

வார்டிகை கார்டு காதிகை வார்டால
வருடாந்த செயற்திறன் அறிக்கை
ANNUAL PERFORMANCE REPORT

2014



அபககை காகிகர்டு டேசார்டமேன்சுல
ஏறறுமதி விவசாயத் திணைக்களம்
DEPARTMENT OF EXPORT AGRICULTURE

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MINISTRY OF MINOR EXPORT CROP PROMOTION

2014

வார்கீக கார்டு காதல வார்கால

வருடாந்த செயற்திறன் அறிக்கை

Annual Performance Report

அதலயல காகீகர்து டீகார்தலீல்துல

தூல அதலயல லுல தூலர்தல அதலயலயலயல

ஏற்துமதல வலவசாயத் தலணைக்களம்
சலறு ஏற்துமதலப் பயலர் ஊக்குவலப்பு அமைச்சு

Department of Export Agriculture
Ministry of Minor Export Crop Promotion

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N.K.A.Rupasingha
Director General
Department of Export Agriculture
18.05.2015

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ABBREVIATIONS

AD	-	Assistant Director
ASMEC	-	Annual Symposium of Minor Export Crops
COP	-	Cost of Production
CRS	-	Cinnamon Research Station
DEA	-	Department of Export Agriculture
DS	-	Divisional Secretariat
EAAS	-	Export Agricultural Assistance Scheme
EAC	-	Export Agricultural Crops
EO	-	Extension Officer
ERP	-	Eppawala Rock Phosphate
FSA	-	Farmer Service Assistance
GAP	-	Good Agricultural Practices
GDP	-	Gross Domestic Product
GMP	-	Good Manufacturing Practices
GN	-	Grama Niladari
Ha	-	Hectare
HQEO	-	Head Quart Extension Officer
HRD	-	Human Resource Development
IBRS	-	Inter-Cropping & Betel Research Station
ICT	-	Information Communication Technology
IPC	-	International Pepper Community
IRP	-	Imported Rock Phosphate
NARP	-	National Agriculture Research Policy
PHASU	-	Post Harvest Advisory Service Unit
PIP	-	Productivity Improvement Programme
R & DA	-	Research & Development Assistance
RO	-	Research Officer
SLTS	-	Sri Lanka Technological Service
SPnDP	-	Small Plantation and Development Programme
VAM	-	Vesicular Arbuscular Micorhiza
FTA	-	Free Trade Agriment

FOREWORD BY THE DIRECTOR GENERAL OF EXPORT AGRICULTURE



The mission of the Department of Export Agriculture (DEA) is to increase foreign exchange earnings from Export Agricultural Crops (EAC) through increasing the production, productivity, improved product quality and enhancing the value addition capacity. This sector which comprises of Spices, Beverages, Industrial, Essential oil and Stimulant crops of perennial nature (other than Tea, Rubber, Coconut and Cashew) contributes to an average share of over 11.8% of all the Agricultural and Plantation sector export earnings during the reporting year. The DEA, under the supervision of the Ministry of Minor Export Crop Promotion, has planned and implemented its Research and Development programmes in 2014 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 2014 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).

Taking up the tradition of offering the first harvest to the tooth of relics the first harvest of Spice Crops of the year was offered to the tooth of relics, in a customary “Kulubandu Pooja Mangalya”. A pepper day was held in collaboration with International Pepper Community to popularize pepper consumption among local consumers at In- Service Training Centre of the DEA in Matale. A retail shop for the sale of spice products and planting material was opened at the premises of the Department.

This report summarizes the overall performance and related information pertaining to the four sub-divisions of the Department under the Director General of the Department of Export Agriculture, 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 2014.

N.K.A. Rupasinghe
Director General

GENERAL INFORMATION - 2014

➤ Growth of the EAC sector in 2014

- Contribution to GDP – 0.3%
- Contribution to export earnings of agriculture – 11.8 %
- Export volume (Mt) – 59,827.28
- Export Value (Rs.mn.) – 43,223.45
- Estimated EAC extent (ha) – 109,690ha (with ginger & turmeric)

➤ District offices, Research stations and Nurseries of the Department

District Offices -14 (Distributed in the following districts)

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

Research Stations and Sub-Units

1. Central Research Station, Matale
2. Cinnamon Research Station at Pallolpitiya, Thihagoda, Matara
3. Intercropping and Betel Research Station, Dampelassa, Narammala
4. Economics and Market Research Unit, Head Office, Peradeniya
5. Mid Country Research Station, Delpitiya
6. Tissue Culture Unit & Plant Nursery, Walpita
7. Research Sub-Unit , Kundasale
8. Research Sub-Unit , Nilambe

Department Plant Production Nurseries

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

1. Functions 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 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, Areca nut, 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
- Provision of 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, Prices etc.
- Control of importation of EAC products, planting materials etc.
- Training of personals involved in EAC production, processing & trading and other stakeholders
- Provision of advisory services for the promotion of EACs in estate sector
- Strengthening of the linkage among public and private organizations involved with EACs
- Executive authority under the Export Agriculture Act No. 46 of 1992
- Contributing towards EACs related policy matters in other governmental organizations
- Technology demonstrations



පරිපාලන நிர்வாகம் **ADMINISTRATION**



2. ADMINISTRATION DIVISION

Highlights of the Administration Division

- Mr. N.K.A. Rupasinghe was appointed to act in the position of Director General of the Department of Export agriculture.
- New officers were recruited for 6 Assistant Director Positions of Sri Lanka Scientific Service.
- Recruiting procedures for all the departmental positions have been approved.

2.1 Introduction

Being headed by the Director of Administration, the Administration 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 31.12.2014.

Table 2.2.1: Cadre Details as at 31st December 2014

No	Post	Approved Cadre		Existing Cadre		Vacancies
		Permanent	Contra. Basic	Permanent	Contra. Basic	
01	Director General	01	-	-	-	01
02	Additional Director General	02	-	-	-	02
03	Director (Research/ Development)	07	-	-	-	07
04	Director (Admin.)	01	-	01	-	-
05	Deputy /Assistant Director (Admin.)	01	-	01	-	-
06	Deputy /Assistant Director	67	-	45	-	22
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	-	51	-	34
13	Administrative Officer	03	-	03	-	-
14	Extension Officer (Special Grade)	19	-	03	-	16
15	Chief Technological Officer	03	-	02	-	01
16	Farm Manager (Special Grade)	01	-	-	-	01
17	Translator	02	-	01	-	01
Total of Tertiary Level		28	-	09	-	19
18	Research & Development Assistant/ Development Assistant	84	-	80	-	04
19	Development Officer	411	-	286	-	125
20	Budget Assistant (Attached from the Department of National Budget)	01	-	01	-	-
21	Librarian	03	-	01	-	02
22	Extension Officer	171	-	135	-	36
23	Technological Officer	22	-	19	-	03
24	Technical Officer	01	-	-	-	01

25	Farm House Manager	13	-	-	-	13
26	Management Assistant	83	-	71	-	12
27	Data Entry Operator	01	-	01	-	-
28	Warden	01	-	01	-	-
29	Farm Service Assistant	09	-	09	-	-
Total of Secondary Level		800	-	604	-	196
30	Driver	61	-	51	-	10
31	Mason	01	-	01	-	-
32	Tractor Driver	02	-	-	-	02
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	-	29	-	06
38	Lorry Cleaner	07	-	07	-	-
39	Driver Assistant	01	-	01	-	-
40	Watcher	47	-	*63	-	-
41	Labourer (contract basis)	190	97	*264	➤ 09	-
42	Cook	01	-	01	-	-
43	Circuit Keeper	02	-	01	-	01
Total of Primary Level		353	97	424	09	19
Total		1266	97	1088	09	268

* The number of labourers and watchers has exceeded the approved cadre, as the contract basis workers on service had been made permanent under PA circular 25/2014

➤ 09 contract labourers who are not eligible to be made permanent remained on service till 31/12/2014 under service requirements.

2.3 Changes made in the Staff in 2014

New Appointments

Assistant Director (Development)	02
Assistant Director (Research)	04
Public Management Assistant Service	03
Watcher	28
Labourer	113

Transfers – In

Assistant Director (administration)	01
Development Officer	02
Development Assistant	01
Public Management Assistant Service	14
Assistant Service	01
Driver	10

Transfers - Out

Development Officer	04
Public Management Assistant	04
Office Assistant Service	01
Driver	03

Resignations

Assistant Director (Research)	01
Development Officer	02

Release

Extension Officer	02
Development Officer	10
Public Management Assistant	01
Labourer	02

Deaths

Contract Labourer	01
Driver	01

Retirements

Director General	01
Deputy Director (Research)	01
Deputy Director (Development)	01
Extension Officer	07
Public Management Assistant	06
Farm Service Assistant	01
Driver	05
Watcher	01
Labourer	09

Vacation of Post

Extension Officer	01
Research and Development Officer	01

2.4 Departmental Examinations 2014

No	Examination	Date
01	Oral Test - Tamil - 1	28.03.2014
02	Oral Test - Tamil - 2	10.10.2014
03	1 st efficiency bar examination for Extension Officers of Sri Lanka Technical Service -1	21.03.2014
04	1 st efficiency bar examination for Extension Officers of Sri Lanka Technical Service -2	11.11.2014
05	2 nd efficiency bar examination for Research and Development officers	27.10.2014

2.5 Foreign Tours and Scholarships – 2014

No	Name of the Officer	Post	Description	Duration	Country
01	Mr. W.D.L. Gunaratne	Director General	CODEX Committee and Spice Summit	10.02.2014 to 19.02.2014	India
02	Mr. W.M.R.W.B. Wijekoon	Research Officer	CODEX Committee and the Quality Committee of IPC	10.02.2014 to 16.02.2014	India
03	Mr. N.K.A. Rupasinghe	Deputy Director General	Special Meeting of International Pepper Community	24.02.2014 to 27.02.2014	Dubai
04	Mr. J.L. Keerthi Weeralal	Dep. Director (Development)	Training on Crop Cultivation Technology in Shade crops	02.04.2014 to 16.05.2014	China
05	Mr. S.P.L. Seneviratne	Director (Development)	Conference on application of IT in Agriculture of Asian Countries	09.05.2014 to 29.05.2014	China
06	Mr. G.G. Jayasinghe	Deputy Director (Research)	Conference on application of IT in Agriculture of Asian Countries	09.05.2014 to 29.05.2014	China
07	Mr. K.G. Upali Ranawaka	Director (Admin)	Training on Export Economy of Asian Countries	04.06.2014. to 26.06.2014	China
08	Mr. R. A. A. K. Ranawaka	Assistant Director (Research)	Training on Fruit Production of Asian Countries	12.06.2014 to 26.07.2014	China
09	Mrs. E.A.H.K. Somalatha	Extension Officer	Training on Fruit Production of Asian Countries	12.06.2014 to 26.07.2014	China
10	Mr. N.K.A. Rupasinghe	Director General	Official Tour with hon. Minister of Minor Export Crop Promotion	16.07.2014 to 21.07.2014	Thailand

11	Mr. D.M.A. Bandara	Extension Officer	Workshop on Comprehensive Utilization Technology of Grain and Oil Crops and Irrigation System	25.07.2014 to 22.10.2014	China
12	Mrs. Thushari Liyanage	Assistant Director (Research)	Training on Food Security, Post-Harvest Technology, Processing and Quality Assurance	19.08.2014 to 17.09.2014	Thailand
13	Mr. I.V.A.D.S. Induruwa	Assistant Director (Research)	Training Workshop on Quality and Safety of Tropical Agro Products	27.08.2014 to 20.10.2014	China
14	Mrs. T.E. Weerawardane	Assistant Director (Research)	MEXT - The Nuclear Researches Exchange Programme	05.10.2014 to 07.03.2015	Japan
15	Mrs. R.N. Amarasinghe	Extension Officer	Grassroots Economic Development following Sufficiency Economy Philosophy	19.10.2014. to 22.11.2014	Thailand
16	Mr. N.K.A. Rupasinghe	Director General	42 nd International Pepper Conference	25.10.2014 to 31.10.2014	Vietnam
17	Dr. A.P. Heenkenda	Deputy Director General (Research)	42 nd International Pepper Conference	25.10.2014 to 31.10.2014	Vietnam
18	Dr. M.A.P.K. Seneviratne	Director (Dev.)	42 nd International Pepper Conference	25.10.2014 to 31.10.2014	Vietnam
19	Mrs. E.A.P.S. Amarawamse	Ass. Director (Dev.)	Learning Organic Agriculture by doing	03.11.2014 to 25.11.2014	Thailand
20	Mrs. G.E.M.A.K. Dissanayake	Ass. Director (Planning)	Sufficiency Economy to Wealthiness of the Nation	03.11.2014 to 01.12.2014	Thailand
21	Mr. P.R.G.S. Amarasena	Extension Officer	Workshop on Integrating small farmers in to Regional & Global Value Chains through contract farming	03.11.2014 to 07.11.2014	Vietnam
22	Mrs. H.A.S.K. Weeratunge	Research and Development Assistant	Integrated Agriculture & Rural Development through the participation of local farmers	03.11.2014 to 21.12.2014	Japan
23	Ms A.P.P. Disna	Director (Regulation)	Workshop on trade facilitation and paperless system for Agri-food products	15.12.2014 to 17.12.2014	Thailand
24	Dr.A.L.S. Dharmaparakrama	Director (Research)	Training on Agricultural Research Management	21.12.2014 to 01.01.2015	India

2.6 Targets Achieved in 2014

- Land Transfers

The land of Assistant Director's Office, Matara was registered under the ownership of this department on 27.05.2014, under section 44 of Land Acquisition Act.

The land of the Research and Processing centres of Export Crop Sector was conferred to the department on 31.12.2014 by the Divisional Secretary, under the approval of Commissioner General of Lands.

- Obtaining approval for Recruitment Procedures

The recruiting procedure for Senior Executive Service Category of Sri Lanka Technological Service of the department of Export Agriculture was approved by the Public Service Commission on 24.07.2014.

- Recruiting Staff

Recruitments were made for 06 positions of Sri Lanka Scientific Service.

12 watchers, 15 Labourers and 01 Circuit Keeper (Departmental Positions) were recruited.

113 Contract Labourers and 28 watchers were made permanent as per PAC 25/2014.



இலாப நிதி FINANCE



3. FINANCE DIVISION

Highlights of 2014

- Out of total allocation, 89.7% was spent during the year 2014.
- Financial performance of project 1 and 2 was 90 % and 89 % of the allocation.
- Progress of capital expenditure under project 1 and 2 was 81.3 % and 60.9% respectively and the progress of the recurrent expenditure for the same projects was 99.92% and 99.94 %.

The Annual Estimates for the year 2014 allocated a financial provision for a sum of a Rs. 788.292 million under the Head 289 for one programme consisting of two Recurrent Expenditure projects and two capital Expenditure projects. Additionally, the end of the year Supplementary allocation had been provided by the Department of National Budget (Rs.3.9 million).

Total allocation of consolidate funds for the development in year 2014 has increased by Rs.Mn. 62.78 over 2013 which was an 8% increment. Out of the total allocation of Rs.788.3mn .The expenditure for the year was Rs.707.4mn. This was 89.7% of the provision allocation for the year. The financial performance of the project1 and 2 was 90% and 89% of the allocated funds. Percentages of the amount spent under capital expenditure of the projects 1 and 2 for 2014 was 81.3% and 60.9% respectively and the same for the recurrent expenditure was 99.9% and 99.9%. Despite the serious man power shortage at all field level technical cadres and the financial constraints the spending of 89.7% of the total annual allocation for the year 2014 has been an impressive achievement of the DEA.

