වාර්ෂික කාර්ය සාධන වාර්තාව 2015

வருடாந்த செயற்திறன் அறிக்கை 2015

ANNUAL PERFORMANCE REPORT

අපනයන කෘෂිකර්ම දෙපාර්තමේන්තුව

ஏற்றுமதி விவசாயத் திணைக்களம்

DEPARTMENT OF EXPORT AGRICULTURE

Web : www.exportagridept.gov.lk

ප්‍රාථමික කර්මාන්ත අමාත්‍යාංශය

ஆரம்பக் கைத்தொழில் அமைச்சு

MINISTRY OF PRIMARY INDUSTRIES

අපේ දැක්ම

කුළුබඩු හා ආශ්‍රිත නිෂ්පාදන අපනයනයෙන් විශිෂ්ඨත්වය

අපේ මෙහෙවර

වැඩි විදේශ විනිමයක් ඉපයීමත්, අපනයන කෘෂි බෝග ක්ෂේත්‍රයේ නිරත සියලු පාර්ශවකරුවන්ගේ තිරසාර ආර්ථික හා සමාජීය සංවර්ධනයත් පෙරදැරි කර ගනිමින්, පරිසරය සුරැකෙන අයුරින් අපනයන කෘෂි බෝග නිෂ්පාදනවල ප්‍රමාණාත්මක හා ගුණාත්මක ප්‍රවර්ධනයක් ඇති කිරීමට අවශ්‍ය වන්නාවූ පර්යේෂණ හා සංවර්ධන ක්‍රියාවලිය සැලසුම් කිරීම හා ක්‍රියාත්මක කිරීම.

எமது தொலைநோக்கு

"வாசனைத் திரவியங்களுக்கும் அதனுடன் இணைந்த உற்பத்திகளுக்கும் ஏற்றுமதியில் சிறப்பிடம்"

எமது குறிக்கோள்

"உயர் அந்நியசெலாவணி வருவாயைப் பெறுவதுடன், ஏற்றுமதி விவசாயத்துறையில் ஈடுபட்டிருக்கும் அனைவரினதும் பொருளாதார, சமூக அபிவிருத்திக்கு முன்னுரிமை வழங்கி, சூழல் பாதுகாப்பை உறுதி செய்து, ஏற்றுமதி விவசாய உற்பத்திகளின் அளவையும் தரத்தையும் உயர்த்துவதற்குத் தேவையான ஆராய்ச்சி, அபிவிருத்தி நடவடிக்கைகளைத் திட்டமிடலும் நடைமுறைப்படுத்தலும்"

OUR VISION

"Excellence in Exports of Spices and Allied Products"

OUR MISSION

"Planning and Implementation of an appropriate Research and Development Programme with the prime objective of earning more foreign exchange through enhancement of quality and quantity of Export Agricultural Crop production for sustainable development of economic and social standards of all the stakeholders of the Export Agricultural Crop sector while ensuring the safeguards to environment"

2015

වාර්ෂික කාර්ය සාධන වාර්තාව

வருடாந்த செயற்திறன் அறிக்கை

ANNUAL PERFORMANCE REPORT

අපනයන කෘෂිකර්ම දෙපාර්තමේන්තුව

ප්‍රාථමික කර්මාන්ත අමාත්‍යාංශය

ஏற்றுமதி விவசாயத் திணைக்களம்

ஆரம்பக் கைத்தொழில் அமைச்சு

DEPARTMENT OF EXPORT AGRICULTURE

MINISTRY OF PRIMARY INDUSTRIES

ACKNOWLEDGEMENT

It is a great pleasure to extend my sincere gratitude to all Heads of Divisions of the Department of Export Agriculture for the contribution they rendered to complete this annual performance report.

I wish to acknowledge the input of the Additional Director General (Research, Development and Administration), Directors (Research), Directors (Development), Director (Regulation), Accountant and Assistant Director (Research) in-charge of the sub research stations and the Economic research unit for their commitment to provide necessary information. The contribution made by the staff of the communication unit for the preparation of the cover page and printing of the report is appreciated.

Finally my thanks go to Mrs. G.E.M.A.K. Dissanayake (Assistant Director-Planning) for her commitment to gather the required data and compile them in this report.

Dr. M.A.P.K. Seneviratne
Director General
Department of Export Agriculture
May 2016

CONTENT

Title			Page no.
GENERAL INFORMATION – 2015			2-3
1.	FUNCTIONS OF THE DEPARTMENT OF EXPORT AGRICULTURE		3
	1.1	Role and objectives	3
	1.2	Major functions	3
2.	ADMINISTRATIVE DIVISION		4-11
	2.1	Introduction	4
	2.2	Staff	5
	2.3	Changes made in the staff in 2015	6
	2.4	Departmental examinations held in 2015	8
	2.5	Foreign tours and scholarships - 2015	8
	2.6	Achievement of targets in 2015	10
3.	FINANCE DIVISION		12-14
	3.1	Financial provision and expenditure – 2015	12
	3.2	Financial provision and expenditure (Project 02) – 2015	13
	3.3	Revenue of 2015	14
4.	DEVELOPMENT DIVISION		15-31
	4.1	Introduction	15
	4.2	Crop development program	16
	4.3	Investment assistance scheme for the promotion of export agricultural crops sector	16
	4.4	Estate sector crop development program	22
	4.5	Production and issuing of planting material	22
	4.6	Plant certification program	24
	4.7	Issuing of plants under the export agriculture crops assistance schemes	24
	4.8	Organic farming program	24
	4.9	Farmer training	25
	4.10	Establishment of demonstration	26

	4.11	Other development programs	27
	4.12	Progress of communication division	30
5.	RESEARCH DIVISION		32
	5.1	Technical functions and organization of research division	33
	5.2	Research achievements on Export Agricultural crops during the year of 2015	33
	5.3	On-going research during the year 2015	45
	5.4	Progress of other activities of the research division	51
	5.5	Economic and market research on EAC	56
	5.6	Research publications	60

LIST OF TABLE

Title		Page no.
Table 2.2.1	Cadre details as at 31st of December 2015	5
Table 2.4	Departmental examinations held in 2015 -2015	8
Table 2.5	Foreign tours and scholarships -2015	8
Table 3.1	Financial provision and expenditure (project 1) – 2015	12
Table 3.2	Financial provision and expenditure (Project 02) – 2015	13
Table 4.3.1.1	EAC assistance scheme for new planting - 2015	16
Table 4.3.1.2	Progress of new planting program – 2015	17
Table 4.3.2.1	Assistance scheme for productivity improvement Program (Cash grant per hectare for each crop in Rs.)	17
Table 4.3.2.2	Target of the productivity improvement program -2015	18
Table 4.3.2.3	The extent (ha) developed under productivity improvement program (PIP) in different district	18
Table 4.3.3.1	Assistance scheme for post-harvest activities	19
Table 4.3.3.2	Progress of the post- harvest assistance scheme in 2015	21
Table 4.4.1	Extent of crops developed under estate sector EAC development program in 2015	22
Table 4.5.1	Details of the central nurseries of the department	23
Table 4.5.2	Number of private nurseries registered with the department	23
Table 4.5.3	Prices of seeds/cuttings and plants/suckers (Rs.)	23
Table 4.6.1:	Details of the plants certified in 2015	24
Table 4.7.1	Issuing of planting material (in numbers) -2015	24
Table 4.8.1	Extent established under organic farming development program in 2015	25
Table 4.9.1	Progress in farmer training 2015	25
Table 4.9.2.1	The progress of cinnamon peelers training program	26

Table 4.9.3.1	Details of the training programs conducted at In –Service Training center, Matale	26
Table 4.10.1	Demonstrations established and maintained in different districts in 2015	27
Table 4.11.2.1	The number of EAC plants distributed in Non-traditional EAC growing districts -2015	27
Table 4.11.3.1	Distribution of plants for intercropping with tea under SPnD project	28
Table 4.11.3.2	Training programs conducted under SPnDP for beneficiaries of EAC	28
Table 4.11.4.1	Progress of pepper pruning week (from 9th to 16th September)	29
Table 4.11.5.1	Areca nut seedling distributed in 2015	29
Table 4.12.1.1	Details of television programs, radio programs and CD/DVD produced	30
Table 4.12.2.1	Publishing of EAC related prices and articles in national newspapers	30
Table 4.12.3.1.	Details of printed material published in 2015	31
Table 4.12.4.1	Usage of activities related to two-way social communities	31
Table 5.2.11.1	Symptoms development in each fungal isolates in the pathogenicity test	44
Table 5.4.8.1	Awareness and training programs offered by the	53
Table 5.4.8.2	Research projects and other training programs conducted by the research staff of the central research station, Matale	53
Table 5.4.11.1	Extension advice given for pest and disease problems of export agricultural crops	55
Table 5.4.12.1	Planting material issued by the central research station, Matale	55
Table 5.5.2.1	Newly established extent(ha) under EAC assistance scheme – 20	57
Table 5.5.3.1	Estimated production of EAC s – 2012/2015	58

List of annexures

Annexure 1: Estimated extent (ha) of EAC by districts – 2015 65

Annexure I1: Export volume and value of export agricultural crops – 2014/2015 66

Annexure III: Average prices of export agricultural crops (Rs./kg) in-2014/2015 67

Annexure 1V: Import volume and value of export agricultural crops –2014/2015 68

Annexure V: Deployment of extension officers 69

Annexure VI: Organizational structure of the department of export agriculture 71

ABBREVIATIONS

AD	-	Assistant Director
ASMEC	-	Annual Symposium of Minor Export Crops
BACC	-	Biodiversity conservation and Adaptation to Climate Change
BRRD	-	Brown Rot Root Disease
CARP	-	Council for Agricultural Research Policy
COC	-	Copper Oxi Chloride
GDP	-	Gross Domestic Product
EAC	-	Export Agricultural Crops
GAP	-	Good Agricultural Practices
GMP	-	Good Manufacturing Practices
ha	-	hectare
HCA	-	Hydroxy Citric Acid
HG	-	Home Garden
IPC	-	International Pepper Community
IPM	-	Integrated Pest Management
MT	-	Metric Tons
MOP	-	Muriate of Potash
NAA	-	Naphthalene Acetic Acid
NARP	-	National Agriculture Research Policy
NLFD	-	Nutmeg Leaf Fall Disease
PHASU	-	Post Harvest Advisory Service Unit
PIP	-	Productivity Improvement Program
SPnDP	-	Small Plantation and Development Program
SLIDA	-	Sri Lanka Institute of Development Administration

FOREWORD BY THE PRESENT DIRECTOR GENERAL

The mission of the Department of Export Agriculture (DEA) is to increase foreign exchange earnings from Export Agricultural Crops (EAC) sector through increasing the production, productivity, product quality and enhancing the value addition capacity of primary products. This sector comprises of Spices, Beverages, Industrial crops, Essential oil producing crops and Stimulant crops of perennial nature (other than Tea, Rubber, Coconut and Cashew) This sector contributes to an average share of over 12.2% of all the Agricultural and Plantation sector export earnings. The DEA, under the supervision of the Ministry of Agriculture until end of August and Ministry of Primary Industries for the rest of the year, has planned and implemented its Research and Development programs in 2015 to achieve the mandated objectives.

As a policy, the DEA paid more attention to increase the production, productivity and to improve the quality of the products in order to meet the international standards and trade regulations, which enable to compete with other producing countries. Considering the international market requirements DEA continued its efforts in 2015 under the theme of "A Better Quality Product", to ensure the implementation of food safety standards in the domestic production system, while promoting Good Agricultural Practices (GAP) and Good Manufacturing Practices (GMP).

This report summarizes the overall performance and related information pertaining to the four sub-divisions of the Department namely Research, Development, Administration and Finance. It includes all activities of the department, strategies used to meet the desired goals and the progress achieved during the year 2015.

Dr. M.A.P.K. Seneviratne
Director General
Department of Export Agriculture
May 2016

GENERAL INFORMATION - 2015

- General information of the EAC sector in 2015

- Contribution to GDP – 0.3%
- Contribution to export earnings of agriculture – 12.2%
- Export volume (Mt) – 71,588.31
- Export Value (Rs.mn.) – 61,558.37
- Estimated EAC extent (ha) – 111,095 ha (with ginger and turmeric)

- District offices, research stations and nurseries of the department

Distribution District Offices

Fourteen offices distributed in the following districts of the country as follows.

Central Province	- Kandy, Matale and Nuwara-eliya
Sabaragamuwa Province	- Kegalle and Ratnapura
Uva Province	- Badulla and Monaragala
Southern Province	- Galle, Matara and Hambantota
Western Province	- Colombo, Kalutara and Gampaha
North- Western Province	- Kurunegala and Puttalama

- Locations of research stations and Sub-Units

Eight Research Stations and Sub-Units located as follows.

1. Central Research Station in Matale
2. Cinnamon Research Station at Pallolpitiya of Matara district
3. Intercropping and Betel Research Station at Dampelassa close to Narammala
4. Economics and Market Research Unit at Head Office in Peradeniya
5. Mid Country Research Station at Delpitiya close to Gampola
6. Tissue Culture Unit and Plant Nursery at Walpita of Gampaha district
7. Research Sub-Unit at Kundasale of Kandy district
8. Research Sub-Unit at Nilambe close to Galaha of Kandy district

- Location of department nurseries

Production of plants are carried out in 10 nurseries in different locations as follows.

Kurunegala District	-	Serapies Plant Nursery at Polgahawela, Holongolla Plant Nursery at Dodangaslanda, Wennoruwa Plant Nursery at Narammala
Nuwaraeliya District	-	Blackwater, Plant Nursery at Ginihaththena Mulhalkele Plant Nursery at Walapane
Matale District	-	Central Plant Nursery at Elwela
Matara District	-	Central Plant Nursery at Mapalana in Kamburupitiya
Kegalle District	-	Central Plant Nursery at Gasnawa, Nelundeniya
Gampaha District	-	Central Plant Nursery at Walpita
Hambantota District	-	Central Nursery and Spice Park at Middeniya

1. FUNCTION OF THE DEPARTMENT OF EXPORT AGRICULTURE

1.1 Role and objectives

The major responsibility of the Department of Export Agriculture (DEA) is to develop the Export Agricultural Crop (EAC) sector in order to earn more foreign exchange by increasing the export volume and improving the quality of the products. As officially defined, the perennial crops, of which over 50% of the annual production is exported (excluding tea, rubber, coconut and cashew) and any other crop that is named by the Minister in-charge to be brought under the purview of the department are classified as EACs. As to this classification DEA's main emphasis is to improve traditional crops such as Cinnamon, Pepper, Clove, Nutmeg, Cardamom, Coffee, Cocoa, Betel, Arecanut, Vanilla, Citronella, Lemongrass, Garcinia (*goraka*), *Kithul*, Ginger and Turmeric. The DEA is basically a technical Department and its functions are focused on research and development activities of the EAC sector.

1.2 Major functions

The Promotion of Export Agriculture Crops Act No. 46 dated 22nd September, 1992 of Parliament of the Democratic Socialist Republic of Sri Lanka, embodies and gives statutory status to the functions and services mentioned below.

- Organizing and promotion of cultivation and processing of EACs
- Undertaking multidisciplinary research on crop improvement, crop husbandry, crop protection, post-harvest handling and socio economics
- Production and supply of quality planting material
- Implementation of EAC assistant schemes on crop production, productivity improvement and quality improvement
- Providing crop protection advisory services
- Promotion of Integrated Pest Management
- Promotion of Integrated Plant Nutrient Management
- Promotion of Organic Farming
- Dissemination of information on marketing, quality standards and prices etc.
- Control of importation of EAC products and planting materials etc.
- Training of personals involved in EAC production, processing and trading
- Providing advisory services for the promotion of EACs in estate sector
- Strengthening of the linkage among public and private organizations involved with EACs
- Executive authority vested under the Export Agriculture Act No. 46 of 1992
- Contributing towards EACs related policy matters in other governmental organizations
- Maintenance of technological demonstrations

පාලන நிர்வாகம்

ADMINISTRATION

2. ADMINISTRATIVE DIVISION

Highlights of the administration division

- Productivity circles have been established in different divisions to improve the productivity of the department. The main objective of this productivity circles is to increase the efficiency of the Department through systematic management of files
- Eighty three officers have trained in the SLIDA and Sri Lanka foundation institute
- Steps were taken to fill 35 cadre positions of various categories officers in the department.

2.1 Introduction

Being headed by the Additional Director General of Administration, the administrative Division of the Department assists the operation of administrative affairs of the Department coordinating with all the other sections and external organizations. Accordingly, new recruitments, promotions and transfers, human resource development, disciplinary procedures and matters related to departmental examinations, procurement and maintenance of capital assets of the department are mainly handled by the division. Besides the major responsibilities, the division carries out the welfare services and related activities for the motivation and welfare of the staff, as and when required.

2.2 Staff

The organization structure of the department is given in attachment VI. Table 2.2.1 illustrates the approved cadre and existing cadre as at 31.12.2015.

