. G. Priyankara	Management Assistant (Book KeeperK)	Estate Managment	01.11.2017
Dr. N. P. A. D. Nainanayake	Head Of Division	Plant Physiology	01.11.2017
Dr. (Ms.) H. D. M. A. C. Dissanayake	Senior Research Officer	Genetics & Plant Breeding	01.11.2017

Retirements

Name	Designation	Division / Unit	Date
Ms. M. P. Premarathne	PA to Director	Establishment	18.10.2017
Mr. M. J. I. Costa	Experimental Officer	Agronomy	01.11.2017
Mr. W. K. M. K. Herath	Technical Officer	Plant Physiology	20.06.2017
Mr. M. P. W. Fernando	S. Field Supervisor	Estate Management	17.03.2017
Mr. A. A. Sirinimal	S. Field Supervisor	Estate Management	18.03.2017
Mr. W. Gunasena	S. L/F Assistant	Soils & Plant Nutrition	02.05.2015
Mr. J. Amarasinghe	S. Driver	Establishment	04.01.2017
Mr. T. M. C. Perera	S. Driver	Establishment	19.02.2017
Mr. M. J. A. Mirando	S. Driver	Establishment	12.04.2017

Resignations

Name	Designation	Division / Unit	Date
Dr. (Ms.) S. A. C. N. Perera	Principal Research Officer	Genetics & Plant Breeding	01.03.2017
Dr. (Ms.) H. M. I. L. Herath	Senior Research Officer	Soils & Plant Nutrition	01.09.2017
Mr. M. S. M. Faheem	Experimental Officer	Genetics & Plant Breeding	01.03.2017
Mr. H. M. P. N. Herath	Asst. Estates Superintendent	Estate Management	15.05.2017
Mr. H. M. I. C. Ekanayaka	Management Assistant (Book Keeper)	Accounts	16.06.2017
Mr. I. G. M. W. Imbulegama	Technical Officer	Coconut Processing Research	14.09.2017
Mr. M. A. P. Sanjeewa	Technical Officer (A/V)	Technology Transfer	25.02.2017
Mr. K. D. L. Gunawardena	Driver	Establishment	16.01.2017
Mr. J. H. Premarathne	S. L/F Attendant	Library	04.01.2017

Transfers

Name & Designation	Destination	Date
Mr. I. A. N. Hemasiri Estate Superintendent	From Technology Transfer Division to Pallama Genetics Resources Centre	01.02.2017
Mr. W. M. D. R. Wijesinghe Field Supervisor	From Pallama Genetics Resources Centre to Rathmalagara Research Station	01.02.2017
Mr. H. N. P. N. Herath Assistant Estate Superintendent	From Bandirippuwa Research Centre to Walpita Research Station	01.02.2017
Mr. A. G. B. G. Silva Senior Field Supervisor	From Rathmalagara Research Centre to Bandirippuwa Research Station	01.02.2017
Mr. S. A. Sudath Kumara Field Supervisor	From Walpita Research Station to Matara Seed Garden	01.02.2017
Mr. H. M. I. C. Ekanayake Management Assistant (Book Keeper)	From Estates Management Division to Accounts Division	01.02.2017
Mr. H. M. G. Jayawardena L/Field Attendant	From Coconut Processing & Research Division to Ambakelle Genetics Resources Centre	01.02.2017
Mr. D. M. T. Sampath General Worker	From Walpita Research Station to Technology Transfer Division	01.02.2017
Mr. K. A. A. Kumara General Worker	From Technology Transfer Division to Chemical Stores (H/O)	01.02.2017
Ms. S. H. M. Chandrawathi General Worker	From Establishment Unit to Coconut Processing & Research Division	01.02.2017
Mr. J. M. C. P. Jayamanne L/Field Attendant	From Rathmalagara Research Station to Ambakelle Genetics Resources Centre	20.02.2017

Transport Facilities

Vehicles of the Coconut Research Institute as at 31.12.2017.

Buses	-	03
Lorries	-	02
Vans	-	06
Cars	-	02
Cabs	-	16
Jeeps	-	01
Motor bicycles	-	67
Three Wheelers	-	04
Tractor Trailer/ Bowser	-	45
Hand Tractors	-	<u>06</u>

180

Debtors due to violation of service agreements / bonds

Name	Designation	Bond Value
Dr. K. B. Dasanayaka	Senior Research Officer	Rs. 2,039,715.00
Dr. H. P. S. Jayasundara	Research Officer	Rs. 2,078,905.33
Dr. (Ms.) M. G. F. S. Jayasundara	Research Officer	Rs. 3,345,424.66
Mr. R. A. J. R. Perera	Research Officer	Rs. 1,068,165.90
Ms. P. G. P. Hewawitharanage	Research Officer	Rs. 1,059,170.18
Mr. N. A. K. De Silva	Research Officer	Rs. 3,024,297.60
Dr. (Mrs) J. M. M. A. Jayasundera	Senior Research Officer	Rs. 847,880.00
Mr. B. H. C. Mendis	Research Officer	Rs. 1,014,780.00



STATEMENT OF FINANCIAL PERFORMANCE

Significant Accounting Policies

1. General

- 1.1. The Coconut Research Institute was founded in 1929 as the Coconut Research Scheme under the Coconut Research Ordinance No. 24 of 1928. The scheme established its headquarters at Bandirippuwa Estate, Lunuwila with three technical divisions namely Genetics, Chemistry and Soil Chemistry. Following the enactment of the Coconut Research Act No. 37 in 1950, it was renamed as the Coconut Research Institute of Ceylon. The Coconut Development Act No. 46 promulgated in 1971, the Coconut Research Board was set up in 1972 to function as the Board of Management of Coconut Research Institute.
- 1.2. The government body of the institute is the Coconut Research Board. In terms of Coconut Development Act, the board consists of 11 board members, appointed by the Minister - in - charge. One member is appointed as the Chairman of the Board. The members hold office for three years and are eligible for reappointment.
- 1.3. Principal Activities and Nature of Operations.
 - Conduct further scientific research on growth and cultivation of coconut palm, growing other crops, engages in animal husbandry in coconut plantation and prevent & cure of pests and diseases.
 - Conduct further scientific research on coconut processing, utilization of coconut products and value addition.
 - Establish and maintain pilot plants for processing of coconut products and fabricate coconut processing equipment.
 - Conduct and further scientific research on growth and cultivation of coconut palm. Growing other crops and engages in animal husbandry in coconut plantations and prevents and cures of diseases and pests.
 - Conduct and further scientific research on processing and utilization of coconut products and value addition.

- Establish and maintain institutes' seed gardens and experimental stations.
- Train advisory and extension workers to assist the coconut industry.
- Guide and advise coconut industry on all matters of technical nature.
- Conduct R & D activities for development of the oil palm industry.
- Establish and maintain institutes' seed gardens and experimental stations.
- Train advisory and extension workers to assist the coconut industry.

General Policies

1.4. Statement of Compliance

Statement of financial position, Statement of financial performances, Statement of changes in net assets/ equity, Cash flow statement, Approved budget column in the financial statement and Notes, comprising a summary of significant accounting policies and other explanatory notes have been prepared in accordance with the Institute of Chartered Accountants of Sri Lanka.

1.5. Basis of Preparation

The financial statements presented in Sri Lanka rupees have been prepared on a historical cost basis.

1.6. Changes in Accounting policies and adoption of new Public Sector Accounting Standards during the year.

The accounting policies adopted are consistent with those of the previous financial years.

The Coconut Research Institute has adopted the following new SLPSAS that are effective in the current year and the accounting policies of the Institute have been revised where relevant to reflect the changes in the provisions of these SLPSAS.

The adoption of the new standards has resulted in changes to the method of presentation and additional disclosures being made in the Financial Statement.

SLPSAS - 01 Presentation of Financial Statements

SLPSAS - 02 Cash Flow Statement

SLPSAS - 03 Accounting Policies, Changes in Accounting Estimates & Errors
Statements

SLPSAS - 04 Borrowing Cost

SLPSAS - 05 Effects of Changes in Foreign Exchange Rates

SLPSAS - 06 Events After the Reporting Data

SLPSAS - 07 Property, Plant & Equipment

SLPSAS - 08 Provisions, Contingent Liabilities and Contingent Assets

SLPSAS - 09 Inventories

SLPSAS - 10 Revenue from Exchange Transactions

1.7. Comparative Information

The Accounting Policies applied by the Institute are, unless otherwise stated, consistent with those used in the previous year. Previous year figures and phrases have been rearranged wherever necessary to conform to the current year presentation.