3.1: Financial Provision and Expenditure – 2014

Project - 01- Export Crops Development programme

Head - 289			
Programme - 02			
Item	Net Provision(Rs)	Expenditure(Rs)	Expenditure (%)
Capital Expenditure			
Rehabilitation and improvement of capital Assets	14,300,000.00	11,237,481.00	78.58
Buildings and Structures	10,000,000.00	7,282,305.00	72.82
Plant, Machinery and equipment	800,000.00	776,170.00	97.02
Vehicles	3,500,000.00	3,179,006.00	90.83
Acquisition of fixed Assets	8,500,000.00	8,125,935.00	95.60
Furniture and office equipment	2,300,000.00	2,227,210.00	96.84
Plant machinery and equipment	2,200,000.00	2,077,829.00	94.45
Lands and Land Improvements	4,000,000.00	3,820,896.00	95.52
Assisting the Farmers for Export crop development			
Development Assistance	309,000,000.00	250,757,365	81.15
Capacity Building			
Staff Training	1,500,000.00	1,063,304.00	70.89
Total Capital Expenditure	333,300,000.00	271,184,085.00	81.36
Recurrent Expenditure	289,522,000.00	289,304,118.00	99.92
Personal Emoluments	251,393,875.00	251,341,072.00	99.98
Other Charges	38,128,125.00	37,963,046.00	99.57
TOTAL EXPENDITURE(project-01)	622,822,000.00	560,488,203.00	89.99

Project -02 Export Crops Research and Integrated pest/disease management (IPM)

Item	Net Provision(Rs.)	Expenditure(Rs.)	Expenditure (%)
Capital Expenditure			
Rehabilitation and improvement of Capital Assets	5,300,000.00	3,274,582.00	61.78
Buildings and Structures	2,500,000.00	1,084,477.00	43.38
Plant, Machinery and equipment	800,000.00	576,110.00	72.01
Vehicles	2,000,000.00	1,613,995.00	80.70
Acquisition of capital Assets	30,000,000.00	16,341,358.00	54.47
Furniture and office equipment	2,500,000.00	1,918,857.00	76.75
Plant machinery and equipment	11,500,000.00	2,400,355.00	20.87
Buildings and Structures	10,000,000.00	7,788,196.00	77.88
Lands and Land Improvements	6,000,000.00	4,233,950.00	70.57
Capacity Building			
Staff Training	600,000.00	333,111.00	55.52
Implementation of National Agricultural Research Plan (NARP)			
investment	4,000,000.00	3,899,371.00	97.48
Investment(Nutmeg leaf fall disease)	7,450,000.00	5,016,468.00	67.34
Total Capital Expenditure	47,350,000.00	28,864,890.00	60.96
Recurrent Expenditure	118,120,000.00	118,051,365.00	99.94
Personal Emoluments	99,139,608.00	99,138,942.00	100.00
Other Charges	18,980,392.00	18,912,421.00	99.64
TOTAL EXPENDITURE (project 2)	165,470,000.00	146,916,255.00	88.79
TOTAL EXPENDITURE(project 1&project 2)	788,292,000.00	707,404,458.00	89.74

3.2 Revenue of 2014

Revenue Source	Estimate (Rs.Mn.)	Actual (Rs.Mn.)
Rent on Govt. Buildings & Houses	1.40	1.39
Loan Interests -other	3.00	3.08
Departmental sales	5.00	5.21
Other Receipts	8.00	7.57
W & O P	13.00	12.71
Sale of Capital Assets	2.00	0.08
Total	32.40	30.04

Advance Account Limits	Estimate(Rs)	Actual (Rs)
Maximum Limit of Expenditure	30,000,000.00	23,771,598.00
Minimum Limit of Receipts	20,000,000.00	23,666,685.00
Maximum Limit of Debit Balance	120,000,000.00	82,439,778.00



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Highlights of 2014

- Opening of sales outlet for marketing spice products and plants at the premises of headquarters at Gatambe
- Ceremony of offering first-harvest of spices (*Kulubadu pooja mangalya*) to Temple-of-Tooth, Kandy
- Ceremony of offering Cinnamon to *Seenigama Devalaya* as an annual event
- Opening of first-ever Garcinea village in the country in Bulathsinhala of Kalutara District
- ‘Pepper-day’ was held at the In-Service Training Centre, Matale to promote pepper consumption in the country

4.1 Introduction

The Development Division plays a significant role in the Department to provide technical advice and guidance, planting materials and cash grants for the promotion of EAC sector. The division is headed by Additional Director General (Development) supported by three Directors (Development), each assigned with two provinces for each, for the management and implementation of EAC development programme. 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 division worked as a supportive staff to continue the services and functions of the Development division.

The development activities and services of the division are mainly focused on the wet and intermediate climatic zones of Sri Lanka covering 14 districts, namely, 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 Programme

The following major programmes were carried out by the Development Division in 2014.

1. New/Replanting Programme
2. Productivity Improvement Programme
3. Post-Harvest Technology and quality improvement programme of EACs.

The special programmes such as post-harvest advisory services, plantation advisory services and plant certification programme for quality assurance of plants and planting material, cultivation of EACs in selected villages as cluster farms, were also implemented during the year 2014. Extension and training of stakeholders were carried out as a tool of popularising those three major development programmes.

4.3 Investment Assistance Scheme for the promotion of Export Agriculture 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 2007 is currently being implemented to promote production, productivity and quality improvement of EACs.

4.3.1. Export Agriculture Crops Investment Assistance Scheme for new planting

Export Agriculture Crops Investment Assistance Scheme currently being implemented for new planting programme is given in table 4.3.1.1 and the progress of the new planting programme has is summarized in table 4.3.1.2.

Table 4.3.1.1: EAC Assistance Scheme for New Planting

Crop	Crop spacing	Plants per hectare	Investment Assistance per hectare (Rs.)	Minimum period Qualifying for Investment Assist.(Yrs)	Maximum period Qualifying for Investment Assist.(Yrs)
Arabica Coffee	1.8x1.8 m 1.8x2.5 m	3,000 2,200	65,000.00	03	05
Robusta Coffee	3.0x3.0 m	1,100	29,900.00	03	05
Cocoa	3.0x3.0 m	1,100	51,000.00	03	05
Cinnamon	1.2x0.9 m	9,000	101,000.00	02.5	05
Black Pepper	2.4x2.4 m	1,700	50,600.00	03	05
Cardamom	2.0x2.5 m	2,000	55,000.00	03	05
Clove	6.0x6.0 m	250	20,000.00	04	06
Nutmeg	6.0x6.0 m	250	30,000.00	04	06
Vanilla	2.4x1.5 m	2,750	16,500.00	03	05
Citronella	0.9x0.9 m 0.6x0.6 m	17,500 30,000	30,625.00	8 Month	02
Lemongrass	0.6x0.6 m	30,000	30,625.00	8 Month	02

Table 4.3.1.2: Progress of New planting Programme– 2014

Crops	Target	Applications Received		Applications Recommended		Permits Issued		Extent Planted		Rewards paid	
		No.	ha	No.	ha	No.	ha	No.	ha	No.	ha
Cinnamon	717	6463	2504.0	5010	1910.7	3286	1170.0	2805	982.5	1642	663.7
Pepper	720	14248	4140.6	9536	2323.3	5369	1240.7	4295	922.2	911	237.3
Cardamom	40	36	24.3	23	18.7	18	12.1	11	10.8	2	1.2
Coffee	60	288	111.6	211	88.1	171	60.2	123	50.3	52	14.9
Cocoa	40	1071	461.1	834	359.1	816	271.1	755	287.0	106	34.2
Clove	50	227	89.3	169	72.4	125	53.8	520	49.6	4	1.4
Nutmeg	80	572	196.0	372	122.4	313	95.6	678	92.4	69	22.5
Vanilla	0	0	0	0	0	0	0	26	4.0	-	-
Citronella	10	98	61.6	71	42.3	18	11.6	32	24.5	4	2.6
Arecanut	250	743	276.5	585	214.1	477	140.9	692	168.9	-	-
Ginger	320	5324	-	4896	651.1	3287	436.7	1591	181.9	-	-
Turmeric	70	604	-	525	27.3	314	16.9	230	16.9	-	-
Betel	0	0	0	0	0	0	0	93	2.4	-	-
Total	2357	29674	7865	22232	5829.5	14194	3509.6	11851	2794.7	2790	977.8

4.4. Productivity Improvement Programme

Productivity Improvement Programme (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 pepper, cinnamon, cocoa, coffee, clove and nutmeg cultivations. Adoption of recommended agronomic practices such as filling vacancies, proper soil conservation measures, crop and shade tree pruning, application of organic manure and integrated pest management are required to qualify under the assistance scheme. The details of the Assistance Scheme are given in Table 4.4.1.

Table 4.4.1: Assistance Scheme for Productivity Improvement Programme (Cash grant per hectare for each crop in Rs.)

Crop	1 st Year (Rs)	2 nd Year (Rs)	3 rd Year (Rs)	Total (Rs)
Cinnamon	13,000.00	13,000.00	11,500.00	37,500.00
Black pepper	13,000.00	13,000.00	11,500.00	37,500.00
Cocoa	13,000.00	13,000.00	4,000.00	30,000.00
Coffee	13,000.00	13,000.00	4,000.00	30,000.00
Clove	6,500.00	6,500.00	2,000.00	15,000.00
Cardamom	13,000.00	13,000.00	4,000.00	30,000.00
Nutmeg	6,500.00	6,500.00	2,000.00	15,000.00

Target of the productivity improvement programme and the progress of the extent developed under productivity improvement programme in 2014 are given in the table 4.4.2 and 4.4.3

Table 4.4.2: Target of the productivity improvement programme

Crop	Cinnamon	Pepper	Coffee	Cocoa	Cardamom	Clove	Nutmeg	Total
Target(ha)	775	980	20	60	20	80	55	1990

Table 4.4.3: The extent (ha) developed under Productivity Improvement Programme (PIP) in different District

District	Cinnamon	Pepper	Coffee	Cocoa	Cardamom	Clove	Nutmeg	Total
Kurunegala	14.3	97.9	0.9	5.0	0	1.2	1.2	120.5
Matale	26.6	117.8	-	4.0	-	-	-	148.4
Kandy	2.0	181.2	5.8	1.2	-	28.1	30.1	248.4
Nuwara- Eliya	-	44.6	5.6	-	4.0	2.8	-	57.0
Badulla	17.7	241.3	-	-	-	-	-	259.0
Monaragala	8.0	49.4	-	6.9	-	-	-	64.3
Hambantota	97.4	31.2	-	-	-	-	-	128.6
Matara	188.7	-	-	-	-	-	-	188.7
Galle	406.0	0.1	-	-	-	-	-	406.1
Kalutara	103.0	-	-	-	-	-	-	103.0
Colombo	7.0	3.7	-	-	-	-	-	10.7
Gampaha	15.5	44.6	-	-	-	-	-	60.1
Kegalle	7.4	40.4	-	-	-	9.6	-	59.8
Ratnapura	59.8	68.2	-	-	-	-	-	128.0
Total	953.4	920.4	12.3	17.1	4.0	41.7	31.3	1980.2

4.5. Export Agriculture 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 its functionality during the reporting year too. The Investment assistance scheme was revised in 2007 and three packages suitable for stakeholders at different levels of operation were introduced. The main objective of this assistance scheme is 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.

1) Group Processing Units

The Farmer Organizations registered with the department are eligible for this assistance scheme, under which machinery required for processing is issued free of charge. The farmer organizations should hold the responsibility of managing the processing unit and handling and maintaining the machineries. In addition, identifying or Construction of buildings required for installation of machinery should be performed by the Farmers' Organization itself. The department helps the Farmer Organizations by providing technical knowledge in operation and maintenance of these processing centres.

2) Central Processing Unit

This assistance scheme has been introduced for applicants who are capable of establishing a large scale processing facilities investing more than two million Rupees. The investor is entitled for a cash grant of 25% of the total investment not exceeding 0.5 million Rupees, under this scheme. The investor has the whole authority to maintain the centre and earning profits.

3) Individual Processing Units

Growers or processors who wish to set up a private processing unit for post-harvest processing of EAC are eligible to apply for this assistance scheme. They are entitled to obtain cash grants for relevant machineries or post-harvest processing facilities approved by the department as indicated in table 4.5.1.

Table 4.5.1: Assistance Scheme for Post-Harvest Activities

No.	Type of investment	Assistance grant per unit (Rs.)
01	Processing of black pepper	
	a) Blancher	1,000
	b) White pepper processing Machine	25,000
	c) Pepper Thresher	
	➤ Manually Operated	10,000
	➤ Electrically operated	20,000
	➤ Engine Operated	22,500
	d) Green pepper seed sorting Machine	8,000
	e) Grader	15,000
02	Processing of Coffee	
	➤ Coffee pulping Machine	
	➤ Manually Operated	5,000
	➤ Machine/Electrically operated	15,000
	Coffee Huller	10,000
03	Processing of cocoa	
	➤ Three fermenting boxes larger than 2'x2'x2'	4,500 (1500 per box)
	(made from grade 1 timber)	
	➤ Fermenting trays	6,000
04	Volatile Oil Distillation Unit	
	➤ For new constructions	75,000
	➤ For repairs	75,000 (maximum)
05	Processing Centre – Minimum 400 feet	
	➤ Cinnamon	40,000
	➤ Other Crops	25,000
06	For Dryers	
	➤ Multifunctional dryers (Capacity>250 kg)	100,000
	➤ Solar dryers (100 feet ²)	10,000 (maximum)
	➤ Protected threshing floor	25,000
	➤ Dryers set above the ground level	Maximum Rs. 25 /feet ²
		Minimum 200 feet ²
07	Vanilla – fermentation (Minimum Capacity - 20 kg)	10,000

Table 4.5.2: progress of the Post- Harvest Assistance Scheme in 2014

Item	Number of units granted
Processing centers	55
Distillation Units	14
Pepper Threshers	27
Blanchers	29
Multi crop Dryers	7
Drying floors	2
graders	1
Shifters	1
Coffee Pulper	3
Pepper Decorticators	12
Others	7
Cinnamon Peeling kits	1100
Total	1258

4.6. Estate Sector Crop Development Programme

Export Agriculture Crops development programme in estate sector was introduced in 1998 with the objective of expansion of EAC cultivations to larger estates by utilizing the available resources of the sector. Special emphasis was given for crop diversification programme with EACs in plantation sector to optimize the profit and minimize risk. Estate management was helped to plan their EAC development programmes by senior officers of the department including researchers, whenever necessary. The following table shows the extent cultivated under the estate sector development programme in 2014.

Table 4.6.1: Extent of crops developed under Estate Sector Crop Development Programme in 2014

District	Crop (ha)							
	Cinnamon	Pepper	Nutmeg	Clove	Coffee	Cocoa	Cardamom	Areca nut
Kandy	21.2	40.0	1.4	23.2	8.7	-	-	4.38
Matale	4.8	1.34	-	12.8	3.75	10.25	-	-
Nuwara eliya	1.4	7.9	-	-	19.7	-	-	1.2
Kuruneala	15.3	-	-	-	-	-	-	1.0
Kegalle	36.2	-	-	-	-	-	-	-
Ratnapura	19.55	9.0	-	-	-	-	-	0.6
Gampaha	1.2	1.0	-	-	-	-	-	0.4
Colombo	4.5	-	-	-	-	-	-	-
Kalutara	6.0	-	-	-	-	-	-	-
Badulle	8.0	56.08	-	-	-	1.0	5.5	17.28
Monaragala	-	-	-	-	-	5.4	-	-
Galle	23.05	-	-	-	-	-	-	-
Matara	30.0	-	-	-	-	-	-	-
Total	171.2	115.32	1.4	36.00	32.15	16.65	5.5	24.86

Under Productivity Improvement Program 7.2 ha of cinnamon, 7.2 ha of pepper, 4.0 ha of clove, 10.0 ha of cocoa and 2.0 ha of coffee have been developed in estate sector.