Table 2.2.1: Cadre details as at 31st December 2015

No.	Post	Approved Cadre		Existing Cadre		Vacancies
		Permanent	Contract basic	Permanent	Contract basic	
01	Director General	01	-	-	-	01
02	Additional Director General (Research/ Development)	02	-	-	-	02
03	Additional Director General (Administration)	01	-	01	-	-
03	Director (Research/ Development/Regulation)	07	-	-	-	07
05	Deputy /Assistant Director (Admin.)	01	-	01	-	-
06	Deputy /Assistant Director	67	-	43	-	24
07	Chief Accountant	01	-	01	-	-
08	Accountant	01	-	-	-	01
09	Assistant Director (Development)	01	-	01	-	-
10	Deputy Director/Assistant Director (Planning)	01	-	01	-	-
11	Internal Auditor	01	-	-	-	01
12	Statistician	01	-	01	-	
Total of Senior Level		85	-	49	-	36
13	Administrative Officer	03	-	03	-	
14	Extension Officer (Special Grade)	19	-	02	-	17
15	Chief Technological Officer	03	-	02	-	01
16	Farm Manager (Special Grade)	01	-	-	-	01
17	Translator	02	-	01	-	01
Total of Tertiary Level		28	-	08	-	20
18	Research & Development Assistant/ Development Assistant	84	-	79	-	05
19	Development Officer	411	-	281	-	130
20	Budget Assistant (Attached from the Department of National Budget)	01	-	01	-	-
21	Librarian	03	-	01	-	02

22	Extension Officer	171	-	149	-	22
23	Technological Officer	22	-	19	-	03
24	Technical Officer	01	-	-	-	01
25	Farm House Manager	14	-	-	-	14
26	Public Management Assistant	83	-	75	-	08
27	Information Communication Technology Assistant	01	-	01	-	-
28	Warden	01	-	01	-	-
29	Farm Service Assistant	08	-	08	-	
Total of Secondary Level		800	-	615	-	185
30	Driver	61	-	58	-	03
31	Mason	01	-	01	-	-
32	Tractor Driver	02	-	01	-	01
33	Spray Machine Operator	02	-	02	-	-
34	Budder	01	-	01	-	-
35	Water Pump Operator	01	-	01	-	-
36	Nursery Keeper	02	-	02	-	-
37	Office Assistant	35	-	28	-	07
38	Lorry Cleaner	07	-	07	-	-
39	Driver Assistant	01	-	01	-	-
40	Watcher	65	-	59	-	06
41	Labourer	303	97	264		39
42	Cook	01	-	01	-	-
43	Circuit bungalow Keeper	02	-	01	-	01
Total of Primary Level		484	97	427	-	57
Total		1397	97	1099	-	298

2.3 Changes made in the staff in 2015

New appointments

Assistant Director (Research)	01
Extension Officer	23
Public Management Assistant Service	02
Driver	10
Tractor Driver	01

Transfers – In

Development Officer	09
Public Management Assistant Service	26
Information communication Technological officer	01
Office Assistant Service	04
Driver	03

Transfers - Out

Development Officer	10
Public Management Assistant	15
Information communication Technological officer	01
Driver	03
Office Assistant Service	03

Resignations

Research and Development Assistant	01
Development Officer	01
Extension Officers	05

Release

Assistant Director (Research)	01
Development Officer	07

Deaths

Public Management Assistant	01

Retirements

Assistant Director (Development)	01
Extension Officer	04
Public Management Assistant	02
Farm Service Assistant	01
Driver	01
Office Assistant Service	02
Watcher	01
Labourer	03

2.4 Departmental examinations held in 2015

No	Examination	Date
01	Oral Test - Tamil – 1	10.06.2015
02	First efficiency bar examination for the posts of primary grade non-technical	2015.10.16
03	Second efficiency bar examination for the posts of primary grade non-technical	2015.10.16
04	Third efficiency bar examination for the post of primary grade non-technical	2015.10.23
05	First efficiency bar examination for the primary senior technical posts	2015.10.16
06	Second department examination for Extension Officers of Sri Lanka Technical Service	2015.07.29
07	Second efficiency bar examination for Research and Development Officers	2015.06.25

2.5 Foreign tours and scholarships – 2015

No.	Name of the officer	Post	Description	Duration	Country
01	Mrs. D.M.N.Gamage	Research & Development Assistant	Comprehensive technology of cultivation & processing of grain & oil crops for Sri Lanka	2015.05.25 to 2015.07.12	China
02	Mr. M.A.C. Rajika	Research & Development Assistant	Comprehensive technology of cultivation & processing of grain & oil crops for Sri Lanka	2015.05.25 to 2015.07.12	China
03	Mr. I.K. Ruwansiri	Research & Development Assistant	Comprehensive technology of cultivation & processing of grain & oil crops for Sri Lanka	2015.05.25 to 2015.07.12	China
04	Mr. N.K.A. Rupasinghe	Director General	A special discussion on pepper which was conducted by IPC	2015.06.25 to 2015.06.29	China
05	Mr. N.A. Wijesekara	Extension Officer	Training course on operation & maintenance of small scale agricultural machinery for developing countries	2015.06.16 to 2015.08.16	China
06	Mr. W.M.M.W.R.Pitawala	Extension Officer	Training course on operation & maintenance of small scale agricultural machinery for developing countries	2015.06.16 to 2015.08.16	China
07	Mr. J.R. Jayasuriya	Extension Officer	Training course on operation & maintenance of small scale Agricultural machinery for developing countries	2015.06.16 to 2015.08.16	China
08	Mr. H.P. Rathnasiri	Research & Development Assistant	Seminar on soya bean production & processing technology & capacity building for developing countries in Asia & Africa	2015.06.30 to 2015.07.22	China
09	Mrs. A.M.C.I.M. Aththanayaka	Research & Development Assistant	Seminar on soya bean production & processing technology & capacity building for developing countries in Asia & Africa	2015.06.30 to 2015.07.22	China
10	Mrs. P.M.E.A. Darmadasa	Extension Officer	Seminar on soya bean production & processing technology & capacity building for developing countries in Asia & Africa	2015.06.30 to 2015.07.22	China

11	Mr. R.M.D.S.S Rathnayaka	Chief Accountant	International program on management & administration at AIT	2015.07.06 to 2015.07.13	Thailand
12	Mrs. H.R.M.A.M.Rathnayaka	Administrative Officer	International program on management & administration at AIT	2015.07.06 to 2015.07.13	Thailand
13	Mr. N.K.A. Rupasingha	Director General	Second session of the CODEX committee	2015.09.13 to 2015.09.19	India
14	Mrs. K.D.N.Priyadarshani	Assistant Director Research	Seminar on protected agriculture and sand industry development for Asian countries	2015.09.02 to 2015.09.23	China
15	Mr. S.N.Gunathilaka	Extension Officer	Seminar on protected agriculture and sand industry development for Asian countries	2015.09.02 to 2015.09.23	China
16	Mrs. T. Thushari	Assistant Director	Meeting of international pepper community (IPC) committee on quality	2015.09.09 to 2015.09.12	India
17	Mr. R.M.W.K.Bebalagama	Extension Officer	Seminar on small & medium enterprises development of inland regions for developing countries	2015.10.15 to 2015.11.04	China
18	Mr. U.K. Kodikara	Extension Officer	Seminar on small & medium enterprises development of inland regions for developing countries	2015.10.15 to 2015.11.04	China
19	Mr. P.K.B. Degaldoruwa	Extension Officer	Export oriented economy for developing countries	2015.10.15 to 2015.11.04	China
20	Dr. H.A. Sumanasena	Director (Research)	Workshop on revision of agreement of IPC	2015.10.26 to 2015.10.28	Indonesia
21	Mr. H.A.Subhasingha	Director (Research)	Climate services users forum for agriculture	2015.10.14 to 2015.10.16	India
22	Mr. L.M.J.K. Lindara	Deputy Director	Learning organic agriculture by doing	2015.11.20 to 2015.1..24	Thailand
23	Miss. A.P.Disna	Director (Regulation)	Canton trade exhibition	2015.10.31 to 2015.11.04	China
24	Mrs. S.P.L.Senevirathna	Director (Development)	Canton trade exhibition	2015.10.31 to 2015.11.04	China
25	N.K.A Rupasinghe	Director General	43rd Session & other meeting of IPC	2015.11.22 to 2015.11.25	India
26	Dr. M.A.P.K. Seneviratne	Additional Director General (Development)	43rd Session & other meeting of IPC	2015.11.22 to 2015.11.25	India
27	Mrs. D.R.R. Suwarnathilaka	Assistant Director (Research))	43rd Session & other meeting of IPC	2015.11.22 to 2015.11.25	India
28	Mr. A.G.A. Sarath Kumara	Assistant Director (Acting)	2015 Semaul undoll training	2015.11.24 to 2015.12.07	Korea

2.6. Achievement of targets in 2015

- Takeover of land ownership

  On approval of Commissioner General of Lands, the Divisional Secretary of Tangalle handed over the ownership of land where district office of Tangalle has been functioning on. 16.09.2015

  - Recruitment of officers
    - A vacancy of an assistant director of Sri Lanka scientific service was filled.
    - Twenty-three extension officers (Grade iii) of Sri Lanka technological services were recruited.
    - Ten employees belong to driver category of combined services were recruited.
    - A vacancy of a tractor driver of semi-technical service (Grade iii) was filled.

  - Other achievement

- Interviews for filling vacancies of seven Director posts of Sri Lanka Scientific Service were held and the details of the qualified candidates were are sent to Public Service Commission
- Steps were taken to solve constraints and revise recruitment procedures with respect to the following categories.
  i. Recruitment procedure of Executive grades of the Sri Lanka Scientific Service
  ii. Recruitment procedure of super grade of Management Assistant of Department of Export Agriculture
  iii. Recruitment procedure of supervisory grade of Management Assistants' Technological Service of Department of Export Agriculture

- Revision of the name of the posts

Previous name of the post	Name of the post after revision
Extension Officer (Special grade)	District Extension Officer/ Subject matter Extension Officer/Senior Extension Officer
Research Assistant (Special grade)	Chief Technological Officer
Research Assistant (i, ii, iii)	Technological Officer (i, ii, iii)

- Details of training programs

Training institute	Title of training program	Type of participants	Number of participants
Sri Lanka Institute of Development Administration	Regulations/clauses of Administrative Regulations	Research and Development Assistant	4
	Attitudinal development of Government Service		
Sri Lanka Institute of Development Administration	Awareness program on agricultural crops	Development Officers	32
	Development of communication skills and presentation skills		
	Office management		
	Attitude development of government service		
	Environment management		
Sri Lanka Institute of Development Administration	Pension salary	Management Assistant	24
	Law that should be known by government officers		
	Government payment procedures		
	Government accounts procedure		
Skills development fund	Contract administration, file keeping and payment procedures	Development Officer	01
	Office equipment maintenance	Management Assistant	02
	Activities and responsibilities of shroff /cashier	Management Assistant	01
Department of Motor Traffic	Workshop on keeping of standards for emission from vehicles	Drivers	06
Yatinuwara Divisional Secretariat Office	Tamil language learning	Management Assistant	03
In-Service Training Center, Matale	Attitude development and In-Service Training	Office Assistant	10

මූල්‍ය

நிதி

FINANCE

FINANCE

Highlights of the finance division

- Ninety nine percent of total financial allocations were spent in 2015
- Financial performance of project 1 and 2 was 99% and 98% respectively
- The capital expenditure under project 1 and 2 was 98.8% and 93.8% respectively whereas corresponding figures for recurrent expenditure were 99.6% and 98.9% respectively

The annual estimates for the year 2015 show that a financial provision of a sum of Rs.975.77 Mn. was given under the head 289 in one program with, two recurrent expenditure projects and two capital expenditure projects.

Table 3.1: Financial provision and expenditure (Project 01) – 2015

Item	Net Provision (Rs.)	Expenditure (Rs.)	Expenditure (%)
Head - 289			
Program - 02			
Project - 01- export crops development program			
Capital expenditure			
Rehabilitation and improvement of capital assets	15,500,000.00	13,266,390.00	85.59
Buildings and structures	11,500,000.00	9,820,416.00.00	85.39
Plant, machinery and equipment	1,000,000.00	468,929.00.00	46.89
Vehicles	3,000,000.00	2,977,045.00.00	99.23
Acquisition of capital assets	13,700,000.00	11,478,949.00	83.79
Furniture and office equipment	2,500,000.00	2,469,458.00	98.78
Plant machinery and equipment	2,200,000.00	2,192,641.00	99.67
Buildings & structures	6,000,000.00	4,614,759.00	76.91
Lands and land improvements	3,000,000.00	2,202,091.00	73.40

Item	Net Provision (Rs)	Expenditure (Rs.)	Expenditure (%)
Assisting the farmers for export crop development			
Development assistance	360,000,000.00	359,973,686.00	99.99
Capacity building			
Staff training	1,500,000.00	1,447,879.00	96.53
Total capital expenditure	390,700,000.00	386,166,904.00	98.84
Recurrent expenditure			
Personal emoluments	349,945,000.00	349,485,953.00	99.87
Other charges	41,900,000.00	40,939,913.00	97.71
General administration	391,845,000.00	390,425,866.00	99.64
Total expenditure (project-01)	782,545,000.00	776,592,770.00	99.24

Table 3.2: Financial provision and expenditure (Project 02) – 2015

Item	Net Provision (Rs.)	Expenditure (Rs.)	Expenditure (%)
Head - 289			
Program - 02			
Project - 02- Export crops research and integrated pest/disease management (IPM) Program			
Capital expenditure			
Rehabilitation and improvement of capital assets	5,800,000.00	5,305,569.00	91.48
Buildings and structures	2,500,000.00	2,434,927.00	97.40
Plant, machinery and equipment	1,000,000.00	686,070.00	68.61
Vehicles	2,300,000.00	2,184,572.00	94.98
Acquisition of fixed assets	20,000,000.00	19,480,708.00	97.40
Furniture and office equipment	2,000,000.00	1,927,798.00	96.39
Plant machinery and equipment	4,000,000.00	3,713,789.00	92.84
Buildings and structures	11,000,000.00	10,988,919.00	99.90
Lands and land improvements	3,000,000.00	2,850,202.00	95.01
Capacity building			
Staff Training	600,000.00	546,873.00	91.15
Implementation of National Agricultural Research Plan (NARP)			
investment	6,000,000.00	5,073,081.00	84.55
Total capital expenditure	32,400,000.00	30,406,231.00	93.85
Recurrent expenditure			
Personal emoluments	141,410,000.00	141,064,362.00	99.76
Other charges	19,415,000.00	18,059,628.00	93.02
General administration	160,825,000.00	159,123,990.00	98.94
Total expenditure (project 2)	193,225,000.00	189,530,221.00	98.09
Total expenditure (project 1 and 2)	975,770,000.0	966,122,991.00	99.01

Total allocation of consolidate funds to the development for the year 2015 has increased by Rs. Mn.187.48 over 2014 and which was a 24% increase. Out of total allocation of Rs.975mn., the expenditure for the year was Rs. Mn. 966 and this was 99.01% of the provision given for the year. The financial performance of the project 1 and 2 were 99.24% and 98.09% respectively of the allocated funds. Percentages of the amount spent under capital expenditure of the projects 1 and 2 for 2015 were 98.84% and 93.85% respectively and the corresponding figures for the recurrent expenditure were 99.64% and 98.94 % respectively. Despite the man power shortage at all field level technical cadres, the spending of 99.01% of the total annual allocation for the year 2015 was an impressive achievement of the DEA.

3.3 Revenue of 2015

Source of revenue	Estimate (Rs.Mn.)	Actual (Rs.Mn.)
Rent on Govt. Buildings and houses	1.40	1.30
Loan Interests - other	3.00	3.20
Sales	5.00	11.79
Other Receipts	5.00	8.30
W & O P	13.00	13.46
Sale of capital assets	0.10	0.56
Total	27.50	38.61

Advance account limits

	Estimate (Rs.Mn.)	Actual (Rs.Mn.)
Maximum Limit of Expenditure	29,760,000.00	29,069,464.00
Minimum Limit of Receipts	23,760,000.00	34,353,374.00
Maximum Limit of Debit Balance	110,000,000.00	77,833,218.00

සංවර්ධන
அபிவிருத்தி
DEVELPOMENT

4. DEVELOPMENT DIVISION

Highlights of Development Division

- 'Pepper-day' was held at the Plant Genetic Resource Centre (PGRC), Gannoruwa to popularize pepper consumption in the country
- Ceremony of offering cinnamon to *Seenigama Devalaya* was held as an annual event
- The pepper shade pruning week was held between 09/09/2015 and 16/09/2015 island-wide covering 8000 ha of pepper cultivations
- A large-scale pepper shade pruning programme was conducted at Dehiattekandiya of Ampara District covering more than 800 farmers on 17/12/2015 and 18/12/2015
- The competition for selecting best three pepper farmers of the island was completed

4.1 Introduction

The Development Division of the Department plays a significant role to provide technical advice and guidance to stakeholders; to produce and distribute planting materials and to grant financial assistance for the stakeholders with view of promotion of the EAC sector. The division is headed by an Additional Director General (Development) supported by three Directors (Development), each of them has been assigned to two provinces, for the effective management and implementation of the EAC development program. In addition, Assistant Directors attached to the respective districts, Extension Officers in-charge of the Extension Officer Ranges, Research and Development Assistants and Development Officers attached to the divisions worked as a supportive staff to continue the services and functions of the development division.

The development activities and services of the division mainly focused on the wet and intermediate zones of Sri Lanka covering 14 districts *viz* Kandy, Matale, Nuwara Eliya, Kurunegala, Colombo, Kalutara, Gampaha, Galle, Matara, Hambantota, Kegalle, Ratnapura, Badulla and Moneragala. In addition, several development activities were carried out to introduce and popularize Turmeric, Ginger, Arecanut, Pepper, Cinnamon and Cocoa in non-traditional areas like Puttalam, Anuradapura, Polonnaruwa, Batticaloa and Ampara Districts.

4.2 Crop development program

The following major programs were carried out by the development division in 2015.

1. New/Replanting program
2. Productivity improvement program
3. Post-Harvest assistance and quality improvement program.

The special programs such as post-harvest advisory services, plantation advisory services and plant certification program for quality assurance of plants and planting material and cultivation of EACs in selected villages as cluster farms were also implemented during the year 2015. Extension and training of stakeholders were carried out as a tool of popularising those three major development programs.

4.3 Investment assistance scheme for the promotion of export agricultural crops sector

This scheme was introduced in 1972 with the inception of the Department and it was revised several times over the past 40 years. The assistance scheme which was revised in April, 2015 is being implemented to promote production, productivity and quality improvement of EACs.

4.3.1 Export agricultural crops investment assistance scheme for new planting

Export agriculture crops investment assistance scheme is being implemented for new planting program is given in table 4.3.1.1 and the progress of the new planting program has been summarized in table 4.3.1.2.

Table 4.3.1.1: EAC assistance scheme for new planting - 2015

Crop	Assistance scheme for new planting					Total value of installments (Rs./ha)
	Crop spacing	Number of plants per hectare	1st installment (Rs.) (03 months after planting)	2nd installment (Rs.) (18 months after planting)	3rd installment (Rs) (24-36 months after planting)	
Cinnamon	1.2x0.9m	9000	40,000.00	20,000.00	20,000.00	80,000.00
Black Pepper	2.4x2.4m	1700	40,000.00	20,000.00	20,000.00	80,000.00
Cocoa	3.0x3.0m	1100	40,000.00	20,000.00	20,000.00	80,000.00
Coffee (Arabica)	1.8x1.8m 1.8x2.5m	3000	40,000.00	20,000.00	20,000.00	80,000.00
Coffee (Robusta)	3.0x3.0m	1600	20,000.00	10,000.00	10,000.00	40,000.00
Cardamom	2.0x2.5m	2000	40,000.00	10,000.00	10,000.00	60,000.00
Nutmeg	6.0x6.0m	250	20,000.00	10,000.00	10,000.00	40,000.00
Clove	6.0x6.0m	250	20,000.00	10,000.00	10,000.00	40,000.00
Citronella/ Lemongrass	0.9x0.9m 0.6x0.6m	27500	20,000.00	20,000.00	-	40,000.00
Arecanut		1600	20,000.00	20,000.00	-	40,000.00

Table 4.3.1.2 Progress of new planting program– 2015

Crop	Target	Applications received		Applications recommended		Permits issued		Extent planted		Rewards paid	
		No.	ha	No.	ha	No.	ha	No.	ha	No.	ha
Cinnamon	680	4059	1833.9	3475	1450	1990	784.7	1629	645.3	2801	1065
Pepper	670	9432	2818.9	7169	1792.6	464	956.7	3283	726.9	2213	505.4
Cardamom	5	22	13.2	16	5.3	6	1.9	3	0.8	1	0.4
Coffee	35	160	153.5	363	86.5	85	48.5	78	28.6	47	12.9
Cocoa	20	1483	479.1	1348	427.7	2250	396.2	1076	333.2	15	11.7
Clove	45	215	84.5	152	52.3	102	32.4	71	19.5	25	6.2
Nutmeg	60	522	181.2	350	106.5	297	105.5	262	93.0	152	35.5
Vanilla	-	6	1.3	9	1.8	12	1.6	10	4.9	-	-
Citronella	45	199	126.6	144	101.8	109	61.1	27	16.6	58	23.8
Arecanut	200	782	284.3	684	222.4	554	141.3	709	140.1	43	16.1
Ginger	400	5476	-	5273	771.1	3260	495.6	4291	616.2	41291	616.2
Turmeric	40	384	-	304	25.9	156	12.4	320	17.8	320	16.8
Betel	-	8	2.6	1	0.2	12	1.6	1	0.4	-	-
Total	2200	22748	5979.1	19288	5044.1	9297	3039.5	11760	2643.3	9966	2310.2

4.3.2 Productivity improvement program

Productivity Improvement Program (PIP) was introduced to increase the production of the existing EAC cultivations per unit area, where production is below the potentials due to low crop density and poor crop management. Growers were assisted with technical advice, supplying of free planting material to fill vacancies and offering outright cash grants for a period of three years in order to improve the existing cultivations of pepper, cinnamon, cocoa, coffee, clove and nutmeg. Adoption of recommended agronomic practices such as filling vacancies, adoption of proper soil and moisture conservation measures, crop and shade tree pruning, integrated plant nutrient management and integrated pest management are the practices required to qualify under the assistance scheme. The details of the assistance scheme are given in Table 4.3.2.1.