1.8. Event After the Balance Sheet Date.

All material post financial position events have been considered and appropriate adjustments or disclosures have been made in the respective notes to the Financial Statements.

1.9. Foreign Currency Translation.

The Financial Statements are prepared in Sri Lanka rupees which is the institute functional and presentation currency.

1.10. Tax

The Board is not liable to Tax in the current year under the provisions of the Inland Revenue Act.

1.11. Infrastructure Plant & Equipment

Infrastructure Plant & Equipment are stated at cost or fair value less accumulated depreciation.

The carrying values of Infrastructure Plant & Equipment are reviewed for impairment when events or changes in circumstances indicate that the carrying value may not be recoverable.

The provision for depreciation is calculated by using a straight- line method on the cost or valuation of all Infrastructure Plant & Equipment, other than freehold land, order to write off such amounts over the estimated useful economic life of such assets.

The estimated useful life of assets are as follows:

<u>Assets</u>	<u>Years</u>
Buildings	25
Machinery & Laboratory Equipments	10
Field equipments	10

Vehicles	05
Office & Computer Equipments	05
Other Equipments	05
Furniture, fittings & Fixtures	20

No depreciation is charged on Lands and on leased lands. On the other assets full depreciation is charged in the year of disposal and no depreciation in the year of purchase.

The Thabbowa Land was Valued on 20th February 2018. But the Valuation report is Pending.

Lease assets

Leased assets or other assets not owned by the Board are not recorded as Board's assets. Expenditure made in developing owned and leased lands is charged to Improvements to Estates account. Lands owned by the Board are shown at cost/valuation under Estate account.

Coconut Cultivation Board decide to allocate land own as Weligama for the seed garden as an operational lease which was leased to Coconut Research Institute for the period of 20 (Twenty) years commencing from 20th December 2016, the payment of Rs.1, 000,000.00(One Million Rupees) as an initial payment and the annual rent of Rs.25,000.00 (Twenty Five Thousand) during the first year and thereafter.

An extent of 75 ac. from the Middeniya farm has been temporary released for 30 years by the Assistant Divisional Secretary of Katuwana to the Ministry of Plantation Industries on October 7, 2004 and it was Vested to Coconut Research Institute on October 11, 2004 by the Ministry of Plantation Industries for stabilizing of sub Coconut Research Centre in Southern Province.

1.12. Improvements to estates

Expenditure in developing properties, maintaining young plantation and replanting for research purposes is charged to Improvements to Estate account which is amortized annually, @ 5%

1.13. Biological Assets

All biological assets are valued at the lower of cost and net realizable value. Net realizable value is the price at which live stocks can be sold in the ordinary course of business less the estimated cost of completion and the estimated cost necessary to make the sale.

These stock are valued base on the National Live stock Development Board rates which is authorized institute of the livestock.

1.14. Working-in- Progress

An account where the expenditure on capital work is recorded. The expenditure here is on assets which are completed and ready for use, the total expenditure in this account is transferred to the appropriate asset account if not disputed. Expenses on major repairs which accrues are shown under Repair in progress account until the repair is fully completed and then transfer to the relevant account.

1.15. Inventories

Inventories are valued at the lower of cost and net realizable value. Net realizable value is the price at which live stocks can be sold in the ordinary course of business less the estimated cost of completion and the estimated cost necessary to make the sale. The cost incurred in

Bringing inventories to its present location and condition is accounted for as follows:

- | | |
|------------------------|---------------------------|
| ➤ Nuts | Subsequent realised value |
| ➤ Copra | Net sales average |
| ➤ Fertilizer | First in first out |
| ➤ Publications | Subsequent realised value |
| ➤ Chemical & Glassware | First in first out |
| ➤ Seedling Product | Subsequent realised value |
| ➤ General Store Stock | First in first out |
| ➤ Other stocks | Subsequent realised value |

1.16. Trade and other Receivable

Trade and other receivable are stated at the amounts they are estimated to realized, net of provisions for bad doubtful receivables.

Debtors are stated at amounts they are estimated to realise .Provision is made in the accounts for all known Bad & Doubtful debtors. Full provision has been made for irrecoverable debtors. 10% provision is on other Debtors.

1.17. Cash and Cash Equivalent

Cash and Cash Equivalents in the cash Flow Statement comprise, cash at bank and in hand and short term deposits

1.18. Books and Periodicals.

The stocks of books & periodicals has been valued and disclosed in the accounts. The previous practice was total book & periodicals expenditure incurred on the purchase of items during the year under review had been charged against the income.

1.19. Liabilities and Provisions

Gratuity is a defined benefit plan. The institute is liable to pay gratuity in terms of the relevant statutes. In order to meet this liability, a provision is calculated based on Actuarial Valuation method. The present value of the defined benefit obligation is determined by discounting the estimated future cash outflows using the yield on Government Bonds at the reporting date and has maturity dates approximating to the terms of the Institute's obligations. The resulting difference between brought forward provision at the beginning of a period and the carried forward provision at the end of the period is dealt with in the statement of financial performances.

The Institute recognizes actuarial gains and losses that arise in calculating the Company's obligation in respect of a plan in other comprehensive income. The present value of the defined benefit obligation depends on a number of factors that are determined on an actuarial basis using a number of assumptions.

Key assumptions used in determining the defined retirement benefit obligations are given in Note 20. Any changes in these assumptions will impact the carrying amount of defined benefit obligations. Provision has been made for retirement gratuities from the first year of service for all employees, in conformity with LKAS 19 - 'Employee Benefits'. However, under the Payment of Gratuity Act No. 12 of 1983, the liability to an employee arises only on completion of 5 years of continued service.

1.20. Provisions, Contingent Assets and Contingent Liabilities.

Provisions are made for all obligations existing as at the balance sheet date when it is probable that such an obligation will result in an outflow of resources and a reliable estimate can be made of the quantum of the outflow. All contingent liabilities are disclosed as a note to the financial statement unless the outflow of resources is remote.

Contingent assets are disclosed, where inflow of economic benefit is probable.

Statement of Financial Performance

1.21. Revenue Recognition.

- i) The total grant received from the Treasury for the year is recognized as income and the for that year.
- ii) The second high income received from the Genetic Resource Center and Research Centre (Estates) for the year is recognized as income and the for that year.
- iii) Other Income

Long term projects funded by external sources are shown separately under the name of the project until the project is over.

Other income is recognized on an accrued basis.

1.22. Expenditure Recognition.

Expenditure are recognized in the statement of financial performance on the basis of a direct association between the cost incurred and the earning of specific items of income. All expenditure incurred in the running of the business and in maintaining the property, plant and equipment in a state of efficiency has been charged to the statement of financial performance.

For the purpose of presentation of the statement of financial performance, the "function of expenses" method has been adopted, on the basis that it presents fairly the elements of the institutional performance.

1.23. Intangible Assets (Research & Development Cost) .

Cost of product development, processes, production of new or substantially improved materials for research development are capitalized which is written off against the profit and loss account as amortisation of research & development cost during the period.

Research & Development Expenditure in the previous year's shown under division wise. From the year 2007 it's indicated under the following trust areas.

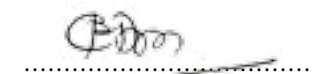
- Crop Production
- Crop Protection
- Crop Improvement
- Crop Processing
- Technology Transfer
- Socio Economic Studies in Coconut
- Oil Palm Research

The previous practice was total Research and Development expenditure disclose as assets of the Balance Sheet and the presently theses expenses during the year under review have been charged against the Statement of Financial Performance.

FOR THE YEAR ENDED 31 ST DECEMBER 2017	NOTES	2017 APPROVED BUDGET Rs.	2017 ACTUAL Rs.	2016 ACTUAL Rs.
<u>OPERATING REVENUE</u>				
TRANSFERS FROM OTHER GOVERNMENT ENTITIES	03	265,000,000	214,620,000	214,320,000
GENETIC & RESEARCH CENTER REVENUE	04	197,339,000	202,969,957	189,229,594
OTHER REVENUE	05	15,000,000	112,797,092	118,556,060
TOTAL REVENUE		<u>477,339,000</u>	<u>530,387,048</u>	<u>522,105,654</u>
<u>OPERATING EXPENCES</u>				
WAGES SALARIES AND EMPLOYEES' BENEFITS	06	210,650,000	184,602,638	169,130,651
SUPPLIES & CONSUMABLES USED	07	59,693,000	49,170,990	53,094,480
DEPRECIATION & AMORTISATION EXPENCES	10		25,550,034	24,074,206
GENETIC & RESEARCH CENTER EXPENCES	04	159,982,000	166,231,916	159,468,773
RESEARCH & DEVELOPMENT EXPENCES WRITE OFF	08	-	44,236,707	50,181,224
OTHER EXPENSES	09	9,657,000	33,841,770	37,423,224
TOTAL EXPENSES		<u>439,982,000</u>	<u>503,634,056</u>	<u>493,372,558</u>
SURPLUS /(DEFICET) FOR THE PERIOD		37,357,000	26,752,992	28,733,096

The Accounting Policies on pages 07 to 14 and Notes on pages 15 to 26 from an integral part of these Financial Statements. The Coconut Research 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.