4.7. Production and Issuing of Planting Material

The objective of this programme is to issue quality planting material for new planting and PIP programmes. Planting material were provided to all farmers who were qualified under the development assistance scheme and successfully completed the land preparation, soil conservation and other field operations as per the instructions given by the department officers. Planting materials were raised in 11 nurseries managed by the department (table 4.7.1) and registered private nurseries under the close supervision of extension staff of the department. There were 427 private nurseries registered with the department during the year 2014. The distribution of private nurseries is shown in table 4.7.2. The same nurseries were used to produce the planting material requirements for “Divineguma” and other national development programmes.

Table 4.7.1: Department Plant Nurseries in different Districts

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

Table 4.7.2: Number of private nurseries registered with the Department in different Districts

District	No. of Nurseries	District	No. of Nurseries
Kurunegala	19	Matara	41
Matale	26	Galle	42
Kandy	48	Colombo	15
Nuwara-Eliya	30	Gampaha	14
Badulla	46	Kegalle	28
Monaragala	39	Rathnapura	34
Hambantota	25	Kalutara	20
Total			427

Prices of the planting materials were revised with effect from 20.08.2012 and prevailed in 2014 are given in table 4.7.3

Table 4.7.3: Prices of Seeds and Planting material (Rs.)

Crop	Seed material (Rs.)	Planting Material (Rs.)
Cocoa	20.00 per pod	Plant 10.00
Pepper	0.20 per 3 node cutting	Plant 16.00
Coffee	80.00 Per kg. of ripen fresh berries and parchment, dry coffee beans 150.00 per kg	Plant 10.00
Cinnamon	80.00 per kg of seeds	Plant 9.00
Cardamom	-	Sucker 10.00
Arecanut	2.00	Plant 9.00
Vanilla	5.00 per 1m cutting	
Clove		Large Plant 40.00
Nutmeg	10.00 per seed	Large 60.00
Garcinea	-	Budded 80.00 Seedlings 15.00
Kitul	-	Large 10.00 Small 4.00
Citronella	-	0.75 per sucker
Lemongrass	-	0.75 per sucker

4.8. Plant Certification Programme

Supplying of certified planting materials to the growers has made a mandatory requirement by the Department. Planting with good quality planting material is well recognized phenomenon in achieving high productive cultivations. To ensure the supply of quality planting material through EAC development programme, 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 are given in table 4.8.1.

Table 4.8.1: Details of the Plants Certified in 2014

Crop	Number of Plants (Certified)
Pepper	2,017,434
Coffee	108,600
Cocoa	333,720
Cinnamon	12,371,520
Areca nut	282,246
Clove	12,625
Nutmeg	16,824
Grand total	15,142,969

4.9. Issuing of Plants under the Export Agriculture Crops Assistance Schemes

Table 4.9.1. Illustrates the details of plants issued under the assistance schemes during the year.

Table 4.9.1: Issuing of Planting Material (in numbers)

Crop	New Planting	Other	Total
Cinnamon	8,383,785	3,520,969	11,904,754
Pepper	1,310,092	547,157	1,857,249
Coffee	369,960	29,364	399,324
Cocoa	22,270	24,270	46,540
Areca nut	211,168	95,105	306,273
Clove	12,685	8,937	21,622
Nutmeg	28,616	4,027	32,643
Other	6,610	35,357	41,967
Total	10,345,186	4,265,186	14,610,372

4.10. Development of other Export Agricultural Crops

The department is dealing with certain crops which have a potential for enhancing foreign exchange earnings other than the main crops mandated to DEA. Crops identified under this programme were Vanilla, Lemongrass, Garcinia (*Goraka*) and Kithul. In addition, Ginger and Turmeric were included in this category in 2007. The programme is being continued during the year 2014 and planting materials and necessary technical advice were provided to relevant farmers under this programme. During the year, 297,875 kg of Ginger and 71,655 kg of Turmeric seed tubers were distributed among the growers.

Table 4.10.1: Progress of the Vanilla Cutting distribution

District	No. of cutting distributed
Matale	2550
Kandy	1700
Kurunegala	0
Total	4250

Vanilla cuttings were distributed in home gardens as an additional income to small-scale farmers (Table 4.10.1)

4.11. Organic Farming Programme

Considering the growing demand for organically produced food in the international market, the department initiated a program for the promotion of organic farming in the year of 1998. Major role of the Department in this regards 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. Farmers were facilitated for marketing their products through the introduction of buyers/exporters.

Table 4.11.1 Extent established under Organic Farming Development Programme in 2014

District	Crop	Extent (ha)
Kurunegala	Pepper/Cinnamon	14.4
Kalutara	Pepper/Cinnamon	20.0
Kandy	Pepper/Nutmeg/Clove	0.1
Hambantota	Cinnamon	3.6
Galle	Cinnamon	11.1
Total		49.2

4.12. 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 processing of EACs. Required resource personals and other services were obtained from the Research Division, whenever necessary, to conduct the training programs. Details of the training classes conducted in the year reviewed are given in table 4.12.1

Table 4.12.1: Progress in Farmer Training 2014

Activity	Number of Programmes		Number of Beneficiaries
	GAP	GMP	
Farmer Training Classes	2193	325	69,342
Field Days	456	91	17,140

4.12.2. Cinnamon Peeler Training Programmes

Experienced Cinnamon peeler shortage has become a serious problem in cinnamon industry. Hence, the department has introduced a cinnamon peeler training programme as a self-employment project in 1988 and continued during the year 2014 as well. A five-day on-the-job training was given for the selected beneficiaries at divisional level. All the participants who have successfully completed the training programme were provided with a toolkit necessary for cinnamon peeling. The progress of cinnamon peelers training programme is given in the following table (4.12.2.1).

Table 4.12.2.1: The progress of cinnamon peelers training programme

District	Number of Beneficiaries
Kegalle	30
Gampaha	104
Rathnapura	113
Colombo	24
Kalutara	110
Galle	150
Badulla	72
Matale	31
Nuwara-Eliya	07
Hambantota	92
Matara	183
Kurunagala	12
Kandy	53
Monaragala	27
Total	1008

4.12.3. 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 4.12.3.1.

Table 4.12.3.1: Details of the training programs conducted at In-Service Training centre, Matale

Type of training	Nature of trainees	Number of training programs	Number of trainees	Number of training days	Number of man-days
Officer training	Officers of DEA	27	773	48	1338
Officer training	Officers of other institutes	17	471	27	730
Farmer training	Farmers and other stakeholders	13	340	15	436
Conferences and workshops	Stakeholders of EAC sector	13	688	13	688
Total		70	2272	103	3192

In addition, 17 training programs were conducted by the training officers attached to the Matale training centre in different locations. In these programs, 471 trainees participated, covering 29 days and 730 man-days.

4.13. 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 programmes and for dissemination of technology too. The details of demonstrations established are shown in table 4.13.1.

Table 4.13.1: Demonstrations established and maintained in different Districts in 2014

District	Number of Demonstrations
Kurunegala	4
Matale	1
Kandy	20
Nuwara Eliya	1
Badulla	1
Moneragala	4
Hambantota	0
Matara	6
Galle	0
Colombo/Kalutara	0
Gampaha	15
Kegalle	18
Ratnapura	6
Total	76

4.14. Other development programmes

Uva Wellasse cocoa development project, introduction of Export Agricultural Crops to non-traditional areas, small plantation development program, Kitul development program and the activities related to pepper pruning week are other development programs carried out within the year 2014. These programs are described below.

4.14.1. Uva Wellasse cocoa development project

This project was initiated to establish 300 ha of cocoa under rubber in Monaragala and Badulle District of Uva province.

In spite of prolonged drought, 230.6 ha of cocoa have been successfully established. In order to reach this achievement, 344,200 seedlings were raised. Thousand one-hundred and fifty four (1,154) farmers, 35 nurserymen and 82 officers, who were involved in this project were trained. Rs.Mn. 2.5 was spent on the project.

4.14. 2. Introduction of Export Agricultural Crops to non-traditional areas

Nine thousand cinnamon plants, 7150 pepper plants, 8700 areca nut plants and 5400 betel cuttings were distributed in non-traditional Export Agricultural Crops growing Districts: Batticaloa, Polonnaruwa, Anuradhapura, Vavuniya and Jaffna.

The DEA supplied plants and technical assistance to this collaborative programme. Plants were given to lands where shade was sufficiently established. The institutes involved in respective Districts and the numbers of plants distributed are given in table 4.14.2.1 as follows.

Table 4.14.2.1: The number of plants distributed from different EAC crops in non-traditional EAC growing Districts

District	Institute involved	Type of Export Agricultural Crop and number of plants Distributed			
		Pepper	Cinnamon	Areca nut	Betel
Batticaloe	District Secretary (under <i>Divineguma</i>)	1000	2000	2700	-
Polonnaruwa	Mahaweli Authority (system B)	1000	2000	1000	-
Polonnaruwa	Department of Irrigation	-	-	2000	-
Anuradhapura	Department of Prison	-	-	500	-
Anuradhapura	Palugaswewa Divisional Secretariat	400	-	-	-
Anuradhapura	Galenbindunuwewa Divisional Secretariat	750	2000	1000	-
Anuradhapura	Nuwaragampalatha Divisional Secretariat	1000	3000	-	-
Anuradhapura	Mahaweli Authority (system H)	3000	-	-	3000
Anuradhapura	Department of Forestry	-	-	-	2400
Vavuniya	Sri Lanka Army	-	-	500	-
Jaffna	Sri Lanka Army	-	-	1000	-
Total		7150	9000	8700	5400

4.14.3. Small Plantation Development Programme (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 4.14.3.1.

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

District	No. of farmer societies	Number of plants distributed			
		Cinnamon	Pepper	Coffee	Arecanut
Kandy	17	210	6,645	200	410
Nuwaraeliya	2	-	3,471	-	4,680
Kegalle	2	2,500	-	-	-
Total	21	2,710	10,116	200	5,090

A productivity improvement programme was also implemented under the SPnDP in Kandy and Kegalle Districts. Under this programme, Productivity of pepper vines, which have already been established in tea cultivations, was improved. In this programme 480 farmers in Kandy Districts and 71 farmers in Kegalle district were benefited through this programme. Two thousand four hundred and eighty three farmers were trained as follows (Table 4.14.3.2).

Table 4.14.3.2: Training programmes conducted under SPnDP for beneficiaries of EAC

District	Number of training programmes held	Number of beneficiaries
Kandy	20	748
Nuwaraeliya	6	100
Kegalle	6	45
Total	32	893

4.14.4. Kitul Development Programme

An exhibition stall was arranged at “Kitulaka Waruna” exhibition held at Kandy City Center from 1st to 3rd August 2014. Twenty thousand Kitul seedlings have been potted to be issued through Ministry of Tourism in 2014.

4.14.5. Pepper pruning week

The major factor offering the yield of black pepper is the excessive shade in black pepper cultivations. The black pepper shade pruning week was introduced as a remedy in order to encourage the farmers on shade tree pruning and applying green manure at the base of the vines. 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 pruning week lasted from 09^h to 16th September 2014. This programme was implemented island wide covering 3,460.9 ha of pepper cultivations belonging to 9,053 farmers. The details of the programme are given in the Table 4.14.5.1.

Table 4.14.5.1: 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	11	45	1298	340.5
Hambantota	5	7	177	111.74
Galle	14	24	987	43.0
Matara	9	12	262	2.36
Kurunagala	8	28	1,056	612.95
Badulle	9	16	496	161.0
Nuwaraeliya	5	12	243	115.0
Kalutara	10	10	220	8.29
Colombo	2	2	48	9.5
Ratnapura	17	35	1,294	841.2
Monaragala	3	12	315	5.66
Matale	8	23	704	680.0
Kandy	18	84	1,729	464.9
Gampaha	11	11	224	64.8
Total	130	321	9,053	3,460.9

4.15 “Divi Neguma” National Development Programme – 2014

In 2014 four development programs were carried out under the Divi Neguma National Development Programme which was funded by the Ministry of Economic Development aiming overall development of Export Agriculture Crop sector.

4.15.1 Establishment of Export Agriculture Crop based Home Gardens

EAC planting materials were distributed to beneficiaries by the DEA. Progress of the programme is given in table 4.15.1.1.

Table 4.15.1.1 Issue of planting materials to home gardens

District	Cinnamon	Pepper	Coffee	Areca nut	Garcinia	Nutmeg	Clove
Colombo	15,975	11,025	-	3,000	-	-	-
Gampaha	17,200	20,506	45	5,670	-	-	-
Kalutara	18,230	30,040	-	3,450	-	-	-
Galle	69,092	9,453	-	-	-	-	-
Matara	52,500	16,900	-	675	-	-	-
Hambantota	5,964	6,758	110	1,380	-	-	-
Kandy	26,840	8,100	3,200	400	-	460	-
Matale	19,538	1,177	-	1,508	145	-	-
NuwaraEliya	8,111	6,585	1,703	1,601	162	161	13
Kegalle	29,950	20,150	2,500	400	-	-	-
Rathnapura	40,000	33,550	-	4,950	175	-	-
Badulla	825	9,795	1,500	1,600	-	-	-
Kurunegala	19,250	15,214	-	100	-	-	-
Moneragala	12,990	6,670	-	2,450	-	-	-
Total	336,465	195,923	9,058	27,184	482	621	13

4.15.2 Establishment of Commercial Crop Unit

Under this programme EAC cultivations with land extent of 0.2-1.0 ha were established targeting increased production through the adoption of scientific agronomic practices and income generation for growers. They were supplied with technical advice, cash grants and planting material free of charge. A sum of Rs. 45.4 million was invested in this programme and the physical progress of establishing commercial crop units are given in table 4.15.2.1.

Table 4.15.2.1: Physical Progress of Establishing Commercial Crop Units (ha)

District	Target (Units)	Progress (Units)	Physical Progress(ha)				Total Progress Extent in
			Cinnamon	Pepper	Cocoa	Nutmeg	
Colombo	15	13	6	-	-	-	6
Gampaha	65	62	7.4	10.6	-	-	18
Kalutara	80	65	27.7	-	-	-	27.7
Galle	90	81	32.9	-	-	-	32.9
Matara	75	94	45.7	-	-	-	45.7
Hambantota	100	79	20.6	11.5	-	-	32.1
Kandy	95	70	2.8	21.7	-	4.4	28.9
Matale	65	49	6	21.5	-	2.4	29.9
NuwaraEliya	60	25	-	8.6	-	-	8.6
Kegalle	65	56	11	12.1	-	-	23.1
Rathnapura	115	99	24.15	24.1	-	-	48.25
Monaragala	65	49	-	9.2	8.8	-	18
Badulla	75	38	-	16.4	-	-	16.4
Kurunegala	75	77	11	16.1	-	-	27.1
Total	1040	857	195.25	151.8	8.8	6.8	362.65

4.15.3 Development of EAC based cottage industries

This programme was launched with the intention of increasing income level of beneficiaries and encourages value addition of EACs. Beneficiaries were supported to purchase prescribed machinery. Table 4.14.3.1. Highlights the physical progress of the programme implemented in 2014.