Table 4.3.2.1: Assistance scheme for productivity improvement program (Cash grant per hectare)

Crop	1st Year (Rs.)	2nd Year (Rs.)	3rd Year (Rs.)	Total (Rs.)
Cinnamon	13,000.00	13,000.00	14,000.00	40,000.00
Black pepper	13,000.00	13,000.00	14,000.00	40,000.00
Cocoa	13,000.00	13,000.00	14,000.00	40,000.00
Coffee	13,000.00	13,000.00	14,000.00	40,000.00
Clove	7,800.00	7,800.00	4,400.00	20,000.00
Cardamom	13,000.00	13,000.00	14,000.00	40,000.00
Nutmeg	7,800.00	7,800.00	4,400.00	20,000.00

Target of the productivity improvement program and the progress of the extent developed under productivity improvement program in 2015 are given in the table 4.3.2.2 and 4.3.2.3

Table 4.3.2.2 : Target of the productivity improvement program – 2015

Crop	Cinnamon	Pepper	Coffee	Cocoa	Cardamom	Clove	Nutmeg	Total
Target(ha)	470	700	15	44	4	70	100	1403

Table 4.3.2.3 : The extent (ha) developed under productivity improvement program (PIP) in different district

District	Crop							Total
	Cinnamon	Pepper	Coffee	Cocoa	Cardamom	Clove	Nutmeg	
Kurunegala	5.5	69.6	1.5	-	-	2.9	1.4	80.9
Matale	13.6	128..6	-	14.2	-	6.6	8.4	171.4
Kandy	3.2	130.0	1.7	3.1	2.9	35.2	33.3	209.4
Nuwara- Eliya	0	26.9	1.3	-	0.6	1.6	-	30.4
Badulla	12.0	160.7	-	-	-	-	-	172.7
Monaragala	0.5	45.5	-	7.7	-	-	-	53.7
Hambantota	66.9	19.9	-	-	-	-	-	86.8
Matara	107.8	-	-	-	-	-	-	107.8
Galle	220.7	-	-	-	-	-	-	220.7
Kalutara	71.0	-	-	-	-	-	-	71.0
Colombo	5.3	-	-	-	-	-	-	5.3
Gampaha	23.8	22.5	-	-	-	-	-	46.3
Kegalle	3.0	26.1	-	-	-	4.9	-	34.0
Ratnapura	6.5	35.5	-	-	-	-	-	41.9
Total	539.8	665.3	4.5	25.0	3.5	51.2	43.1	1332.3

4.3.3 Export agricultural crop assistance scheme for post-harvest development activities

Post-harvest advisory service unit (PHASU) was established in 1998 to upgrade the quality of export agricultural crop products and continued it activities during the reporting year too. The investment assistance scheme was revised in April 2015 to suit the stakeholders at different levels of operation. The main objective of this assistance scheme was to maintain the quality of the product to be competitive in international markets, product diversification and value addition and to facilitate marketing of EAC products. The details of the three assistance schemes are given below (Table 4.3.3.1)

Table 4.3.3.1: Assistance scheme for post-harvest activities

a) Machineries

Equipment				Capacity (minimum)	Investment Assistance per unit (Maximum) Rs.
1.1	Equipment for Pepper Processing				
	a	Blancher		25 kg/batch	Rs. 3,000.00
	b	Decorticator		150kg/hour	Rs. 30,000.00
	c	Thresher			
		i	Manual	100 kg/hour	Rs. 15,000.00
		ii	Electric	500 kg/hour	Rs. 40,000.00
		iii	Motor driven	500 kg/hour	Rs. 40,000.00
	d	Shifter-Green berry separator		250 kg/hour	Rs. 15,000.00
	e	Grader / Blower		200 kg/hour	Rs. 30,000.00
	f	Hand Sieves - No 6/8/10 net		Volume 2′ x2′ x3″	Rs. 200.00
1.2	Equipment for Coffee Processing				
	a	Pulpier – Disc / Rotary			
		i	Manual	100 kg/hour	Rs.10,000.00
		ii	Motor Driven or Electric (with the facility of seed washing)	250 kg/hour	Rs.20,000.00
	b	Huller		250 kg/hour	Rs.25,000.00
1.3	Equipment for Cocoa Processing				
	a	Fermentation Box (3 units) (1st class Timber)		2'x2'x2'	(Rs. 2,000 *3) Rs 6,000.00
1.4	Other Crops				
	a	Ginger/Turmeric Slicer i. Manual ii. Electric		30 kg/hour 100 kg/hour	 Rs.5,000.00 Rs.20,000.00
	b	Turmeric boiler		10 kg	Rs 1,500.00
	c	Turmeric Polisher i. Manual ii. Electric		 30 kg/hour 60 kg/hour	 Rs 5,000.00 Rs 10,000.00
	d	Crusher			Rs10,000.00
	e	Grinder			Rs 30,000.00
	f	Nutmeg Sheller		100 kg/hour	Rs 10,000.00
	g	Vanilla fermentation box		20 kg /unit	Rs.15,000.00
1.5		Drying Units (Fuel wood or Fuel)			
	a	Drying Trays - Should be located 2.5 feet above floor level			
		Drying trays		i. 100 sq feet minimum	Rs 6,000.00
				ii. > 100 sq feet (60.00 Rs/ sq feet)	Maximum Rs 10,000 .00
	b	Green House Dryer/ Drying Chamber should furnish with drying trays			
		Drying Chambers		i. sq feet 400 – 799	Rs.40,000.00
				ii. > 800 sq feet	Rs. 100,000
	c	Multicrop Driers			
		i	Cabinet	i. 50 kg – 149 kg ii. 150 kg – 299 kg iii. 300 kg or more	Rs 25,000 Rs.75,000.00 Rs.250,000.00
		ii	Flat bed	500 kg or more	Rs 250,000.00
	d	Cardamom Barn		250 kg	Rs.200,000.00
	e	Solar Dryer		Minimum 100 sq feet	Rs. 15,000.00
	f	Drying Floor		minimum 200 sq feet	Rs.10,000.00

b) Processing centres

	Type of building			
2.1	Small scale processing centres New/Repairing (Group B)			
	• New constructions			Maximum amount (Rs)
	a. sq feet 400-599			Rs.100,000.00
	b. sq feet 600 - 999			Rs.150,000.00
	c. sq feet 1000 or more			Rs.200,000.00
	• Repairing/ rehabilitation of old buildings a. 400 sq feet or more		Maximum amount Rs	Rs.100,000.00
		i.Roof	Rs. 25,000.00	
		ii.Ceiling	Rs. 15,000.00	
		iii.Plastering and painting	Rs.15,000.00	
		iv.Tiling of floor	Rs. 25,000.00	
		v. Pavement	Rs. 10,000.00	
		vi.Ventillation	Rs. 10,000.00	
2.2	Central processing centres (Group D)			
	Investment i. Over 01Mn Rs		Rs.250,000.00	Should be more than 1000sq feet
	ii. Over 02Mn Rs		Rs.500,000.00	
	iii. Over 03Mn Rs		Rs.600,000.00	
	iv. Over 04Mn Rs		Rs.700,000.00	
	v. Over 05Mn Rs		Rs.750,000.00	
2.3	Group processing centres (Group C) As per the circular no 3/2014 , (2014/08/01) .			

c) Investment assistance for oil distillation units

Oil distillation units			
Equipment	minimum capacity	maximum investment assistance Rs.	
3.1. New constructions			
• Bark oil	50 kg/batch (minimum)	Rs. 250,000.00	
• Leaf oil	250 kg/batch (minimum)		
3.2. Repair/Improvements			
• Bark oil	50 kg/batch (minimum)	Rs. 200,000.00 (maximum)	
• Leaf oil	250 kg/batch (minimum)		
	i.	Boiler (steel)	Rs.10,000.00
	ii.	Boiler (white steel)	Rs 25,000.00
	iii.	Furnace /chimney	Rs 12,000.00
	iv.	Still for cinnamon leaf - with lid ((stainless steel)	Rs 40,000.00
	v.	Steam conveying tubes with controllers (stainless steel)	Rs 10,000.00
	vi.	Pre-cooler (stainless steel)	Rs 15,000.00
	vii.	accessories	Rs 7,000.00
	viii.	Condenser tube 1½" or 2" (steel, stainless steel))	Rs 25,000.00
	ix.	Oil separator(stainless steel)	Rs 15,000.00
	x.	Goose neck (stainless steel)	Rs 10,000.00
	xi.	Still for cinnamon bark (stainless steel)	Rs 25,000.00
	xii.	Building (sq. feet 1200)	Rs 40,000.00

d) Investment assistance for EAC storage facilities

This assistance scheme was established to encourage GMP in order to achieve and maintain high quality products throughout the value chain.

No.	Area(sq.ft.)	Investment(Rs.)	Assistance (Rs.)
1	300-500	200,000-400,000	50,000.00
2	More than 500	More than 400,000	100,000.00

e) Investment assistance for EAC value added products Industries

This program was initiated to promote the investors to enter into the EAC value addition with GMP to increase the foreign exchange earnings to the country.

No.	Investment(Rs.mn)	Assistance(Rs)
1	More than 2.00	0.70
2	More than 3.00	0.75
3	More than 4.00	0.80
4	More than 5.00	0.90

Table 4.3.3.2 : Progress of the post- harvest assistance scheme in 2015

Item	Number of units granted
Processing centers	37
Distillation units	12
Pepper threshers	73
Blanchers	58
Multicrop dryers	19
Drying floors	6
Graders	1
Coffee pulpers	2
Pepper decorticators	5
Ginger and turmeric slicer	01
Grinder	01
Cinnamon Peeling kits	305
Total	520

4.4 Estate sector EAC development program

Export agricultural crops development program in estate sector was introduced in 1998 with the objective of expansion of EAC cultivations to larger estates by utilizing the available resources. An emphasis was given for crop diversification program with EACs in plantation sector to optimize the profit and minimize risk. Estate management was supported to plan their EAC development programs by senior officers of the department including researchers, whenever necessary. The following table (4.4.1) shows the extent cultivated under the estate sector development program in 2015.

Table 4.4.1: Extent of crop developed under estate sector EAC development program in 2015

District	Crop extent (ha)					
	Cinnamon	Pepper	Clove	Coffee	Cocoa	Areca nut
Kandy	3.1	19.8	5.5	1.1	-	4.1
Matale	-	2.4	0.4	-	1.4	1.6
Nuwara eliya	-	-	0.4	30.5	-	0.2
Kuruneala	2.8	-	-	-	-	-
Kegalle	2.4	0.8	-	-	-	-
Ratnapura	39.65	1.8	-	-	-	0.4
Gampaha	0.4	3.4	-	-	-	1.2
Colombo	38.9	-	-	-	-	-
Kalutara	34.2	-	-	-	-	-
Badulle	-	30.5	0.4	0.4	2.8	1.98
Monaragala	-	1.4	-	-	17.5	0.7
Galle	9.875	1.5	-	-	-	-
Matara	9.7	0.73	-	-	-	-
Total	141.025	62.33	6.7	32	21.7	10.18

4.5 Production and issuing of planting material

The objective of this program is to issue quality planting material for new planting and PIP programs. Planting material was provided to all farmers who were qualified under the development assistance scheme and successfully completed the practices like land preparation, soil conservation and other field operations as per the instructions given by the department officers. Planting material was raised in 11 central nurseries managed by the department (table 4.5.1) and in registered private nurseries under the close supervision of extension staff of the department. There were 388 private nurseries registered with the department during the year 2015. The distribution of private nurseries is shown in table 4.5.1.

Table 4.5.1: Details of the central nurseries of the Department

District	No. of nurseries
Kurunegala	03
Matale	01
Nuwara-Eliya	02
Matara	01
Gampaha	01
Kegalle	01
Hambantota	01
Kandy	01
Total	11

Table 4.5.2: Number of private nurseries registered with the department

District	No. of nurseries	District	No. of nurseries
Kurunegala	22	Matara	29
Matale	26	Galle	36
Kandy	53	Colombo	15
Nuwara-Eliya	22	Gampaha	13
Badulla	46	Kegalle	26
Monaragala	33	Rathnapura	26
Hambantota	23	Kalutara	18
Total			388

Prices of the planting material were revised with effect from 20.08.2012 and that prevailed in 2015 are given in table 4.5.3

Table 4.5.3.Prices of Seeds/cuttings and plants/suckers (Rs.)

Crop	Seed material /cuttings (Rs.)	Plants/ suckers (Rs.)
Cocoa	20.00 per pod	Plant 14.00
Pepper	0.20 per 3 node cutting	Plant 23.00
Coffee	80.00 per kg of ripened fresh berries and 150.00 per kg of parchment, dry coffee beans	Plant 14.00
Cinnamon	80.00 per kg of seeds	Plant 13.00
Cardamom	-	Sucker 10.00
Cardamom		Tissue cultured sucker 50.00
Arecanut	2.00 per nut	Plant 13.00
Vanilla	5.00 per 1m cutting	5.00
Clove		Large Plant 70.00
Nutmeg	10.00 per seed	Seedling 100.00 Budded 180.00
Garcinea	-	Seedling 70.00 Budded 120.00
Kitul	-	Large 45.00 Small 12.00
Citronella	-	2.00 per sucker
Lemongrass	-	2.00 per sucker
Ginger	60.00 per kg	-
Turmeric	30.00 per kg	-

4.6 Plant certification program

Supplying of certified plants to the growers has been made a mandatory requirement by the Department. Starting with good quality plants is a prerequisite in achieving a high productive cultivation. In order to ensure supply of quality plants through EAC development program, a team of officers consisting of a Director, District AD and/or RO and an Extension Officer, or officer appointed by the Director General visited each nursery and plant certification was performed using the guidelines introduced by the Department. The details of certified plants are given in table 4.6.1.

Table 4.6.1: Details of the plants certified in 2015

Crop	Number of plants (certified)
Pepper	1,155,784
Coffee	76,950
Cocoa	333,960
Cinnamon	5,627,900
Arecanut	501,603
Clove	11,260
Nutmeg	14,275
Grand total	7,721,732

4.7 Issuing of plants under the export agricultural crops assistance schemes

Table 4.7.1 Illustrates the details of plants issued under the assistance schemes during 2015.

Table 4.7.1. Issuing of planting material (in numbers) – 2015

Crop	New Planting	*Other	Total
Cinnamon	4,580,660	1,640,028	6,220,688
Pepper	1,099,802	228,640	1,328,442
Coffee	29,500	53,012	82,512
Cocoa	317,130	23,410	340,540
Areca nut	252,579	301,329	553,908
Clove	5,520	2,060	7,580
Nutmeg	12,595	1,769	14,364
Other	8,270	2,856	11,126
Total	6,306,056	2,253,104	8,559,160

(*other includes supplying of plants under productivity improvement program and organic farming)

4.8 Organic farming program

Considering the growing demand for organically produced food in the international market, the department initiated this program for promotion of organic farming in the year of 1998. Major role of the Department in this program was to educate growers on organic farming and principles behind it, establishment of demonstrations in selected villages, encourage them to keep records and, promotion

of the use of organic manure and integrated pest management practices. Farmers were facilitated for marketing their products through introduction of buyers/exporters. The program was targeted to popularize organic farming among EAC growers and bring the benefits of this niche market to them and to the country while conserving the environment.

Table 4.8.1: Extent established under organic farming development program in 2015

District	Crop	Extent (ha)
Kurunegala	Pepper/Cinnamon	98.5
Kalutara	Pepper/Cinnamon	10.0
Kandy	Pepper/Nutmeg/ Clove	0.4
Hambantota	Cinnamon	53.2
Galle	Cinnamon	6.0
Total		168.1

4.9 Farmer training

Farmer training programs were organized and conducted by the Assistant Director in- charge of each district with their supporting technical staff in order to improve knowledge and skills of farmers and other stakeholders with updated technological information and to motivate farmers to adopt improved Good Agricultural Practices (GAP) in cultivation and Good management Practices (GMP) in processing of EACs. Required resource personnel and other services were obtained from the Research Division, whenever necessary, to conduct the training programs. Details of the training classes conducted on the topics of Good Agricultural Practices (GAP) and Good Manufacturing Practices (GMP) in the year reviewed are given in table 4.9.1.

Table 4.9.1: Progress in farmer training 2015

Activity	Number of programs		Number of beneficiaries
	GAP	GMP	
Farmer Training Classes	1,761	366	63,264
Field Days	415	83	15,266

4.9.2 Cinnamon peeler training programs

Experienced cinnamon peeler shortage has become a serious problem in cinnamon industry. Hence, the department has introduced a cinnamon peeler training program as a self-employment generation project in 1988 and was continued during the year 2015 as well. The progress of cinnamon peeler training program is given in the following table (4.9.2.1).

Table 4.9.2.1: The progress of cinnamon peeler training program

District	Number of beneficiaries
Kegalle	20
Gampaha	58
Rathnapura	62
Colombo	45
Kalutara	69
Galle	105
Badulla	12
Matale	13
Nuwara-Eliya	0
Hambantota	80
Matara	160
Kurunagala	107
Kandy	12
Monaragala	09
Total	752

4.9.3 Training programs conducted in In-Service Training Centre, Matale

Progress of the training programs held at the In-Service Training Centre, Matale is given in table 4.11.3.1.

Table 4.9.3.1: Details of the training programs conducted at In-Service Training centre, Matale

Type of training	Nature of trainees	Number of training programs conducted	Number of trainees trained	Number of training days	Number of man-days
Officer training	Officers of DEA	29	827	70	2,060
Officer training	Officers of other institutes	18	626	33	951
Farmer training	Farmers and other stakeholders	8	327	8	327
Conferences and workshops	Stakeholders of EAC sector	12	980	12	980
Total		67	2,760	123	4,318

The training program:ms were conducted for stakeholders of EAC sector including farmers on establishment of crops, maintenance and post-harvest technology, ginger, turmeric and pepper in particular.

4.10 Establishment of demonstrations

Field demonstrations were established and maintained at each Extension officer division to educate growers on Good Agricultural Practices (GAP) to increase crop yield and to reduce the cost of production. Field demonstrations were used for training programs and for dissemination of technology too. The details of demonstrations established are shown in table 4.10.1.

Table 4.10.1: Demonstrations established and maintained in different districts in 2015

District	Number of demonstrations Established/Maintained
Kurunegala	1
Matale	7
Kandy	18
Moneragala	4
Matara	2
Galle	4
Kegalle	6
Total	42

4.11 Other development programs

Uva-Wellasse cocoa development project, which is meant for introduction of Export Agricultural Crops to non-traditional areas; small plantation development program; two million areca nut program and the activities related to pepper pruning week are other development programs that were carried out within the year 2015. These programs are described below.

4.11.1 Uva-Wellasse cocoa development project

This project was initiated to establish 270 ha of cocoa under rubber in Monaragala District of Uva province. In spite of prolonged drought, 227.65 ha of cocoa have been successfully established. In order to meet this target, 228,640 cocoa seedlings were raised and distributed among beneficiaries. A sum of Rs.Mn.3.44 was spent on the project for production of plants and training of farmers.