 CHAIRMAN
 COCONUT RESEARCH BOARD


 DIRECTOR
 COCONUT RESEARCH INSTITUTE


 SENIOR ACCOUNTANT
 COCONUT RESEARCH INSTITUTE

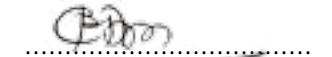
STATEMENT OF FINANCIAL POSITION

AS AT 31st DECEMBER 2017

	NOTES	2017 APPROVED BUDGET Rs.	2017 ACTUAL Rs.	2016 ACTUAL Rs.
<u>NON CURRENT ASSETS</u>				
INFRASTRUCTURE PLANT & EQUIPMENT	10	98,700,000	2,023,601,284	1,991,507,712
BIOLOGICAL ASSETS	11		8,362,081	6,777,231
OTHER NON FINANCIAL ASSETS	12	1,300,000	3,055,587	2,875,563
OTHER NON CURRENT ASSETS	13		65,294,123	15,304,439
		<u>100,000,000</u>	<u>2,100,313,076</u>	<u>2,016,464,945</u>
<u>CURRENT ASSETS</u>				
CASH & CASH EQUIVALANTS	14		148,961,275	143,646,147
RECIEVABLES	15		11,084,848	9,933,206
INVENTORIES	16		82,942,099	68,862,600
PREPAYMENTS	17		-	-
OTHER CURRENT ASSETS	18		44,200,358	69,889,906
		-	287,188,580	292,331,859
TOTAL ASSETS			<u>2,387,501,656</u>	<u>2,308,796,804</u>
<u>LIABILITIES</u>				
<u>CURRENT LIABILITIES</u>				
PAYABLES	19		88,671,667	53,463,429
EMPLOYEE BENEFITS	20		123,312,909	114,856,361
		-	<u>211,984,576</u>	<u>168,319,790</u>
<u>NON CURRENT LIABILITIES</u>				
CAPITAL CONTRIBUTED BY DONOR FUNDED PROJECTS	21		54,776,594	46,227,573
		-	54,776,594	46,227,573
TOTAL LIABILITIES			<u>266,761,170</u>	<u>214,547,363</u>
NET ASSETS			<u>2,120,740,486</u>	<u>2,094,249,441</u>
<u>NET ASSETS/EQUITY</u>				
CAPITAL CONTRIBUTED BY THE OTHER GOVERNMENT ENTITIES		100,000,000	397,061,481	404,086,966
RESERVES			1,689,612,303	1,689,612,303
ACCUMULATED SURPLUS/(DEFECIT)			34,066,702	550,173
		100,000,000	2,120,740,486	2,094,249,441
TOTAL NET ASSETS/EQUITY		<u>100,000,000</u>	<u>2,120,740,486</u>	<u>2,094,249,441</u>

The Accounting Policies on pages 07 to 14 and Notes on pages 15 to 26 from an integral part of these Financial Statements. The Coconut Research 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.


 CHAIRMAN
 COCONUT RESEARCH BOARD


 DIRECTOR
 COCONUT RESEARCH INSTITUTE


 ACCOUNTANT
 COCONUT RESEARCH INSTITUTE

CASH FLOW STATEMENT

FOR THE YEAR ENDED 31st DECEMBER

	2017 Rs.	2016 Rs.
CASH FLOW FROM OPERATING ACTIVITIES		
SURPLUS/(DEFICIT)	26,752,992	28,733,096
NON-CASH MOVEMENTS		
DEPRECIATION & AMORTIZATION	40,318,619	38,421,554
ASSETS & RESEARCH EXPENCE WRITE OFF	(63,087,234)	(56,472,656)
FIXED DEPOSIT INTEREST	(6,904,083)	(3,260,242)
PROVISION FOR DOUBTFUL DEBTS	-	-
INCREASE/(DECREASE) IN PAYABLES	35,208,238	22,825,164
INCREASE IN PROVISIONS RELATING TO EMPLOYEE COSTS	19,851,365	6,537,776
EMPLOYEE GRATUITY PAYMENT	(11,394,817)	(12,981,660)
(GAINS)/LOSSES ON SALE OF PROPERTY, PLANT & EQUIPEMENT	5,101,722	(963,616)
INCREASE IN OTHER CURRENT ASSETS	(19,569,753)	(4,474,096)
DECREASE IN INVENTORIES	(14,079,500)	10,076,780
DECREASE IN RECEIVABLES	(438,373)	4,160,263
DECREASE IN PREPAYMENTS	-	11,823
PRIOR YEAR PROFIT ADJUSTMENT	6,763,537	-
NET CASH FLOW FROM OPERATING ACTIVITIES	<u>18,522,714</u>	<u>32,614,185</u>
CASH FLOW FROM INVESTING ACTIVITIES		
PURCHASE OF PLANT & EQUIPEMENT TREASURY FUND	(78,579,515)	(60,403,557)
PURCHASE OF LIBRARY BOOKS & PERIODICALS	(180,024)	(53,190)
PURCHASE / SALE OF BIOLOGICAL ASSETS	(1,584,851)	3,204,156
PROCEEDS FROM SALE OF PLANT & EQUIPEMENT	1,065,601	2,098,515
ISSUED LOANS	(8,499,825)	(8,897,650)
SETTLEMENTS OF LOANS	7,369,442	7,349,948
INTEREST ON INVESTMENT	6,190,814	920,996
INVESTMENT IN FIXED DEPOSIT	(3,600,000)	(35,000,000)
NET CASH FLOW FROM INVESTING ACTIVITES	<u>(77,818,358)</u>	<u>(90,780,783)</u>
CASH FLOW FROM THE FINANCING ACTIVITIES		
TREASURY CAPITAL GRANT	(7,025,484)	2,926,712
DONOR FUNDED PROJECTS CAPITAL GRANT	8,549,021	188,578
RESEARCH & DEVELOPMENT AND ASSETS WRITE OFF	63,087,234	56,472,656
NET CASH FLOWS FROM THE FINANCING ACTIVITES	<u>64,610,772</u>	<u>59,587,946</u>

	2017 Rs.	2016 Rs.
NET INCREASE / (DECREASE) IN CASH & CASH EQUIVALENTS	5,315,127	1,421,348
CASH & CASH EQUIVALENTS AT BEGINNING OF PERIOD	143,646,147	142,224,799
CASH & CASH EQUIVALENTS AT END OF PERIOD	148,961,275	143,646,147
BANK OF CEYLON - DANKOTUWA - A/C NO 3002507	20,726,324	19,057,536
BANK OF CEYLON - DANKOTUWA - A/C NO 3002942	13,748,882	8,897,469
BANK OF CEYLON - DANKOTUWA - A/C NO 3002556	34,186,792	53,308,396
BANK OF CEYLON - DANKOTUWA - A/C NO 3003088	78,986,266	59,155,717
BANK OF CEYLON - DANKOTUWA - A/C NO 3002557	-	-
BANK OF CEYLON - DANKOTUWA - A/C NO 3001528	1,182,011	355,726
BANK OF CEYLON - DANKOTUWA - A/C NO 75852571	-	2,020,782
	148,830,275	142,795,626
NSB - NEGOMBO	-	-
BOC - NEGOMBO	5,000	5,000
CASH IN TRANSIT	126,000	845,521
	148,961,275	143,646,147

STATEMENT OF CHANGES IN NET ASSETS/ EQUITY

NOTE	CONTRIBUTED BY THE GOVERNMENT	REVALUATION RESERVE	ACCUMULATED SURPLUS/DEFICIT	TOTAL EQUITY
BALANCE AS AT 01-01-2017	404,086,966	1,689,612,303	550,172	2,094,249,441
CAPITAL GRANT-TREASURY	69,179,000	-	-	69,179,000
SURPLUS/DEFICIT FOR THE YEAR	-	-	26,752,992	26,752,992
ASSETS WRITE OFF FOR THE CURRENT YEAR	(31,967,778)	-	-	(31,967,778)
R & D WRITE OFF FOR THE CURRENT YEAR	(44,236,707)	-	-	(44,236,707)
PREVIOUS YEAR CHEMICAL & GLASSWARE STOCK ADJUSTMENT			6,763,537	6,763,537
BALANCE AS AT 12-31-2017	397,061,481	1,689,612,303	34,066,702	2,120,740,486

Figures in brackets indicate deductions

The Accounting Policies and Notes as Set out on the pages 7 to 27 from an integral part of these Financial Statements.