Table 4.15.3.1 Progress of EAC Based Economic Household Units

Economic Household Units	Prescribed Machinery	Number
High Quality Pepper Production	Pepper Thresher	16
White Pepper Production	White Pepper Processing Machine	04
High Quality Coffee Production	Coffee Pulper	01
Spice Processing	Dryers	02
	Spice Grinding Machine	06
Total		29

4.15.4. Establishment of shade houses in EAC Nurseries

Under this programme nurserymen were provided with 50% financial support to construct shade houses to increase the quality and quantity of the EAC plants they produced. During 2014 ten shade houses worth Rs. 1,260,000 were established.

District	Number of plant sheds	Specification
Gampaha	01	60' x18'
Kandy	04	60' x18'
Rathnapura	01	60' x18'
Kurunegala	03	60' x18'
	01	40' x18'
Total	10	

4.16. Progress of Communication Division

Following programs were carried out during the year 2014.

4.16.1. Electronic media

- Twenty episodes of 'Sagavunu kahawanu' programme were produced and telecasted through National television channel. Two documentaries on *Mahinda chinthana* vision forward were also produced.
- Eight radio programmes by the name of 'Rasajanani' was broadcasted on Kandurata sevaya, Ruhunu sevaya, Wayamba sevaya and Swadeshiya sevaya. Another radio programme called 'Kahawanu Thuru' was also broadcasted on the above channels. Two programs of 'Kahawanu Thuru' were broadcasted in 2014.

4.16.2. Print media

- Price information on Export Agricultural Crops produce was published on weekly basis in *Dinamina* newspaper. Such information was published on 51 occasions.
- A poster on spice grades (2000 copies) were printed and distributed.
- Two handbooks, one for cinnamon training programmes and another for Uva Wellassa cocoa project was published.

- Posters on pepper shade tree pruning week (5,000 copies) and EAC assistance scheme and its benefits (2,500 copies) were printed.
- Thirty thousand leaflets on ‘Nutmeg leaf-fall disease, 5000 leaflets for *Deyata-kirula* exhibition, 10,000 leaflets for pepper shade pruning week, 500 leaflets on *Garcinea* and 4,000 leaflets for ‘Kitulaka Waruna’ exhibition were printed and distributed.
- Two thousand docketts for *Garcinea* project and 200 docketts for ‘pepper- day’ were printed and distributed.
- Thousands stickers on ‘Nutmeg leaf-fall disease’ was printed targeting public transport means in Kandy, Matale, Kurunegala and Kegalle Districts.
- Fifteen flip charts for Uva Wellasse cocoa project and six display boards on ‘Nutmeg leaf-fall disease’ was produced.
- Newsletter ‘Sarathi’ was released.

4.16.3 Other Special Events

- Kulubadu Pooja Mangalyaya – 2014

“Kulubadu Pooja Mangalyaya” was held for the first time on 16th of June 2014 at the Temple of tooth relic, where the first harvest of spice crops was offered to the sacred tooth relic in a ceremonial religious event organized jointly by the Ministry of Export crop consisting of Cinnamon, Cardamom, Nutmeg, Mace, Clove, Black pepper , Vanilla, *Garcinia*, Betal, and Areca nut were offered in this ceremony.



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Highlights of the Research Division

- Higher cinnamon yield can be achieved by the application of half of the recommended amount of inorganic fertilizer (450 kg/ha/yr.) with the application of cinnamon leaf compost at the rate of 10t/ha.
- Application of urea has no beneficial effects on peelability of cinnamon.
- New cinnamon peeling table was fabricated with low cost (Rs.15,000.00) and low space requirement
- Introduced pepper hybrids (14/3, 27/1) were mass propagated at famer fields.
- *Trichoderma* spp. P fluorescence and Arabuscular mycorrhiza enhanced the growth of pepper and showed the potential to serve as bio control agents as well as growth promoters.
- The highest butter fat content of 58% was given from cocoa cultivar W5/5.
- The method was found to differentiate the Sri Lankan areca nut and Indonesian areca nut.
- Three recipes were tested to produce ginger flavored jam using fresh Chinese ginger.
- Chemical control methods were developed to control the scale insects and mealy bugs inflected local and Chinese ginger.

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 Agriculture Crops. The locations of the Research stations and their functions are given bellow.

- Central Research Station, Matale - Multidisciplinary Research on EACs except Cinnamon, Citronella and Betel
- Cinnamon Research Station , Pallolpitiya, Matara - Multidisciplinary Research on Cinnamon and Citronella
- Intercropping and Betel Research Station , Narammala - Intercropping of EACs with Coconut and Betel
- Tissue Culture Laboratory and Plant Production Nursery, Walpita - Tissue Culture Research and Plant Propagation
- Sub-Research Station, Kundasale - Multidisciplinary Research mainly on Cocoa, Kithul, Ginger and Turmeric
- Sub-Research Station, Nillambe - Cropping Systems
- Sub-Research Station, Delpitiya - Organic Farming and Spice Park
- Economic Research Unit, Head Office, Peradeniya - Conducting of Economics and Marketing Research

Central Research Station and Plant Protection Unit function under the Director (Research) of Matale. Cinnamon Research Station and Intercropping and Betel Research Station are also operated under two Directors (Research), while other sub-research stations function under the supervision of the respective Assistant Director/Research in-charge. The progress of the research projects conducted in 2014 at the main research station and other sub-stations are described below, on crop and discipline basis.

5.2 Research achievements on EAC's during the year of 2014

5.2.1 Cinnamon

Agronomy

- Study was conducted to identify the fundamental basis of formation of sandy texture and the impact of the condition on economical production. According to the results it was evident that the condition is commonly related more than 55 % of the plants with over matured stems and less than 15% of plants are affected with the condition at all growth stages. The risk of the condition to genetically transfer by open pollination is observed approximately less than 4 %.

- To extend the storage period up to six months to make available viable seeds for Maha *season* and to increase the packaging size, fine tuning of the method of seed storage of cinnamon was conducted considering two factors of packaging size and packaging material. Freshly harvested seeds after removing the pericarp are washed and treated with 0.05% folicur solution for 45 minutes and need to air drying five days before packing in sealed cellophane bags as 1kg, 3kg or 5kg. Above treated seeds can be stored in room temperature up to 5 months with a germination percentage of 85% - 90%.
- Experiment was conducted to investigate the effect of fertilizer application time on growth, yield and peelability of cinnamon. The recommended fertilizer mixture was applied five months, four months, three months (current recommendation), two months, and one month and two weeks before harvesting as treatments. Results showed that there was no significant effect of different treatments on growth, yield and peel ability. However, highest average peel ability of 1.6 kg/hr. was observed in treatments that fertilizer application at one month and two weeks before harvesting. The highest dry bark yield of 669 kg/ha/6months was recorded in treatment that fertilizer application at two weeks before harvesting. No significant variation was observed among the treatments in number of new shoots per bush.

Soil and Plant Nutrition

- It was clearly indicated that some soil properties of cinnamon growing soils closely associated and remarkably accounted to the cinnamon bark yield levels. Soil analytical data collected from cinnamon cultivations having different bark yield levels (Mean high bark yield 986.0 kg ha⁻¹ yr⁻¹ & mean low bark yield 310.0 kg ha⁻¹ yr⁻¹) in Galle district indicated that soil pH, electrical conductivity (EC), total nitrogen (N), available phosphorus (P), exchangeable potassium (K) and available sulphur (S) are closely related to the cinnamon bark yield levels. The mean values of different soil variables for high and low yield classes were 5.57 and 5.10 for pH, 0.034 ds m⁻¹ and 0.021 ds m⁻¹ for EC, 0.224 % and 0.173 % for total nitrogen, 4.73 mg kg⁻¹ and 3.58 mg kg⁻¹ for phosphorus, 46 mg kg⁻¹ and 30 mg kg⁻¹ for exchangeable potassium and 2.52 mg kg⁻¹ and 1.19 mg kg⁻¹ for sulphur respectively. These soil properties can be employed to predict the yield potential of cinnamon grown soils.
- The study conducted to investigate the possibility of reducing the dose of current inorganic fertilizer recommendation for cinnamon (900 kg ha⁻¹ yr.) by application of compost production from cinnamon leaves enriched with rock phosphate clearly showed that comparable bark yield at third harvest can be taken by applying half of the current recommendation (450 kg ha⁻¹ yr⁻¹) together with 10 tons of cinnamon leaf compost. Similarly, it was noticed that reducing the current fertilizer recommendation as indicated by 50 % and applying the same with 10 tons of compost, 7 % bark yield increase could be obtained. The current fertilizer recommendation gave the cumulative bark yield of 3497 kg ha⁻¹ yr⁻¹ whereas the integrated mixture with

compost recorded the cumulative bark yield of 3735 kg ha⁻¹ yr⁻¹ indicating the vast possibility of reducing inorganic fertilizers.

- The experiment conducted to investigate the effect of sub soil and different organic manures on growth of cinnamon seedlings revealed that sub soil can be used instead of top soil by incorporating with cow dung, sand & coir dust in a ratio of 1: 1: 1:1 by weight. Vermi-compost and cinnamon leaf compost can also be used instead of cow dung in making potting mixture with top soil, sand and coir dust at the ratio of 1:1:1:1.

Genetics and Plant Breeding

VP plants from 7 cinnamon varieties were evaluated in the field. Var. Sri Wijaya (CRS 40) showed outstanding yield and growth performance compared to the other 6 varieties. CRS 40, CRS 166 and CRS 317 showed the highest survival rate and CRS 184, CRS 201 and CRS 351 showed the lowest survival rate. Although the oil samples were analysed the results didn't show any significance. Yield data collection is in progress.

Plant Protection.

- Study was conducted to investigate the changes of oil quantity and quality under different severity levels of cinnamon upper leaf galls (*Trioza cinnamomi*) & lower leaf galls (*Eriophyes Boise*). Both leaf gall infestations have an ability to change the leaf oil content and quality significantly in cinnamon and there was a strong negative significant relationship with intensity of infestation and cinnamon leaf oil content. In term of oil quality, there was a negative correlation between intensity of gall infestation and eugenol content, but positive correlation with cinnamaldehyde contents and acetyl eugenol as well.
- Experiments were conducted to identify types of infected fungi on processed cinnamon quills and its relationship with moisture content of quill and environmental factors such as ambient temperature and relative humidity. *Rhizopus sp.*, *Penicillium sp.*, *Aspergillus niger*, *Aspergillus flavus* were the most common types of fungi encountered on cinnamon quills. But the emergence and the quantity of fungal colony forming units were different with the moisture level, relative humidity, location and the availability of initial inoculums. The number of colony forming units of fungi and bacteria were increased with the increment of relative humidity, decrement of temperature and available moisture content. The maximum number of fungal and bacterial colonies can be observed with 80 - 90% of relative humidity, 15-20% of moisture, 28-31⁰C of temperature during 20 - 40 days of storage period.

Post-Harvest Technology

- The study was designed to find out the effect of urea foliar application on cinnamon peel ability. Five urea concentrations from no urea (control) up to 20g per litre were used. Interval between urea application and harvesting were also changed from 3 days to 14 days during the flushing and fruiting stages. Application of urea in difficult period for cinnamon peeling mainly focused to enhance the peel ability. But the results showed that application of urea has no beneficial effect on peel ability.
- Fabrication of new cinnamon peeling table has completed. It has advantages over existing table in aspects of size reduction, reduction in space requirement and low cost. The new table cost was about Rs 15,000.00 and cost for existing table was about Rs.20, 000.00. Space requirement for new table is 90cm x120cm and for existing table is 140cm x 155cm. Preliminary trials have been done. Further modifications are conducting.

5.2.2 Black Pepper

Agronomy

Effect of humid chamber opening time on nursery level growth performance of different black pepper cultivars in low country intermediate zone (IL_{1a})

- Experiment was carried out to investigate the effect of humid chamber opening time on nursery level growth performance of different black pepper cultivars in low country intermediate zone (IL_{1a}). This study considered two factors were considered in this study. Different stages of humid chamber openings, as 3 weeks after potting, 4 weeks after potting and 5 weeks after potting were considered as the one factor and the growth performances of black pepper cultivars of IW5, MB12, MW21, GK49 and Panniyur-1 were considered as second factor.
- Panniyur-1 showed the highest survival rate (99.26%) at all humid chamber opening times. Cultivar MB12 had the lowest survival rate (84%) when opening at 5 weeks after potting.
- Mean shoot and mean root length were also measured up to 11th week after potting. In each and every week, the highest shoot length was observed in Panniyur-1 and the lowest shoot length was observed in IW5. The highest average root length was observed in Panniyur-1 (314.7 cm) at 5 weeks after potting, and the lowest average root length was observed in MB12 (126.21).
- The cultivars of MW21(1.4mm), GK49(1.3mm) and Panniyur-1 (1.2mm) showed higher root mean diameter values at humid chamber opening of 5 weeks after planting.
- In cultivar IW5 at 4th and 5th weeks after potting, humid chamber openings show significant high values of root shoot ratio (R:S>1). Overall root shoot ratio was lower most for cultivar MB12 at all three humid chambers.

Flowering & fruiting of bush pepper plants originated from plagiotropic branches (GK 49):

The experiment is being conducted since 2009 and observed that the flowering of bush pepper occurs throughout the year in low country intermediate zone (IL_{1a}). Therefore, about 4 stages of flowering can be seen in a bush pepper. However, high number of flowers (spikes) has been recorded during main rainy seasons.

1400 g of average fresh black pepper yield can be harvested from one black pepper bush per year after two years of field planting.

Soil and Plant Nutrition

Effect of cover crops on soil properties, growth and yield of black pepper

Pepper plants with *Arachis pintoii* and *Desmodium oval folium* as cover crops showed higher growth than other treatments. Although the moisture retention of *Mucuna bracetaria* is high the growth rate of pepper has been decreased.

Effect of Mg on growth and yield of pepper

Results showed that application of recommended fertilizer dosage with half a dosage of Mg as Kieserite gives highest yield. However application of recommended dosage with half a dosage of Mg as Dolomite can be recommended since it shows no significant difference with the application of kieserite and low in cost.

Plant protection

Preparation of bio fertilizer (Arbuscular Mycorrhiza-AM), Bio control agents (*Trichoderma* spp. *Pseudomonas fluorescens* and mass culturing.

The results of the nursery experiment confirmed that *Trichoderma* sp., *P. fluorescens* and AM enhanced plant growth and showed the potential to serve as bio control agents as well as growth promoters. Application of bio control agents and bio fertilizer in different combinations is to be studied further. Spores of *Trichoderma* sp. could be preserved at least for four months in loosely capped glass bottles or tubes filled with sterilized distilled water at room temperature. Future work is necessary to improve the water suspension of *Trichoderma* sp. spores at least for nursery level applications. Spore preservation technique in distilled water would be useful in advancing the commercial preparation of the product.

Post-Harvest Technology

Estimation of oil, oleoresin and piper in percentages in ripened seeds of local Black pepper cultivars:

Oil, oleoresin and piperin percentages in ripened seeds of local black pepper cultivars of MW21, KW30, GK49, KW33, KW31, MB12, MW18 and IW5 which were grown in low country intermediate zone (IL_{1a}) were measured. The highest average oil percentage (in dry basis) (2.88%) was given by the cultivar of KW30, and the highest average oleoresin percentage (in dry basis) (13.57%) was given by the cultivar of GK49. Out of these local black pepper cultivars, the highest average piperin percentage (in dry basis) (8.03%) was given by IW5.