4.11.2 Introduction of export agricultural crops to non-traditional areas

Nearly 3000 pepper plants and 46,700 arecanut seedlings were distributed in non-traditional Export Agricultural-Crops growing Districts: Polonnaruwa and Anuradhapura. The DEA supplied plants and technical assistance to this collaborative program implemented with Sri Lanka Mahaweli Authority. Plants were given to lands where shade was sufficiently established. The number of plants distributed are given in table 4.11.2.1 as follows.

Table 4.11.2.1: The number of EAC plants distributed in non-traditional EAC growing Districts in 2015

District	Type of export agricultural crop and number of plants distributed	
	Pepper	Areca nut
Polonnaruwa	-	7,100
Anuradhapura	2,975	39,600
Total	2,975	46,700

4.11.3 Small plantation development program (SPnDP)

EAC were distributed among members of farmer societies in Kandy, Nuwaraeliya and Kegalle districts for intercropping with tea under the SPnD project. The details are given in table 4.11.3.1

4.11.3.1: Distribution of plants for intercropping with tea under SPnD project

District	No. of farmer societies	Number of plants distributed		
		Cinnamon	Pepper	Arecanut
Kandy	38	-	4,317	
Nuwaraeliya	19	-	2,975	2,000
Kegalle	21	2,500	1,212	-
Total	78	2,500	8,504	2,000

A productivity improvement program was also implemented under the assistance of SPnDP in Kandy and Kegalle Districts. Under this program, productivity of pepper vines, which have already been established in tea cultivations, was improved. In this program 300 farmers in Kandy Districts and 99 farmers in Kegalle district were benefited. One thousand one hundred and twenty-three farmers were trained as follows (Table 4.11.3.2).

Table 4.11.3.2: Training programs conducted under SPnDP for beneficiaries of EAC

District	Number of training programs held	Number of beneficiaries
Kandy	39	706
Nuwaraeliya	4	320
Kegalle	5	97
Total	48	1,123

4.11.4 Pepper shade pruning week

The major factor impede the yield of black pepper is the excessive shade in black pepper cultivations. Pepper pruning week was meant for mass-scale pruning of gliricidea shade trees of pepper cultivations in order to facilitate light penetration to increase yield of pepper vines. The pepper growers were encouraged for shade tree pruning and applying green manure at the base of the vines. The pepper pruning week lasted from 09^{h} to 16th September 2015. This program was implemented island wide covering 8,063.2 ha of pepper cultivations belonging to 15,354 farmers. The details of the program are given in the Table 4.11.4.1.

Table 4.11.4.1: Progress of pepper pruning week (from 09th to 16thSeptember)

District	Number of ds divisions covered	Number of GN divisions covered	Number of pepper growers involved	Extent of pepper cultivations pruned (ha)
Kegalle	13	190	4,028	851.55
Hambantota	07	16	201	1,421.65
Galle	05	05	88	10.83
Matara	11	15	384	45.50
Kurunagala	10	38	1,399	613.22
Badulle	0	10	1,242	865.00
Nuwaraeliya	04	09	373	220.00
Kalutara	11	19	443	42.70
Colombo	2	10	91	14.16
Ratnapura	08	58	2,585	1,318.00
Monaragala	08	43	1,350	600.44
Matale	11	58	1,598	1,605.60
Kandy	12	31	760	246.65
Gampaha	12	49	812	204.90
Total	114	551	15,354	8,063.20

4.11.5 Two million arecanut planting program

Two million arecanut seedling planting program was launched as a special project for two years lasting from 2015 to 2016. The objective of this program was to increase arecanut production to fulfil national requirement and increase arecanut exports. Under this program, arecanut seedlings were distributed in selected cultivable lands, estates, home gardens, government office premises, camps of armed-forces, boundaries of stream, tanks, roads and forest reserves. The details of the seedling distribution program in 2015 are given in table 4.11.5.1.

4.11.5.1: Arecanut seedlings distributed in 2015

District	Target(No. of seedlings)	Progress(No. of seedlings)
Colombo	50,000	50,000
Gampaha	70,000	46,060
Kalutara	70,000	94,965
Galle	60,000	67,750
Matara	30,000	7,300
Hambantota	70,000	90,000
Kandy	80,000	21,000
Matale	120,000	135,380
Nuwaraeliya	50,000	12,382
Kurunegala	120,000	72,280
Kegalle	70,000	63,900
Ratnapura	70,000	121,520
Badulla	70,000	54,000
Moneragala	70,000	31,500
Total	1,000,000	868,037

4.12 Progress of media and communication division

The prime objective of the media and communication division is to link all the stakeholders and enhance their awareness and knowledge on Export Agricultural Crops (EAC) industry. For this purpose audio-visual media streams such as electronic and printed means are used. In addition, exhibitions, demonstrations are also done by this division to raise public awareness on the EAC sector. All the media and publicity events are guided, formulated, organized and dispersed towards the enrichment of the vision of the Ministry of Primary Industry and the Department of Export Agriculture.

4.12.1. Electronic media

National level mass media usage facilitates the coverage of the highest number of stakeholders in cost effective manner. All the documentary, commercial and other programs telecast / broadcast were in-house productions of the division. The following table (4.12.1.1) shows the all-electronic media activities performed in year 2015.

Table 4.12.1.1: Details of television programs, radio programs and CD/DVD produced

No	Media	Name of the program	No. of episodes	Chanel broadcast
01	*Rupavahini*	*Sengawunu Kahawanu*	24	National television channel
02	TV Spot	Nutmeg leaf fall disease		National television channel
03	Radio	*Rasa Janani*	48	Kandurata, Ruhunu, Wayamba, and Swadeshiya Sevaya of SLBC
		Kahawanuthuru	24	Kandurata Sevaya of Sri Lanka Broadcasting Cooperation.
04	Radio Spot	Technical Information on Export Agric. Crops	04	Kandurata Sevaya SLBC (at Dalada Perahera Season)
05	CD / DVD	Spice and Associated topics	07	As Internal Demonstration Aids

4.12.2. Press media

Generally, to keep the stakeholders aware with timely updates and the newly generated knowledge were mainly delivered through the press media. For this purpose, national level newspapers were used and also sought the supports of regional level journalists to further dissemination of such information in their own newspapers. Table (4.12.2.1) shows the relevant activities done in year 2015.

Table 4.12.2.1: Publishing of EAC related prices and articles in national newspapers

No	Item	No Of Occasions	Newspaper
01	Price list of export agricultural crop products	52	Dinamina (Every Friday)
02	Timely news and feature writings	20	Dinamina, Diwaina, Mawubima,Ada, Kanda and Riwira

4.12.3 Technical bulletins and leaflets published

Technical bulletins and leaflets etc. are the prime source of technical information and knowledge records in the sector. The department urges to generate new and updated knowledge on behalf of the stakeholders' regularly. Table (4.12.3.1) shows the relevant activities done in year 2015.

Table 4.12.3.1: Details of printed material published in 2015

No	Category	Names of item	Total no. printed
01	Technical bulletins	Pepper, Cloves, Cinnamon, Nutmeg, Vanilla, and Ginger	80,000 copies.
02	Leaflets	Pepper, Cinnamon, Betel, Cinnamon, Nutmeg, Arecanut, Ginger and Turmeric	141,000 copies.
03	Flex / Banners	Crops and associated	12
04	Magazine	"Sarathee"	3,000

4.12.4. Demonstrations / Social media

Direct interaction with the stakeholders brings better results than other media activities performed since it interacts with the live and active two-way social communities. Therefore, such sources and streams play a crucial role in delivering the particular information towards the betterment of the spice sector. Following table (4.12.4.1) shows the relevant activities and service details in year 2015.

Table 4.12.4.1: Usage of activities related to two-way social communities

No	Item	Function	No. of incident / addressed
01	Exhibition	Stalls and demonstrations	10
02	Websites	www.Exagri.info www.exportagidept.gov.lk	02
03	Social Media / FB / Twitter	Department of Export Agriculture	1,500
04	Counseling	Visitors Advice / Telephone	2,500

4.12.5 Other special events engaged in

- Generally, indoor and outdoor media and communication needs of the department were facilitated by division throughout the year. However, as the special events such as "Newum Kurundu Mangalya" and Annual Symposium of Minor Export Crops (ASMEC) were the main highlights performed while other timely important functions were also supported with appropriate media needs.

පර්යේෂණ
ஆராய்ச்சி
RESEARCH

5. RESEARCH DIVISION

Highlights of the research division

- New Black pepper hybrids namely *Bootawe Rala Kohukumbure Rala* and *Dingi Rala* were officially released
- A new Arabica high yielding variety of coffee : *Lak Perakum* was officially released.
- Two selected accessions of *Naram-malee* and *Naram-rathee* of exportable quality were officially released.
- New arecanut variety of *Matale Sinha* was released.
- Pepper growing with different cover crops such as *Arachis pintoi* and *Desmodium ovalifolium* can enhance shoot and leaf growing of black pepper while enhancing the soil moisture retention.
- The National Spice Park was established in Matale.
- Cinnamon leaf based compost was invented to curtail inorganic fertiliser and improve soil properties.
- Application of Dolomite at the rate of 750 kg ha^{-1} proved beneficial for cinnamon
- Triforin @ 76 ppm and Copper Oxi Chloride (COC) at 2000 ppm under *invitro* condition were proved effective in controlling all the pathogens involved in Nutmeg leaf-fall disease

5.1 Technical functions and organization of research division

The Research Division operates under the supervision of the Additional Director General (Research) and consists of three main units: Commodity Research Unit, Economic Research Unit and Plant Protection Unit. Central Research Station and six sub-stations had constantly been developing appropriate technologies to solve farmers' problems and new technology to enhance the production, productivity and quality of Export Agricultural Crops.

Central Research Station and Plant Protection Unit operate under the Director (Research) of Matale. National Cinnamon Research and training centre and inter cropping and Betel Research Station also operate under two Directors (Research) while other sub-research stations function under the supervision of the respective Deputy/Assistant Directors in-charge. The progress of the research projects conducted in 2015 at the main research station and other sub-stations are described below, on crop and discipline basis.

5.2 Research achievements on Export Agricultural Crops during the year of 2015

5.2.1 Cinnamon

Soil and plant nutrition

- Integration of cinnamon leaf compost 10t $ha^{-1}yr^{-1}$ with half of current fertilizer recommendation (450 kg ha^{-1} yr^{-1}) recorded 4% bark yield increase in cumulative bark yield of four harvests when compared to current fertilizer recommendation (900 kg ha^{-1} yr^{-1}) for cinnamon indicating the possibility of sound practice of Integrated Nutrient Management in Cinnamon to reduce the fertilizer cost and improve the soil quality.
- Application of Dolomite at the rate of 750 kg ha^{-1} enhanced the soil fertility status and nutrient availability of cinnamon growing soils compared to current Dolomite recommendation of 500 kg ha^{-1} indicating the necessity of increasing existing Dolomite recommendation from 500 to 750kg ha^{-1} for cinnamon growing soils.

Plant protection

- Yield performance and Economic Injury Levels (EILs) were tested in three different severity levels (low as control, moderate and higher) in three different age (years) levels of cinnamon cultivation (<20, 21 – 40 and 41-60) when cinnamon fields were infested with Wood Boring Moth (WBM). Considerable yield losses (30 – 50 %) occurred due to cinnamon WBM after a certain severity level of infestation. This could be reduction of harvestable stems per bush, reduction of the number of bushes due to damage and finally reduction of average dry bark yield per bush.

- Several good agricultural practices (selective pruning, slash weeding, heaping of soil into base of bushes and environmental friendly pest and disease management practices) and their combinations were compared with general practice of cinnamon fields. There was a significant reduction in pest and disease incidences especially rough bark disease and wood boring moth damage among the treatments. Lower pest and disease incidences (from 60 to 10 %) were recorded in plots where good agricultural practices were established and 25 % of average yield increment was observed when all the practices were integrated.
- Abundance of soil invertebrates as well as diversity of them was significantly varied according to the practices implemented. Management of weed layer in cinnamon plantations is very important for improvement of some abiotic factors such as soil moisture and organic matter that increase abundance of soil invertebrates. This may indirectly be affected to improve the productivity of cinnamon lands. Soil invertebrates are very important to improve soil health for sustainable cinnamon cultivation since they are important for recycling nutrients within the system and natural pest control.

Postharvest Technology

- Effect of mechanical harvesting on regeneration of true cinnamon was studied. Overall results indicated that plants smaller than 15 cm girth, can die due to extra shock produced by mechanical harvesting. There is no significant difference between manual harvesting and mechanical harvesting on shoot formation and growth of new shoots and there was a trend of improvement.
- A new peeling table with low space requirement was developed and compared with the existing table and, it is expected to evaluate for improved working conditions, peeler comfort and compliance with food sanitary requirement.

5.2.2 Black Pepper

Agronomy

Incorporation of partially burnt paddy husk, phosphorous and mycorrhizae to the potting media for propagation of pepper (*Piper nigrum* L.)

The effect of different potting media for propagation of pepper (*Piper nigrum* L.) and their influence on root system development was investigated. In consequence, it was observed that, 66% of root growth improvement in nursery stage could easily be obtained in comparison with the department recommended potting mixture, when the potting media comprising top soil, well decomposed cattle manure, river sand, coir dust and partially burnt paddy husk at the volumetric ratio of 2:1:1:1:3 with 75 g of AM (*Glomus mosseae*) inocula containing approximately 795 spore fungal hyphae and Eppawala Rock Phosphate (50µg/g soil) was applied.

Impact of canopy light interception on spike initiation and other yield parameters

Three different shade levels of 0%, 40% and 60% were maintained in a five year old pepper field with three cultivars of MB-12, GK- 49 and Panniyur-1. Yield attributes were observed at two weeks intervals during spike initiation to harvesting (8 months). All the yield attributes varied significantly among applied shade levels and highest values of number of spike per plant (78), spike length (15.66cm), spike filling percentage (92.5%), number of fruits per spike (124), fresh berry weight of 10 spikes (191.4g) and dry berry weight of 10 spikes (80.9g) recorded with panniyur-1 under 0% level shade condition. All these parameters were followed by MB-12 and GK-49 respectively at the same shade condition. All the values decreased progressively with the increasing shade, thus it is evident that shade management in black pepper is an imperative factor for increasing the yield. Panniyur -1 seems to be highly sensitive for light intensity as compared to other tested cultivars.

Variation of some yield quality parameters of black pepper under different shade levels

Variation on yield quality parameters: bulk density, piperine content and oil content were tested under different shade level of black pepper. Three shade levels of 0%, 40-50% and 70-80% were maintained from spike initiation to harvesting (8 months). All the quality parameters were highest in pepper under 0% shade level (Bulk density -572.9 g/L, Piperine 12.5% and Oil content – 4.6%) and decreased with increasing shade level. The lowest bulk density (161.9 g/L), piperine content (9.4%) and oil content (2.2%) were reported at the highest shade level of 70-80%.

Planting material production of black pepper through terminal branches (uprights)

A new technique was developed to collect terminal shoots within a short period of time and at the same time to maintain a mother plants garden for production of high yielding planting material. In this method, plant originated from terminal shoots are maintained at 120cm x 60cm spacing and first harvest of upright stem cuttings can be done after 4 months. Four to five stem cuttings per vine can be collected at the first harvest and it increased up to 12-15 in subsequent harvests which take less than 4 months. Approximately, 2800-3000 plants of 5 nodal stem cuttings having two short lateral branches can be produced at the second harvest and onwards with maintaining of 200 mother plants within an area equal to 12m x 12m**.**

Clustering pattern of selected black pepper (*Piper nigrum* L.) cultivars in Sri Lanka based on morphological, yield and chemical characters

The clustering patterns of eight local black pepper cultivars (IW5, MB12, MW18, MW21, GK49, KW30, KW31and KW33) and two introduced cultivars (Panniyur-1 and Kuching) were investigated based on the morphological, yield and chemical characteristics.

According to the results, all the cultivars clustered into three separate clusters. Consequently, the cluster 1 exclusively consisted of variety Kuching, while, the cluster three included Panniyur -1 and local selection IW5. Moreover, the cluster two comprised the rest of the cultivars together. The outcome of the experiment would productively be utilized in Black pepper hybridization programs.

Evaluation of different rapid multiplication techniques of pepper for commercial plant production

Different multiplication techniques of pepper including bamboo method, heap with coir dust, heap with paddy straw, heap with saw dust and polythene tube method were evaluated to determine the best method for commercial plant production. According to that, maximum number of cuttings per unit area was obtained from polythene tube method. The best overall plant growth performance was observed in heap with saw dust method.

Plant protection

Major population parameters of selected soil organisms in different land use systems at Uda Dumbara area

Three land use systems: pepper based Kandyan home garden, natural forest and chemical used agricultural lands were evaluated for certain soil biological parameters. Highest numerical abundance of earth worms (78 individual m^{-2}) was observed in natural forest (NF) followed by plot of black pepper dominating home garden (HG) (73 individual m^{-2}). Least abundance (1 individual m^{-2}) was observed in plots of agro-chemical used agricultural field (CF). The abundance of free-living nematodes in natural forest was as high as 28 individuals in 20g of soils. Free-living nematodes abundance was significantly different between HG and NF as well as FF and CF. Arbuscular mycorrhizae (AM) spore densities ranged from 148-243 spores 50 g^{-1} of soil, with the highest count occurring in the natural forest and agricultural field after fallowing period.

Trichoderma spp.; the common biological control agent was abundant in natural forest as well as in the black pepper dominating home garden but not found in the agricultural field after fallowing period and chemicals used agricultural field. *Fusarium* spp.; was found only in chemicals used agricultural field. Soil biodiversity of Uda Dumbara area indicated that black pepper based Kandyan home garden system was superior to other cropping systems associated with annuals.

Postharvest Technology

Development of dehydrated green pepper

This research was conducted to develop a processing protocol for dehydration of green pepper. Ascorbic acid, citric acid and sodium metabisulfite (SMS) were used to preserve the color at two concentrations 2% and 4% respectively. Local pepper samples were blanched at three different temperatures 80 ^{o}C, 90^{o}C and 100^{o}C for 3 min. and 5 min. respectively. Standard colour charts were

used to compare the colour of the treated samples. Treatment combination of 2% and 4% SMS, blanching at 100^{o}C for 5 min has given the green colour of dehydrated pepper. Therefore, it was recommended the use of 2% SMS, blanching at 100^{o}C for 5 min for the production of dehydrated green pepper.

Genetics and plant breeding

Three new Black Pepper hybrids namely *Bootawe Rala, Dingi Rala, Kohukumbure Rala* were officially released following experiments over 18 years.

Soil Science and plant nutrition

The effect of cover crops on black pepper cultivation

Pepper was grown with *Arachis pintoi, Mucuna bracteata and Desmodium ovalifolium* as cover crops and without cover crops. The result showed that growing *Arachis pintoi* and *Desmodium ovalifolium* as cover crops can enhance shoot and leaf growth of young vines of black pepper while enhancing the soil moisture retention.

Comparative evaluation of soil fertility status of DELMIX model with marginal grass land and conventional pepper land in mid country

This study revealed that phosphorus (P) accumulation is high in lower layers of manure circles of organically grown DELMIX model. The maximum Olsen phosphorus content within the manure circle of DELMIX at lower layer (7.5 to 15 cm) was 63.6 mg kg^{-1}of soil while it was 41.98 mg kg^{-1} of soil in conventional pepper land at same site and same depth. Overall results suggest that in the process of conversion of conventional mature pepper plantations into organic systems, only organically recommended manure without rock phosphate fertilizer can be applied for few years.