GENETIC RESOURCE CENTER & RESEARCH CENTER (ESTATES) REVENUE & EXPENDITURE

	Bandirippuwa RC	Rathmalaraga RC	Ambakelle GRC	Potthukulama RC	Walpita RC	Makandura GRC	Maduruoya GRC	Middeniya RC	Pallama RC	Thabbowa RC	Estate Managemant Division	Technology Park	TOTAL 2017	BUDGET 2017	TOTAL 2016
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.		Rs.	Rs.	Rs.		Rs.	Rs.	Rs.
REVENUE															
SALES OF COCONUT	15,279,265	12,672,143	46,657,259	25,274,369	3,951,233	9,537,288	23,869,148	3,147,142	21,832,895	1,614,894			163,835,636	153,461,000	156,318,009
SALES OF COPRA	578,972	123,683	64,064	321,106	-	139,331	241,117	245,074	603,247	-			2,316,593	1,777,000	1,483,912
SALES OF SEEDLING	-	446,635	4,570,530	19,250	322,000	2,594,430	259,420	2,706,705	5,601,315	1,495,599	80,000		18,095,884	28,217,000	17,734,477
SALES OF SUNDRIES	1,453,945	4,705,196	294,927	2,929,517	245,793	543,024	185,650	15,079	389,685	143,729			10,906,544	9,939,000	13,960,879
SALE OF ANIMALS PRODUCE & ANIMALS	1,057,565	-	279,780	249,930	-	-	230,644	-	-	-			1,817,919	3,945,000	5,560,452
FD INTEREST INCOME	-	-	-	-	-	-	-	-	-	-	6,190,814		6,190,814	-	3,380,755
TOTAL REVENUE	18,369,746	17,947,657	51,866,559	28,794,173	4,519,026	12,814,073	24,785,978	6,114,000	28,427,142	3,254,222	6,270,814		203,163,390	197,339,000	198,438,484
STOCK VARIANCES															
STOCK AS AT 01-01-2017	1,442,560	3,946,480	13,979,003	5,450,238	687,411	2,437,661	7,353,513	1,686,009	5,415,875	994,936	-		43,393,685	-	52,602,576
STOCK AS AT 31-12-2017	2,852,442	1,705,155	12,712,751	4,985,695	817,465	2,157,402	6,627,134	2,646,985	7,309,338	1,192,015	-	193,870	43,200,252	-	43,393,686
	1,409,882	(2,241,325)	(1,266,252)	(464,543)	130,055	(280,259)	(726,379)	960,976	1,893,463	197,079	-	193,870	(193,433)	-	(9,208,890)
ESTATE REVENUE	19,779,628	15,706,332	50,600,307	28,329,629	4,649,081	12,533,814	24,059,599	7,074,976	30,320,605	3,451,302	6,270,814	193,870	202,969,957	197,339,000	189,229,594
GENERAL CHARGES	6,060,161	7,792,916	9,276,921	4,829,931	1,270,466	3,515,755	5,192,690	2,720,785	5,793,338	528,452	17,461,084	684,021	65,126,520	52,357,000	56,138,522
STAFF SALARIES	4,819,273	2,219,121	3,359,503	1,812,442	632,209	2,934,280	1,772,614	1,003,624	2,536,518	2,161	4,228,357	-	25,320,102	24,395,000	32,236,037
UPKEEP	2,431,599	1,601,398	8,396,382	1,457,701	308,946	1,093,925	1,979,133	536,355	4,587,162	83,428	-	-	22,476,031	27,082,000	36,324,035
CULTIVATION	1,780,385	2,228,481	1,968,001	2,029,639	316,618	1,366,242	1,184,681	950,267	682,660	87,553	-	-	12,594,527	22,740,000	8,619,710
COST OF SEEDLING	20,853	296,938	3,096,942	698,631	89,100	1,022,783	41,714	2,392,949	4,168,234	1,678,295	-	-	13,506,438	15,473,000	-
HARVESTING	2,968,671	1,285,527	3,445,825	1,596,845	404,205	720,392	1,127,102	161,495	1,615,193	115,161	-	-	13,440,418	13,621,000	12,699,127
DEPRECIATION	124,367	521,682	560,011	336,231	55,531	286,498	242,888	180,785	270,438	20,886	189,891	-	2,789,208	-	2,614,680
TOTAL COST OF PRODUCT.	18,205,310	15,946,062	30,103,587	12,761,421	3,077,075	10,939,876	11,540,823	7,946,259	19,653,543	2,515,937	21,879,332	684,021	155,253,244	155,668,000	148,632,111
CURING INTO COPRA/ DISPOSE	122,628	129,605	285,475	305,260	29,160	101,385	111,521	70,863.46	297,210	26,623			1,479,731	788,000	1,348,231
ANIMAL HUSBANDRY	917,146	337,503	425,818	608,030	6,220		367,580	-	446,050				3,108,347	3,526,000	3,546,520
AMORTIZATION	674,946	279,770	624,114	230,669	88,253	260,851	124,102	1,753,244.21	2,115,757	-	238,888		6,390,594		5,941,911
TOTAL EXPENDITURE	19,920,030	16,692,940	31,438,993	13,905,379	3,200,708	11,302,112	12,144,026	9,770,367	22,512,561	2,542,560	22,118,221	684,021	166,231,916	159,982,000	159,468,773
NET SURPLUS/(DEFICIT)	(140,402)	(986,608)	19,161,314	14,424,250	1,448,373	1,231,702	11,915,573	(2,695,391)	7,808,045	908,742	(15,847,407)	(490,151)	36,738,040	37,357,000	29,760,821

Head Office Administration Expences

7,000,000

43,738,040

Notes to the Financial Statements

As at 31st December

	2017 BUDGET Rs.	2017 ACTUAL Rs	2016 ACTUAL Rs
Note 03 TRANSFERS FROM OTHER ENTITIES			
RECURRENT GRANT	265,000,000	207,620,000	206,320,000
ESTATE PROFIT TRANSFER	8,000,000	7,000,000	8,000,000
	273,000,000	214,620,000	214,320,000

Note 05 OTHER REVENUE			
INTEREST ON LOAN & INVESTMENT		946,305	883,127
INCOME FROM MOTOR VEHICLES	750,000	555,933	642,689
SUNDRY INCOME	13,450,000	2,378,341	7,824,716
SALES CENTER INCOME	200,000	544,799	1,164,832
SALES OF PHEROMONE	400,000	482,225	1,376,155
SALES OF MONOCROTOPHOSE	200,000	-	10,660
INCOME PROJECTS		565,547	-
RESEARCH & DEVELOPMENT WRITE OFF		44,236,707	50,181,224
ASSETS WRITE OFF		31,967,778	30,492,064
PROJECTS EXPENSES WRITE-OFF		24,502,630	25,980,592
FOREIGN AID WRITEOFF		6,616,827	-
	15,000,000	112,797,092	118,556,060

Note 06 WAGES SALARIES AND EMPLOYEES' BENEFITS			
SALARIES ALLOWENCES & OVER TIME	168,050,000	141,543,564	131,203,876
BOARDS CONTRIBUTION TO ETF/EPF	23,000,000	19,872,704	17,131,793
BOARDS CONTRIBUTION TO MEDICAL AID	8,000,000	6,638,467	5,043,745
COCONUT ALLOWANCES	1,600,000	1,641,324	953,207
GRATUITY	10,000,000	14,906,578	14,798,030
	210,650,000	184,602,638	169,130,651

Note 07 SUPPLIES AND CONSUMABLES USED			
SUPPLIERS AND CONSUMABLES	7,525,000	10,087,645	17,910,468
CONTRACTUAL SERVICES	32,208,000	16,576,387	8,162,465
MAINTENANCE	19,960,000	22,506,958	27,021,547
	59,693,000	49,170,990	53,094,480

	2017 BUDGET Rs.	2017 ACTUAL Rs	2016 ACTUAL Rs
Note 09 OTHER EXPENSES			
TRAVELLING	2,247,000	646,437	240,534
EXPENSES- PROJECTS	-	24,502,630	29,329,365
EXPENSES- CESS	-	3,628,535	3,803,178
BOARD MEMBERS FEES	900,000	1,112,885	614,236
WELFARE	2,400,000	2,980,771	2,160,743
OTHER OPERATING EXPENSES	14,005,000	970,512	1,275,168
	19,552,000	33,841,770	37,423,224

Notes to the Financial Statements (Contd...)