Estimation of bulk densities of local black pepper cultivars:

Bulk densities in ripened seeds (8 months maturity) of local black pepper cultivars of MW21, KW30, GK49, KW33, KW31, MB12, MW18 and IW5 which were grown in low country intermediate zone (IL_{1a}) were measured. The highest bulk density of 577.67 g/l was indicated by the cultivar of KW31 and the second highest (540.67 g/l) was indicated by KW33.

Genetics and Plant Breeding

Mass propagation activities have been commenced for aiming to release of newly selected/developed pepper varieties that were introduced recently. The mother vine plantations were started in several farmer fields at Matale. The varieties are Gk49, MB12, MN41, New hybrids of 14/3,27/1 and U/2.

Seven local pepper varieties with Panniyur – 1 were evaluated under organic conditions at Dalpitiya Research Station. Panniyur-1, UD 21, TG 7 and MB 12 showed the highest survival rate. According to the growth data obtained, MB 12 is more superior to the other 7 varieties. Yield data collection is in progress.

Physiology and Plant Production

- Rooted cuttings from orthotropic (terminal), plagiotropic (Lateral branches) and single nodal cuttings from Bamboo Rapid Multiplication System of two local selections (BRMS) (GK 49 and MB 12) were field planted in 2009. Number of lateral branches was higher in plants originated from orthotropic cutting plants (27) than plants originated from single nodal cutting plants from BRMS (19) and plagiotropic cutting plants (8). The average number of spikes per vine was higher in plants raised from orthotropic cuttings (54) than plants from plagiotropic cuttings (16) and plants from single nodal cuttings from BRMS (10).
- *In vitro* clonal propagation of Black Pepper (*Piper nigrum* L.) was completed for several high yielding local selections named as GK49, MB12, GM28, BD/MN41, TG7 and DM 7. Shoot tips and nodal segments (lateral buds) were used as explant. The plant production programme using Bamboo rapid multiplication system was continued using high yielding local Black Pepper selections (GK49, MB12, GM28, BD/MN/41, UD21, DM7 and PK11) and hybrids

(11/2, 14/3, 27/2). In 2014, approximately 1500 plants were produced using BRMS and tissue culture technique and 1000 plants were issued.

5.2.3 Cocoa

Genetic and Plant Breeding

Mass propagation activities have been commenced aiming release of newly selected/developed cocoa cultivars that were introduced recently. Following mother plantations were started in several farm fields as follows

Place	Variety/s	Number of plants
RS Matale	W 5/5, WK-2, S-306, S-181	50 from each
IBRS, Narammala	W 5/5, WK-2, S-306,	25 from each
Rs, Kundasale	W 5/5, WK-2, S-306,	100 from each
Wykumbura Estate	W 5/5, WK-2, S-306,	100 from each

Soil and Plant Nutrition

A study was conducted to find out the relationship between available macro/micro nutrients in soils and effect of cherrelle wilt for pod development using existing mature cocoa trees during 2014 at the Research Station Matale. According to the results there was no significant effect from soil micro and macro nutrients (N,P,K,Mg, Ca, Zn and B) to cherrelle wilt incidence in cocoa. It seems that cherrelle wilt condition during the study period may be attributed to the physiological disorders.

Post-harvest technology

A study was conducted to find out the effect of processing methods and cocoa varieties on butter fat content of Sri Lankan cocoa (*Theobroma cacao* l.). This study revealed that a highly perform cultivar was W5/5 among the five newly introduced cultivars (WK1- 54.54%, WK2 – 52.45 %, WK7 - 55.23 %, SCA6* ICS 6 - 55.63 %, W5/5 – 58 %). The other cultivars also have shown more than 50 % of butter fat content. Therefore all the cultivars can be recommended for the cultivation in Sri Lanka. In this study after fermentation, four processing methods were evaluated (Washed Sun dried, Unwashed sundried, Washed Artificial dried, Unwashed Artificial dried). Washed sundried samples have shown the highest butterfat content (55.70 %) than other processing methods. Therefore under the good climatic conditions, washing and sun drying can be recommended as a suitable processing method for cocoa.

5.2.4 Coffee

Genetic and Plant Breeding

Mass propagation activities have been commenced aiming release of newly selected/developed Arabica coffee cultivars that were introduced recently. Following mother plantations were started in several farm fields as follows.

Place	Variety/s	Number of plants
Kelaniya Estate Ginigathhena	S 4711	1000
Welioya Estate Ginigathhena	S 4711	1000
Kabaragala Estate Rikillagaskada	S 4711	900
Wewelmada Estate Raththota	S 4711	500

The progenies of 8 *Coffea Arabica* varieties are being evaluated. Preliminary results showed that all the 8 varieties have 100 % survival rate. According to the growth data, CAM/S42 and CAM/S45 showed high growth performance. Yield data collection is in progress.

5.2.5 Ginger

Agronomy

Potential of field planting ginger in Maha season:

Study of the effect of planting time of the year on the yield of ginger revealed that established ginger during Maha season in low country intermediate zone (IL_{1a}) (August, October and November) has been given the considerable yield with over 763 g and 398 g per bush of Chinese and Rangun types of ginger respectively. So, if seed rhizomes are available ginger can be planted during Maha season in addition to normal Yala season.

Irrigation requirement of ginger in the Intermediate Zone Low Country. (IL_{1a})

The readily available water storage capacity for ginger was estimated to be 11 mm of soil water for root zone of ginger. Supplementary irrigation requirement would be 720 mm as a height and a farmer can commence irrigation whenever any short dry spell exceed beyond 4 consecutive dry days with application of 12 mm height of irrigation on 5th day and continue until rain to avoid water stress in IL_{1a}.

Seed rhizome size on crop growth and yield

Five different seed sizes (15g, 25g, 35g, 45g & 55g) from Rangoon variety were tested for growth and yield of ginger under the recommended practices of DEA. Growth characteristics such as number of days (23) taken for germination, total leaf area, fresh weight and dry weight of plant were not affected by the treatments but lowest number of days taken leaf initiation, highest number of leaves (80) and

highest number of tillers (09) were recorded with T5 (55g seed). Highest fresh and dry weight of rhizome were obtained from T4 (45g seed) after 4 months of field planting.

Growth inhibitors to extend storage life of seed ginger

- Different concentrations of 1-methylcyclopropene -1MCP (0ppm, 1ppm and 5ppm) were tested to delay sprouting of seed ginger. They were exposed 24 hours to the treatments and stored in dried paddy husk under 27 C° temperature and 75-76 % Relative Humidity (RH) for 8 weeks. Treated seed samples were transferred to germination test and 100% germination were observed in all treatments. The tested concentration of 1MCP did not significantly influence on delaying sprouting of seed ginger.

Soil and Plant Nutrition

Evaluation of effect of organic manure water extracts for the suppression of soil borne pathogens or development of host plant resistance were studied for ginger. Visual observations in natural occurrence of soil borne disease incidences, growth and yield of ginger which were evaluated in this study didn't show any significant differences among the treatments.

Plant Protection

Scale insects and mealy bugs infected Local ginger and Chinese ginger were treated with chemicals and field evaluated. Results revealed that Thiamethoxam 25% (w/WG treated rhizome of both cultivars showed significantly higher number of germination per bed and higher number of shoots per bush.

Post-Harvest Technology

Estimation of volatile percentages of different types of ginger:

Volatile oil percentages were measured separately in Local, Rangoon and Chinese types ginger which were cultivated in low country intermediate zone (IL_{1a}). The average volatile oil percentages (in dry basis) were 1.74, 1.48 and 1.055 respectively when harvest 9 months after field planting.

Production of ginger jam and ginger mixed fruit jam

Fresh Chinese ginger was used to produce jam. Three types of recipes were tested to produce ginger flavoured jam. Recipes were developed using Chinese ginger. Sensory evaluation was done in the 'Dayata kirula 2014' national exhibition by using specific questionnaires. Non-trained sensory panel were used to sensory evaluation. According to the sensory evaluation, overall acceptability of Ginger jam is 80 %, Ginger with pineapple is 78 % and Ginger with watermelon is 70 %. Ginger jam and ginger with pineapple jam can be recommended for the community as a ginger value added products.

5.2.6 Turmeric

Agronomy

Selection of suitable protocol for *in vitro* propagation of Turmeric

The highest percentage of survival of buds was recorded with the sterilization of 0.1% Mercuric chloride for 20 minutes. The highest multiplication rate was observed on MS medium fortified with 3.0 mg/l BAP and plantlet elongation was observed on MS medium fortified with 1.0mg/l BAP. Development of multiple shoots and roots were observed after 80 days on MS medium fortified with 3.0mg/l BAP

Soil and Plant Nutrition

Four years field study conducted on turmeric fertilizer application gave an average yield of 23.3t/ha at fertilizer mixture of 104kg of Triple Super Phosphate (TSP), 65kg of urea and 100kg of Muriate Of Potash (MOP) applied at each 45 and 90 days after planting, along with a basal dressing of 20 t of compost and 104kg of TSP per hectare. In addition to inorganic recommendations, application of 10t/ha Gliricidea (applied in 5 equal splits) along with a basal application of 20t/ha compost also gave an equivalent higher yield.

Post-Harvest Technology

Effect of boiling time on drying and colour of turmeric powder was tested to determine the blanching time on the quality (curcumin content and colour) of processed turmeric. The lowest drying time (56 hrs for tubers and 48 hrs for fingers) and the highest mean curcumin content (6.4% for tubers and 5.0 % for fingers) were observed for 45 min of blanching time. The drying time and the mean curcumin content for 30 min of blanching were 60 hrs for tubers and 50 hrs for fingers and 6.4% for tubers and 4.7% for fingers respectively. The lightness and b value (green to yellow) increased with blanching time but there was no significant difference ($p>0.05$) between 30 and 45 min boiling duration. In addition, there was no significant difference ($p>0.05$) in mean curcumin content for both tubers and fingers for the blanching treatments of 45 min and 30 min. Therefore, the optimum blanching time for turmeric tubers and fingers in order to obtain quality turmeric powder would be 30 min.

5.2.7 Betel

Post-harvest technology

Preliminary studies were conducted to prepare different products using oil and pulp of betel. Under this, betel flavoured toffee and incense sticks were prepared. But these products should be developed further with different proportions of raw materials to enhance the quality.

5.2.8 Areca nut

Post-harvest technology

A comparative study of Sri Lankan and Indonesian Areca nut (*Areca catechu L.*)

This study was conducted to investigate the degree of compatibility of dried areca nut for export, comparative morphological characteristics, chemical composition and physical properties between Sri Lankan dried areca nut (SA) and Indonesian dried areca nut (IA). Seed morphological characteristics revealed whiter core with unclear light brown colour veins of SA and lesser white core with distinct dark colour veins of IA. Physical properties of SA and IA were determined by considering kernel shape as ovate. IA had higher effective diameter, average volume, projected area and weight of one nut, roundness and sphericity values at normal-major axis compared to SA. SA had greater true density, bulk density and porosity values in comparison to IA. Higher coefficient of friction of SA was observed on wood and stainless steel surfaces. The result of the proximate analysis revealed that the IA was richer in crude fibre, ash, volatile oil and aqueous extract percentages than that of SA, while SA exhibiting greater amount of carbohydrate content. Gas chromatography (GC) revealed that the myristic, palmitic, oleic, linoleic and linoleic acids are prominent in both SA and IA. SA contains significantly ($p < 0.05$) higher percentage of total phenolic flavonoid and tannin content in IA than SA. Alkaloid and arecoline concentrations were observed in significantly ($P < 0.05$) higher amounts in IA extracts than SA. IA showed greater antioxidant properties in the DPPH assay followed by SA and ascorbic acid standard. As a rich source of phenolics and flavonoids, and high antioxidant activity, IA can be considered as a good source of antioxidants, but higher arecoline content in IA compared to SA may cause oral submucosis, fibrosis and cholinergic muscarinic agonistic activity in human beings.

5.2.9 Nutmeg

Physiology and Plant Production

Field evaluation of grafted nutmeg was carried out from 2005 in Matale Research Station (10 selections) and Gasnawa Central Nursery (8 selection). Plant growth performances are higher in Gasnawa than Matale. Very first flowering and fruit set was observed two years after field establishment. The average number of fruits per plant was higher in selection B (72) (Delpitiya selection) in both Gasnawa (72) and Matale (32).

Pathology

Management of Nutmeg (*Myristica fragrans*) leaf fall disease

Field evaluation of three different commercially available fungicides (Copper oxychloride 50 % WP, Thiophanate methyl 70% and Carbendazim 50% WP) and 1% "Bordeaux mixture was compared with current Department recommendation. The results obtained in field experiment showed, 1% "Bordeaux mixture" can be tentatively recommended for disease management in organically certified fields.

Four different fungal isolates which are morphologically similar to the *Colletotrichum* spp were isolated from infected leaf samples collected at five different locations. Out of four fungal isolates, one is showed 77% similarity to *Neofusicoccom* spp in DNA homology search.

In vitro fungicidal assay was conducted using current recommended fungicides (Mancozeb and COC) against the isolated four different fungus isolates. Two recommended fungicides was performed differently with four isolated fungal isolates

Post-harvest technology

Thin layer drying characteristics of nutmeg were determined as per two methods namely sun drying and mechanical drying. Mechanical drying was carried out at three temperature levels (40, 50 and 60 °C). Initial moisture content of fresh nutmeg is around 68%. It took 48 hours to reach moisture content to 10% under sun drying. It took 23 and 26 hours to reach 10% moisture under mechanical drying at 60 and 50 °C respectively. The lowest drying rate showed at 40 °C and it took 28 hours to reach 15% moisture content. There was significant oil loss when drying at 60 °C. There was no significant oil loss when mechanical drying at either 40 or 50 °C. Total microbial count of sun dried sample was 72×10^3 colony forming units (cfu) g/ml whereas total microbial count of 40, 32 and 25×10^3 (cfu g/ml) when practicing mechanical drying at 40, 50 and 60 °C respectively. According to above results nutmeg that were mechanically dried at 50 °C showed the best quality than sun dried and mechanically dried at 40 °C and 60 °C Samples.

5.2.10 Goraka

Entomology

Application of organic and inorganic insecticides (Actara® 25WG (Thiamethoxam 25% WG), Regent® 50 SC (Fipronil), Provado®(Imidacloprid WG) and Kalani Shaka Saraya®) with brushing were tested against Soft Wax Scale insects (*Ceroplastes* sp.) on Goraka (*Garcinia questitia* Pierre.) plants. Brushing with Application of Actara® 25WG (Thiamethoxam 25% WG) was reduced the number of *Ceroplastes* sp. as well as parasitoid emerged *Ceroplastes* sp. significantly.

5.2.11 Citronella

This study was carried out to investigate the effect of citronella leaf, field drying period and distillation time on oil yield. Earlier experiment revealed that oil yield does not have significant relationship with duration of field drying up to two weeks when oil content is calculated on the basis of dry leaf weight. With the increase of distilling period up to 6 hours oil yield is increasing. And also revealed that oil yield does not significantly increase after 6 hours of distillation. Therefore 6 hours of distillation is more economical. The result need to validate under field conditions using commercial oil extractors.