Effect of bio-char (partially burned paddy husk) and soil moisture regime on post nursery field establishment stage of black pepper

Plants grown in a potting media containing 1:1 mixture of top soil: bio char gave significantly high mean root dry matter under each 4 day and 7 day watering regime and this media contained significantly high amount of Potassium (K).

Physiology and plant production

Rooted cuttings from orthotropic (terminal), plagiotropic (lateral branches) and single nodal cuttings from Bamboo Rapid Multiplication System of two local pepper selections (GK49 and MB12) were field planted in January 2010. In the second year, number of spikes were significantly higher (54) in plants originated from orthotropic cuttings than in other two types. In third year plants originated

from orthotropic cuttings and pre- rooted single nodal cuttings showed higher number of spikes, 135 and 107 respectively. Number of spikes from plants from plagiotropic cuttings showed the lowest number of spikes 14 per plant. A similar trend was followed in the fourth year also. As per the results of the nursery and the field experiments, orthotropic shoots from the top most part of the pepper plants appeared to be the best for the pepper plant production, as they produce well branched canopy with good structure and early bearing.

5.2.3 Cocoa

Soil and plant nutrition

Investigation on relationship between availability of soil nutrients and cherrelle wilt incidence in cocoa

According to a study on available soil nutrients and pod development of cocoa revealed that there was no relationship between availability of soil nutrients such as N, P, K, Mg, Ca, Zn and cherrelle wilt incidence in cocoa. However, all types of mature, immature and wilted cocoa pods had high amount of K (1.6-2.3 %) and cocoa litter contained significant amount of N (0.6 %) and Mg (0.3 %)

5.2.4 Coffee

Genetic and plant breeding

A new Arabica high yielding Coffee variety called *Lak Parakum* was officially released following experiments over 17 years.

5.2.5 Ginger

Agronomy

Effect of soil moisture on initial growth and yield parameters of ginger

Growth and yield parameters of ginger were monitored with different irrigation intervals (II) of 5days, 10days, 15days, 20days and control (without irrigation) and data were recorded with two weekly intervals. The highest level of soil moisture and lowest canopy temperature were observed in 5days II. Gradual decrease of soil moisture and increase of canopy temperature were observed with longer irrigation interval. Above both micro-meteorological parameters were highly fluctuated in control treatment. Lowest number of days for germination, highest germination percentage, maximum plant height, highest fresh and dry weight of above ground part and highest fresh and dry weight of rhizome were recorded with ginger maintained at 5days II. But the highest number of pseudo-stems per bush and highest number of leaves per pseudo-stem were recorded with the plants at control treatment.

Feasibility of Planting Ginger (*Zingiber officinale* Rosc.) during off-Season in the Low country Intermediate Zone of Sri Lanka

The study was conducted to examine the feasibility of planting ginger during off-season in the low country intermediate zone of Sri Lanka. As a result, ginger was planted in normal planting season in April and off- season in October and November. However, there is no significant difference in terms of yield in considered planting times except in November. The yields of April and October were 1057 g/bush and 964 g/bush respectively. Therefore, if supplementary Irrigation can be provided, ginger can be grown in off- seasons as well.

Genetics and plant breeding

Collection and conservation of ginger germplasm

Fifty three ginger accessions were collected from the growers' fields in the districts of Kurunegala, Gampaha, Kalutara, Galle, Matara, Hambantota, Monaragala, Nuwara Eliya, Matale, Kegalle, Jaffna and Ampara. Collected accessions were established in an *ex-situ* conservation field at Intercropping and Betel Research Station, Narammala.

Soil and plant nutrition

Effect of higher levels of Nitrogen, Potassium and different irrigation intervals on growth and formation of rhizome of ginger

Findings of the experiment clearly indicated that the vegetative growth and formation of rhizomes were induced by higher nitrogen and potassium levels and short irrigation intervals. Ginger plants prefer wet soil condition rather than the dry soil. Therefore, during the early stages of growth, soil moisture highly influences the sprouting of ginger shoots and further, facilitates the absorption of plant nutrients.

The study revealed that the low irrigation intervals (once in every two days) under every fertilizer level (high and low N and K levels (Urea -82 kg, MOP 42 kg and Urea 246 kg, MOP 126 kg) showed a positive impact on both vegetative growth and formation of rhizomes.

Plant protection

A study on Ginger rhizome fly (*Mimegralla coeruleifrons*)

Some studies on Ginger rhizome fly (*Mimegralla coeruleifrons*) have been carried out, revealing that the pupal and adult stages of *M. coeruleifrons* lasted for 13.4 to 16.69 days and 14.28 to 20.74 days respectively. It was found that the Chinese cultivar is more susceptible for its attack than the local

cultivar of Ginger. One of the pupal parasitoid of rhizome fly, *Trichopria* spp. was recorded for the first time within Sri Lanka.

Effect of rhizome scales and mealy bugs on germination and yield of ginger

Results of the effect of rhizome scales insects on germination and subsequent yield of ginger revealed that mealy bugs (*Formicococcus* sp.) infected ginger seeds were shown low germination as well as low fresh yield than Scale insects (*Aspidiella hartil*) infected seed ginger.

Postharvest Technology

Improvement of Ginger peeling machine

The existing ginger peeler was modified to be used for peeling ginger to produce bleached ginger and value added products. The local ginger should be peeled at 103 rpm for 15 minutes and Chinese ginger should be peeled at 103 rpm for 10 minutes. The capacity of the machine varies with the type of ginger and it is 15 kg/hr for local ginger while 20 kg/hr for Chinese ginger. Cost of peeling per kilogram for Local and Chinese ginger is Rs. 7.01 and Rs. 5.21 respectively.

Investigation on the effect of different storage conditions for germination ability of ginger (*Zingiber officinale*) and turmeric (*Curcuma longa*) as seed rhizomes

This study was conducted to find out a suitable storage method for ginger and turmeric. Results revealed that both ginger and turmeric can be stored under 19 ^{0}C -20 ^{0}C up to five months with 25% weight loss, 16 % sprouting percentage and 2 % deteriorate rate in low country intermediate zone. In comparison with the diverse storage conditions, the best condition is the cold storage method than other storage media conditions which were soil, sand, coir dust and paddy husk for both ginger and turmeric in low country intermediate zone.

Physiology and plant production

In vitro propagation of ginger

MS medium supplemented with 2mgl-1 BA and 0.25mgl-1 NAA has shown the best performance of initial multiplication of local ginger buds. However, same basal medium supplemented with 4 mgl-1 BA and 0.25mgl-1 NAA has shown the highest rate of multiplication for ginger cultivars of Chinese and Rangun.

5.2.6 Turmeric

Genetic and plant breeding

Collection and conservation of turmeric germplasm

Sixty seven turmeric accessions were collected from fields in the districts of Kurunegala, Gampaha, Monaragala, Matale, Jaffna and Ampara. Collected accessions were established in a field gene bank at Intercropping and Betel Research Station, Narammala.

5.2.7 Betel

Agronomy

Identification of low cost potting mixture for propagation of betel

A low cost potting media was examined for propagation of betel *(Piper betle)* and consequently, seven treatments which were comprised with combinations of top soil, sand, cattle manure, coir dust and partially burnt paddy husk were attempted. In accord with the result, partially burnt paddy husk can be used instead of sand and coir dust in making potting mixture. Therefore, the best combination is top soil, cattle manure and partially burnt paddy husk at the ratio of 1:1:3.

Evaluation of cost effective potting mixture for commercial betel (*Piper betle* L.)

At present, commonly used recommended potting mixture for betel comprises top soil, sand, cow dung and coir dust in equal parts. However, due to unavailability of cow dung and sand along with high production cost of the potting mixture, the net profit of nursery owners greatly decreases. Therefore, the novel low cost potting mixture was found as a solution for pot producers.

Dust of dry gliricidia leaves, and granite dust and chips can be used as components for a potting mixture for betel with the proportion of top soil 2: granite dust 1: chips 1: gliricidia 2: coir dust 2, replacing traditionally used cow dung and sand.

Postharvest technology

Development of technology to produce beverage from betel leaves (*Piper betle* L.), Sensory evaluation and determination of chemical constituents of betel drink developed

Betel oil and oleoresin were used to produce betel drink. Product was tested by ITI for Safrol content. A Betel soft drink was developed which can be recommended for the community as a betel value added product.

Genetic and plant breeding

Collection and evaluation of Betel (*piper betle* L.) germplasm with promising leaf quality characters

A number of betel accessions were collected from Kurunegala District, covering several Extension Officer (EO) ranges (Polgahawela, Welpalla, Kuliyapitiya, Wariyapola, Dambadeniya, Weerabugedara, Katugampala, and Alawwa) in order to evaluate high yielding betel cultivars with promising leaf quality characteristics. As a result, out of 67 betel accessions, two promising accessions were selected based on their significance with regard to the considering characteristics.

The selected accession "**Naram-malee**" comprises 75% of export quality leaves per vine along with 26 cm of average leaf length, 17 cm of average leaf width, and 8 g of leaf weight. Moreover, the average number of leaves per vine varies from 60 to 65 in three weeks harvesting intervals. In addition, the second selected accession"**Naram-rathee**" contains 80% of export quality leaves, out of 60 to 50 total numbers of leaves per vine. Apart from that, the average leaf length, average leaf width and the average leaf weight were 25 cm, 19 cm and 8 g respectively.

These two accessions were released to farmers on 17th of November 2015.

5.2.8 Arecanut

Genetic and Plant Breeding

Matale Sinha (yield, 770 nuts/tree/year), a new variety, was released

5.2.9 Nutmeg

Plant protection

Management of Nutmeg (*Myristica fragrance*) Leaf Fall Disease (NLFD)

Five different fungal isolates which are morphologically similar to the fungus *Colletotrichum* spp. and one fungal isolate morphologically similar to the fungus *Pestalotia* spp. were isolated from the infected leaf samples. Pathogenecity was tested using Koch's postulation and it was confirmed that these fungal isolates caused the disease. Out of five fungal isolates three isolates showed 96% similarity *to Colletotrichum gloeosporioides* and *Glomerella cingulata.* The fungal isolate morphologically similar to the *Pestalotia* showed 88% similarity *to Pestaloptiopsis mangiferae* in DNA homology search. All the pathogens involved with the NLFD can be effectively controlled by Triforin® @ 76ppm and Copper Oxi Chloride (COC) @ 2000ppm under *in vitro* Condition.

Fallen dead leaves, pericarps and twigs samples were collected from NLFD infected farmer fields. Collected samples were observed under the microscope. Perithecia with different maturity stages were observed under the microscope such as perithecia encloses with immature asci and asci did not formed ascospores, and perithecia enclose with mature asci and ascospores formed and mature in

asci. Acervuli also observed in the samples. Hence, the causal organism of NLFD exist both sexual (perithecium) and asexual stage (acervulus).

Physiology and plant production

Field evaluation of grafted nutmeg was carried out in Matale and Gasnawa. The number of fruits per plant was higher in selection B (Delpitiya selection) in Gasnawa (55) and Matale (157) and selection E respectively. More or less 1200 seeds were put into sand beds for future grafting process.

5.2.10 Goraka

Postharvest technology

The comparative phytochemical, mineral and proximate content between dried rinds of four high yielding *G. quaesita* selections : Ovilikanda-I, Ovilikanda-II, Gasnawa and Aranayaka-I were investigated.

Hydroxycitric acid (HCA) content of three selections of Ovilikanda-I, Gasnawa and Aranayaka-I was within the range of 2.16% to 1.89% and the differences were not significant. The lowest HCA content of 1.26% (Ovilikanda-II) was significantly smaller than all the other three selections.
According to the findings of the present study, HCA content of dried rinds of *Garcinia quaesita* showed less than in other *Garcinia* species in comparable research findings. Flavonoid content observed was significantly higher in Ovilikanda I than in other selections. The results of proximate analysis revealed that Ovilikanda I was richer in acid insoluble ash and dry matter while Gasnawa selection exhibited greater amount of crude fat and crude protein. It was found that significantly higher amount of crude protein and Nitrogen contents in Aranayaka I selection while Ovilikanda II selection exhibed highest total ash content.

Physiology and plant production

Field evaluation of grafted goraka was carried out in Matale Research station and Gasnawa Central nursery. Field establishment, growth performances were higher in Gasnawa than Matale. The average number of fruits per plant was higher in C1- Aranayake selection (130) followed by B-Gasnawa selection (125). Grafted goraka could be recommended for field cultivation as well as selection C1 is the best among tested selections. This research will be terminated in December, 2015.

5.2.11 Clove

Management of leaf fall disease (leaf blight and leaf spots) of clove (*Euginia caryophyllus*) in mid country

Leaf samples with typical disease symptoms were collected from the infected clove plants. Two different fungal isolates which are morphologically similar to the fungus *Cylindrocladium* and one fungal isolate morphologically similar to the fungus *Colletotrichum* were isolated from the infected leaf samples. Two different *Cylindrocladium* isolates named as *Cylindrocladium* A and *Cylindrocladium* B and followed Koch's postulation with three fungal isolates to confirm the pathogenicity. In pathogenicity test following results were received.

Table 5.2.1**1**.1 : Symptoms development in each fungal isolate in the pathogenicity test

Treatment (fungal isolates)	Symptoms observed in treated plants
Cylindrocladium A	Leaf spots
Cylindrocladium B	Leaf blight
Colletotrichum	No symptoms observed
Cylindrocladium A + B	Leaf spots + Leaf blight
Cylindrocladium A + *Colletotrichum*	Leaf spots
Cylindrocladium B + *Colletotrichum*	Leaf spots + Leaf blight
Cylindrocladium A + B + *Colletotrichum*	Leaf spots + Leaf blight
Control	No symptoms observed

Above results revealed that *Cylindrocladium* B fungal isolate caused the Clove leaf blight and *Cylindrocladium* A or *Cylindrocladium* A combination with *Colletotrichum* isolates caused the Clove leaf spots.

Two different *Cylindrocladium* isolates were isolated from Clove leaf spots and leaf blight infected leaf samples. Out of two different *Cylindrocladium* isolates one *Cylindrocladium* isolate caused leaf blight disease of clove.

Other research

Potential use of tea refuse as a compositing material

A study was carried out to investigate the potential use of tea refuse as a compositing material showed that tea refuse is more economical as a composting material at a ratio of tea refuse: cow dung: gliricidia and cut grasses 1:1:1:1 volumes in composting recipe. Original tea refuse had slightly acidic pH (4.4), a C: N ratio of 13:1 , 31.2% organic C, 2.4% total N, 0.2% available P, 2.1%

K, 0.3% Mg and 17.4% of total polyphenols. During decomposition, presence of macro-organisms was very poor in all recipes containing tea refuse. A gradual reduction in total polyphenol contents was observed during decomposition. Values of pH, C:N ratio, percentages of organic C, total N, available P, exchangeable K, Mg and total polyphenols of final composted product were 6.8, 9:1, 6.5%, 0.8%, 0.02%, 0.3%, 0.15% and 1.7% respectively. There were about 80-100% germination of vegetable seeds on decomposed products while zero germination on original tea refuse.

Preparation of digital maps

Digital maps were prepared for mega zones of Sri Lanka for Export Agricultural Crops such as black pepper, cinnamon, clove, nutmeg, ginger, turmeric and cocoa.

5.3 On-going research during the year 2015

5.3.1 Cinnamon

- Effect of compost and inorganic fertilizers and their combinations on growth and yield of cinnamon
- Development of Integrated Pest Management (IPM) program for cinnamon wood boring moth (*Ichneumoniptera cinnamomumi*)
- Study on the effect of sea water for managing pests and diseases in cinnamon nurseries.
- Effect of dolomite application on growth and yield of Cinnamon grown in acid soils
- Effect of growing gliricidia and legume cover crops on growth, yield and soil fertility status in cinnamon
- Development of crop health based IPM package for managing major pests of cinnamon
- Investigation of possibility of using sub soil to make potting mixture for cinnamon with different organic/inorganic fertilizers and bio-fertilizers
- Characterization and evaluation of soil fertility status of selected soils of major cinnamon growing areas and crop productivity relations
- Nursery studies in cinnamon: Effect of cinnamon wood charcoal and scraping charcoal on cinnamon (*Cinnamomom zeylanicum* Blume) seedling growth
- Intercropping ginger and turmeric with early stage of cinnamon cultivation
- Study on the formation of sandy texture on cinnamon bark tissues
- Investigation of soil invertebrate activities in cinnamon field
- Evaluation and comparison of superior quality characteristics of Pieris cinnamon with selected cinnamon accessions (Sri Gemunu and Sri Wijaya)
- Effect of fertilizer application time on growth, yield and peeling ability of cinnamon

- Screening and evaluation of selected hybrid cinnamon plants for quality, growth, and yield performance
- Study on the effect of Nitrogen based fertilizer application on peelability of cinnamon
- Design and evaluation of further modified peeling table
- Economical evaluation of cinnamon processing by freezing
- Investigation on Three Major Leaf Types of Cinnamon (*Cinnamomum zeylanicum* Blume)
- Determination of microbial quality of stored cinnamon quills at different moisture levels
- Study the brown rot disease (BRRD) and its effect on cinnamon cultivation
- Effect of applied sulphur containing fertilizer on growth and yield of cinnamon (*Cinnamomum verum*)
- Effect of type of planting materials and different rate of inorganic and organic fertilizer on growth and yield of cinnamon
- Effect of different techniques to cover the cut surface on formation of healthy shoots and prevent the juice secretion from cutting edge of cinnamon bush
- Effect of different pruning methods on bark yield, pest and disease severity of cinnamon cultivation
- Evaluation of effect of fertilizer application time on growth and yield of cinnamon
- Evaluation of continuous harvesting for cinnamon
- Evaluation of selected cinnamon lines in mid country region

5.3.2 Black pepper

- Multifaceted black pepper development progamme (NARP Project) (component for low country intermediate zone under coconut)
- Hybridization of selected black pepper (*Piper nigrum* L) cultivars for low country intermediate zone
- Comparison of black pepper (*Piper nigrum* L) yield per unit area of plants originated from orthotropic and plageotropic branches (GK 49)
- Study the potential use of coconut tree as a live support for pepper (*Piper nigrum* L.)
- Incorporation of partially burnt paddy husk, phosphorous and mycorrhizae to enhance potting media for propagation of pepper (*Piper nigrum* L)
- Effect of different pruning levels on canopy development and yield of pepper (*piper nigrum)*
- Studies on variation of vegetative growth, flowering, fruit setting and yield of black pepper (*Piper nigrum* L.) under different agro-ecological zones
- Improvement of resource use efficiency of black pepper (*Piper nigrum* L.) to increase the yield through support tree manipulation.