Note 08 Research & Development Expenses Write Off

Description (Thrust Area)	CODE	WRITE OFF YEAR 2017	WRITE OFF YEAR 2016
(1) Crop Protection			
1.1 Crop Protection Division			
Major Pests	257	1,602,695.62	3,072,032
Minor Pests	258		-
Diseases	259	582,814.29	721,188
Protection services	260	3,011,916.21	5,218,590
Waligama Leaf Wilt Disease	287		5,348
Maintenance of Predator Lab	289		573
Plesisps Beetle	290	180,298.00	125,580
		5,377,724.12	9,143,309
(2) Crop Production			
2.1 Agronomy Division			
Soil Moisture Conservation	261	509,115.26	407,670
Low Yielding Palms	262	950,606.48	2,408,252
Farming System	263	483,001.96	430,418
Bio-energy Production	264	63,529.60	939,963
Inter Cropping	265	506,725.88	342,291
Weed Management	266	10,540.50	151,994
Poverty Alleviation Studies	267	1,931,210.65	1,269,122
Animal Husbandry	268	441,119.72	424,307
Vermi Culture	269	1,633.50	113,459

Description (Thrust Area)	CODE	WRITE OFF YEAR 2017	WRITE OFF YEAR 2016
Coconut Planting Systems	270	782,838.87	576,539
Organic Farming	271	438,177.50	369,574
Coconut Sheep Intergrated Farm	445		498,195
		6,118,499.92	7,931,784
2.2 Oil Plam			
Oil farm research	291	30,265.00	835
Land Suitability Assessment	292	120,000.00	61,692
Land & Field Management	293	7,100.00	66,447
Genetic Improvement	294		61,979
Clonel Sudies	295	423.02	98,478
Soil & Fertilizer Studies	296		49,254
Environment Physiology Studies	297		10,500
Pest & Diseases Management	298		-
Processing Studies	299		-
Socio-Economic Studies	300		-
		157,788.02	349,185
2.3 Soil & Plant Nutrition Div.			
Low cost Material	272	451,303.30	829,119
Fertilizer Mixture	273	516,732.98	745,204
D.F.R.	274	260,331.41	452,882
Micronutrients	275	1,032,182.54	868,484
Fertilizer Application	276		-
Irrigation	277	42,739.50	238,687
Nutrient Mapping	278	1,608,694.37	877,824
Organic Manure	279	298,023.51	934,857
Land suitability assesment	288	1,067,935.40	1,040,425
		5,277,943.01	5,987,482
(3) Crop Improvement-GPBD			
Eval. Exis. Co. Cultivars	280	5,703.00	2,512
Dev. New co. Cultivars	281	2,117,416.62	1,599,679
Conse. Eva. Co. Germplasm	282	765,185.40	1,531,883
Tolerance to Aceria mite	283		-
Research Nursery	284		-
Miscellaneous Research	285		-
		2,888,305.02	3,134,073

Description (Thrust Area)	CODE	WRITE OFF YEAR 2017	WRITE OFF YEAR 2016
(4) Coconut Processing-CPRD			
Improv.Kernal Based Product	225	738,315.60	797,931
Sap Based Product	226	572,245.19	622,801
Charcol making Process	227		-
Testing of Abrasive Feeling Machanism	228		-
Project on Coconut Oil	255	5,051,303.59	2,323,947
Project on Product Develop.	256	63,979.64	-
		6,425,844.02	3,744,679
(5) Agriculture Economics			
Socio Economy Studies	286	593,269.44	854,010
		593,269.44	854,010
Total			31,144,523
(6) Development & Services Related to Crop Production			
Drought Study - Middeniya (PPD)	400	114,159.23	667,526
Phosphate Sources - Middeniya (PPD)	401	2,227,344.19	2,380,099
Monthly Harvesting Impact(PPD)	402	693,791.00	884,710
Devlopment & Maintenance of Middeniya R.C.(ME)	403	684,357.02	365,257
Assessment & Improv. Of soil Quality Dep.Co.Land	404	1,322,392.06	103,953
Yield Improv. Co. Land by Rain Water Harve. Tech.	407	466,392.13	1,894,247
Consumer survey Nut Consumption & coco. Oil	408	80,203.94	127,610
Production of Dihaploids (TCD)	409	385,914.91	547,870
Predication of husk weight / copra weight (Bio)	427		-
Balance c/f		5,974,554.48	6,971,271.69
Biofertilizer for co.Indigenouse arbuscular mycorriza	428		-
Appling Zn & Cu sources for coconut palm	429		-
Formulation of an Effective Fertilizer Mix.Young Coco.	430		-
Use of locally K sources as Fertilizer for coconut(Bio)	431		22,065
Improv. of soil Ferti.coco. Land Through Vermiculture	446	-	-
		5,974,554.48	6,993,336.69
(7) Development & Services Activities Related to Genetical Improvement of Coconut (Gpb)			
Assessment of Biodiversity in Unawatuna (PPD)	410		-
Construction of a Coconut Genome map	411	309,782.46	1,651,162

Description (Thrust Area)	CODE	WRITE OFF YEAR 2017	WRITE OFF YEAR 2016
Constr. Of a Population for Mapping QTL Acaria Mite	412	147,048.39	135,131
Molecular Diagnosis of coco. Disorders	413		3,321
Estab. P.S.G. for mass Production of CRISL98	414	67,741.96	69,149
Upgrading ISG to Increase the Produ. Of CRIC 65	415	22,502.21	160,036
Germplasm Importation	416		31,272
Function of the Seed Production Unit	417	3,629,209.10	3,505,051
Estab. Seed Garden for mass Produ. Of Kapruwana	432		-
		4,176,284.12	5,555,122
(8) Development & Services Related to Crop Protection			
Coconut Mite Research & Development (CPD)	418	155,624.00	485,569
Extension Programs for Mite Management	419	460,786.84	-
Impact of mite damage on yeild at spatial & temp. scale	420	17,555.45	-
Determi. Proba. Casues of palm decline multidis. Project	421		-
Manag. Of black beetal using pherom. & Oryctes(CPD)	433	113,856.00	132,388
Power driven sprayer to tall coconut plams	434		-
		747,822.29	617,957
(9) Development & Services Related to Coconut processing & Value Addition (CPRD)			
Dev. & Popula.organic Pro. & Processing Of Coconut	405		-
Vergine oil - value addition	422	26,218.00	65,838
Dev.& Impro. Co. coir retting thro. Intrudu.Cons. Micro	423	232,666.16	855,730
Dev.& Impro. Coconut fibre based Products	424	151,349.41	302,806
Dev. Prod. Of high qua. Charcoal & Copra	425		-
		410,233.57	1,224,373
(10) Development & Services Related to Coconut processing & Value Addition			
Develop. Farm machinery for coconut sector (CPRD)	435	5,440.00	2,672
Coconut milk pouch for household use(CPRD)	436		-
Coconut water vinegar manufacturing method(CPRD)	437		-
		5,440.00	2,672

Description (Thrust Area)	CODE	WRITE OFF YEAR 2017	WRITE OFF YEAR 2016
(11) Agricultural Economics			
Mechanization & the demand of machinery co. Indus.	438	70,865.00	125,445
Increasing farmers through toddy tapping	439		-
Fertilizer use in incre. Productivity & Profitability C. P.	440		-
		70,865.00	125,445
(12) Transfer of Technology			
Coconut Technology Village	426		56,124
Electronic print media & Techn. transfer Prog (TTD)	441	4,116,633.52	3,112,569
Development of field models & exhibits (TTD)	442	281,316.09	210,227
Farmer field school Expansion (TTD)	443	25,630.00	4,504
Impro. farm practices in mini coco. Triangle Hambantota (TTD)	444	954,453.26	1,134,371
		6,012,133.91	4,517,795
Total		44,236,706.92	19,036,700
GRAND TOTAL		44,236,706.92	50,181,224

Note 09 OTHER EXPENSES

	2017 BUDGET Rs.	2017 ACTUAL Rs.	2016 ACTUAL Rs.
TRAVELLING	2,002,000	646,437	240,534
EXPENSES- PROJECTS	-	24,502,630	29,329,365
EXPENSES- CESS	-	3,628,535	3,803,178
BOARD MEMBERS FEES	850,000	1,112,885	614,236
WELFARE	2,000,000	2,980,771	2,160,743
OTHER OPERATING EXPENSES	4,805,000	970,512	1,275,168
	9,657,000	33,841,770	37,423,224

Notes to the Financial Statements (Contd)