5.3. On-going Research during the year 2014

5.3.1 Cinnamon.

- Investigation of cinnamon invertebrate activities in cinnamon field
- Effect of compost and inorganic fertilizers and their combinations on growth and yield of cinnamon
- Development of Integrated Pest Management (IPM) programme for cinnamon wood boring moth (*Ichneumoniptera cinnamomumi*)
- Effect of dolomite application on growth and yield of Cinnamon grown in acid soils
- Effect of growing gliricidia & 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
- Improvement of sub soil as a potting mixture by adding vermicompost and microbial compost for cinnamon seedlings (*Cinnamomum zeylanicum Blume*)
- 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 the formation of sandy texture on cinnamon bark tissues
- Development of pests & diseases management package for cinnamon nurseries.
- 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 and yield of cinnamon
- Screening and evaluation of selected hybrid cinnamon plants for quality, growth, and yield performance
- Damage Assessment and Evaluation the Efficacy of Protection methods of Cinnamon Plants from vertebrate pests
- Identification and Isolation of Attractive Chemical Compound for Cinnamon Wood Boring Moth
- Chemical Identify the Cinnamon Thrip Species, their biology and suitable attractive compound to monitor and control them
- Evaluate the efficacy of suitable control method for white root disease of cinnamon
- Study 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
- The effect of, different techniques to cover the cut surface on formation of healthy shoot and prevent the juice secretion from cutting edge of cinnamon bush.
- Investigation on Three Major Leaf Types of Cinnamon (*Cinnamomum zeylanicum* Blume)

5.3.2 Black Pepper

- Multifaceted black pepper development programme (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 plagiotropic branches(GK 49)
- Studies on variation of flowering, fruit setting and yield of black pepper under different agro-ecological zones (Coconut Intercropping component)
- 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 orthotropic, plagiotropic (lateral branches) and single nodal cutting plants.
- 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

- Effect of soil amendments at planting on field establishment rate of black pepper
- Identification of suitable bio – indicators to monitor soil qualities responsible for black pepper yellowing
- Study of Pepper Vine Borer (*Pterolophia annulata*), biology , damage and control,
- Evaluation of local pepper varieties under organic conditions
- Evaluation of selected accessions of black pepper

5.3.3 Cocoa

- Cocoa (*Theobroma cacao*) seed garden / conservation field establishment
- Selection of cocoa (*Theobroma cacao*) mother plants for mixed cropping and further improvement of mass propagation through bud grafting and rooted cuttings.
- 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), 2012-2014.
- Screening of capsid bug (*Helopeltis ceylonensis* (De Silva) resistant /tolerant cultivars of cocoa.
- Productivity improvement of cocoa through integrated soil and plant nutrients management under rubber and coconut
- Development of soil conditioner using cocoa pod husk for reclamation of poor quality cocoa field
- Evaluation of field performance of rooted cocoa (*Theobroma cacao* L.)

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
- Effect of different rates of inorganic fertilizer on different cultivars of ginger
- Strategies for organic cultivation of Arabica coffee
- Progeny evaluation of selected Arabica coffee lines

5.3.5 Cardamom

- Development of control measures for cardamom thrips (*Sciothrips cardamomi*).
- Screening of wild types of Cardamom against thrips (*Sciothrips cardamom*)

5.3.6 Clove

- Management of leaf fall disease (leaf blight & leaf spots) of clove (*Eugenia caryophyllus*) in mid country
- Application of plant growth regulators (Paclobutrazol) for flowering induction of clove (*Eugenia caryophyllus*).
- Management of leaf fall disease (leaf blight & leaf spots) of clove (*Eugenia caryophyllus*) in mid country

5.3.7 Nutmeg

- Field evaluation of grafted nutmeg (*Myristica fragrans*) selections
- Nutmeg leaf fall disease and its control

5.3.8 Goraka

- Field evaluation of grafted goraka (*Garcinia quaesita*) selections.
- Efficiency of certain chemical insecticides against the soft wax scale insects (*Ceroplastes* sp.) on garcinia plants and identification of its parasitoids

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 chuyva*)' 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 (*Piper 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

5.3.10 Ginger

- Evaluation of ginger (*Zingibar officinale*) Germplasm under coconut
- Effect of size of planting material on the yield and quality of ginger (*Zingiber officinale* Ros)
- Effect of spacing and planting time on growth and yield of local ginger (*Zingiber officinale* L.)

- Investigation on the effect of different storage conditions for germination ability of ginger (*Zingiber officinale*) as seed rhizomes.
- A study on major diseases of 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

5.3.11 Turmeric

- Effect of the size of planting material on the yield and quality of turmeric (*Curcuma longa*)
- Field evaluation of grafted nutmeg (*Myristica fragrans*) selections
- Management of Nutmeg (*Myristica fragrance*) leaf fall disease

5.3.12 Other

- Preparation of bio fertilizer (Arbuscular Mycorrhiza-AM), Bio control agents (*Trichoderma* spp. *Pseudomonas fluorescens* and mass culturing.
- Evaluation of storage pest damages of Export Agricultural Crops.
- Studies on mammalian pests and their control methods.
- Home garden model of Export Agricultural crops at Matale

5.4 Progress of Other Activities of the Research Division

5.4.1 Improved Planting material issued by Research Farm of Matale

Genetics and Plant Breeding Division distributed seed materials of 9.5kg of coffee seeds, 2065 no. of cocoa pods and 30,650 nuts of areca nut from the seed gardens maintained by the division of Genetics and Plant Breeding.

Paddy cultivation continued at Nillambe sub Research Station. Local rice varieties were cultivated in Maha season.

5.4.2. Development Activities

New development plan of Intercropping and Betel Research was commenced from year 2014 mainly focusing to achieve below mentioned objectives

- Under planting of 2 Ac coconuts land was completed and to intercrop that land all pits were prepared and plants are raised in polybags to establish in the field during next monsoonal rains. Coffee, Betel, Garcinia, Nutmeg, Clove, Cocoa, Arecanut, Cardamom, Kithul, and Pepper crops will be planted as intercrops.

- The supplementary irrigation system to cover the intercropped field and all the other research fields was started by laying 3200ft long pipe line and two water tanks with the capacity of 2000l each were purchased for the supplementary irrigation system.
- Mass production of betel planting materials was commenced using selected IBRS 1 and IBRS 2 betel lines and normally grown betel cuttings. These cuttings are planted in bed system and around 600 sticks are there in the field at present.

5.4.3 National Exhibitions and workshops

- Deyata kirula site development and conducting exhibitions for Ministry of Minor Export and Crop Promotion
- Provision of resources material and expertise for exhibitions such as Govisathiya, Kurundu Managallaya, Jathike Kulubadu puja Mangalya
- Organized and Conducted one day technical program in collaboration with development division to mark the International Pepper Day
- Participating local workshops and training programmes such as Export Development Board workshops, National Science Foundation (NSF) workshops, CARP workshops.

5.4.4. Development of ‘National Spice Garden’ at Central Research Station, Matale and Dalpitiya

- The National spice garden is being developed as a specialize technology transfer unit attached to the central research station. More than 90% of field establishment activities were already completed. Development of other infra-structure facilities such as Roads, foot paths, gates, net houses, Gamagedara, ponds, are almost completed. Some of the structures are in progress.
- Spice park development program ‘*Medarata Kulubadu Arana*’ was carried out at Dalpitiya Sub Research Station. Medicinal plant collection was established and development activities are still in progress.

5.4.5. Plant certification programmes attended by the research staff

Inspection and certification of twenty (20) plant nurseries in the extension Officer’s range in Matale district.

5.4.6. Estate Visit for Plantation Advisory Services

Nine specialist visits were made by the research staff for state sector requests a recommendations have been given for relevant request. Representative soil sampling and site specific recommendation was also given as appropriate.

Attended 06 training programmes on Nursery Management and Quality Planting Material Production at Kurunegala, Badulla, Rathnapura, Kegalle, Kandy and Inservice Training Center, Matale.

Three Programmes for Farmers from Community Development and Livelihood Improvement Project, Kothmale.

Resource persons and exhibits have been provided for different mass communication programmes conducted by the communication division of DEA.

Apart from that resource persons and technology transfer facilities have been given to the training programs of in-service training centre of the DEA as and when requested.

Investigations were done to solve small areca nut problem in Gampaha district.

5.4.7 Training Programmes carried out by the research staff

Conducting training programmes for farmers, students, teachers and producers.

Following participants were visited to the central research station as their field training requirements and our research staff trained them on EAC research and development activities.

- 385 numbers of university students
- 358 numbers of school students
- 110 numbers of school teachers
- 235 numbers of farmers
- 78 numbers of students in agricultural school
- Training Programme for stake holders -7
- Sixteen farmer training classes were conducted at Intercropping and Betel Research Station, Narammala with the total participation of 481 farmers. Around 150 betel growers visited the station to solve their problems while 161 betel growers who gave phone calls were consulted and gave solutions to their problems.

5.4.8. 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 these problems. Other than field visits and field days we have given appropriate solutions for number of plant protection problems raised via our direct telephone lines and 1920 “ Govi Sahana Sarana Sevaya”

5.4.8.1 Description of the technology transfer activities on Plant Protection Service

Crop	Disease/ Pest	Number of Trainings	Number of Field Days	Number of Field Visits
Nutmeg	Leaf fall disease	02	05	03
	White root disease	-	-	03
Pepper	Little leaf disease	01	-	01
	Slow wilt		-	01
	Quick wilt		-	01
	Leaf blight		-	01
	Other		-	02
Clove	Leaf blight/leaf fall	-	-	01
	Root rot	-	-	01
	Stem borer	-	-	01
Areca nut	Inflorescence die back	-	-	01
Ginger	Rhizome rot/ Leaf spot	01	-	02
Cinnamon	Brown root rot	-	-	01
	Other	-	-	01
Turmeric	Turmeric disease	01	-	-
Cocoa	Cocoa pest & disease	01	-	-
Gliricidea	Root rot	-	-	01
	Twig borer	-	-	01
All EACs	Nursery diseases	03	-	-
All EACs	Plant protection	01	-	-
Total		10 (200participants)	05 (100Participants)	22

5.4.9 Planting material issued by the Research Division

Crop	Plants
Cinnamon	219,075
Pepper	73,312
Bush Pepper	1080
Coffee	1339
Cardamom	20
Cocoa	1070
Nutmeg	
Grafted	65
Seedlings	951
Kithul	1163
Areca nut	13,060
Clove	218
Garcinia	07
Betel	389

5.4.10. Collaborative research and development project

Following collaborative research projects have been in operations during 2014.

1. Use of microorganisms to improve solubility of phosphate fertilizer - Grant No: RG/2011/AG/06

Principle investigator is Dr. C.M. Nanayakkara, University of Colombo and Co-investigators are Dr. H.A. Sumanasena and Dr. D. N. Samaraweera, the experimental activities are being carried out at the plant science laboratory, University of Colombo and laboratory of the central research station, Matale.

2. Mainstreaming Biodiversity Conservation and Use in Sri Lankan Agro-ecosystems for Livelihoods and Adaptation to Climate Change (BACC Project) project

This project is a GEF/UNEP funded project under the Ministry of Environment and Renewable Energy implemented by the Department of Agriculture. Following three components have been assigned to the central research station of DEA from November 2014 as follows.

2.1) Develop test and implement monitoring procedures and practices at site, regional and national levels for belowground soil biodiversity.

2.2) Review key steps/tasks involved in providing key support to farmers on agro-biodiversity maintenance and use and the introduction of new materials with a focus on participatory and farmer-led approaches

2.3) Analyse and assess actors' roles, responsibilities and competencies in relation to agro-biodiversity maintenance and utilization and the introduction of new materials

5.5 Economics & Market Research on EAC

5.5.1. Studies and Surveys

5.5.1.1 Production Forecasting Program

Export Agriculture Crops are mainly growing in 14 districts and many cultivations are small scale or as scattered trees at home gardens. Especially in mid country many EAC such as pepper, clove, nutmeg, areca nut, vanilla etc. are grown as mixed crops in almost all home gardens in rural areas. Assessment of the annual EAC production from the field data is not an easy task and the DEA has used to estimate the production based on annual exports and local consumption. However that procedure does not permit the quarterly or half annual estimates and also with increasing imports the estimation procedures have become complex. Therefore a study was started to forecast the annual production of EAC at the field level and the Extension Officers of DEA had collected data on flowering and harvesting seasons of main EAC and production forecast of EAC for 2014. Forecasted production estimates for pepper, cinnamon, coffee, cloves, nutmeg and cocoa were 22287mt, 19,620mt, 2992mt, 5984mt, 1545mt and 1066mt respectively. However actual production estimates were somewhat below than the forecasted figures as the total forested harvest could not be realized due to various reasons.

5.5.2 Extent of EAC

It is well accepted that more than 95% of the new crop establishments of EAC in Sri Lanka is done under the assistance of the DEA. Therefore the newly established extent of EAC in 2014 was computed based on the acreage of 3rd successful inspections completed under the New Planting Assistance Scheme of the department (table 5.5.2.1).

Table 5.5.2.1: Newly Established Extent under EAC Assistance Scheme – 2014

District	Cocoa	Coff.e	Cinn.	Card.	Pepper	Clove	Nutmeg	Total
Kandy	10.4	5.5	12.4	0.3	68.3	3.6	14.3	114.8
Matale	1.0	1.5	67.2	0.2	118.1	-	4.8	192.8
N'elliya	-	8.1	-	-	5.8	-	-	13.9
Kurunegala	-	-	1.0	-	13.0	-	-	14.0
Badulla	-	0.4	2.0	-	29.9	-	--	32.3
Moneragala	-	-	0.8	-	-	-	-	0.8
Kegalle	-	0.4	14.6	-	7.9	1.1	2.0	26.0
Ratnapura	-	-	33.5	-	24.3	-	-	57.8
Colombo	-	-	11.9	-	1.7	-	-	13.6
Kalutara	-	-	23.1	--	1.1	-	-	24.2
Gampaha	-	-	15.6	-	18.5	-	-	34.1
Galle	-	-	32.4	-	-	-	-	32.4
Matara	-	-	72.4	-	0.6	-	-	73.0
Hambantota	-	-	27.1	-	-	--	-	27.1
Other dis.	-	-	-	-	-	-	-	-
Total	11.4	15.9	314.0	0.5	289.2	4.7	21.1	656.8

Source: Monthly Progress Reports of the Development Division

Under the DEA assistance scheme 656.8ha.of EAC has been established in 2014 throughout main growing districts. However, over 365 ha.of EAC had been field planted in 2014 under the “Divinagama” program which could not be taken into consideration into above figures.

Considering performances in table 5.1 and taking ‘Agriculture Census 2002’ as the base line district wise extent figures and total extent of EAC in 2014 were estimated (Annex 1).

5.5.3 Estimated Production of EAC in 2014

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 & 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 2011-2014 is given below (table 5.5.3.1).

Table 5.5.3.1: Estimated Production (MT) of EAC s (2011-2014)

Crop	2011	2012	2013*	2014**
Cocoa	525	513	515	500
Coffee	2,974	3,000	3,000	3,000
Cinnamon	18,250	17,165	17,500	17,600
Pepper	10,834	18,604	28,000	17,000
Cardamom	57	80	50	87
Clove	5,533	4,009	6,190	3,225
Nutmeg (& mace)	2116	2002	2545	1656
Areca nut	24,485	23,450	24,000	23,500
Betel	30,645	28,200	30,000	30,800
Citronella oil	9	13	14	11
Ginger	13,663	14,911	14,075	15,481
Turmeric	9,308	8,708	11,282	11,351

Source: Dept. of Census & Statistics & DEA data base *Revised ** Provisional

5.5.4 Exports and Export Earnings of EAC in 2014

Export volume of EAC had increased in 2014 to the 3rd consecutive year but export earnings had shown a decline. Total export volume had increased marginally by 4.6% from 57,192,5mt. in 2013 to 59,827.3 mt. in 2014 but export earnings had declined from Rs. 48,392.7mn in previous year to Rs.43,223.5mn. In 2014 (Annex II).

