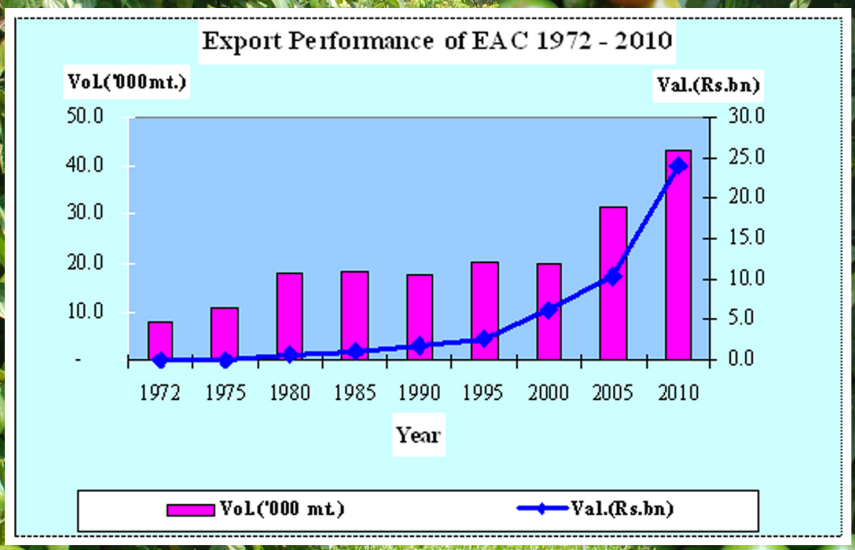
පාලන වාර්තාව

நிர்வாக அறிக்கை

ADMINISTRATION REPORT

2010



Graphic Design By-Gimhan Degaldoruwa

අපනයන කෘෂිකර්ම දෙපාර්තමේන්තුව

සුළු අපනයන බෝග ප්‍රවර්ධන අමාත්‍යාංශය

ஏற்றுமதி விவசாயத் திணைக்களம்

சிறு ஏற்றுமதிப் பயிர் ஊக்குவிப்பு அமைச்சு

Department of Export Agriculture

Ministry of Minor Export Crop Promotion

Web- www.exportagridept.lk

2010

කාර්ය සාධන හා ගිණුම් වාර්තාව

செயல்திறன் மற்றும் கணக்கு அறிக்கை

Performance and Accounts Report

අපනයන කෘෂිකර්ම දෙපාර්තමේන්තුව
සුළු අපනයන බෝග ප්‍රවර්ධන අමාත්‍යාංශය

ஏற்றுமதி விவசாயத் திணைக்களம்
சிறு ஏற்றுமதிப் பயிர் மேம்பாடு அமைச்சு

Department of Export Agriculture
Ministry of Minor Export Crop Promotion

අපේ දැක්ම

කුළුබඩු හා ආශ්‍රිත නිෂ්පාදන අපනයනයෙන් විශිෂ්ඨත්වය

අපේ මෙහෙවර

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

எமது தொலைநோக்கு

"வாசனைத் திரவியங்களுக்கும் அதனுடன் இணைந்த உற்பத்திகளுக்கும் ஏற்றுமதியில் சிறப்பிடம்"

எமது குறிக்கோள்

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

OUR VISION

"Excellence in Exports of Spices and Allied Products"

OUR MISSION

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

ACKNOWLEDGEMENTS

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

I wish to acknowledge the input of the Directors (Research and Development), Deputy Director (Administration), Deputy Director (Research), Deputy Director (Technical), Research Officers in charge of the Sub Research Stations, the Economic Research Unit, and the Assistant Directors for their commitment to provide necessary information. The contribution made by the staff of the Communication Unit for the preparation of the Cover page and printing of the report is appreciated.

I wish to convey my sincere thanks to Mrs. M.R.F.Nazreen (Assistant Director, Planning) for her commitment to gather the required data and compile the information in this document.

W.D.L Gunaratne

2011.04.20 Director General,

Department Of Export Agriculture

CONTENTS **PAGE NO**

TABLES **PAGE NO**

CHARTS

ABBREVIATIONS

AD	-	Assistant Director
ARP	-	Agricultural Research Project
CA	-	Chief Accountant
CARP	-	Council for Agricultural Research Policy
DD	-	Deputy Director
DD(R)	-	Deputy Director (Research)
DD(T)	-	Deputy Director (Technical)
DEA	-	Department of Export Agriculture
DS	-	Divisional Secretary
EAAS	-	Export Agricultural Assistance Scheme
EAC	-	Export Agricultural Crops
EO	-	Extension Officer
ERU	-	Economic Research Unit
Ex.O	-	Experimental Officer
ha	-	Hectare
HRD	-	Human Resource Development
IPC	-	International Pepper Community
IRDP	-	Integrated Rural Development Project
ISTC	-	In-Service Training Center
PHASU	-	Post Harvest Advisory Service Unit
PLASU	-	Plantation Advisory Service Unit
PMU	-	Progress Monitoring Unit
PIP	-	Productivity Improvement Programme
RA	-	Research Assistance
RO	-	Research Officer
ROIC	-	Research Officer-in-charge
SDD (Dev)	-	Senior Deputy Director (Development)
SDD(R)	-	Senior Deputy Director (Research)
SLAcS	-	Sri Lanka Accountant Service
SLAS	-	Sri Lanka Administration Service
SLSS	-	Sri Lanka Scientific Service
SLTS	-	Sri Lanka Technological Service
SLR	-	Sri Lankan Rupees
SPCDP	-	Second Perennial Crops Development Project
SPDA	-	Southern Province Development Authority

FOREWORD BY THE DIRECTOR GENERAL

DEPARTMENT OF EXPORT AGRICULTURE

The Department of Export Agriculture (DEA) is mandated to develop the Export Agricultural Crops (EAC) sector through increasing production, productivity improvement product quality improvement and enhancing the value addition by implementing Research and Development programmes. In the year 2010 the highest growth has been noted in both export volume and export earnings from EAC products. This sector which comprises of Spices, Beverages Industrial and Stimulant crops of perennial nature (other than Tea, Rubber, Coconut and Cashew) contributes an average share of more than 10.4 % of the all Agricultural and Plantation export earnings during the reporting year 2010. The government has established new ministry named "Ministry of Minor Export Crop Promotion" in order to pay special attention to this sector. It is my duty to thank all the officers currently on duty and who served in the Department as well as all the other public and private stake holders contributed towards this achievement.