As at 31st December

Note 10 - INFRASTRUCTURE PLANT & EQUIPMENT

	<u>Rs.</u>	<u>Rs.</u>	<u>Rs.</u>	<u>Rs.</u>	<u>Rs.</u>	<u>Rs.</u>	<u>Rs.</u>	<u>Rs.</u>	<u>Rs.</u>
<u>COST</u>									
AS AT 01-01-2017	1,522,283,874	244,711,022	126,670,444	249,073,807	91,403,302	61,679,900	29,045,486	2,324,867,836	2,276,902,139
ADDITIONS	-	15,478,973	7,925,225	38,554,332	1,577,500	7,366,946	163,245	71,066,221	58,977,992
DSPOSALS	-	-	-	5,779,590	-	1,559,977	513,375	7,852,941	11,012,295
AS AT 31-12-2017	1,522,283,874	260,189,994	134,595,669	281,848,550	92,980,802	67,486,869	28,695,357	2,388,081,116	2,324,867,836
<u>ACCUMULATED DEPRECIATION</u>									
AS AT 01-01-2017	-	74,865,208.94	30,388,914.49	108,825,300.16	71,157,672.93	35,643,595.54	13,904,997.61	334,785,689.67	306,241,531.33
ADDITIONS	-	9,789,540	6,390,594	13,292,967	4,951,214	4,434,058	1,460,245	40,318,619	38,421,554
DSPOSALS	-	-	-	1,251,231	-	116,266	318,120	1,685,618	9,877,396
AS AT 31-12-2017	-	84,654,749	36,779,509	120,867,036	76,108,887	39,961,387	15,047,122	373,418,691.04	334,785,689.67
CARRYING VALUE	-	74,865,209	30,388,914	107,574,069	71,157,673	35,527,329	13,586,877	333,100,071.77	296,364,135.58
WORKING PROGRESS				-				8,938,860	1,425,565
AS AT 31 DECEMBER 2017	1,522,283,874	175,535,245	97,816,161	160,981,514	16,871,915	27,525,482	13,648,235	2,023,601,284	1,991,507,711
AS AT 31 DECEMBER 2016	1,522,283,874	169,845,813	96,281,530	140,248,507	20,245,629	26,036,304	15,140,488		

AMORTIZATION - ESTATE IMPROVEMENT	6,390,594
ASSETS DEPRECIATION - HEAD OFFICE	25,550,034
ASSETS DEPRECIATION - ESTATES	2,789,208
ASSETS DEPRECIATION - CESS PROJECTS	3,628,535
ASSETS DEPRECIATION - DONOR PROJECTS	1,960,247
	40,318,619

Notes to the Financial Statements (Contd)

As at 31 December

		2017	2017	2016
		Budget	ACTUAL	ACTUAL
		Rs.	Rs.	Rs.
Note 11	<u>BIOLOGICAL ASSETS</u>			
	LIVE STOCK		8,362,081	6,777,231
			8,362,081	6,777,231
Note 12	<u>OTHER NON FINCIAL ASSETS</u>			
	LIBRARY BOOKS & PERIODICALS	1,300,000	3,055,587	2,875,563
		1,300,000	3,055,587	2,875,563
Note 13	<u>OTHER NON CURRENT ASSETS</u>			
	DISTRESS & TRANSPORT LOAN		15,796,450	14,428,266
	TRANSPORT LOAN		897,673	876,173
	ESTATE FUNDS INVESTMENTS		48,600,000	-
			65,294,123	15,304,439
			2015	2014
			ACTUAL	ACTUAL
			Rs.	Rs.
Note 14	<u>CASH & CASH EQUIVALANTS</u>			
	BANK OF CEYLON - DANKOTUWA - A/C NO 3002507		20,726,324	19,057,536
	BANK OF CEYLON - DANKOTUWA - A/C NO 3002942		13,748,882	8,897,469
	BANK OF CEYLON - DANKOTUWA - A/C NO 3002556		34,186,792	53,308,396
	BANK OF CEYLON - DANKOTUWA - A/C NO 3003088		78,986,266	59,155,717
	BANK OF CEYLON - DANKOTUWA - A/C NO 3001528		1,182,011	355,726
	BANK OF CEYLON - DANKOTUWA - A/C NO 75852571		-	2,020,782
			148,830,275	142,795,626
	<u>SAVINGS DEPOSITS</u>			
	CASH IN TRANSIT		126,000	845,521
	BOC - NEGOMBO		5,000	5,000
			131,000	850,521
	TOTAL		148,961,275	143,646,147
Note 15	<u>RECIEVABLES</u>			
	SALES LEDGER CONTROL ACCOUNT		7,750,786	7,626,762
	LESS - BAD & DOUBTFUL DEBTS		(539,737)	(554,737)
	PROVISION FOR THE YEAR			
			7,211,049	7,072,025

	2017 Budget Rs.	2017 ACTUAL Rs.	2016 ACTUAL Rs.
POST MASTER GENERAL		31,620	31,620
INTEREST RECIEVABLE ON FD		3,530,831	2,817,562
SALARY CONTROL		3,000	12,000
SUNDRY RECIEVABLES		308,348	-
		11,084,848	9,933,206

Note 16 INVENTORIES

COCONUT	21,416,010	23,814,645
COPRA	444,918	441,900
GENERAL STORES/ESTATE	4,665,778	5,182,882
FERTILIZER	10,496,661	4,202,095
CHEMICAL & GLASSWARE	29,357,168	18,704,153
SEEDLING STOCKS	12,846,920	12,359,910
STOCK OF PUBLICATIONS	3,714,645	4,157,015
	82,942,099	68,862,600

Note 17 PREPAYMENTS

INSURENCES	-	11,823
	-	11,823

Note 18 OTHER CURRENT ASSETS

ADVANCE TO LOCAL SUPPLIERS	12,412,680	12,045,983
ADVANCE TO STAFF	37,377	171,541
MOBILIZATION ADVANCE	19,351,450	159,936
ESTATE FUNDS INVESTMENTS (CURRENT)	5,000,000	50,000,000
SECURITY DEPOSIT RECIEVABLE	245,650	245,650
DISTRESS LOAN	5,454,036.00	5,682,962
TRANSPORT LOAN	390,000.00	420,375
WAGES ADVANCE	12,766	29,894
FESTIVAL ADVANCE	488,800	497,550
SPECIAL ADVANCE	-	400
SPECIAL SALARY ADVANCE	158,500	172,500
FESTIVAL ADVANCES TO LABOURERS	467,519	363,025
SPECIAL SALARY ADVANCES TO LABOURERS	181,581	100,090
	44,200,358	69,889,906

	2017 Budget Rs.	2017 ACTUAL Rs.	2016 ACTUAL Rs.
Note 19	PAYABLES		
	ACCRUED EXPENSES	79,087,606	47,586,951
	EXPENCE CREDITORS	2,486,286	1,616,402
	UCLAIMED WAGES	14,579	14,579
	UNPAID SALARIES	200	8,711
	PROVISION FOR AUDIT FEES	1,200,000	800,000
	PROVIDENT FUND (LABOURER)	1,096,735	834,669
	SECURITY DEPOSITS	476,716	327,818
	RETENTION	2,369,235	1,493,648
	SECURITY DEPOSIT STAFF	49,000	49,000
	TENDER DEPOSIT PAYABLE	1,025,900	731,650
	SUNDRY PAYABLES	865,411	-
		88,671,667	53,463,429

Note 20	EMPLOYEE BENEFITS		
	PROVISION FOR GRATUITY	123,312,909	114,856,361
		123,312,909	114,856,361

Notes to the Financial Statements (Contd...)

Assumptions are based on institute's best estimates and recognized as follows.

- Discounting Rate: Government Bond rate near to the closing date of financial statement reporting period and 10 years' service per employee.
- Employee Turnover ratio: Consider the employee turnover for the period of 2017.01.01 to 2017.12.31.
- Expected salary increment ratio: Consider the salary increments for the period 2018.01.01 to 2018.12.31 based on MSD circular 2/2016.

Note 21	NON CURRENT LIABILITIES		
	CONTRIBUTED CAPITAL - PROJECTS	39,610,746	39,422,168
	FOREIGN AID	6,616,827	6,616,827
		46,227,573	46,038,995

Notes to the Financial Statements (Contd...)