- Effect of micro-irrigation on plant establishment, growth and yield of black pepper *(Piper nigrum* L.)
- Effect of planting material originated from different cutting types on canopy development and yield of black pepper (*Piper nigrum* L.)
- Effect of soil moisture on flowering and fruiting habits of black pepper (*Piper nigrum* L.)
- Comparison of growth and yield of pepper (*Piper nigrum L.)* raised from tissue cultured plants and single nodal cutting plants
- Detection of microbial contaminations at different stages of post harvest practices of Export Agricultural Crops (EACs) mainly black pepper (*Piper nigrum* L.) and its control
- Investigation of effect of source of Nitrogen on growth and yield of black pepper
- Effect of cover crops on soil properties, growth and yield of black pepper
- Identification of suitable bio – indicators to monitor soil qualities responsible for black pepper yellowing
- A study on marketing behaviour of pepper farmers in major pepper growing regions
- Study the effect of soil amendments at planting on field establishment rate of Black pepper (*Piper nigrum* L)
- Investigation of underline mechanism of intra specific variation in flowering of Black pepper (*Piper nigrum* L)
- Fixing geographical indication for pepper in Sri Lanka
- Variation in chemical constituents of *Piper* species exist in Sri Lanka
- Design, fabrication and evaluation of steam blancher for pepper
- Studies on use of soil moisture conservation methods and agronomic management practices for improvement of black pepper (*Piper nigrum* L.) productivity as climate change adaptation techniques
- Effect of irrigation and fertilizer application on inducing of flower initiation and yield of bush pepper throughout the year
- Field evaluation of bush pepper (Local and paniyur)
- Evaluation of different rapid multiplication techniques of pepper for commercial plant production (Bamboo method, Leap method and polythene tube method)
- Evaluation of selected accessions of Black pepper under organic conditions
- Pepper canopy improvement through different planting material originated from different cutting types and canopy training
- Effect of supplementary irrigation on establishment and early growth of Black pepper
- Determination of oil, oleoresin and piperine content in pepper from different locations in Sri Lanka

5.3.3 Cocoa

- Cocoa (*Theobroma cacao*) seed garden establishment
- Productivity improvement of cocoa (*Theobroma cacao* L.) through integrated soil and plant nutrient management system including good management practices under coconut and rubber (coconut component) (NARP Project)
- Screening of capsid bug *(Helopeltis ceylonensis)* (De Silva) resistant /tolerant cultivars of cocoa
- Development of soil conditioner using cocoa pod husk for reclamation of poor quality cocoa field
- Evaluation of field performance of rooted cocoa (*Theobroma cacoa* L.)
- Characterization of available cocoa (*Theobromae cacao* L.) lines and establishment of a clonal garden
- Evaluation of different cocoa lines for different climatic zones
- Development of technology to produce wine and vinegar from cocoa mucilage
- Evaluation of cocoa (*Theobromae cacao)* germplasm under coconut
- Selection of high yielding cocoa (*Theobromae cacao*) lines for mixed cropping and further improvement of mass propagation through bud grafting and rooted cutting
- Establishment of cocoa clonal seed garden

5.3.4 Coffee

- Evaluation of the performance of selected coffee accession (*Coffia* sp.) under coconut in low country intermediate zone
- Use of *Beauveria brassiana* for the control of coffee berry borer
- Investigations of biological control agents of coffee berry borer
- Design a trap for coffee berry borer
- Strategies for organic cultivation of Arabica coffee
- Evaluation of catimore coffee progeny
- Evaluation of Arabica coffee (*Coffea arabica*) accessions for yield, quality and resistant to major pest and diseases.
- Fixing geographical indication for coffee in Sri Lanka
- Determination of caffeine content of Arabica and Robusta coffee selections
- Development of a small scale coffee roaster
- Progeny evaluation of selected accessions and hybrids of Arabica coffee

5.3.5 Cardamom

- Collection, characterization and hybridization of wild relatives of cardamom species in Sri Lanka
  (Finger printing of Cardamom accession)
- Screening of wild types of cardamom against thrips (*Sciothrips cardamomi* (Ramk.))
- Evaluation of promising cardamom lines for low elevation under Mahogony (Location : Kiriella)
- Management of leaf fall disease (leaf blight and leaf spots) of clove (*Euginia caryophyllus*) in mid country
- Application of plant growth regulators (Paclobutrazol) for flowering induction of clove (*Eugenia caryophyllus)*
- Estimation of crop loss in clove (*Eugenia caryophyllus*) due to occurrence of extreme weather events during the flower buds development stage

5.3.6 Clove

- Management of leaf fall disease (leaf blight and leaf spots) of clove (*Euginia caryophyllus*) in mid country
- Application of plant growth regulators (Paclobutrazol) for flowering induction of clove (*Eugenia caryophyllus*
- Estimation of crop loss in clove (*Eugenia caryophyllus*) due to occurrence of extreme weather events during the flower buds development stage

5.3.7 Nutmeg

- Field evaluation of grafted nutmeg (*Myristica fragrans*) selections
- Management of nutmeg leaf fall disease and its control
- Development of nutmeg manual halving tool
- Identification of thin layer drying characteristics in nutmeg: comparison between sun drying and mechanical drying
- *In vitro* propagation of Nutmeg (*Myristica fragrans*)
- Effectiveness of control measures taken to control nutmeg leaf fall disease

5.3.8 Goraka

- Field evaluation of grafted and seedling plants of goraka (*Garcinia quaesita*) selections at different spacing levels
- Investigation of chemical properties of *Garcinia quesita* L. (Goraka) fruit
- Development of technology to produce value added products of Garcinia (Goraka)

5.3.9 Betel

- Collection, establishment, evaluation and conservation of Betel (*Piper betle*) Germplasm in Sri Lanka
- Studies on effect of partially burnt paddy husk as an alternative nutrient source for growth and yield of betel (*Piper betle* L.)
- Breeding of 'Maneru (*Piper betle* L.)' and 'Mala bulath (*Piper chuvya*)' with 'Ratadalu (*Piper betle* L.)' and comparison of the yield parameters of their subsequent generations with 'Ratadalu',
- Evaluation of department fertilizer mixture for single supporting system in betel (*Pipper betle* L) cultivation
- Investigation on use of indigenous techniques for controlling Bacterial Leaf Blight in Betel (*Piper betle* L.)
- Rock Phosphate solubility improvement using mycorrhizae and commercial sulfur powder for (*Piper betle* L.) under coconut
- Study the optimum shade level for producing export quality betel leaves (*Piper betel* L.)
- Studies of mosquito repellent activity of Betel
- *In vitro* propagation of Betel

5.3.10 Ginger

- Effect of rhizome scales on germination and subsequent yield of ginger
- Effect of planting time and plant spacing on growth and yield of Ginger (*Zingiber officinale* Roscoe) under different agro-ecological zones
- Management of major diseases of ginger (*Zingiber officinale* Rosc.)
- Study on storage of fresh Ginger
- Investigation on the effect of different storage conditions for germination ability of ginger and turmeric
- Effect of different rates of inorganic fertilizer on different cultivars of Ginger

5.3.11 Turmeric

- Effect of the size of planting material on the yield and quality of turmeric (*Curcuma longa*)
- Development of market preferable le turmeric powder from local turmeric cultivars and isolation of curcumin from turmeric rhizomes
- Effect of different types of mulches on growth and yield of turmeric

5.3.12 Other

- Preparation of bio fertilizer (*Arbuscular Mycorriza*-AM), Bio control agents (*Trichoderma* spp. *Pseudomonas fluorescens*) and mass culturing
- Technology innovation for large scale *in-vitro* multiplication of cardamom, pepper, ginger, turmeric and cinnamon
- Growth and yield performances of Macademia VP plants at different spacing levels

5.4 Progress of other activities of the research division

5.4.1 Development activities at National Cinnamon Research Station at Palolpitiya

- First time of cinnamon research story, training unit was established in cinnamon research station during year 2012. In year 2015, six hundred and twenty seven (627) cinnamon stakeholders were successfully trained. Nine sessions of five- day cinnamon peelers training programmes, three sessions of two- day programme and 11 sessions of one- day progamme were conducted and all together 933 man- days of training were worked out. Furthermore, 113 persons visited the station and obtained necessary information regarding cinnamon Industry.
- Rs. Mn. 10 was spent for new laboratories of agronomy and crop improvement division.
- About 5,000 Sri Gemunu and Sri Wijaya vegetatively propagated plants were produced and 4200 seedling plants were also produced.
- Officers of the cinnamon research station participated in plant certification programme of Galle, Matara and Hambantota districts with department extension staff.

5.4.2 Development activities at IBRS, Naramamala

- An intercropping garden under coconut was developed with all EACs in a 2 ac block
- Arecanut and kithul seed gardens were developed in a 3 ac block after developing suitable drainage system in the wet land area
- Coconut under planting was done in 5 ac block
- Hilly area of 3 ac was developed with planting Cinnamon – 900 plants, budded garcinia – 100 plants, budded nutmeg – 50 plants, clove – 25 plants and budded cashew – 100 plants
- Two nursery sheds (18’x60’) were constructed
- An irrigation system was developed for the field with sprinklers
- Twenty name boards were established for the research and development fields
- Forty betel beds were developed to obtain planting materials
- Thirty five ginger beds and 13 turmeric beds were developed as demonstration blocks
- A project was implemented to obtain betel sticks
- Sixty acre coconut field was maintained with fifteen intercropping fields with EACs

5.4.3 Development activities at Central Research Station, Matale

- Molecular Biological research facilities were upgraded by commissioning a new gel documentation unit at Matale research Station
- Three abandoned labour quarters were fully renovated at the cost of Rs. 1,746,165.26
- Two net houses were constructed for the nursery of the substation of Kundasale at Rs 317,748.00 and the dimension of one each net house is 60ft X 18 ft with 8 feet height
- Repairing of the watcher hut at the main gate was done at a cost of rupees 65000 in collaboration with Divisional Secretariat of Manikhinna.

5.4.4 Home garden model with coconut at Matale

- Three acres of abandoned land was developed and planted with coconut seedlings and it is intended to develop as an EAC based homegarden for Midcountry intermediate zone with Coconut palm

5.4.5 National exhibitions and workshops

Representation of the department at various technical committees as appropriate

Officers of the research institutes participated and represented the Department of Export Agriculture in technical meetings at other institutes as follows.

- Two day workshop on preparation of policy report for climate change adaptation strategies organized by the Ministry of Environment and Renewable Energy.
- Two day biodiversity adaptation workshops in Ministry of Environment and Renewable Energy.
- Participated in Agro Pesticides subcommittee meeting at PGRC - Gannoruwa
- Participated in CARP breeding committee
- Represented monsoon forum at meteorological department.

5.4.6 Establishment of 'National Spice Garden' at Central Research Station, Matale

National Spice Garden was officially and ceremonially opened 4th of July, 2015 with the support of Ministry of Agriculture and Irrigation. Interested local groups as well as foreigners visited throughout the year and all attendees highly appreciated the establishment of such important place for improvement of spice sector of the country. New proposal was submitted for further improvement of National spice Garden to the Ministry of Primary Industries for 2016.

5.4.7 Plant certification programmes attended by the research staff

24 Plant Certification Programmes in Matale District was supported by research staff.

5.4.8 Training Programmes carried out by the research staff

In addition to research activities research staff at Matale station involved in awareness and training programmes as depicted in table 5.4.8.1. and 5.4.8.2.

Table 5.4.8.1: Awareness and training programmes offered by the research staff at the Central Research Station Matale

Type of beneficiaries	Number
University Students	226
Farmers	50
Development officers	60
Diploma level students	50
NVQ students	60
School students	110

Table 5.4.8.2: Research projects and other training programmes conducted by the research staff of the Central Research Station, Matale

Type of beneficiaries	Number
University students	17
Diploma level students	1
Technical college students	4
Agriculture training centres	3
Other	2

The following training programmes were also conducted by the research staff as well.

- Two training programmes on nursery management and quality planting material production
- Two training programmes on importance of shade management in pepper cultivation
- Two Programmes for farmers from Community Development and Livelihood Improvement Project, Kothmale
- Special lecture on ‘‘Management of Spice parks and home gardens in Central Province’’ was delivered for Trainee Tourists guides - Organized by Department of Trade, Commerce and Tourism, Central Province.
- Five Training programmes on Ginger Cultivation for North and Eastern provinces, Polonnaruwa and Kekirawa areas.
- Two field Tours on observation of problems on EACs

5.4.8.3 Knowledge and technology dissemination of betel through IBRS at Narammala in year 2015

The number of training Programmes conducted	–	07
The number of participants in training programmes (Farmers, growers)	–	236
The number of personnel who was given advice over the phone	-	162
The number of personnel who visited to IBRS seeking advice	-	287

5.4.9 TV and radio programmes

Rividina Arunella – Tv programme

Four Programmes on,

1. National Spices Garden
2. Pepper planting material production by using terminal branches
3. Importance of Nutmeg bud grafted plants
4. Lemongrass cultivation

5.4.10 Local training programs and workshops attended by IBRS

1. S. I. C. Silva (Assistant Director/ Research) participated in a training programme on Mutation Breeding during 20th – 24th July 2015, held at Field Crops Research and Development Institute, Department of Agriculture, Maha-Illuppallama.

2. S. I. C. Silva (Assistant Director/ Research) participated in a training programme on Report Writing Skills during 23rd and 24th November 2015, held at Sri Lanka Institute of Development Administration, Colombo 07.

3. K.D.N. Priyadarshanie (Assistant Director/ Research) participated in a training programme on Ecosystem resilience in a changing climate from 5th April to 10th April 2015 held at Sri Lanka Institute of Development Administration, Colombo 07.

4. K.D.N. Priyadarshanie (Assistant Director/ Research) participated in a training programme on Report Writing Skills during 23rd and 24th November 2015, held at Sri Lanka Institute of Development Administration, Colombo 07.

5. D.M.P.V. Dissanayaka (Assistant Director/ Research) participated in a Seminar on strategies for enhancing production of quality spices for local and export market on 29th October 2015 held at Industrial Training Institute, 363, Bauddhaloka Mawatha, Colombo 07.

6. D.M.P.V. Dissanayaka (Assistant Director/ Research) participated in a Symposium on natural products fostering healthy brain aging, on 17th December 2015 held at University of Sri Jayewardenepura.

5.4.11 Pest and disease control

Plant protection service

Following trainings, field days and field visits were conducted under the plant protection service and appropriate solutions were given to current problems. Other than field visits and field days appropriate solutions have been given for number of plant protection problems raised via our direct telephone lines, mobile phone and 1920 " Govi Sahana Sarana Sevaya"

Table 5.4.11.1: Extension advice given for pest and disease problems of Export Agricultural Crops

Crop	Disease/ Pest	Number of trainings	Number of field days	Number of field visits
Nutmeg	Leaf fall disease	02	03	02
	White root disease			01
	Stem borer			02
Pepper	Little leaf disease	01		01
	Slow wilt			01
	Quick wilt		02	01
	Other			01
	Pepper vine Borer			01
Clove	Leaf blight/leaf fall	01	01	02
	Root rot			02
Ginger	Rhizome rot/ Leaf spot	01		03
	Rhizome fly			07
All EACs	Nursery diseases	01		
	Nursery Pests	03		
Total		09	06	24
Total number of participant		300	200	

5.4.12. Planting material issued

Table 5.4.12: Planting material issued by the central Research station, Matale

Item	Number
Pepper rooted cuttings	11,354
Areca nut seedlings	2,614
Areca nut seeds	66,200
Coffee seedlings	4875
Cocoa seedlings	978
Kithul seedlings	110
Nutmeg seedlings	564
Lemmon grass	285
Clove	1,330
Cinnamon	47,000
Dwarf Kithul	32

5.4.13. Collaborative research and development project

1. Use of microorganisms to improve solubility of phosphate fertilizer – Grant no : RG/2011/AG/06. The principle investigator is Dr. C.M. Nanayakkara of University of Colombo and the co – investigators are Dr. H.A. Sumanasena and Dr. D.N. Samaraweera. The experimental activities are in progress at the plant science laboratory of University of Colombo and the Central Research Station of Department of Export Agriculture, Matale.

2. Mainstreaming Biodiversity Conservation and use in Sri Lankan Agro-ecosystems for livelihoods and adaptation to climate change (BACC) project.

5.5 Economics and market research on EAC

5.5.1 Studies and surveys

5.5.1.1 Survey on nutmeg trading

Nutmeg is one among five major export crops among Export Agricultural Crops and current tendency of declining market prices of nutmeg has largely affected on the household economy of large number of nutmeg farmers. To understand the background of this situation and identify reasons for price decline a study was conducted in 2014 by the Economics Research Unit. A desk study was done using domestic and international prices, export volumes and values in past 13 yrs and results showed that both local and international prices have declined during past few years. Moreover a field study was conducted in Poojapitiya, Harispattuwa, Akurana and Yatinuwara areas with 40 farmers and 60 collectors using a pretested schedule. Other than international price influence, low prices paid by organized intermediate market players and lack of premium for graded products were identified as main reasons. It was also revealed that some foreign nationals were involved with nutmeg trade and they had preferred buying high quality nutmeg at considerably high price but leaving low quality nutmeg for large number of local collectors who usually pay a flat rate ignoring quality difference. Because of low price difference among grades and low premium for quality products nutmeg growers had paid no interest for producing high quality grades but used to sell as bulk. Substantial amount of nutmeg, seen at collecting places during survey, was with sub-standard quality and largely comprised with fungal infected seeds. It could also be observed that there was a high tendency of immature nutmeg coming to market and it has reasonably influenced on declining overall market prices. Other than international influence poor understanding and interest of producers as well as market players on quality needs of current nutmeg market and poor premiums for higher grades had largely influenced on declined prices.

5.5.2 Extent of EAC

The newly established extent of EAC in 2015 was computed based on the acreage, which was qualified to be paid 2nd installment of the revised New Planting Assistance Scheme of the DEA during 2015 (table 5.5.2.1).

Table 5.5.2.1: Newly established extent(ha) under EAC assistance scheme – 2015

District	Cocoa	Coffee	Cinnamon	Pepper	Clove	Nutmeg	Citronella	Arecanut	Total
Kandy	0.4	0.5	3.6	27.7	0.4	5.7	-	-	38.3
Matale	-	-	7.5	16.7	-	0.3	-	-	24.5
N'elliya	-	-	0.3	2.3	-	-	-	-	2.6
Kurunegala	-	0.4	8.3	11.4	-	-	-	1.4	21.5
Badulla	-	0.8	5.4	26.4	-	-	-	-	32.6
Moneragala	141.1	-	13.7	48.8	-	-	-	2.1	205.7
Kegalle	-	0.8	2.3	7.2	0.2	-	-	-	10.5
Ratnapura	-	-	155	60	15	3	-	20	253
Colombo	-	-	14.75	2.4	-	-	-	-	17.15
Kalutara	-	-	28	0.8	-	-	-	-	28.8
Gampaha	-	-	12.6	15.2	-	-	-	1.3	29.1
Galle	-	-	54.34	-	-	-	-	-	54.34
Matara	-	-	69.3	1.1	-	-	-	-	70.4
Hambantota	-	-	100.4	15.8	-	-	17.2	-	133.4
Total	141.5	2.5	475.49	235.8	15.6	9	17.2	24.8	921.89

Source: Monthly progress reports of the development division of DEA

Considering performances in table 5.5.2.1 and taking 'Agriculture Census 2002' as the base line district wise extent figures and total extent of EAC in 2015 were estimated (Annex 1).

5.5.3 Estimated production of EAC in 2015

The annual production of main EAC is usually estimated considering exports, local consumption in different sectors in the economy (house hold consumption based on per capita annual consumption reported by the Dept. of Census and Statistics, industry consumption, and Food service industry consumption) and imports. Substantial amounts are allocated for withholding stocks and unreported exports. Based on those assumptions, the estimated production of EAC for 2012-2015 is given below (table 5.5.3.1).

Table 5.5.3.1: Estimated production of EAC s – 2012/2015

Crop	2012	2013*	2014*	2015**
Cocoa	513	515	500	457
Coffee	3,000	2,580	2,674	2,639
Cinnamon	17,165	17,500	17,600	17,707
Pepper	18,604	28,686	18,660	28,177
Cardamom	80	50	87	91
Clove	4,009	6,190	3,225	5,253
Nutmeg (and mace)	2,002	2,545	2,960	2,750
Arecanut	23,450	22,279	22,385	23,524
Betel	28,200	24,145	24,123	21,524
Citronella oil	13	21	35	31
Ginger	14,911	14,075	15,481	17,273
Turmeric	8,708	11,282	11,351	14,397

(Source: Dept. of census & statistics & DEA data base *Revised ** Provisional)

5.5.4 Exports and export earnings of EAC in 2015

Total export volume of EAC in 2015 had increased considerably by 19.2% from 60,033 mt. in 2014 to 71,558 mt. in 2015 and export earnings from EAC had increased from Rs. 44,451 mn in previous year to Rs.61,589 mn. in 2015 (Annex II).