The Department continued to support for new or replanting, productivity improvement of the existing lands by adopting Good Agricultural Practices, 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. In order to cater to the consumer needs of safe, high quality commodities are given more emphasis. For these new challenges DEA continued its efforts in 2010 under the theme of "**A Better Quality Product**", to ensure the implementation of food safety standards in the domestic production system, while promoting Good Agricultural Practices (GAP) and Good Manufacturing Practices (GMP).

This report summaries the performance of the two technical divisions of Development and Research as well as the Administration and Finance divisions continued to support those technical functions. The report includes all activities of the department, strategies used to meet the desired goals and the progress achieved during the year 2010.

පරිපාලන

நிர்வாகம்

ADMINISTRATION

1. GENERAL

1.1 Role and objectives

Development of EAC sector by means of production, productivity, quality improvement and value addition is the major responsibility of the Department. The Department is responsible for the planning and implementation of Research and Development programmes to promote Export Agricultural Crops sector. As officially defined the crops that are perennial in nature other than tea, rubber, coconut and cashew, where over fifty percent of their annual production is exported and any crop that is named by the Minister in-charge to be included for department purview are classified as EACs. Under this classification DEAs' main emphasis is paid to traditional crops such as Cinnamon, Pepper, Clove, Nutmeg, Cardamom, Coffee, Cocoa, Arecanut, Citronella, Vanilla, Lemon Grass, Betel, Garcinia , Kitul, Ginger and Turmeric.The DEA is basically a technical Department and functions are focused on Research and Development activities of the EAC sector.

1.2 Major Functions

The act of Parliament of the Democratic Socialist Republic of Sri Lanka named as Promotion of Export Agriculture No. 46 of 22nd September, 1992 on the promotion of Export Agriculture embodies the functions and gives statutory status to certain functions and services mentioned below.

- Organizing and promotion of cultivation and processing of EACs
- Undertake multidisciplinary Research on Crop Improvement, Crop husbandry, Crop protection, Post harvest handling and Socio economics
- Production and supply of quality planting material
- Implementation of EAC Assistant schemes on Crop Production, Productivity Improvement and Quality Improvement
- Providing Crop protection advisory services
- Promotion of Integrated Pest Management
- Promotion of Integrated Plant Nutrient Management
- Promotion of Organic Farming
- Dissemination of information on Marketing, Quality standards, Prices etc.
- Control of importation of EAC products, planting material etc.
- Training of personal involve in EAC Production, Processing and Trading and other stake holders
- Provide advisory services for promotion of EACs in Estate sector
- Strengthening linkage among Public and Private organizations involve with EACs
- Executive authority under the Export agriculture Act No. 46 of 1992
- Technology demonstration

2. ADMINISTRATION DIVISION

The Administration Division of the Department headed by the Deputy Director (Administration) assists the Director General of Export Agriculture for the management of human and physical resources which include new recruitments, orientation programmes for new recruits, promotions and transfers of staff, disciplinary procedures and matters related to departmental examinations, procurement and maintenance of capital assets of the Department. Besides the major responsibilities, the division takes the responsibilities of welfare services and related activities as and when required for the motivation and welfare of the staff. The organizational chart of the DEA is given in annexure VII.

2.1 Staff Cadres

Positions of approved staff cadres and number in services are given in table 2.1. Figures show that there was a shortage of officers in some technical cadres which adversely affected the major functions of the department during the reporting year. The position of the approved staff cadres of the Department in service is given below.

Table 2.1.1 The position of the cadres of the Department in service as at December 2010

Position	No. Approved	No. in service	No. Vacant
Director General	01	01	-
Director (Research/Development)	02	02	-
Deputy Director (Admin)	01	01	-
Director (Finance)	01	-	01
Deputy Director (Finance)	01	01	-
Deputy Director (Technical/Research)	04	-	04
Assistant Director (Planning)	01	01	-
Assistant Director	19	12	07
Research Officer	30	22	08
Assistant Director (Development)	03	02	01
Administrative Officer	03	02	01
Language Translator	02	-	02
Research Assistant	14	10	04
Extension Officer	184	163	21
Librarian	02	01	01
Technical Officer	01	-	01
Development Assistant	23	23	-
Research & Development Assistant	69	55	14
Budget Assistant	01	01	-
Data Entry Operator	02	01	01
Management Assistant	73	71	02
Farm Service Assistant	38	12	26
Hostel Warden	01	01	-
Telephone Operator	01		-
Roneo Machine Operator	01		-

Position	No. Approved	No. in service	No. Vacant
Book Binder	01		-
Cycle Messenger	02	33	3
Office Assistant	02		-
Office Labour	21		-
Watcher	08		01
Drivers	61	45	16
Lorry Cleaner	10	08	02
Driver Assistant	01	01	-
Tractor Driver	01	00	01
Watcher(Departmental)	41	40	01
Mason	01	01	-
Carpenter	01	00	01
Nursery Care Taker	02	01	01
Budder	01	01	-
Laborer – Farm	244	191	53
Laborer (Garden)	01	01	
Laborer (Sanitary)	03	-	03
Spray Machine Operator	03	01	02
Water Pump Operator	01	01	-
Cook	01	01	-
Total	**884**	**710**	**174**

2.2 Senior Management positions of the Department

Director General	-	Mr. W.D.L. Gunaratne
Director (Research)	-	Dr. R.S. Kularatne
Director (Development)	-	Mr. U.M. Gunasinghe
Director (Finance)	-	Mrs.W.M.Kalyani Menike
Deputy Director (Admin)	-	Mr. O.M. Jabeer
Deputy Director (Finance)	-	Mr. R.M.D.S.S. Ratnayake
Deputy Director (Technical)	-	Mr. E.M. Nawaratne Banda
Deputy Director (Technical)	-	Mr .N.K.A. Rupasinghe

- **New appointments**

Watcher	04
Labour	25

- **New Arrivals**

Deputy Director (Admin)	01
Assistant Director (Development)	02
Administrative Officer	01
Research and Development Assistant	01
Public Management Assistant Service	06
Driver	04

- **Transfers**

Public Management Assistant Service	03
Driver	02

- **Retirements**

Assistant Director	01
Administrative Officer	01
Extension Officer	07
Public Management Assistant Service	03
Driver	01
Watcher	01
Labour & Equal Services	06

- **Releases**

Assistant Director	01
Extension Officer	03
Public Management Assistant Service	02

- **Vacation of Service**

Extension Officer	01

- **Resignations**

Extension Officer	01

- **Deaths**

Director (Finance)	01
Labour	02

2.3 Progress of Land Acquisition

- **Completion of surveying the lands, owned by the following research centers.**
    - Research centre, Matale
    - Sub Research Station, Nillamba
    - Sub Research Station, Walpita.