DISCLOSURE

1. The following cases are regarding the bond violated officers of CRI

NAME	RECIEVABLE BOND VALUE	ACTION TAKEN
Mr. B. H. C. Mendis	1,014,780.00	All the documents related to this case have been submitted to the Department of Attorney General. File No.C/245/15/CRI.
Dr. K. B. Dasanayake	2,039,715.00	As per the case report issued on 2017.10.10 under the case no 2625/M, attorney general has already taken an action to send summon to the foreign address of this defendant.
Ms. M. G. F. S. Jayasundara	3,345,424.66	It is stated that there is a problem with foreign address of this depfendant.But a new address was revealed through the internet & informed it to the lawyer on 2017.10.20.Further,summons of the 2nd & 3rd defendant have been returned due to not available.Divisional secretary also has informed that the defendant was not available in this address (Case No.1917/M).
Dr. N. A. K. De Silva	3,024,297.60	All the documents related to the written submission have been presented to the court on 28.09.2017 by the lawyer,which were issued by the department of attorney generals.The court ordered to enter the names of 2nd & 3rd defendants for this case (Case No.3010/M).
Dr. J. M. M. N. Marikkar	1,068,165.00	The total amount of the bond value has been already paid.
Dr. (Ms.)J. M. M. A. Jayasundara	847,880.00	Two advisory letters were received from the department of attorney general with the explanation of the complain done by Mrs.jayasundara at labour office.But,due to the difference between this two answers,further clarifications are waiting from the department of attorney general's.
Mr. H. P. S. Jayasundara	2,078,905.33	The summons have been already handed over to Mr. Densil Fonseka (attorney at law) to forward to the court (Case No.2096/M).

Mr. R. A. J. R. Perera	1,068,165.00	District Court of Marawila pronounced a unilateral decision for this case. It was stated that the total bond value should be paid by the defendant. But the defendant's address can't be found for handing over the court decisions. Further, Empowerment period also has expired of this decision & requested to offload the decision.
Ms. P. G. P. Hewawitharana	2,993,945.18	She has been informed to pay off the total bond value & has already paid the sum Rs.1,934,775.18. The balance amount to be paid by her is Rs.1,059,170.00. She has requested to discuss with the department of attorney general to pay off this balance amount through her lawyer. But, the Board has decided to continue the case.

1. A basic investigation was done & punished against to the H.M. Lionel Gamini & D.M. Vijitha Amarawathi due to stealing coconut & influencing to the security officers. Hence they have filed a case in the Department of labour tribunal against to the CRI. Although the Decision has already stated by the labour tribunal council chair, they have not satisfied with the decision. Hence, they have filed a case again on high court & it is going on.
2. An extent of 75 acres from the Middeniya farm has been temporary released for 30 years by the Assistant Divisional Secretary of Katuwana to the Ministry of Plantation Industries on October 7, 2004 and it was Vested to Coconut Research Institute on October 11, 2004 by the Ministry of Plantation Industries for stabilizing of sub Coconut Research Centre in Southern Province.
3. The following Funds have been credited to the Capital Current Account (Ac No.3002556) of the Coconut Research Institute, which have been allocated for specified tasks of the CRI but not Utilized.

Rs.10,000,000.00	She has been informed to pay off the total bond value & has already paid the sum Rs.1,934,775.18. The balance amount to be paid by her is Rs.1,059,170.00. She has requested to discuss with the department of attorney general to pay off this balance amount through her lawyer. But, the Board has decided to continue the case.
Rs. 9,522,210.00	Returned amount from the Ceylon Electricity Board of the Payment for the Supply of 3 Phase Electricity to the Poonarin Seed Garden.
Rs. 4,110,400.00	Returned amount from the SL Army of the payment for the Clearance the Land of Poonarin Seed Garden.

4. It is stated that Rs.19,179,000.00 has been granted by the ministry of plantation Industries for the Strengthening the Research Institute programme. This amount also has credited to the Capital Treasury grant Account.



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தேசிய கணக்காய்வு அலுவலகம்

NATIONAL AUDIT OFFICE



මගේ අංකය
எனது இல.
My No.

පිටුවල්/ඩි/සීපාර්සී/1/2017/03

ඔබේ අංකය
உமது இல.
Your No.

දිනය
திகதி
Date

2018 නොවැම්බර් 16 දින

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පොල් පර්යේෂණ මණ්ඩලය.

පොල් පර්යේෂණ මණ්ඩලයේ 2017 දෙසැම්බර් 31 දිනෙන් අවසන් වර්ෂය සඳහා වූ මූල්‍ය ප්‍රකාශන
පිළිබඳව 1971 අංක 38 දරන මුදල් පනතේ 14(2)(ඔ) වගන්තිය ප්‍රකාර විගණකාධිපති වාර්තාව

මාගේ සමාක හා 2018 ඔක්තෝබර් 10 දිනැති ලිපියට යොමුවේ.

02. ඉහත සඳහන් ලිපිය සමඟ එවන ලද මාගේ වාර්තාවේ ඉංග්‍රීසි අනුවාදය මේ සමඟ එවා ඇත.


රේ.ඒ.ඒ.ආරාත්න

නියෝජ්‍ය විගණකාධිපති
විගණකාධිපති වෙනුවට

- පිටපත් -
1. ලේකම්, වැවිලි කර්මාන්ත අමාත්‍යාංශය
 2. ලේකම්, මුදල් හා ආර්ථික කටයුතු අමාත්‍යාංශය



ජාතික විගණන කාර්යාලය

தேசிய கணக்காய்வு அலுவலகம்

NATIONAL AUDIT OFFICE



මගේ අංකය
எனது இல.
My No. }

PLA/D/CRB/01/2017/03

ඔබේ අංකය
உமது இல.
Your No. }

දිනය
திகதி
Date }

10 October 2018

The Chairman,
Coconut Research Board

Report of the Auditor General on the Financial Statements of the Coconut Research Board for the year ended 31 December 2017 in terms of Section 14 (2) (c) of the Finance Act, No. 38 of 1971.

The audit of financial statements of the Coconut Research Board for the year ended 31 December 2017 comprising the statement of financial position as at 31 December 2017, the statement of financial performance, statement of changes in equity and cash flow statement for the year then ended and a summary of significant accounting policies and other explanatory information, 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 Section 13(1) of the Finance Act, No. 38 of 1971 and Section 43 of the Coconut Development Act, No. 46 of 1971. My comments and observations which I consider should be published with the Annual Report of the Board in terms of Section 14(2)(C) of the Finance Act appear in this Report. A detailed report in terms of section 13 (7)(a) of the Finance Act was issued to the Chairman of the Board on 18 May 2018.

1.2 Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Sri Lanka Public Sector Accounting Standards and for such internal control as the management determines is necessary to enable the preparation of financial statements that are free from material misstatements, whether due to fraud or error.



1.3 Auditor's Responsibility

My responsibility is to express an opinion on these financial statements based on my audit. I conducted my audit in accordance with Sri Lanka Auditing Standards consistent with International Auditing Standards of Supreme Audit Institutions (ISSAI 1000-1810). Those Standards require that I comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatements.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the Authority's preparation and fair presentation of financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Authority's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements. Sub-sections (3) and (4) of Section 13 of the Finance Act, No.38 of 1971 give discretionary powers to the Auditor General to determine the scope and extent of the audit.

I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

1.4 Basis for Qualified Opinion

My opinion is qualified based on the matters described in paragraph 2.2 of this report.



2. Financial Statements

2.1 Qualified Opinion

In my opinion, except for the effects of the matters described in paragraph 2.2 of this report, the financial statements give a true and fair view of the financial position of the Coconut Research Board as at 31 December 2017 and its financial performance and cash flows for the year then ended in accordance with Sri Lanka Public Sector Accounting Standards.

2.2 Comments on Financial Statements

2.2.1 Sri Lanka Public Sector Accounting Standards

The following observations are made.

(a) Sri Lanka Public Sector Accounting Standards 01

According to the section 48 of the standard assets and liabilities should not be offset each other unless required permitted festival advance given for labourers and special salary advances Rs.68,475 and Rs.90,865 respectively offset with negative balancers and the net balance of Rs.467,519 and Rs.181,581 shown in the other current assets had been stated in the financial statements.

(b) Sri Lanka Public Sector Accounting Standards 02

(i) Interest income on fixed deposit amounting to Rs.6,190,814 shown in the statement of financial performance it was shown in the cash flow statement under non-financial changes reason into that cash flow generated from operational activities was shown less by Rs.713,269.

(ii) Although according to the cash flow statement under investing activities interest income receiving in cash for the fixed deposits was Rs.5,011,893 but it was shown under cash flow generated from investing activities as Rs.6,190,814.

(c) Sri Lanka Public Sector Accounting Standards 07

- (i) According to the section 47 of the standard once every 3 years or 5 years properly, plant and equipment should be revealed land cost at Rs.1,522,283,874 had not been revalued by the board after the year 2005.
- (ii) Although fully depreciated properly and plant which is amounting to Rs.208,560,016 had been further used due to reviving of the effective lifetime of the non-current assets as per section 65 of the standard. Accordingly an action had not been taken to revise the estimated error as per the Sri Lanka public sector accounting standard No.03.