Among EAC, spices had recovered from depression in 2014 and had shown a considerable progress in exports of many commodities in 2015. Export volume of black pepper had increased from 7,930mt. in 2014 to 16,656 mt. in 2015 and export earnings had increased by 116% over previous year from Rs.9,029 mn to Rs.19,543 mn. in 2015. Other than black pepper high volume of pepper oil and oleoresin has also exported in 2015 thanks to the sizable harvest comparative to 2014. Cinnamon had shown a very marginal negative growth in export volume in 2015 over 2014 but export earnings had increased by 4% from Rs.17,274 mn. to Rs.17,959 mn. in 2015. Export of clove had increased significantly from 1,239 mt. in 2014 to 5,525mt. in 2015 and same increase could be noted in export earnings from Rs.1,819 mn. in 2014 to Rs.6,405 mn. in 2015. Nutmeg which performed well in past, had shown marginal declines in terms of both export volume value in past two consecutive years. However, mace exports in 2015 had shown 58% increase in volume and 3.6% increase of export earnings over 2014.

Export volumes of cocoa had declined sharply from 2,099mt. in 2014 to 911mt. in 2015. Almost all cocoa export comprises with re-exports of imported cocoa hence the decline may be due to the market side problem. As usual, export of coffee was low and total export of coffee was 24mt. with Rs.24mn. export earnings.

As in previous two years, export of arecanut contributed to large bulk of EAC exports and total export of arecanut in 2015 was 29,646mt. with Rs.9,235 mn. of export earnings. When considering past trend, export of arecanut with Sri Lankan origin could not exceed more than 3,500mt. and it is reasonable to think that the rest of the export should have come from imports. However, as has been reported in 2015, only 9,743mt. of arecanut, have been imported and it is unexplainable how Sri Lanka could export 29,646mt. arecanut with such low import. Among other crops export of cardamom had shown impressive upward trend but it is also unexplainable whether exported cardamom came from Sri Lankan production or from unreported imports. Among other crops, export volumes of betel had declined significantly may be due to the continued trend of declined import from Pakistan. Export of vanilla and ginger had increased in 2015 but turmeric exports had shown a marginal decline.

As a whole essential oil sector had shown an impressive progress in 2015 over 2014 mainly due to increased export of pepper/nutmeg oleoresin and increased export of pepper/nutmeg oil. Other than that cinnamon leaf oil, clove oil, cardamom oil, lemon grass oil and vanilla oil had shown positive growth in both export volumes and earnings in 2015 but export volumes of cinnamon bark oil, mace oil, citronella oil and ginger oil had declined over 2014 (annex II).

5.5.5 Exporting countries of EAC from Sri Lanka

No noticeable shift was seen in main importing countries of EAC from Sri Lanka in 2015 and traditional buyers had played the main role in the market. As usual, Mexico had purchased around 36% of total cinnamon export and many Latin American countries had purchased large bulks. India was the main buyer of pepper, cloves, cocoa products and arecanut from Sri Lanka and purchases comprised of 54% of pepper and 39% of clove exports in 2015. Almost all areca nut imports brought from Indonesia had been exported to India as re-exports under SLFTA and India alone contributed to 29, 512mt. of arecanut out of 29, 646mt. of total arecanut export volume of Sri Lanka in 2015. Pakistan was virtually the only buyer of Betel in 2015 and Australia was the main buyer of coffee with 8.5mt.

5.5.6 Behaviour of prices

Average annual farm gate prices of pepper, cinnamon, cocoa beans, betel and arecanut were on the increasing trend in past few years including 2015 making them more attractive for farmers (Annex III). Clove prices had declined marginally but still remains at higher level. Both farm gate and international prices of cardamom, nutmeg and mace had been on the decline since 2012 and if the trend continues it would badly affect on farmer economy, especially for large number of small nutmeg farmers. Farm gate prices of arecanut prices showed higher performance in 2015, which could be explained as the influence of increased demand for local products to be mixed with re-exports. Local price of citronella was

unusually high in 2015 and was several folds of reported Chinese citronella price. It was reported that local product was purchased for some specific value added product by a local manufacturer at a higher price (Annex III).

5.5.7 Trends in EAC imports in 2015

According to the custom data import of EAC had declined rapidly in 2015 from 36,162 mt. in 2014 to 19,582mt. in 2015(annex IV). Import expenditure was Rs. 9,267 mn. In 2014 and it had declined to Rs. 6.149 mt. in 2015. A main reason for declined total import in 2015 was low level of reported areca nut import volume. Import of cocoa and cocoa products had increased by 18.6% in 2015 over 2014 and expenditure for cocoa import had increased by 13.4%. Black pepper is imported usually for value addition purposes when local raw material is inadequate and the low import of pepper in 2015 indicates that value addition companies had largely used local pepper for their industries. As usual turmeric import volumes had reached recorded high level from 4,168 mt. in 2014 to 4,909 mt. in 2015 and spending for importing turmeric had increased from Rs.606 mt. in 2014 to Rs.943mn. in 2015. All other EAC except, clove and betel, had imported to Sri Lanka in 2014 at least in minor quantities (annex IV).

5.6. Research publications

Abegunawardhena R.C., Subasinghe H.M.P.A. 2015. Variation of different quality and quantity attributes in yield of Black Pepper (*Piper nigrum* L.) under different light interception regimes., Proceedings of the Annual Research Symposium , Faculty of Agriculture, University of Peradeniya.

Abeyrathne R.G.C.K., Induruwa I.V.A.D.C.S, Arampath P.C., Wimalasiri K.M.S., 2015. Development of green Coffee (Coffea spp.) powder and spice blended green coffee powder. Proceedings of the annual symposium on Minor Export Crops (B.Marambe , Editor). Volume 03, pp105- 113, 13-14 September 2015, Peradeniya, Sri Lanka.

Amarasinghe, A.A.P.G., Wijekoon, W.M.R.W.B. and Amarasinghe, K.G.A.P. (2015). Study on the life cycle of causal organism of nutmeg leaf fall disease (NLDF) reported in the mid country of Sri Lanka. *In proceedings of 14th Agricultural Research Symposium,* Faculty of Agriculture and plantation Management, Wayamba University of Sri Lanka. pp.229-232.

Attanayaka A.M.C.I.M., Liyanage M.N., Randeniya R.M.E.M.K., Yapabandara Y.M.H.B and Hennayaka H.M.R (2015). Comparison of growth and yield of black pepper (*Piper nigrum* L.) originated from orthotropic, plagiotropic and pre rooted single nodal cuttings. Journal of “Focus on pepper”, vol 12, No 1, published by International Pepper Community, pp 35 -44.

Bandara H.A.P.C, Prasanta B.D.R and Induruwa I.V.A.D.C.S (2014). The thin layer drying characteristics of nutmeg: Comparison between sun drying and mechanical drying. Proceedings of the Peradeniya Univ. International Research Sessions, Sri Lanka, Vol. 18, 4th& 5th July, . Pp 201

Chaturangani, W.A.W., Seneviratne, M.A.P.K and Gajanayake, B. (2015). Quality deterioration associated with non-adoption of good processing practices in clove. Proceedings of 14th Agricultural Research Symposium, Wayamba University of Sri Lanka: 243-247.

Chaturani, L. G. T., Samaraweera, D. N., Amarasekara, M. G. T. S. and Ekanayaka, J. S**.** (2015). Liming effect of some soil properties in cinnamon (*Cinnamomum zeylanicum* Blume) growing soils: An incubation study, In Marambe, B. (Ed). Annual Symposium of Minor Export Crops, Vol. 3, pp 32-42, 13-14 August. Peradeniya, Sri Lanka.

Dissanayake D.M.P.V., Priyadarshani, K.D.N., and Sumanasena, H.A. (2015), Incorporation of partially burnt paddy husk, Phosphorous and Mycorrhizae to enhance Potting Media for Propagation of Black pepper. Proceedings of the Annual Symposium on Minor Export Crops, Plant Genetic Resource Centre, Peradeniya, Sri Lanka 13th and 14th August 2015, pp 27-30.

Gunaratne H.D.A.K., Heenkende A.P., Karunaratne M.L., and. Idamekorala P.R. , 2015, Effects of cover crops on soil moisture content and early growth of black pepper (*Piper nigrum* L.). Annual Symposium of Minor Export Crops (B. Marambe , Editor) Volume 3, 1-4, 13-14August, Peradeniya, Sri Lanka

Hettiarachchi, R. H. A. N., Samaraweera, D. N., and Amarasekara, D. A. B. N. (2015). Comparative study on solubilization of tricalcium phosphate- soloubilizing bacteria isolated from rhizosphere soil of cinnamon (*Cinnamomum zeylanicum* Blume) and black pepper (*Piper nigrum* L.) cultivations, In Marambe, B. (Ed). Annual Symposium of Minor Export Crops, Vol. 3, pp 20-26, 13-14 August. Peradeniya, Sri Lanka

Induruwa I.V.A.D.C.S., Madujith T. and Jayathissa D.N., 2015. Performance evaluation of a newly designed ginger peeler for production of bleached Ginger (*Zingiber officinale* Rosc.) Proceedings of the annual symposium on Minor Export Crops (B.Marambe , Editor). Volume 03, pp114-122, 13-14 September 2015, Peradeniya Sri Lanka.

Jayasinghe, G. G. (2015). Determination of economic injury levels of wood boring moth (*Ichneumenoptera cinnamomumi*) with reference to the age of cinnamon plantation, In

Marambe, B. (Ed). Annual Symposium of Minor Export Crops, Vol 3, 62-69 pp, 13 -14 August, Peradeniya, Sri Lanka.

Liyanage T., Ekanayake E.W.M.S.D.K., Weerakkody N. S., Senevirathne J. M. and EdirisingheE.D.K. (2015). Effect of washing and drying of Cocoa seeds during processing on fat content of high yielding Cocoa (*Theobroma cacoa* L.) cultivars in Sri Lanka. Proceedings of the annual symposium on Minor Export Crops (B.Marambe , Editor). Volume 03, pp123 -129, 13-14 September 2015, Peradeniya Sri Lanka.

Priyadarshani K.D.N., Sumanasena H.A., Dissanayake D.M.P.V. and Rupasinghe K.A.S.A. (2015). Feasibility of planting ginger (*Zingiber officinale* Rosc.) during offseason in the low country intermediate zone of Sri Lanka. Proceedings of the Annual Symposium of Minor Export Crops-ASMEC (Ed. B. Marambe). 13-14August Peradeniya, Sri Lanka.Volume 3:50-54.

Pathirana, S. M., Jayasinghe, G. G., Chandrasena, G. and Weerawansha, A. N. R (2015). Determination of microbial quality and quantity of stored cinnamon quills, In Marambe, B. (Ed). Annual Symposium of Minor Export Crops, Vol 3, 97-104 pp, 13 -14 August, Peradeniya, Sri Lanka.

Priyadarshani, K.D.N., Sumanasena, H.A., Dissanayake, D.M.P.V. and Rupasinghe, K.A.S.A. (2015), Feasibility of Planting Ginger (*Zingiber officinale* Rosc.) during Off Season in the Low country Intermediate Zone of Sri Lanka, Proceeding of the Annual Symposium on Minor Export Crops, Plant Genetic Resource Centre, Peradeniya, Sri Lanka 13th and 14th August , pp 50-53.

Priyadarshani, K.D.N., Heenkende , A.P. , and Amarakoon, A.M.E.S.(2015). Effect of Different Fertilizer rates and Green Manure on the Yield of Ginger (*Zingiber officinale* Rosc.) cultivated under coconut in Low Country Intermediate zone. Proceeding of the Annual Symposium on Minor Export Crops, Plant Genetic Resource Centre, Peradeniya, Sri Lanka 13th and 14th August 2015, pp 16-18.

Ranasinghe R. K. R. S., Nanyakkara, C. M., Sumanasene, H. A. and Samaraweera, D. N. (2015). Developing mass culture procedure for some potential phosphate biofertilizers using agriculture waste products. Proceeding of the Peradeniya University International Research Sessions, Sri Lanka, Vol. 19, 5th and 6th November

Ranasinghe B.R.G.I.T., Weerawardena T. E. and Abeysingha N.S., 2015. The potential of tea refuse as a material for compost production, , Proceedings of Undergraduate Research Symposium, 12 August 2015,Faculty of Agriculture, Rajarata University of Sri Lanka

Samarasekare M.A., Wimalasiri K.M.S., Liyanage T. and Senevirathne A. (2014), A comparative study of Sri Lankan and Indonesian Areca nut (*Areca catechu L.*): Comparison between sun drying and mechanical drying. Proceedings of the Peradeniya Univ. International Research Sessions, Sri Lanka, Vol. 18, 4th& 5th July, . Pp 191

Samarasinghe, M.K.S.R.D. 2015. Biology, abundance and pupal parasitoid rhizome fly (*Mimegralla coeruleifrons* Macquart; Micropezidae: Diptera): A pest of ginger (*Zingiber officinale* Rose.) Proceedings of the Annual Symposium on Minor Export Crops (Ed: B. Marambe). Vol 3:13 – 14 August 2015, Peradeniya, Sri Lanka.pp: 70-74

Senaratne, G., Jayasinghe, G.G., Hemachandra, K.S., Wijesinghe, K. G. G. and Samaraweera, D. N. 2015. Behaviors of soil invertebrates in cinnamon ecosystem under different crop management practices, In Marambe, B. (Ed). Annual Symposium of Minor Export Crops, Vol 3, 5-15 pp, 13 -14 August, Peradeniya, Sri Lanka.

Seneviratne, M.A.P.K., Dissanayake, D.M.D.K.S., Wanigasundara, W.A.D.P and Wijeratne, M. (2015). Success of seasoning Kitul (*Caryota urens L.*) inflorescences in Sri Lanka. Proceedings of the Symposium on Minor Export Crops (Ed. B. Marambe) held on 13th and 14th August at Plant Genetic Resources Center Peradeniya:Vol 3. 85-90

Senevirathne S.G.M.D.l., Subasinghe H.M.P.A. and Ampitiyawaththa A.D. 2015.effect of soil moisture on variation of growth and yield characteristics of Ginger (*Zingiber officinale* Roscoe), Proceedings of the Annual Research Symposium , Faculty of Agricultural Sciences, Sabaragamuwa University of Sri Lanka.

Silva, S. I. C., Weerasena, O. V. D. S. J., and Senevirathne J. M. 2015. Clustering pattern of selected black pepper (*Piper nigrum* L.) cultivars in Sri Lanka based on morphological, yield and chemical characters, Proceedings of the Annual Symposium on Minor Export Crops-ASMEC (Ed. B. Marambe). Published by Department of Export Agriculture, Peradeniya, Sri Lanka. Vol. 3:80-84.

Subasinghe H.M.P.A and Welage P.W.G.K. 2015 Variation of spike initiation and some yield attributes of Black Pepper (*Piper nigrum* L.) under different shade levels, Focus in Pepper 2015 , International Pepper Community.

Subasinghe H.M.P.A.,2015. Development of a support tree management system to overcome competition for Black Pepper (*Piper nigrum* L.),Proceedings of the Annual Pepper Congress of International Pepper Community (22^{nd} -25^{th} November), Mysore, India. 2015.

Swarnathilaka,D.B.R,Kottearachchi and Weerakkody W.J.S.K(2016) *In- vitro* multiplication of ginger (*Zingiber officinale* Rosc.) cultivars , Local, Chinese and Rangun .1^{st} International conference on Bio science and Bio technology Book of Abstract Colombo,Sri Lanka,

Udayangani, K.K.R., Priyadarshani, K.D.N., Dharmaparakkrama, A.L.S. and Gayanayake, B. 2015. Effect of higher levels of Nitrogen, Potassium and different irrigation intervals on growth and formation of rhizome of ginger. Proceeding of 14^{th} Agricultural Research Symposium, Department of Plantation Management, Faculty of Agriculture and Plantation Management, Wayamba university of Sri Lanka, Makadura, Gonawilla. pp 224-228.

Wijesinghe, K.G.G. (2015); Cinnamon Development Programs in Sri Lanka;Spice Handbook – 2015; 18 – 22.Wijewardhana, A. N., Samaraweera, D. N. and Vidhanaarachchi, L. P. (2015); Comparison of some soil properties incinnamon (*Cinnamomum zeylanicum* Blume) growing soils selected from high and low yielding cultivations in the Matara district of Sri Lanka, In Marambe, B. (Ed). Annual Symposium of Minor Export Crops, Vol. 3, pp 43-54, 13-14 August. Peradeniya, Sri Lanka

Yapa, S.S., Mohotti, A.J., Seneviratne, M.A.P.K., Peiris, B.L. and Wijesundara, D.A.A. (2015). Occurrence of parasitic plants in spice and beverage crops of Sri Lanka. Proceedings of the Peradeniya University International Research Sessions, Sri Lanka, Vol 19: 388.

Books published

"Production of Quality Pepper (*Piper nigrum* L.) Planting Material", W.D.L. Gunaratne, H.M.P.A. Subasinghe, Yap Chin Ann, M. Anandraj & Dyah Manohara, International Pepper Community, Jakartha, Indonesia. October 2015, ISBN No. 978-979-99118-7-2

Wijekoon, W.M.R.W.B. (2015). Disease and Insect Pest Management of Black pepper (*Piper nigrum* L.) Sinhala translation. Published by International Pepper Community; August 2015, Peradeniya , Sri Lanka.