2.4 Targets Achieved by the Administration Branch

- Established Data Base of all officers in the Department of Export Agriculture
- Established Data Base for Sri Lanka Scientific Service and Sri lanka Technical Service Extension Officers in the Department of Export Agriculture.

2.5 Department Examinations

Following examinations were conducted by the Department during 2010.

Examination	Date
1st Department Examination for Extension Officers (SLTS) Class II "A"	12.10.2010
2nd EB Examination for Research & Development Assistant	24.03.2010,12.10.2010
2nd EB Examination for Development Assistant	24.03.2010,12.10.2010
EB Examination for Drivers	26.04.2010, 29.10.2010
National Language Test	24.05.2010
2nd Department Examination for Extension Officers(SLTS) Class II "A"	24.03.2010,12.10.2010
K.K.S. EB Examination	26.04.2010

EB- Efficiency Bar

2.6 Foreign Scholarships & Traveling

Table2.6.1. Foreign Scholarships & Traveling during the year 2010

Officer's Name	Post	Reason	Period	Country
Mr.W.D.L. Gunaratne, Mr.I.V.A.D.S.C.Induruwa Mr.K.G.G.Wijesinghe Mr.J.L.K.Weeralal	Director General Research Officer Research Officer Assistant Director	Invitation to attend the 38 th Session &3Meeting of IPC.	08.11.2010-12.11.2010	India
Mrs.Thushari Liyanage	Research Officer	Training Programme on Oil Crop Comprehensive Technology for Developing Countries.	10.05.2010-29.08.2010	China
Mrs.C.L.Thilakeratne	Research Officer	Austrailian Development Scholarship-M.Sc of Philosophy(Land& Environment)	12.01.2010-01.03.2010	Australia
Mr.S.B.U.S.K.Ranaweera	Assistant Director	Master's in Agriculture & Rural Development.	27.07.2010-29.09.2011	Korea
Mr.U.M.Gunasinghe	Director (Development)	Study Meeting on reforming Agriculture Extension system through Knowledge Management.	06.09.2010-11.09.2010	India

මූල්‍ය

நிதி

FINANCE

3. FINANCIAL DIVISION

The Annual Estimates for the year 2010 allocated a financial provision of a sum of Rs.473 million Under the Head 289 in one programme for, two Recurrent Expenditure projects and two capital Expenditure projects (Table 3.1). In addition to this Rupees 12.8million were allocated to the Department from the Ministry fund (Appiwawamu Ratanagamu Programme and organic Fartilizer promotion Programme) during the period under review.

The expenditure for the year was Rs 452.5 M. And this was a 96% of the provision allocation for the year. The financial performances of the project 1 and 2 were 97% and 90% of the allocated fund s. Percentages of the amount spent under capital expenditure of the projects 1 and 2 for the year 2010 were98 % and 76% respectively and the same for the recurrent expenditure were 96% and 95%. Despite the serious man power shortages at all field level technical cadres and the financial constraint the spending of 96 % of the total annual allocation for the year 2010 was an impressive achievement of the DEA. Chart 3.1 and Table 3.2 shows the financial progress of the year 2010.

3.1 Internal Audit Inspection in 2010

Internal Audit of the Department is operated under the Director General. Fifteen Station including Research Stations, Assistant Director's Office and Nurseries of DEA were audited by Internal Audit unit during the year of 2010.