2.2.2 Accounting deficiencies

The following observations are made.

- (a) The value of the land belongs to the board research Centre situated at Thabbowa in extent of 5 acres had not been valued and taken to the financial statements.
- (b) Receivable fixed deposits interest relating to the under review amounting to Rs.507,637 had not been taken to the financial statements.
- (c) Foreign grants received during the year under review amounting to Rs.6,616,827 relating to the previous year had been brought to account as income of the Year under review the profit for the year under review had been shown in excess by that amount.



2.2.3 Lack of Evidence for audit

Evidence shown against each accounts items shown below was not furnished to audit.

Item of Accounts	Value	Evidence not furnished
	Rs.	
(i) Debtors	7,541,354	} Confirmation Letters Annual Board of Survey reports
(ii) Creditors	1,916,781	
(iii) Library books and Periodicals	3,055,587	
(iv) Laboratory Instruments	2,357,168	

2.3 Receivable Accounts

Following observations are made

- Out of the debtors existing at the end of the year under review amounting to Rs.7,750,786 a sum of Rs.539,737 had not been recovered more than 5 years period.
- Security deposit amounting to Rs. 245,650 receivable from 13 institutions existed at the last date of the year under review remaining more than 5 years and necessary action had not been taken by the board to recover that.
- There are two cash books belong to the board and error in entering of receipt of Rs.126,000 action not taken to correct it which had been shown in financial statements as transit in cash.
- Advance money for pre work amounting to Rs.159,936 given to private institution in the year 2012 for new aluminium doors not settled even as at 31 December 2017.



- (c) Retention money amounting to Rs.407,286 had been recovered from 20 private Institutions more than 1 year and the balance sum of Rs.424,352 retain from cess fund more than several years not settling it and brought forward.

2.4 Non- compliance with Laws, Rules, Regulations and Management Decisions

Non- compliances with the following laws, rules and regulations were observed.

Reference to Laws, Rules and Regulations	Non- compliance
(a) Circular No.PED/03/2017 dated 11 December 2017 of the Ministry of finance and mass media.	Though it should be paid Rs.10,000 per 36 permanent officers of the Estate Management Section as bonus, contrary to that Circular a sum of Rs.883,272 had been paid as bonus on the basis of basic salary of the relevant employees on the approval of the Director Board.
(b) Circular No.1/2008 Section 02 dated March 2008 of the Treasury Operations.	Providing funds as direct or indirect to the institutions by the government and assigned the final liability to government as direct or indirect the activities relating to the funds a proper investment procedure should be initiated to give good results give to the National economy even though a sum ranging from Rs.8 million to Rs.103 million had been retained in 04 bank current accounts idling during the year under review.



3. Financial Review

3.1 Financial Results

According to the financial statements present the financial result for the year under review had been a surplus of Rs.26,752,992 as compared with corresponding surplus of Rs.28,733,096 for the preceding year, thus indicating a deterioration of Rs.1,980,104. Increase of the research Centre income by Rs. 13,740,363 increase of salaries and wages benefit expenses by Rs.15,471,987 relative to the preceding year had been the main reasons for the above deterioration.

while analysis of the financial results in 04 preceding years and the year under review even though surplus had been excised in the year 2013 had increased up to Rs.70,181,762 in the year 2014 had deteriorated continuously in the year 2015 the surplus decreased up to Rs.26,752,992 in the year 2017. However depreciation for non current assets and tax paid to the government the contribution of Rs.211,637,093 in the year 2013 had increased up to Rs.251,806,285 with fluctuations of the year under review.

3.2 Analytical financial review

The following observations are made

- (a) The current ratio of the year under review had been reduced from 1:1.74 to 1:1.35 as compared with the preceding year and quick assets ratio reduced from 1:1.33 to 1:0.96.
- (b) The profitability ratio of the year under review has been reduced from 5.5 per cent to 5.04 per cent as compared with the preceding year.



3.3 Legal cases initiated against or by the Institution

The board had filed 9 cases against 09 external Institutions and persons in the courts claiming compensation totalling Rs.15,629,888 and 03 cases had been filed by external parties against the board.

4. Operation review

4.1 Performance

4.1.1 Activity and Review

The following observations are made

- (a) The yield of coconut amounting to 5,689,864 for the year 2016 in 10 estates belongs to the board was reduced up to 3,917,072 as 31 per cent during the year under review. Although the yield of coconut for a acre should be between 2400 fruits 3,000 fruit out of 10 estates belongs to the board 5 estates coconut yield was low amount and annual average coconut yield for a tree should be 60 fruit but annual average coconut yield of five estates belong to the board was ranging from home 21 fruit to 48 fruit.
- (b) According to the action plan of the board two research projects at estimated cost amounting to Rs.543,000 had planned to be implemented during the year under review but it not implemented by the board. Further estimated cost of Rs.7,617,000 16 research projects scheduled to be completed during the year on the review performance level was ranging between 8 per cent to 10 per cent. Lack of research officers, Non receiving of chemical items and delay in purchasing of chemical instruments was mainly affected to this.
- (c) Although allocation of Rs.4 million had been made according to the action plan for implement infrastructure and development 03 projects but that project not implemented due to the reason goods could not be purchased in due time.



- (d) Even though the research activities in respect of introducing of new varieties of coconuts were continuously done by the division of Genetic and plant breeding of the board an introduction of new coconut varieties had not been done after the year 2013. Out of the six varieties of coconuts introduced such as kapruwana, kapsetha, kapsuwaya had not been expanded among the people.
- (e) It could not be produced Willowpitha mite packets to prevent the attack coconut mite and non-preparation of a method to keep Villopitha mite packets for tall coconut trees the number of mite attached coconuts were 342,051 in 10 coconut estates belong to the board had increased up to 467,034 by 36 per cent during the year under review.

4.2 Management Activities

The following observations are made.

- (a) Although the approval of the director board and the ministry should be obtained for research results trade off in connection with other countries important as national which is search by the coconut research board without obtaining Such a approval research result of the issues planning Technology had being trade off with a Indian foreign company.
- (b) Even though the genetic resources centre in makandura was established as a seed coconut Garden from 21 July 1984 obtaining coconut seeds had been ceased due to the untimely the damage of coconut palms action had been taking to hold as a exemplary of inter cropping.

4.3 Idle and Underutilized Assets

Even though a Heat conservation unit had been established in the year 2008 at a cost of Rs.1,719,250 in Bandirippawa Research centre for the purpose of drying copra instead of emission of the heat to the environment in the production of charcoal from coconut shells that was being idle on the reasons of not done the repairs without utilization since the year 2012 up to the end of the year under review.



4.4 Staff Administration

The approval cadre of the Board was 391 and the number of actual cadre was 287. It was shown 104 vacancies in 31 posts. Accordingly because of 27 per cent vacancies existed from the approved cadre thus it was a barrier to carrying on the activities of the Board efficiently.

5. Sustainable Development

5.1 The Achievement of Sustainable Development Goals

Every government institution should work in terms of circular No. NP/SP/SDG/17 of 14 August 2017 issued by the secretary to the Ministry of National Policies and Economic Affairs and the '2030 agenda' of the United Nations for Sustainable Development and the Coconut Research Board had been aware of how to take action in respect of functions coming under its scope relating to the year under review. The following observations are made in this connection.

- (a) To achieve the sustainable development goals the activities identified by the Board had not been included in the Annual Plan and to fulfil that functions necessary financial allocations had not been included in to the annual budget.
- (b) Although it is vital in existing correct data system to measure the correct performance of any activity. The Board had not taken action to create a correct data system to measure the achievements of the sustainable development targets.

6. Systems and Controls

Deficiencies in systems and controls observed during the course of audit were brought to the notice of the Chairman of the Board from time to time. Special attention is needed in respect of the following areas of control.



Areas of Systems and Controls

Observations

(a) Accounting

To be net according to the public sector accounting standards and non-revaluation of assets which were fully depreciated.

(b) Human Resources Administration

- (i) Action not taken to recruit the officers in existing vacancies in accordance with the scheme of recruitment.
- (ii) Even though the accuracy of the certificates relating to the educational and professional qualifications of the officers not confirmed from those institutions.

(c) Estate Management

Necessary action not taken to increase the coconut yield, to introduce new coconut varieties and to suppression cultivation of coconut vermin deleterious.

H.M.Gamini Wijesinghe

Auditor General

Sgd / H.M. GAMINI WIJESINGHE
Auditor General