Annexure 1 : Estimated Extent (ha) of EAC by Districts –2015

District	Cinnamon	Pepper	Clove	Cardamom	Coffee	Cocoa	Nutmeg	Areca nut	Betel	Citronella	Total (EAC)	Ginger	Turmeric	Grand Total (including Ginger & Turmeric)
Kandy	130	5,997	3,007	721	1,325	299	821	2,266	58	-	14,623	506	288	15,417
Matale	335	6,450	674	1,133	660	1,068	73	1,194	45	-	11,632	42	85	11,759
Nuwaraeliya	35	883	337	116	1,084	5	4	554	7	-	3,026	153	208	3,387
Kurunegala	166	3,020	403	8	706	152	50	830	1,072	-	6,409	541	105	7,055
Badulla	195	2,538	55	10	337	35	-	1,423	55	-	4,649	84	65	4,798
Moneragala	93	1,832	6	-	192	740	1	1,306	56	-	4,226	14	10	4,250
Galle	11,246	468	192	-	107	3	2	755	240	-	13,013	73	46	13,132
Matara	8,522	776	489	34	172	4	5	1,131	111	-	11,244	149	102	11,495
Hambantota	3,258	1,824	54	1	116	-	-	551	33	805	6,642	13	12	6,667
Colombo	242	245	59	1	58	2	2	215	85	-	909	135	20	1,064
Gampaha	278	1,715	114	2	369	8	6	1,124	1,128	-	4,744	249	69	5,062
Kalutara	3,397	314	130	3	139	4	4	584	1,000	-	5,575	153	39	5,767
Ratnapura	4,174	3,313	418	338	226	23	9	1,918	138	389	10,946	85	50	11,081
Kegalle	266	3,086	1,704	434	596	173	45	1,613	209	-	8,127	208	208	8,543
Other Districts	5	65	-	-	50	-	-	1,035	359	-	1,514	78	27	1,619
Total	32,342	32,527	7,643	2,801	6,137	2,517	1,022	16,500	4,596	1,194	107,278	2,483	1,334	111,095

Source: Census of Agriculture -2002 , Department of Export Agriculture, Agricultural Statistics – Department of Census & Statistics. *Provisional

Annexure 1I : Export Volume and Value of Export Agriculture Crops – 2014 and 2015

Commodity	Unit	2014	2015 **	Growth % 2014-2015
Cinnamon	Vol (MT)	13,686.36	13,548.78	-1.0
	Val (Rs.Mn)	17,274.24	17,958.55	4.0
Cinnamon leaf oil	Vol (MT)	248.03	264.65	6.7
	Val (Rs.Mn)	485.57	704.02	44.9
Cinnamon bark oil	Vol (MT)	16.95	14.39	-15.1
	Val (Rs.Mn)	499.48	436.23	-12.7
Cloves	Vol (MT)	1,101.67	4,782.53	334.1
	Val (Rs.Mn)	1,777.29	6,239.11	251.0
Clove stems	Vol (MT)	138.17	741.21	436.4
	Val (Rs.Mn)	42.26	166.43	293.9
Clove oil	Vol (MT)	2.05	9.88	381.0
	Val (Rs.Mn)	24.75	52.67	112.8
Cocoa & cocoa products	Vol (MT)	2,098.92	911.25	-56.6
	Val (Rs.Mn)	1,076.28	469.11	-56.4
Coffee	Vol (MT)	56.98	23.60	-58.6
	Val (Rs.Mn)	29.81	24.03	-19.4
Pepper	Vol (MT)	7,929.63	16,656.64	110.1
	Val (Rs.Mn)	9,028.42	19,542.52	116.5
Pepper oil	Vol (MT)	25.51	61.37	138.7
	Val (Rs.Mn)	287.54	543.24	88.9
Oleoresin	Vol (MT)	205.61	301.19	46.5
	Val (Rs.Mn)	1,227.83	2,035.87	65.8
Cardamom	Vol (MT)	8.25	119.87	1,352.3
	Val (Rs.Mn)	39.60	146.64	270.3
Cardamom oil	Vol (MT)	1.27	1.42	11.5
	Val (Rs.Mn)	59.25	27.16	-54.2
Citronella	Vol (MT)	10.08	7.83	-22.3
	Val (Rs.Mn)	38.97	75.86	94.7
Nutmeg	Vol (MT)	1,630.64	1,575.62	-3.4
	Val (Rs.Mn)	1,927.67	1,525.81	-20.8
Mace	Vol (MT)	198.25	313.41	58.1
	Val (Rs.Mn)	504.22	522.13	3.6
Nutmeg oil	Vol (MT)	30.44	67.98	123.3
	Val (Rs.Mn)	226.59	449.99	98.6
Mace oil	Vol (MT)	0.13	0.02	-85.0
	Val (Rs.Mn)	0.55	0.66	19.8
Areca nut*	Vol (MT)	29,508.79	29,645.52	0.5
	Val (Rs.Mn)	8,351.01	9,234.62	10.6
Betel	Vol (MT)	3,002.66	2,403.73	-19.9
	Val (Rs.Mn)	1,378.59	1,235.32	-10.4
Vanilla	Vol (MT)	0.30	0.80	166.7
	Val (Rs.Mn)	5.98	8.91	49.1
Vanilla oil	Vol (MT)	0.05	0.20	316.7
	Val (Rs.Mn)	0.13	0.76	500.3
Lemongrass oil	Vol (MT)	0.75	0.81	7.4
	Val (Rs.Mn)	3.45	3.75	8.8
Total EAC	Vol (MT)	59,901.70	71,452.70	19.3
	Val (Rs.Mn)	44,289.65	61,403.39	38.6
Ginger	Vol (MT)	59.65	66.34	11.2
	Val (Rs.Mn)	70.86	72.20	1.9
Ginger oil	Vol (MT)	1.63	1.41	-13.5
	Val (Rs.Mn)	31.50	28.05	-11.0
Turmeric	Vol (MT)	69.91	67.86	-2.9
	Val (Rs.Mn)	59.28	54.73	-7.7
Total (Ginger and Turmeric)	Vol (MT)	131.18	135.61	3.4
	Val (Rs.Mn)	161.64	154.98	-4.1
Total (with Ginger and Turmeric)	Vol (MT)	60,032.89	71,588.31	19.2
	Val (Rs.Mn)	44,451.28	61,558.37	38.5

Source:- Sri Lanka Customs **Provisional *Include re-export

Annexure III : Average Prices of Export Agricultural Crops (Rs./kg) in 2012/2015

Crop	Price	Annual Average Price				Growth % 2014/15
		2012	2013	2014	2015	
Cocoa	FG	266.92	193.97	234.84	244.38	4.06
	AU	346.94	361.63	339.21	369.81	9.02
	WM	304.31	315.35	402.23	473.39	17.69
Coffee*	FG	249.51	220.7	218.86	251.19	14.77
	AU	251.49	249.39	263.13	301.72	14.67
	WM*	309.54	286.33	301.6	381.96	26.64
Pepper	FG	832.05	731.06	1,037.64	1,090.34	5.08
	AU	826.83	765.98	1,095.81	1,144.36	4.43
	WM	934.61	945.12	1,247.25	1,449.41	16.21
Clove	FG	1,159.70	1,233.93	1,400.89	1,046.11	-25.33
	AU	1,225.95	1330.13	1457.68	1257.9	-13.71
	WM	1,367.58	1,591.14	1,904.25	1,822.37	-4.30
Cinnamon - quills	FG	1,042.08	1,109.41	1,172.79	1,246.06	6.25
	AU	889.53	892.6	1284.66	1365.86	6.32
	WM	-	-	-	-	-
Nutmeg	FG	838.45	683.88	642.17	511.28	-20.38
	AU	909.83	777.85	692.31	556.65	-19.60
	WM	3,118.39	2,798.13	2,257.58	1,776.92	-21.29
Mace	FG	2,096.51	1,536.27	1,741.52	1,423.59	-18.26
	AU	2,374.48	1,825.41	2,024.80	1,619.73	-20.01
	WM	3,141.56	2,650.38	2,169.48	1,996.08	-7.99
Cardamom	FG	1,945.55	1,731.68	1,642.08	1,610.78	-1.91
	AU	1,300.00	1,925.00	1,804.56	1,755.61	-2.71
	WM	1,667.93	1,864.16	1,187.48	1,576.12	32.73
Betel (Rs./1000 leaves)	FG	2,018.96	1,922.22	2,166.15	3,583.89	65.45
	AU	-	-	-	-	-
	WM	-	-	-	-	-
Areca nut	FG	201.25	177.47	304.60	341.74	12.19
	AU	284.22	213.83	305.11	364.74	19.54
	WM	-	-	-	-	-
Citronella	FG	1210.14	1751.63	2754.50	6381.12	131.66
	AU	-	-	3000.00	-	-
	WM	3409.42	2874.23	2713.23	2459.08	-9.37
Ginger (Raw)	FG	106.78	214.40	289.59	137.72	-52.44
	AU	-	-	-	588.43	-
	WM	-	-	-	-	-
Turmeric (Raw)	FG	36.54	34.54	37.37	34.72	-7.09
	AU	-	-	-	-	-
	WM	-	-	-	-	-

Sources: FG: Farm-gate Price (DEA); AU: Auction Price (SAPPTA); WM: World Market Price (Public Ledger) *Robusta coffee price

**Ginger WM: Average of Chinese/Indian/Myanmar prices

Annexure 1V: Import Volume and Value of Export Agriculture Crops – 2014 & 2015

Commodity	Units	2014	2015*	Growth% 2013/14
Cinnamon	Vol (mt.)	89.23	17.61	-80.3
	Val (Rs.mn)	133.07	25.23	-81.0
Cinnamon leaf oil	Vol (mt.)	0.38	0.22	-40.5
	Val (Rs.mn)	0.23	0.29	24.8
Cinnamon bark oil	Vol (mt.)	0.06	0.07	30.7
	Val (Rs.mn)	0.04	1.08	2,317.0
Clove Stems	Vol (mt.)	13.48	-	-100.0
	Val (Rs.mn)	3.56	-	-100.0
Clove oil	Vol (mt.)	3.57	3.48	-2.7
	Val (Rs.mn)	10.02	11.58	15.6
Cocoa & cocoa products	Vol(mt.)	3,680.20	4,364.07	18.6
	Val (Rs.mn)	2,563.29	2,906.56	13.4
Coffee	Vol(mt.)	51.89	48.84	-5.9
	Val (Rs.mn)	61.06	63.65	4.2
Pepper	Vol(mt.)	367.11	79.60	-78.3
	Val (Rs.mn)	340.09	68.92	-79.7
Pepper oil	Vol(mt.)	0.76	0.06	-92.4
	Val (Rs.mn)	0.44	0.02	-95.8
Oleoresin	Vol (MT)	8.20	1.75	-78.7
	Val (Rs.Mn)	27.76	9.20	-66.9
Cardamom	Vol(mt.)	40.47	59.83	47.9
	Val (Rs.mn)	32.95	67.49	104.8
Cardamom oil	Vol(mt.)	1.70	2.65	55.8
	Val (Rs.mn)	20.41	29.86	46.3
Citronella	Vol(mt.)	0.33	1.47	343.2
	Val (Rs.mn)	0.52	4.33	726.9
Nutmeg	Vol(mt.)	19.13	-	-100.0
	Val (Rs.mn)	33.00	-	-100.0
Mace	Vol(mt.)	10.40	-	-100.0
	Val (Rs.mn)	17.09	-	-100.0
Areca nut	Vol(mt.)	27,002.79	9,742.39	-63.9
	Val (Rs.mn)	5,163.61	1,816.16	-64.8
Vanilla	Vol(mt.)	5.44	12.25	125.3
	Val (Rs.mn)	9.59	11.84	23.5
Vanilla oil	Vol(mt.)	3.09	0.29	-90.7
	Val (Rs.mn)	2.95	0.55	-81.5
Lemon grass oil	Vol(mt.)	1.70	0.25	-85.3
	Val (Rs.mn)	3.45	0.65	-81.0
Total EAC	Vol(mt.)	31,299.92	14,334.83	-54.2
	Val (Rs.mn)	8,423.14	5,017.39	-40.4
Commodity	Units	2014	2015*	Growth% 2013/14
Ginger	Vol(mt.)	691.89	336.74	-51.3
	Val (Rs.mn)	230.91	176.60	-23.5
Ginger oil	Vol(mt.)	0.49	1.08	118.1
	Val (Rs.mn)	7.29	12.21	67.4
Turmeric	Vol(mt.)	4,167.71	4,909.41	17.8
	Val (Rs.mn)	606.57	942.96	55.5
Total (Ginger & Turmeric)	Vol(mt.)	4,860.10	5,247.23	8.0
	Val (Rs.mn)	844.77	1,131.78	34.0
Total (with Ginger & Turmeric)	Vol(mt.)	36,160.01	19,582.06	-45.8
	Val (Rs.mn)	9,267.91	6,149.17	-33.7

Source: Sri Lanka Customs * Provisional

Annexture V: Deployment of Extension Officers

Galle	EO's Range
	Aluthwela
	Hiniduma
	Habaraduwa
	Ambalangoda
	Balapitiya
	Akmeemana
	Ethkandura
	Elpitiya
	Karandeniya
	Baddegama
	Niyagama
	Hikkaduwa
	Yakkalamulla
	Nagoda

Hambantota	EO's Range
	Okewela
	Beliaththa
	Middeniya
	Katuwana
	Walasmulla
	Sooriyawawa
	Weeraketiya
	Warapitiya
	Thangalle

Gampaha	EO's Range
	Dompe
	Udugampola
	Gampaha
	Mahara
	Badalgama
	Pallewela
	Biyagama
	Meerigama
	Divulapitiya
	Minuwangoda
	Aththanagalle

Nuwaraeliya	EO's Range
	Ginigathhena
	Helboda
	Hanguranketha
	Walapane
	Rikillagaskada
	Maldeniya

Kandy	EO's Range
	Galagedara
	Udunuwara
	Kurunduwatte
	Harispattuwa
	Poojapitiya
	Udadumbara
	Rambukpitiya
	Yatinuwara
	Wattegama,
	Kundasale
	Hatharaliyadde
	Alawathugoda
	Medapitiya
	Gangawatakorale
	Udapalatha
	Teldeniya
	Talathuoya
	Minipe
	Galaha

Rathnapura	EO's Range
	Weligepola
	Kolonne
	Ayagama
	Godakawela
	Palmadulle
	Balangoda
	Rathnapura
	Embilipitiya
	Niwithigala
	Kealla
	Elapatha
	Pothupitiya
	Pallebadda

Monaragala	EO's Range
	Bibile
	Monaragala
	Badalkumbura
	Madulle
	Hingurukaduwa
	Madagama
	Padiyathalawa
	Wellawaya
	Meegahayaya
	kotagama

Kegalle	EO's Range
	Mawanalle
	Ussapitiya
	Pinnawala
	Kegalle
	Warakapola
	Daraniyagala
	Dedigama
	Aranayake
	Ruwanwelle
	Yatiyantota
	Bulathkohupitiya
	Galigamuwa
	Rambukkana

Matale	EO's Range
	Palapathwala
	Ukuwela
	Thenna
	Rattota
	Weragama
	Yatawatta
	Hunukataela
	Pallepola
	Wahakotte
	Alugolla

Kurunegala	EO's Range
	Polgahawela
	Dodamgaslande
	Mawathagama
	Rambadagalle
	Polpithigama
	Karandagolle
	Melsiripura
	Dambadeniya
	Katugampola
	Ududdawa
	Wariyapola
	Kuliyapitiya
	Panduwasnuwara
	Madampe
	Naththandiya
	Chilaw

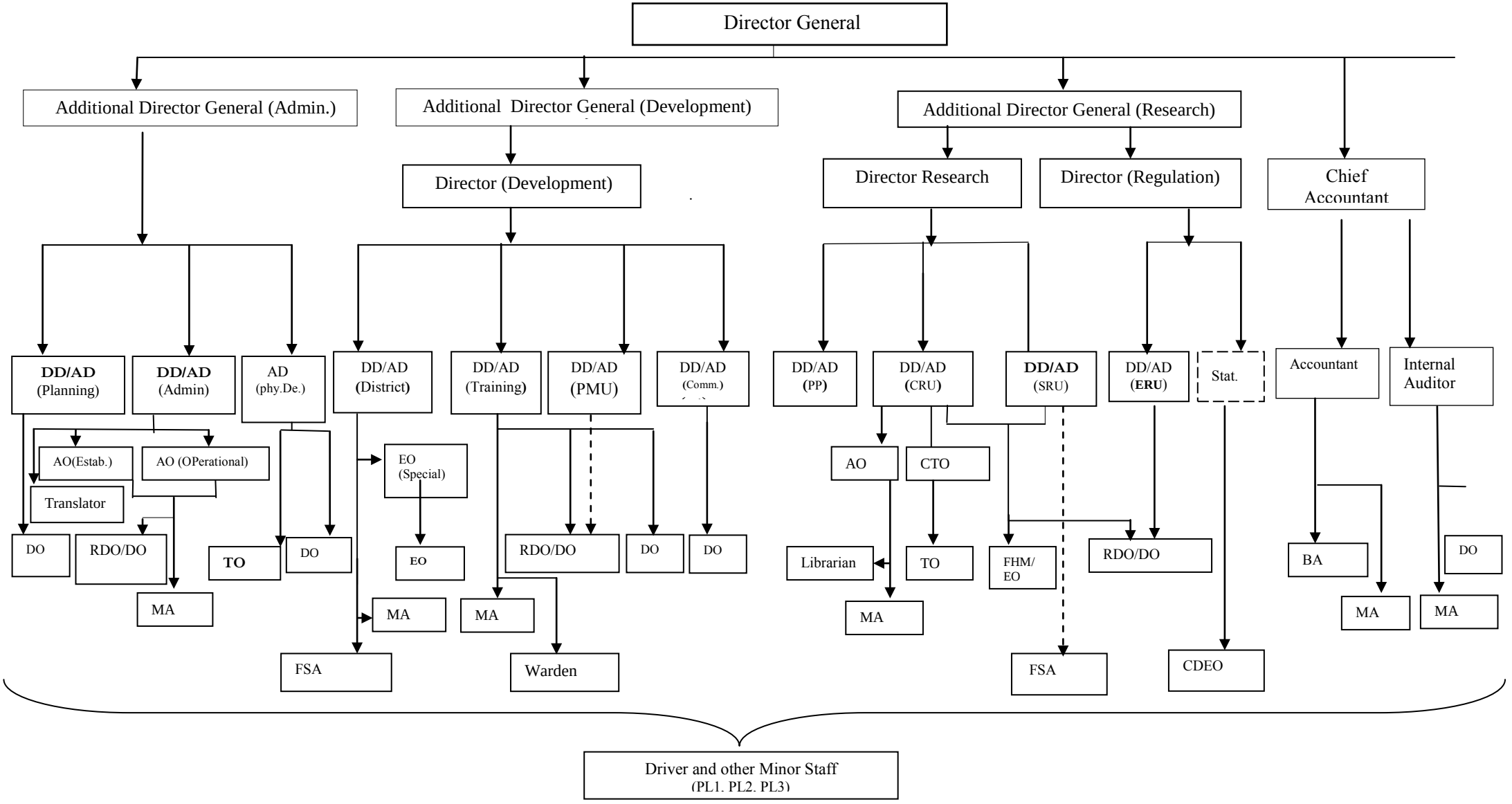
Badulla	EO's Range
	Badulle
	Haldummulle
	Nikapotha
	Uvaparanagama
	Passara
	Ridimaliyadde
	Haliela
	Meegahakiula
	Kandaketiya
	Bandarawela

Matara	EO's Range
	Deniyaya
	Akuressa
	Pasgoda
	Hakmana
	Weligama
	Devinuwara
	Deiyandara
	Kamburupitiya
	Matara
	Pitabaddara

Kaluthara	EO's Range
	Madurawela
	Bandaragama
	Kaluthara
	Mathugama
	Iththepana
	Baduraliya
	Beruwala
	Horana
	Bulathsinghala
	Pelawatta
	Agalawatta

Colombo	EO's Range
	Avissawella
	Homagama
	Padukke

Annexure VI: Organizational Structure of the Department of Export Agriculture - 2015



DD-Deputy Director AD-Assistant Director PMU-Progress Monitoring Unit PP-Plant Protection CRU- Central Research Unit SRU-Sub Research Unit ERU-Economic Research Unit Stat-Statistician AO -Administrative Officer EO-Extension Officer RDO-Research & Development Officer DO-Development Officer CTO-Chief Technical Officer TO-Technical Officer FHM-Farm House Manager BA-Budget Assistant MA- Management Assistant FSA-Farm Service Assistant CDEO- Computer Data Entry Operator

2015

අපනයන කෘෂිකර්ම දෙපාර්තමේන්තුව

ஏற்றுமதி விவசாயத் திணைக்களம்

DEPARTMENT OF EXPORT AGRICULTURE

අපනයන කෘෂිකර්ම දෙපාර්තමේන්තුව - අතමිට සරු හෙට දිනකට

ஏற்றுமதி விவசாயத் திணைக்களம் - வளமான எதிர்காலத்திற்கு

Cover Graphic Design By - Gimhan Degaldoruwa

DEPARTMENT OF EXPORT AGRICULTURE - FOR A PROSPEROUS FUTURE