Chart 3.1.1 Expenditure of the projects 1 and 2 for the year 2010

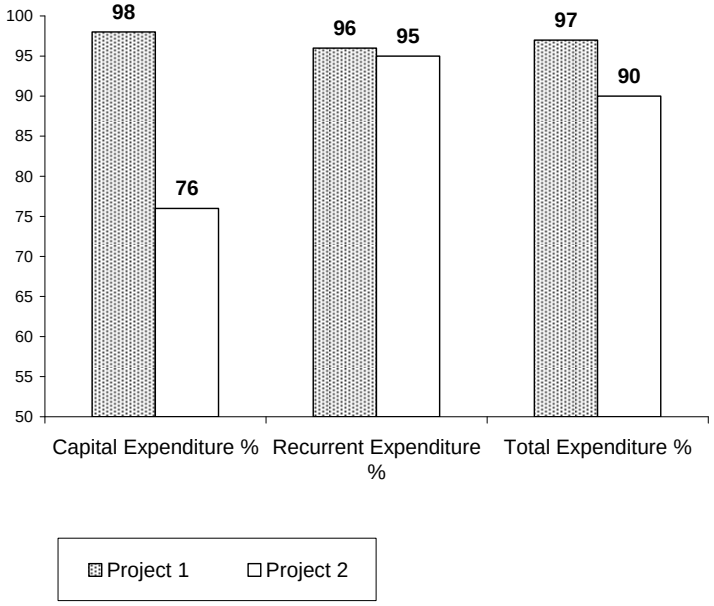


Table 3.1.1: Financial Provision and Expenditure-2010			
Item	**Provision(Rs)**	**Expenditure(Rs)**	**Ex:(%)**
Head -289			
Programme -02			
Project -01-Export Crops Development programme			
Capital Expenditure			
Rehabilitation and improvement of Capital Assets	9,000,000	5,586,110	62
Acquisition of fixed Assets	6,500,000	6,302,894	97
Capital Transfers			
Development Assistance(Assistant scheme for EAC)	180,000,000	179,954,175	100
Training and capacity Building	2,000,000	1,995,374	100
Total Capital Expenditure	**197,500,000**	**193,838,553**	**98**
Recurrent Expenditure			
General Administration	168,630,000	162,052,050	96
TOTAL EXPENDITURE(PROJECT 1)	**366,130,000**	**355,890,603**	**97**
Project-02-Multidisciplinary research integrated pest/disease management of EAC			
Item	**Provision(Rs)**	**Expenditure(Rs)**	**Ex:(%)**
Capital Expenditure			
Rehabilitation and improvement of Capital Assets	3,000,000	1,775,577	59
Acquisition of fixed Assets	20,500,000	15,459,684	75
Development Assistance	3,800,000	3,446,638	91
Specific Research Projects	500,000	424,745	85
Total Capital Expenditure	**27,800,000**	**21,106,644**	**76**
Recurrent Expenditure			
General Administration	79,457,000	75,555,078	95
TOTAL EXPENDITURE(PROJECT 2)	**107,257,000**	**96,661,722**	**90**
TOTAL EXPENDITURE	**473,387,000**	**452,552,325**	**96**
Special Allocation	12,803,386	8,785,863	69

සංවර්ධන
அபிவிருத்தி
DEVELOPMENT

4. Development Division

4.1 Introduction

Development Division of the Department is located at the Head Office in Peradeniya, Sri Lanka. This division plays a very important role of the Department. It provides farmers and other stakeholders with technical advice and guidance, planting materials and cash grant for the promotion of EAC sector.

The Division is headed by Director Development and supported by 3 Deputy Directors (Technical) each assigned with two provinces for the management of EAC development programme. In addition as a supportive Staff, Research and Development Assistants, Public Management Assistants are also attached to the Division.

The Major functions of the Development division are

- New Cultivation Programme (New Planting, Replanting)
- Productivity Improvement Programme for existing cultivation
- Quality Improvement Of EAC Product
- Extension and Training of Stakeholders

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 Nuwaraeliya, Kurunegala, Colombo, Kalutara, Gampaha, Galle, Matara, Hambantota, Kegalle, Ratnapura, Badulla and Moneragala . In addition several development activities carried out to introduce and popularize Turmeric, Ginger, Arecanut, Pepper and Cocoa in several parts of Anuradapura, Pollonaruwa and Ampara Districts. The special programs such as Post harvest advisory services, Plantation advisory services and plant Certification for quality assurance of plants and planting material, Cultivation of Export Agricultural Crops in selected village as cluster farms, were also implemented during the year 2010.

4.2. Crop Development Programme

The total estimated area under EAC was approximately 98,829 ha as at December 2010.The following Programmes are carried out by Development Division.

(i) New Planting Programme,

(ii) Productivity Improvement Programme

(iii) Post Harvest Technology and quality improvement programme of EACs.

4.3. Export Agriculture Assistance Scheme (EAAS) for New Planting

This scheme was introduced in 1972 with the inception of the Department. In addition to the issue of free planting material at the beginning and provision of technical information, this scheme provided outright cash grants for new planting and replanting of selected EACs for the successfully established cultivations at maturity. New planting scheme was confined to some selected crops economically important in the long-run. However due to the financial conditions and precedence of the department this assistant scheme has been subjected to reversals several times. EAC Assistant Scheme for new planting programme is given below.

Table 4..3.1 The EAC Assistant Scheme for New Planting

Crop	Crop spacing	Free plants issued per Hectare	Investment Assistance per Hectare (Rs.)	Minimum period of Investment Assist. (Yrs)	Maximum period of Investment Assist.(Yrs)
Catimor Coffee	1.8x1.8 m	3000	35,000	03	05
Arabica Coffee	1.8x1.8 m	3000	35,000	03	05
	1.8x2.5 m	2200			
Robusta Coffee	3.0x3.0 m	1100	20,000	03	05
Cocoa	3.0x3.0	1100	40,000	03	05
Cinnamon	1.2x0.9 m	9000	20,000	02	05
	1.2x0.6 m	14000			
Black Pepper	2.4x2.4 m	1750	25,000	03	05
Cardamom	2.0x2.5 m	2000	35,000	03	05
Clove	6.0x6.0 m	250	10,000	04	06
Nutmeg	6.0x6.0 m	250	15,000	04	06
Vanilla	2.4x1.5 m	2750	5,000	03	05
Citronella	0.9x0.9 m	17500	10,000	8 Month	02
	0.6x0.6 m	30000			
Lemon grass	0.6x0.6 m	30000	10,000	8 Month	02

Extent cultivated under new planting Investment assistance scheme including the plantation sector is given below.

Table 4.3.2. Extents Cultivated under New Planting Programme in 2009 and 2010

Crop	Cinnamon	Pepper	Coffee	Cocoa	Cardamom	Citronella & Lemon Grass	Clove & Nutmeg	Vanilla	Betel	**Total (ha)**	Ginger	Turmeric	Mixed (Home garden)	Arecanut (Plants)
Extent(ha) 2010	829	843	219	82	2	35	122	21	18	**2170**	370	145	185	329,300
Extent (ha) 2009	786	819	182	70	10	38	68	14	56	**2048**	199	43	54	284,246

Number of applications received, land inspections completed under new cultivation Programme are summarized in table 4.3.

Table 4.3.3. Applications received, land inspected for New planting Programme -2010

New planting Under Permits	No of Applications	No of Application Succeeded	Extent planted	Inspections(after new Planting)					
				1st Success Inspection		2nd Success Inspection		3rd Success Inspect	
Jan.-Dec.	**No:**	**No:**	**Ha.**	**No:**	**Ha.**	**No:**	**Ha.**	**No:**	**Ha.**
Cinnamon	4,344	4,180	1,898	2,340	865	2,090	747	1,741	638
Pepper	6,273	6,019	1,723	3,106	802	2,345	575	1,530	399
Cardamom	75	75	42	35	14	26	10	1	5
Coffee	651	627	315	378	165	250	105	100	31
Cocoa	429	409	121	100	39	87	41	35	28
Clove	255	242	73	64	21	45	12	6	2
Nutmeg	468	432	104	200	61	89	34	79	21
Vanilla /Betel	425	418	47	252	12	16	3	3	1
Citronella	292	259	141	198	79	200	78	25	10
Ginger	6,688	6,554	1,122	2,610	767	661	97	16	2
Turmeric	1,458	1,408	445	504	207	57	6	0	0
Total	**21,358**	**20,623**	**6,031**	**9,787**	**3,032**	**5,866**	**1,708**	**3,536**	**1,137**
Other EAC programs									
Home Garden	4,289	4,242	414	694	67	109	11	12	2
Organic farming	125	125	38	67	24	64	24	0	0
Grant Total	**25,772**	**24,990**	**6,483**	**10,548**	**3,123**	**6,039**	**1,743**	**3,548**	**1,138**