Spices which had shown an excellent progress in 2013 had not shown the same behavior in 2014. Especially black pepper had shown a notable downward trend in export volume from 21,329.6mt. in 2013 to 7,929.6mt. in 2014. Cinnamon had shown a very marginal negative growth in export volume in 2014 over 2013 but export earnings had increased by 0.8%. Clove, nutmeg and mace had shown considerable declines of export volumes over 2013 from 74.8%, 6.4% and 33.2% respectively and export earnings from those commodities too had declined. In Sri Lanka major harvest of black pepper in main growing areas such as Matale, Kandy and Ratnapura usually falls in July-August but this year harvest of pepper in those areas were very poor in the major season. Instead a sizable harvest was seen in the minor season of those areas, which fell on December-January of 2015. However that harvest had not yet been exported and that may be the main reason for such huge decline in black pepper export. Export volumes cocoa and coffee had shown a notable increase over 2013 from 73% and 198% respectively and export earnings had increased by 57.8% and 94% respectively. Part of cocoa export may be re-exports of value added products produced from imported cocoa. However imports of cocoa too had declined from 6330mt. in 2013 to 3,680mt. In this year and it could have predicted that the increased local cocoa production too had considerably contributed to the upward trend of exports. Increased coffee exports may solely have come from domestic production and DEA assistance schemes on extent expansion and productivity improvement may definitely have contributed to improving coffee exports year by year.

Among other crops, export volumes and earnings of cardamom and vanilla had shown considerable increases while betel and ginger had shown declined export volumes and values. Most interesting feature in 2014 export of EAC is the highest recorded export volume of areca nut in the recent history. Sri Lanka had imported 27,002.79mt, areca nut to Sri Lanka in 2014 and exported 29,508.8mt. A private entrepreneur had been allowed to import areca nut, do some kind of value addition and to re-export to India under Indo-Lanka FTA and the business performed very well in 2014. It could be assumed that the export of local production of areca nut could be 2305.9.

As a whole essential oil sector had shown 1.9% decline in exports over 2013 while export earnings had increased by 10.3%. Cinnamon bark oil, pepper oil, lemon grass oil, ginger oil and vanilla oil had shown positive growth in both export volumes and earnings and pepper oil alone had shown 238.1% increase in export and 184.37% increase in earnings. Export volumes of cinnamon leaf oil, clove oil, cardamom oil, citronella oil and nutmeg oil had declined over 2013 (annex II).

5.5.5 Exporting Countries

No noticeable shift was seen in main importing countries of EAC from Sri Lanka and traditional buyers had played the main role in the market. As usual, Mexico had purchased around 40-45% of total cinnamon export and many Latin American countries had purchased large bulks. India was the main buyer of pepper, cloves, nutmeg, mace and areca nut from Sri Lanka. India had only purchased 34% of Sri Lankan pepper in 2013 but the share had increased to 65% in 2014 other than the local

purchases for Indian owned companies. In 2014, 27,000mt. Of areca nut was imported from Indonesia and exported to India as re-exports under SLFTA. India alone contributed to 29498.8mt.of areca nut out of 29,508.8 mt. of total areca nut export volume of Sri Lanka in 2014.

5.5.6 Behaviour of Prices

Average annual farm gate prices of main EAC, except nutmeg, clove and cardamom, had shown positive growth but not at very high magnitude. Cardamom prices had been on the decline consciously for about three years from 2012 and nutmeg prices, which had steady upward trend in past decade, was in the decline in both 2013 and 2014. World market prices too of those commodities had followed the same path. Only farm gate prices of areca nut prices showed higher performance by 71% increase over 2013 (Annex III).

5.5.7 Trends in EAC Imports in 2014

A considerably large quantity of EAC had been imported to Sri Lanka in 2014 (annex IV). Total imports in 2014 were 36,151.81mt. and it was about 174.9% increase over 2013. Import expenditure too was increased from Rs.4604.84mn. in 2013 to Rs. 9240.15mn. in 2014 and it was about 100.7% increase over 2013. Out of total imports, about 27,000mt. was comprised with areca nut which cost about Rs. 5,163mn. Other main imported EAC items were cocoa products and turmeric but the import volumes of cocoa was significantly lower than 2013. Import of pepper had also increased from 31.33mt. in 2013 to 367.11mt. in 2014 mainly as a raw material for newly setup value addition factories. 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

- Abeysinghe, P.D; Samarajeewa, N.G.C.D; LI, G and Wijesinghe, K.G.G. (2014); Preliminary investigation for the identification of Sri Lankan Cinnamomum species using randomly amplified polymorphic DNA (RAPD) and sequence related amplified polymorphic (SRAP) markers; *J.Natn. Sci. Foundation, 2014 42 (3): 175 – 182.*
- Chaturani, L.G.T; Samaraweera, D.N. and Amarasekara, M.G.T.S; (2014); Liming effect on selected soil properties in cinnamon (Cinnamomum zeylanicum Blume) growing soils; *6th Annual Symposium Proceedings, Faculty of Agriculture, Rajarata University of Sri Lanla*
- Dissanayake S.G.H.C.K., Attanayake A.M.C.I.M., Dr. Alwis L.M.H.R., Jayasinghe H.A.S.L and Dr. Seneviratne J.M. (2014). Development of a protocol for *in-vitro* propagation of black pepper (*Piper nigrum* L.) local selections. *5th Annual Research Symposium - Uva Wellassa University of Sri Lanka.*

- Jayasinghe, G.G; Ketakumbura, K.H.M.P.K; Wijesinghe, K.G.G.; Hemachandra, K.S. and Weligamage, S; (2014); Relationship between Pest and Disease incidences and Agronomic operations implemented by farmers in cinnamon (*Cinnamomum zeylanicum* Blume) fields in Southern Sri Lanka. *Book of Abstracts: SLCARP International agricultural Research Symposium 2014, Sri Lanka Council for Agricultural Research Policy, 11 – 12 august , Colombo, Sri Lanka, Pp 43*
- Jayasinghe, G. G. and Mallik, B. (2014) Development of a model for mass production of *Neoseiulus gispinosus*: a phytoseiid predator of spider mites. *Book of abstract: SLCARP International Agricultural Symposium 2014, Sri Lanka Council for Agricultural Research Policy, 11 – 12 August, Colombo, Sri Lanka, p 49.*
- Jayasinghe, G. G. and Mallik, B. (2014) Management of two spotted spider mite, *Tetranychus urticae* Koch infested tomato using phytoseiid predator, *Neoseiulus gispinosus* (Evans), as a biological control agent at green house condition. *International symposium on Agriculture and Environment 2014, University of Ruhuna, Sri Lanka, pp 31 – 35.*
- Kodithuwakku, R.D., Kumari, I.S., De Silva, D.P.P. and Wijekoon, W.M.R.W.B. (2014) Potential use of Bio fertilizer (Arbuscular Mycorrhizae - AM) and bio control agents (*Trichoderma* sp. and *Pseudomonas fluorescens*) for black pepper (*Piper nigrum* L.) nursery plants. *Focus on Pepper, Vol.vi, No.1, pp.34-46.*
- Kodithuwakku, R.D., Wijekoon, W.M.R.W.B., Kumari, I.S. and De Silva, D.P.P. (2014) *In – vitro* antagonistic ability of bio control agents *Trichoderma* sp. and *Pseudomonas fluorescens* over soil borne pathogens and growth promoting activity of bio control agents and bio fertilizer (Arbuscular Mycorrhizae-AM) over black pepper (*Piper nigrum* L.) nursery plants. *Book of Abstracts: SLCARP International Agricultural Research Symposium, Sri Lanka Council for Agricultural Research Policy. pp. 33.*
- Pallegama P.R.D.K., Weerakkody W.A.P. and Subasinghe H.M.P.A.– 2014,. Use of chemical growth inhibitors for extension of storage life of seed ginger (*Zingiber officinale* Roscoe) *Proceedings of the Annual Research Symposium - 2014, Faculty of Agriculture, University of Peradeniya, Sri Lanka.-*
- Pradeep M.R., Subasinghe H.M.P.A. and Hitinayake H.M.G.S.B. – 2014,.Effect of seed rhizome weight on growth and yield of ginger (*Zingiber officinale* Roscoe). *Proceedings of the Annual Research Symposium - 2014, Faculty of Agriculture, University of Peradeniya, Sri Lanka.*

- Ranasinghe, R. K. R. S., Nanayakkara, C. M., Sumanasena, H. A., and Samaraweera, D. N. (2014). Optimizing environmental parameters affecting *in-vitro* rock phosphate solubilization by a native *Burkholderia* sp. Proceedings of the annual symposium, University of Colombo. pp 215
- Samarasekara M.A., Wimalasiri K.M.S., Liyanage T., 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, 2014. Pp 191
- Seneviratne, J.M. and Rajapakse, I.G.M. (2014) Development of high yielding black pepper (*Piper nigrum* L.) varieties while preserving the authenticity of local black pepper. *Focus on Pepper* (J. of the Pepper Industry) Vol. VI No. 1 January-June 2014 International Pepper Community (IPC), Jakarta, Indonesia. Pp 12-19
- Subasinghe H.M.P.A and Dissanayake D.M.R.D. -2014,. Variation of dry matter partitioning into spikes and fine roots of black pepper (*Piper nigrum* L.) under different crop management practices. Focus in Pepper - 2014, International Pepper Community.
- Sumanasena H.A., Priyadarshani, K.D.N. and Bowatta, S. (2012) Domestication of Wallapatta (*Gyneros Walla Gaetn.*) as a potential export agricultural crop species. *The Sri Lanka Forester*. 34:109-120
- Thilakarathne C.L., Posch S., Cane K., Norton R., Tausz M., Seneweera S. (2014) Intraspecific variation in leaf growth of wheat (*Triticum aestivum*) under Australian Grain Free Air CO₂ Enrichment (AGFACE): is it regulated through carbon and/or nitrogen supply? *Functional Plant Biology*. <http://dx.doi.org/10.1071/FP14125>
- Weerasuriya, S.N; Munasinghe, R.S. and Wijesinghe, K.G.G. (2014); Effect of Sulphur fumigation on Cinnamon (*Cinnamomum zeylanicum* Blume.) Quills for Quality , Storage Life and Food Safety; *Book of Abstracts: SLCARP International agricultural Research Symposium 2014, Sri Lanka Council for Agricultural Research Policy, 11 – 12 august , Colombo, Sri Lanka, Pp 87.* 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, 2014. Pp. 201

Annexure 1: Estimated Extent (ha) of EAC by Districts - 2014 *

District	Cinnamon	Pepper	Clove	Cardamom	Coffee	Cocoa	Nutmeg	Areca nut	Betel	Citronella	Total	Ginger	Turmeric	Grand Total (including Ginger & Turmeric)
Kandy	126	5,969	3,007	721	1,324	299	815	2,266	58	-	14,585	437	392	15,414
Matale	327	6,433	674	1,133	660	1,068	73	1,194	45	-	11,607	38	87	11,732
Nuwaraeliya	35	881	337	116	1,084	5	4	554	7	-	3,023	134	145	3,302
Kurunegala	158	3,009	403	8	706	152	50	829	1,072	-	6,387	378	85	6,850
Badulla	190	2,512	55	10	336	35	-	1,423	55	-	4,616	97	59	4,772
Moneragala	79	1,783	6	-	192	599	1	1,304	56	-	4,020	6	3	4,029
Galle	11,192	468	192	-	107	3	2	755	240	-	12,959	90	51	13,100
Matara	8,453	775	489	34	172	4	5	1,131	111	-	11,174	127	96	11,397
Hambantota	3,158	1,808	54	1	116	-	-	551	33	788	6,509	17	9	6,535
Colombo	227	243	59	1	58	2	2	215	85	-	892	95	8	995
Gampaha	265	1,700	114	2	369	8	6	1,123	1,128	-	4,715	295	89	5,099
Kalutara	3,369	313	130	3	139	4	4	584	1,000	-	5,546	111	29	5,686
Ratnapura	4,019	3,253	403	338	226	23	6	1,898	138	389	10,693	89	51	10,833
Kegalle	264	3,079	1,704	434	595	173	45	1,613	209	-	8,116	184	132	8,432
Other Districts	5	65	-	-	50	-	-	1,035	359	-	1,514	-	-	1,514
Total	31,867	32,291	7,627	2,801	6,134	2,375	1,013	16,475	4,596	1177	106,356	2,098	1,236	109,690

Source: Census of Agriculture-2002, DEA data base, Agricultural Statistics, Department of Census & Statistics.
*provisional figures

Annexure I1 : Export Volume and Value of Export Agriculture Crops – 2013 & 2014

Commodity	Units	2013	2014 **	Growth% 2013/14
Cinnamon	Vol (mt.)	13,799.3	13,686.4	-0.8
	Val (Rs.mn)	17,129.2	17,274.2	0.8
Cinnamon Leaf Oil	Vol (mt.)	265.1	248.0	-6.4
	Val (Rs.mn)	479.7	485.8	1.3
Cinnamon Bark Oil	Vol (mt.)	16.8	17.0	0.9
	Val (Rs.mn)	323.5	499.5	54.4
Clove	Vol (mt.)	4,378.8	1,101.7	-74.8
	Val (Rs.mn)	6,123.8	1,777.3	-71.0
Clove Stems	Vol (mt.)	1,099.4	138.2	-87.4
	Val (Rs.mn)	237.1	42.3	-82.2
Clove Oil	Vol (mt.)	4.5	2.1	-54.4
	Val (Rs.mn)	39.5	24.8	-37.3
Cocoa & Cocoa Products*	Vol(mt.)	1,212.6	2,098.9	73.1
	Val (Rs.mn)	682.1	1,076.3	57.8
Coffee	Vol(mt.)	19.1	57.0	198.3
	Val (Rs.mn)	15.3	29.8	94.8
Pepper	Vol(mt.)	21,329.6	7929.6	-62.8
	Val (Rs.mn)	16,478.4	9,028.4	-45.2
Pepper Oil	Vol(mt.)	7.6	25.7	238.3
	Val (Rs.mn)	101.1	287.5	184.4
Cardamom	Vol(mt.)	4.1	8.3	101.3
	Val (Rs.mn)	21.4	39.6	85.0
Cardamom Oil	Vol(mt.)	1.7	1.3	-25.1
	Val (Rs.mn)	73.8	59.2	-19.7
Citronella	Vol(mt.)	13.9	10.1	-27.5
	Val (Rs.mn)	45.7	39.0	-14.7
Nutmeg	Vol(mt.)	1,741.5	1,630.6	-6.4
	Val (Rs.mn)	2,029.8	1,927.7	-5.0
Mace	Vol(mt.)	297.1	198.3	-33.3
	Val (Rs.mn)	667.4	504.2	-24.5
Nutmeg Oil	Vol(mt.)	33.2	30.4	-8.3
	Val (Rs.mn)	419.7	226.6	-46.0
Mace Oil	Vol(mt.)	0.1	0.1	33.0
	Val (Rs.mn)	0.6	0.6	-8.2
Areca nut*	Vol(mt.)	9,782.6	29,508.8	201.6
	Val (Rs.mn)	2,064.9	8,351.0	304.4
Betel	Vol(mt.)	3,024.5	3,002.7	-0.7
	Val (Rs.mn)	1,368.3	1,378.6	0.8
Vanilla	Vol(mt.)	0.1	0.3	200.0
	Val (Rs.mn)	4.0	6.0	49.4
Vanilla Oil	Vol(mt.)	0.04	0.05	20.0
	Val (Rs.mn)	0.1	0.1	26.6
Lemon Grass Oil	Vol(mt.)	0.6	0.8	25.7
	Val (Rs.mn)	2.7	3.4	27.7
Total EAC	Vol(mt.)	*57,032.2	59,696.1	4.7
	Val (Rs.mn)	**48,308.1	43,061.8	-10.9
Ginger	Vol(mt.)	92.3	59.6	-35.4
	Val (Rs.mn)	29.0	70.9	144.3
Ginger Oil	Vol(mt.)	1.0	1.6	63.0
	Val (Rs.mn)	16.4	31.5	92.1
Turmeric	Vol(mt.)	66.9	69.9	4.5
	Val (Rs.mn)	39.5	59.3	50.1
Total (Ginger & Turmeric)	Vol(mt.)	160.2	131.2	-18.1
	Val (Rs.mn)	84.9	161.6	90.4
Total (with Ginger & Turmeric)	Vol(mt.)	57,192.5	59,827.3	4.6
	Val (Rs. mn)	48,392.7	43,223.5	-10.7