4.4. Productivity Improvement Programme

Opportunities to expand Export Agriculture Crops to new lands are limited Therefore Productivity Improvement Programme (PIP) was introduced to increase the per unit area production of the existing EAC cultivations, where production is below the potential due to low crop density and poor crop management. Growers are assisted with technical advices, supply of planting material to fill vacancies, cash grant for a period of 3 years in order to improve the existing pepper, cinnamon, cocoa, coffee, cloves and nutmeg cultivations by adopting proper soil conservation measures, crop and shade tree pruning, application of organic fertilizers and integrated pest management etc.

Table 4.4.1.Assistant Scheme for Productivity Improvement Programme (Cash granted per Hectare for each Crop. (Rs.))

Crop	1st Year	2nd Year	3rd Year
Cinnamon	15,000	15,000	7,500
Black pepper	15,000	15,000	7,500
Cocoa	12,000	12,000	6,000
Coffee	12,000	12,000	6,000
Clove	6,000	6,000	3,000
Cardamom	12,000	12,000	6,000
Nutmeg	6,000	6,000	3,000

The progress of PIP in 2010 is given bellow.

Crops	Cinnamon	Black Pepper	Coffee	Cocoa	Cardamom	Clove / Nutmeg	Total
Extent (ha)	1840	428	48	92	92	38	2508

Progress of Payments for rewards under PIP is given below in the table 4.3 in the year 2010.

Table4.4.2.. Payment of rewards for Productivity Improvement Programme -2010

Crop	Registered under PIP		Installment Paid					
			1st Installment		2nd Installment		3rd Installment	
	No	Ha	Extent (Ha)	Amount (Rs.)	Extent (Ha)	Amount (Rs.)	Extent (Ha)	Amount (Rs.)
Cinnamon	2,851	899	350	484,500	330	3,744,000	181	890,250
Pepper	1,559	613	17	137,400	0	0	0	0
Coffee	45	19	0	181,800	0	0	0	0
Cocoa	53	63	1	14,400	0	0	0	0
Cardamom	27	9	0	0	0	0	0	0
Clove	188	76	0	0	0	0	0	0
Nutmeg	151	43	0	0	0	0	0	0
TOTAL	**4,874**	**1,722**	**368**	**818,100**	**330**	**3,744,000**	**181**	**890,250**

4.5. Estate Sector Crop Development Programme

In 1998 this programme was initiated and given especial emphasis to develop the crop diversification of EACs in plantation sector. Estate management was helped to plan their EAC development programs by senior officers including researchers when necessary. Following table shows cultivated crops and respective extents under the estates in 2010.

Table 4.5.1. Estate Sector Program in 2010(Crop Extent in (ha)

District	Cinnamon	Black Pepper	Coffee	Cocoa	Other crops
Kandy	11.5	68.0	7.9		11.3
Kurunegala	1.4	14.1	4.4	2.8	6.6
Matale	12.6	1.6	4.5	1.0	1.0
Badulla	3.2	17.8	-	5.0	
Nuwara Elia	11.6	0.6	25	-	1.0
Kegalle	7.3	1.0	-	-	-
Ratnapura	4.8	-		-	-
Other Districts	11.6	-	8.9	5.6	-
Total	**64.0**	**103.1**	**50.7**	**14.4**	**19.9**
Grand Total (ha)	**252.1**				

4.6. Cluster Farm Development

The aim of this program is to promote Export Agricultural Crop production and productivity and quality in a systematic manner in climatically suitable potential locations and to enhance the productivity of all land parcels in a selected geographical location with farmer participation. The programme focuses to improve the total production of the cluster through productivity Improvement of land holdings by dissemination of collectivized advisory service. Improvement of the quality of EAC produce by promoting central processing centers to meet with internationally accepted quality parameters is also an objective. The Details of clusters established and continued are shown in table 4.4.

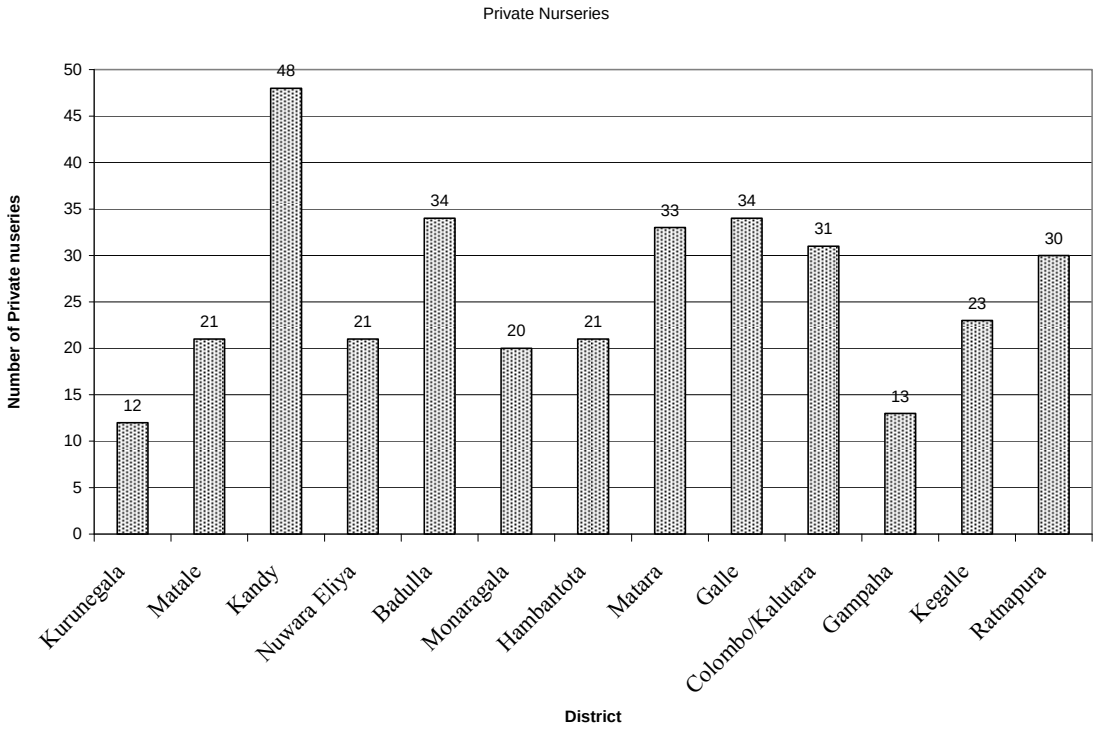
Table 4.6.1.. Performance of the Cluster Farm Development1

District	Main crops of Clusters	Number
Kurunegala	Betel/Pepper/Ginger/Lemon grass/Coffee	35
Matale	Pepper	18
Kandy	Pepper	54
Nuwara Eliya	Pepper/Kithul/Vanilla	11
Matara	Pepper/Cinnamon	7
Galle	Cinnamon	11
Gampaha	Pepper/Betel/Cardamom/Vanilla/Ginger	24
Kegalle	Pepper/Vanilla/Kithul	53
Total		**213**

4.7. Production and Issue of Planting Materials

The Department objective of this programme is to increase the production of EAC crops. Planting materials are provided free of charge to all farmers who have been enrolled in the Development assistance schemes and successfully completed the land preparation soil conservation and other field operations as per the instruction given by DEA. Planting materials were raised in 10 nurseries managed by the department and the rest through registered private nurseries under the close supervision of extension staff of the DEA. There were 351 private nurseries registered under the Department during the year of 2010. The distribution of Private nurseries is shown in Chart 4.1

Chart 4.7.1 : Registered Private Plant Nurseries and Their Distribution



- **Department Plant Nurseries and Their Distribution**

District	Government Nurseries
Kurunegala	03
Matale	01
Nuwara Eliya	02
Matara	01
Gampaha	01
Kegalle	01
Total	**09**

4.8. Plant Certification Program

The objective of this programme is to supply better quality plants to the growers while improving the standards of the private nurseries. For the purpose of certification, a team consisting of at least 3 Officers among them, DD (T), District AD(In charge of the District), and RO or an Extension Officer appointed by the Director General visits each nursery and plants certification was done using the standards and criteria developed by the Department.

Details of the Plants Certification and Plants issued in 2010 are given below.

Crop	Total Number of Plants Certified	Total Number of Plants Issued
Pepper	1,385,043	1,256,467
Coffee	723,115	619,131
Cocoa	48,955	45,390
Cinnamon	5,142,140	7,633,644
Areca nut	361,764	329,301
Clove	17,469	9,035
Nutmeg	26,987	20,934
Cardamom*		5,000
Vanilla*		10,565
Citronella*		892,000
Lemongrass*		36,005
Betel*		25,400
Total	**7,708,548**	**10,882,872**

**** Planting materials are supplied by the farmers or self nurseries with assured quality***

4.9.1. Issue of Plants under the Export Agriculture Assistant schemes

Following table depicts plants issued under the assistance schemes during 2010.

Table4.9.1.. Issue of Planting Material

Crop	Mono crop	Other	Total
Cinnamon	7,151,129	482,515	7,633,644
Cardamom	5,000	-	5,000
Pepper	1,051,983	204,084	1,256,067
Coffee	450,529	168,602	619,131
Cocoa	43,485	4,655	48,140
Citronella	892,000	-	892,000
Arecanut	204,897	118,399	323,296
Clove	6,775	2,260	9,035
Nutmeg	20,389	545	20,934
Betel	25,400	-	25,400
Total	**9,851,587**	**981,060**	**10,832,647**

4.10. Introduction of New Export Agricultural Crops

The Department of Export Agriculture was dealing with certain crops which have a potential for enhancing foreign exchange earnings. Crops identified under this programme were Vanilla, Lemon grass, Ginger, Garciniya and Kithul. Ginger and Turmeric were also added in to that category in 2007. The programme is continued during the year 2010 and under this program planting materials and necessary technical advice was provided to relevant farmers.

Table 4.10.1.. Progress of the Vanilla Cultivation in Major Growing Areas

District	Number of Cuttings planted
Kandy	600
Kegalle	2475
Kurunegala	185
Other Districts	7305
Total	**10565**

During the reporting year, 320,865 Kg of Ginger and 86,737 Kg of Turmeric seed material were distributed among the growers.

4.11. Export Agriculture Assistance Scheme for Post Harvest Activities

Post Harvest technology advisory Service was instigated in 1998 and the main objective of this programme was to upgrade the quality of the Export Agricultural products. The Export Investment Assistant Scheme for Post Harvest Practices was subjected to reversals since June 2007 and a set of three Assistant Schemes suitable for stakeholders of different levels was introduced. The main objective of this set of Assistant schemes is to maintain the quality of the product and to facilitate trade affairs. Elucidations of the 3 assistant Schemes are given below.

1. **Group Processing Units**

   The Farmers' Organizations registered under the Department are eligible for this assistant scheme under which the plants and machinery required for processing products are issued to the Farmers' Organizations free of charge. The responsibility of controlling the processing units and handling of the machines should be held by the Farmers' Organizations. In addition identifying processing buildings required for storing all the machinery and a proper land for establishing sheds should be performed by the Farmers' Organization itself. The Department staff helps the Farmers Organizations for the management and maintenance of these processing centres.

2. **Central Processing Units**

   This assistant scheme has been introduced for applicants who are capable of investing more than 1 Million Rupees and instigating a large scale processing measure. The investor is entitled for a cash grant of 25% of the total investment not exceeding 0.5 Million Rupees, under this scheme. Profits will be conferred after the investment, made under the approval of the department.

3. **Individual Processing Units**

   Applicants who wish to maintain a private processing unit for post harvest processing facilities are eligible to apply for this assistant scheme. They are entitled to obtain

subsidies for relevant machinery or post harvest processing facilities approved by the department. Relevant information is given below.