Source: Sri Lanka Customs

** provisional figures

*includes re-exports

Annexure III: Average Prices of Export Agricultural Crops (Rs/Kg) in 2011- 2014

Crop	Price	Annual Average Price				Growth % 2013/14
		2011	2012	2013	2014	
Cocoa	FG	322.13	266.92	193.97	234.84	21.07
	AU	347.16	346.94	361.63	339.21	-6.20
	WM	332.71	304.31	315.35	402.23	27.55
Coffee*	FG	234.09	249.51	220.7	218.86	-0.83
	AU	266.16	251.49	249.39	263.13	5.51
	WM*	282.20	309.54	286.33	301.60	5.33
Pepper	FG	691.90	832.05	731.06	1,037.64	41.94
	AU	703.46	826.83	765.98	1,095.81	43.06
	WM	726.58	934.61	945.12	1,247.25	31.97
Clove	FG	1,250.35	1,159.70	1,233.93	1,400.89	13.53
	AU	1,376.14	1,225.95	1330.13	1457.68	9.59
	WM	1,291.82	1,367.58	1,591.14	1,904.25	19.68
Cinnamon Quills	FG	921.85	1,042.08	1,109.41	1,172.79	5.71
	AU	822.82	889.53	892.60	1284.66	43.82
	WM	-	-	-	-	-
Nutmeg	FG	742.53	838.45	683.88	642.17	-6.10
	AU	790.02	909.83	777.85	692.31	-11.00
	WM	2,442.44	3,118.39	2,798.13	2,257.58	-19.32
Mace	FG	2,847.77	2,096.51	1,536.27	1,741.52	13.36
	AU	3,092.01	2,374.48	1,825.41	2,024.80	10.92
	WM	3,758.72	3,141.56	2,650.38	2,169.48	-18.14
Cardamom	FG	2,713.12	1,945.75	1,731.68	1,642.08	-5.17
	AU	2,482.81	1,300.00	1,925.00	1,804.56	-6.26
	WM	-	1,667.93	1,864.16	1,187.48	-36.30
Betel (Rs./1000 leaves)	FG	2,042.19	2,018.96	1,922.22	2,166.15	12.69
	AU	-	-	-	-	-
	WM	-	-	-	-	-
Areca nut	FG	215.31	201.25	177.47	304.60	71.63
	AU	226.46	284.22	213.83	305.11	42.69
	WM	-	-	-	-	-
Vanilla	FG	-	-	-	-	-
	AU	-	-	-	-	-
	WM	2,848.00	-	-	-	-
Ginger (Raw)	FG	76.51	106.78	214.40	289.59	35.07
	AU	-	-	-	-	-
	WM	-	-	-	-	-
Turmeric (Raw)	FG	47.70	36.54	34.54	37.37	8.19
	AU	-	-	-	-	-
	WM	-	-	-	-	-

Source: DEA data base /Public ledger/SAPPTA

FG: Farm-gate Price; AU: Auction Price; WM: World Market Price

*Robusta coffee price

Annexure IV: Import Volume and Value of Export Agriculture Crops – 2013&2014

Commodity	Units	2013	2014*	Growth% 2013/14
Cinnamon	Vol (mt.)	45.8	89.23	94.82
	Val (Rs.mn)	64.75	133.07	105.51
Cinnamon Leaf Oil	Vol (mt.)	0.22	0.38	70.45
	Val (Rs.mn)	1.03	0.23	-77.67
Cinnamon Bark Oil	Vol (mt.)	0.99	0.06	-93.94
	Val (Rs.mn)	12.24	0.04	-99.67
Clove	Vol (mt.)	5	-	-
	Val (Rs.mn)	7.52	-	-
Clove Stems	Vol (mt.)	-	13.48	-
	Val (Rs.mn)	-	3.56	-
Clove Oil	Vol (mt.)	2.04	3.57	75.15
	Val (Rs.mn)	5.77	10.02	73.66
Cocoa & Cocoa Products	Vol(mt.)	6,330.22	3,680.20	-41.86
	Val (Rs.mn)	3,391.45	2,563.29	-24.42
Coffee	Vol(mt.)	43.11	51.89	20.37
	Val (Rs.mn)	44.18	61.06	38.21
Pepper	Vol(mt.)	31.33	367.11	1071.75
	Val (Rs.mn)	14.42	340.09	2258.46
Pepper Oil	Vol(mt.)	0.81	0.76	-5.93
	Val (Rs.mn)	1.2	0.44	-63.33
Cardamom	Vol(mt.)	42.07	40.47	-3.80
	Val (Rs.mn)	42.29	32.95	-22.08
Cardamom Oil	Vol(mt.)	1.8	1.7	-5.55
	Val (Rs.mn)	23.53	20.4	-13.30
Citronella	Vol(mt.)	1.36	0.33	-75.73
	Val (Rs.mn)	2.45	0.52	-78.77
Nutmeg	Vol(mt.)	27.102	19.13	-29.41
	Val (Rs.mn)	34.613	33.00	-4.66
Mace	Vol(mt.)	0.5	10.40	1980.00
	Val (Rs.mn)	1.21	17.09	1312.40
Nutmeg Oil	Vol(mt.)	1.8	-	-
	Val (Rs.mn)	20.4	-	-
Areca nut	Vol(mt.)	1,196.58	27,002.79	2156.66
	Val (Rs.mn)	150.66	5,163.61	3327.33
Betel	Vol(mt.)	-	-	-
	Val (Rs.mn)	-	-	-
Vanilla	Vol(mt.)	0.26	5.44	1992.31
	Val (Rs.mn)	0.15	9.59	6293.33
Vanilla Oil	Vol(mt.)	0.824	3.09	275.00
	Val (Rs.mn)	1.89	2.95	56.08
Lemon Grass Oil	Vol(mt.)	1.5	1.70	13.33
	Val (Rs.mn)	3	3.45	15.00
Total EAC	Vol(mt.)	7,733.32	31,291.72	304.63
	Val (Rs.mn)	3,822.75	8,395.38	119.62
Ginger	Vol(mt.)	1,295.60	691.89	-46.60
	Val (Rs.mn)	177.88	230.91	29.81
Ginger Oil	Vol(mt.)	0.76	0.5	-34.21
	Val (Rs.mn)	8.67	7.3	-15.80
Turmeric	Vol(mt.)	4,118.73	4,167.71	1.19
	Val (Rs.mn)	595.54	606.57	1.85
Total (Ginger & Turmeric)	Vol(mt.)	5,415.09	4,860.10	-10.25
	Val (Rs.mn)	782.09	844.77	8.01
Total (with Ginger & Turmeric)	Vol(mt.)	13,148.41	36,151.81	174.95
	Val (Rs.mn)	4,604.84	9,240.15	100.66

Source: Sri Lanka Customs

* provisional figures

Annexture V: Deployment of Extention Officers

Galle	Eo's Range Aluthwela Hiniduma Habaraduwa Ambalangoda Balapitiya Akmeemana Athkandura Alpitiya Karandeniya Baddegama Niyagama Hikkaduwa Yakkalamulla	Kandy	Eo's Range Galagedara Udunuwara Kurunduwatta Talatuoya Pujapitiya Udadumbara Rambukpitiya Yatinuwara Wattegama, Kundasale Hatharaliyadda Alawathugoda Medapitiya Gagawata Korale Udupalatha Huluganga Talathuoya Minipe Galaha
Hambantota	Eo's Range Okewela Beliaththa Middeniya Katuwana Walasmulla sooriyawawa Weerakatiya Warapitiya	Rathnapura	Eo's Range Waligepola Kolonna Ayagama Godakawela Palmadulla Balangoda Rathnapura Ambilipitiya Niwithigala Keella Alapatha Pothupitiya Pallebadda
Gampaha	Eo's Range Dompe Udugampola Gampaha Mahara Badalgama Pallewela Biyagama Meerigama Divulapitiya Minuwangoda Aththanagalla	Monaragala	Eo's Range Bibile Monaragala Badalkumbura Madulla Hingurukaduwa Madagama Padiyathalawa Muttala Migahayaya kotagama
Nuwaraeliya	Eo's Range Ginigathhena Helboda Hanguranketha Walapane Pallebowala Nildandahinna Rikillagaskada Maldeniya		

Kegalle**Eo's Range**

Mawanalla
 Ussapitiya
 Pinnawala
 Kegalle
 Warakapola
 Daraniyagala
 Dadigama
 Aranayake
 Ruwanwella
 Yatiyantota
 Bulathkohupitiya
 Galigamuwa
 Rambukkana

Badulla**Eo's Range**

Soranatota Badulla
 Haldummulla
 Nikapotha
 Uwaparanagama
 Passara
 Redimaliyadda
 Haliela
 Lunugala
 Megahakiula
 Kandaketiya
 Bandarawela

Matale**Eo's Range**

Palapathwala
 Ukuwela
 Thanna
 Rattota
 Weragama
 Yatawatta
 Hunukataela
 Pallapola
 Wahakotte
 Alugolla

Matara**Eo's Range**

Deniyaya
 Akurassa
 Pasgoda
 Hakmana
 Waligama
 Devinuwara
 Deiyandara
 Kamburupitiya
 Ransagoda
 Pitabaddara

Kurunegala**Eo's Range**

Polgahawela,
 Dodamgaslanda
 Mawathagama
 Rambadagalle
 Polpithigama
 Karandagolla
 Malsiripura
 Dambadeniya
 Katugampola
 Bingiriya
 Wariyapola
 Kuliypitiya
 Paduwasnuwara
 Madampe
 Naththandiya

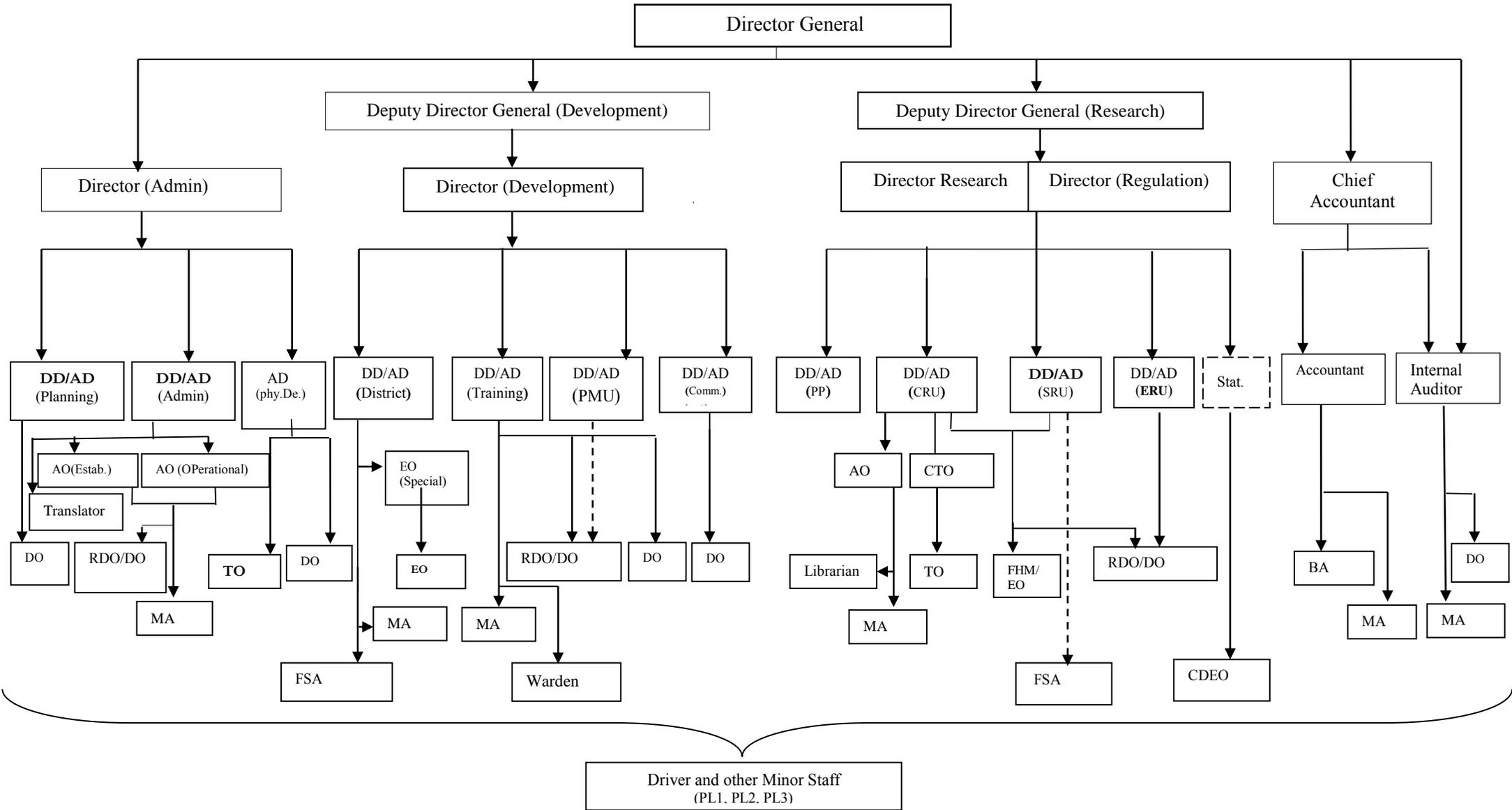
Kaluthara**Eo's Range**

Maduruwela
 Bandaragama
 Kaluthara
 Mathugama
 Iththapana
 Baduraliya
 Beruwala
 Horana
 Bulathsinghala
 Palawatta

Colombo**Eo's Range**

Avissawella
 Homagama
 Padukka

Organizational Structure of the Department of Export Agriculture



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



අපනයන කෘෂිකර්ම දෙපාර්තමේන්තුව - අනම්ම සරු හෙට දිනකට
ஏற்றுமதி விவசாயத் திணைக்களம் - வளமான எதிர்காலத்திற்கு

DEPARTMENT OF EXPORT AGRICULTURE - FOR A PROSPEROUS FUTURE