Table 4.11.1.. Assistance Scheme for Post Harvest Activities

	Investment	Subsidy 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'' (Grade I timber)	4,500(1500 per box)
	➢ Tray fermentation	6,000
04	Volatile Oil distillation Units	
	➢ For new constructions	75,000
	➢ For repairs	75,000 (maximum)
05	Processing Centre – Minimum 400 Square Feet	
	➢ Cinnamon	40,000
	➢ Other Crops	25,000
06	For Dryers	
	➢ Multi functional Dryers (Capacity - 250 Kg or more)	100,000
	➢ Solar Dryers (100 Square Feet)	10,000 (maximum)
	➢ Protected threshing floor	25,000
	➢ Dryers set above the ground level	MaximumRs 25 /feet^2 Minimum 200 feet^2
07	Vanilla – fermentation (Minimum Capacity - 20 Kg per day)	10,000

Performance of the Post Harvest Assistance Scheme

Item	Number
Distillation Units	10
Pepper Threshers	26
Dryers	17
Pepper Blanchers	85
Processing Centers/Units	112

4.12. Organic Farming Programme

Considering the growing demand for organically produced food in the international markets, Department initiated the promotion of organic farming in the year of 1998. Major role of the Department was to educate growers on principle behind organic farming, encourage them for record keeping, promotion of the use of organic fertilizer and integrated pest management, support for clean processing storage and link the growers with Exporters, who pays a reasonable price.

Table 4.12.1. Organic Farming Development Programme 2010 (new extents)

District	Crop	Ha
Monaragala	Pepper	28
Matale	Pepper	1.4
Kandy	Pepper/Nutmeg	8.3
Other District		1.0

4.13. Farmer Training

Farmer training programmes were organized and conducted by the Assistant Director in charge of each district with their supporting technical staff in order to improve the knowledge and skills of farmers and other stakeholders with updated technological information and to motivate farmers to adopt improved agriculture practices in cultivation and processing of EAC. Required Resource personals and other services received from the Research Division to conduct the training programmes. Details of the training classes are given in table 4.12.

Table 4.12.2. Progress in Farmer Training -2010

Activity	Number of Programmes	Number Participated
Farmer Training Classes & Field Days	2,512	67,273
Training of Cinnamon Peelers	52	674

4.14. Demonstrations

The entire field level Extension Officers were mandatory to establish and maintain one or more field demonstration to educate growers on Good Agricultural Practices to increase crop yield and to reduce the Cost of production. Field demonstrations are used for training programmes and for dissemination of technology too. The details of demonstrations established are shown in table 4.10

Table 4.14.1. Demonstrations established and maintained in 2010

District	Number of Demonstrations
Kurunegala	119
Matale	24
Kandy	19
Nuwara Eliya	39
Badulla	5
Monaragala	5
Hambantota	2
Matara	07
Galle	10
Colombo/Kalutara	17
Gampaha	39
Kegalle	28
Ratnapura	04
Total	**318**

4.15. In-Service Training Center, Matale

The national Training center of DEA is located at Elwala in Matale District. It provides training facilities for farmers and other stake holders on all aspects of Export Agriculture Crop production, processing and Marketing. It has residential training facilities for 30 trainees at a time. The training centre is headed by an Assistant Director who holds the responsibility of the overall management of the training centre. The duration of the training programme is varies from 1 day to 5 days depending on the subjects covered during the training programme. Training sessions , seminars and workshops on EAC related topics were conducted for students of the Agriculture training collages, Universities and private sector organizations too. The following trainings were conducted during the reporting year.

Table 4.15.1 Farmer training programs conducted at the ISTC- Matale

Subject Area	No of Classes	No Attended	Total Man days
EAC Production	12	275	334
Post Harvest Technology	03	41	62
Nursery Management	01	20	20
Value Added Products	01	24	48
Total	**17**	**360**	**464**

Table 4.15.2.: Training programs conducted for DEA officers and officers of other Organizations

Trainees	No of Classes	No Attended	Total Man days
01 DEA Officials			
(a)Extension Officers	06	148	303
(b)Farm Service Assistants	04	112	187
(c)Research and Development Assistants	01	21	63
02 Officers from Other Institutes			
(a)Estate Sector Officers	01	20	20
(b)Sri Lanka Industrial Development Board	01	32	96
(c) Agriculture Research and Production Assistants	06	98	196
03 Undergraduates, Agricultural School Students and Students			
(a) Agricultural School Students	04	111	211
(b) School Students	02	82	82
(c) Undergraduates	01	26	52
04 Seminars and Workshops	08	356	437
Total	**34**	**1006**	**1647**

Following Subject Area were discussed

▪ EAC production ▪ Post harvest technology ▪ Value added products ▪ Integrated nutrient management ▪ Organic farming ▪ Program planning on communication ▪ Pest and disease control and new recommendations ▪ Entrepreneur development ▪ Nursery management Extension program planning	▪ Preparation of visual aids ▪ Training methodology and techniques ▪ Positive thinking ▪ Office methods and procedures ▪ Administration and accounting ▪ Employee responsibilities and duties ▪ Program planning with participatory rural appraisal (for special village development programs) Agricultural marketing Extension

4.16 National food production drive "Api Wawamu Rata Nagamu programme" 2007-2010

This programme was introduced in September 2007 to increase the production of selected 36 crops such as fruits, vegetables, spices etc. to become self sufficient in them by 2010, by the Ministry of Agriculture Development And Agrarian Service(MADAS).

DEA was assigned two crops namely, Turmeric and Ginger in order to carry out research and development programmes to enhance the production of them to meet the local requirement. This programme was continued during the year 2010.Table 4.16.points out the progress of "Api wawamu Rata Nagamu" food productivity Programme

Table 4.16.1 Progress of "Api wawamu Rata Nagamu" food productivity Programme

Major Components	Financial (Rs.) Mn		Physical	
	Target	Progress	Target	Progress
1. Establishment of New Home Gardens	1.0	0.57	1750 (Home Gardens)	1626(Home Gardens)
2.Crop specialized Programme 2.1Crop Production of Ginger ,Turmeric ,fruits and Vegetables in the Department Premises	0.2	0.27	In 22 Lands	- Cultivated in 22 Lands - produced 7135 Kg of Ginger and Turmeric seed material - 5 acre of Fruits and Vegetables Cultivated in the department and farms premises - 4 acres of Paddy cultivated at Research Farms (Nillambe)
2.2 Training Programmes on cultivation of Ginger and Turmeric	0.32	0.14	48 Training programmes 1100 Beneficiaries	323 Training programmes 65,500 Beneficiaries
2.3 Establishment of demonstrations (Ginger, Turmeric, etc.)	1.7	1.10	135Demonstration	123 Demonstration
Traveling Fuel and Other expenses	0.7	0.19		

4.17 Communication Division

Communication division of Department of Export Agriculture performed well in 2010 and showed excellent team work. The major objective of the communication division is to keep all the stake holders of the Export Agricultural crop sector informed about the innovations, latest technology etc. Following communication programmes were carried out to fulfill the above objectives.

- **Electronic Media.**
  - **Television**

The TV programme 'Sangavunu Kahawanu' was given a complete face lift from studio production type to more appealing documentary type programme and was presented in an authentic natural atmosphere. The entire production including script, camera, narration presenting, editing etc were done by the staff of the communication division. The new format created by our own staff made a significant positive impact on the audience and the feed back was absolutely commendable. Very vital and timely message on cultivation, latest post harvest techniques etc were incorporated into every episode to make it absolutely beneficial to the people engaged in EAC sector. 45 events had telecasted in 2010. This programme is telecasted every Friday at 6.00 p.m. on National Television Channel.

  - **Radio**

Radio programme 'Daye Urumaya' is broadcasted every Sunday at 7.00 pm in Sinhala Swadeshi sevaya, Kadurata, Rajarata and Ruhunu Sevaya as a simultaneous broadcast. This programe has already caught the listener's attention. A snippet or a short message was broadcasted titled as'Sedamawatha' in City FM channel every day at 6.30 a.m.

- **Print Media**

EAC prices were published in 'Dinamina' sinhala newspaper every Friday with the collaboration of the Economic Research Division. This was published with the intention of creating awareness among all the stake holders about the prices of export crops prevailing during the week.

- **Magazines**

A quarterly magazine named 'Sarathi' was launched in 2010 and circulated among officers of government sector with latest information on EAC sector. This magazine was created and was of a high literary standard.

- **Digital Name Boards**

Five Large format digital name boards were designed at the communication division especially for 'Deyata Kirula' exhibition. These were displayed at five different locations in Moneragala.

- **Cover Page Designing-**

Cover pages for the Administration Reports 2008 & 2009 were designed at the communication division. Book cover for market information was also designed at our division.

- **DVD Production-**

DVDs especially containing 'Senagawunu Kahawanu' programmes were distributed in order to create awareness among export crop stake holders.

- **Exhibitions-**

National level Exhibition stalls were designed and installed by the communication division including 'Deyata Kirula' exhibition held at Pallekele and Farmer's week exhibition at Kaduruwela.

පර්යේෂණ
ஆராய்ச்சி
RESEARCH

5. RESEARCH DIVISION

5.1 Technical functions and organization of Research Division

The Research Division operated under the supervision of the Director (Research) and consists of 3 main units: Commodity Research Unit, Economic Research Unit and Plant Protection Unit. Main Research Station (Matale) and other six sub stations were continued to develop appropriate technology to solve farmer problems and enhance the production, productivity and quality of Export Agriculture Crops.

- Central Research Station, Matale
- Cinnamon Research Station – Pallolpitiya, Matara
- Intercropping & Betel Research Station – Narammala
- Tissue culture laboratory and Plant Nursery – Walpita
- Sub Research Station – Kundasale
- Sub Research Station – Nillambe
- Sub Research Station – Delpitiya
- Economic Research Unit – Head Office, Peradeniya

Central Research Station and Plant Protection Unit were functioned under the Deputy Director (Research) and other sub research stations were under the supervision of the respective Research Officers In Charge. The progress of the research conducted in 2010 by the main research station and other sub stations are described below according to the crop and discipline basis.

5.2 Research achievements on EAC's during the year of 2010

5.2.1 Cinnamon

- ✓ **Agronomy**

At the seventeenth harvests also reconfirm, medium level spacing of 4' x 3' with six plants in a point gave highest bark yield of 888.3 kg/ha, followed by closer spacing of 4' x 1.5' with two plants a point (877.9 kg/ha). However, early stages of cinnamon spacing experiment up to 12 years closer spacing showed high yield but after 12 years medium level of 4' x 3' exhibited highest value. After considering overall results and feedback from the extension and growers, it was concluded that row spacing of 4 feet and within the row spacing of 3 feet and five plants per point as the most suitable for cinnamon.

- ✓ **Genetics and Plant Breeding**

Cinnamon pollination can be controlled artificially using cloth bags. Cinnamon flowers completely covered did not bear any fruits and self pollination was successfully done in the cage with black ants. And also cinnamon cross pollination was achieved with application of

pollen by hand. However, bees and laboratory maintained pollen cannot be used to succeed the pollination.

Seven cinnamon lines (CRS 40, 351, 166, 317, 156, 184, and 201) were intercropped under coconut in Intermediate zone and highest survival rate (100) observed in CRS 40 and followed by CRS 317 (90.3). According to the average bark yield data Cinnamon lines CRS 40 **(**819.89 kg/ha/yr) and CRS 317 (858.78 kg/ha/yr) are performing better under coconut in intermediate zone.

- ✓ **Crop Protection**

Four types of mites and several insect species were observed in the cinnamon quills when they were stored with moisture contents above 12 %. Treated cinnamon quills with sulphur or store cinnamon quills under low temperature (around 5 – 10 ^{0}C) and low RH reduced the insect and mite population significantly. When cinnamon quills were stored, after reducing moisture to12 %, in air proof bags such as triple layer polythene, significantly reduced the insect and mite population.

- ✓ **Soil and Plant nutrients**

No significant difference in bark yield was found with respect to five different fertilizer application methods namely broadcasting, band application, half circular application on upper side, full circular application and application into three dug holes on upper side. However, all yield parameters except length of harvested stick, fertilizer application method of three dug holes on upper side of the cinnamon bush gave highest values for all yield parameters.

Application of sulphur (0, 50, 100, 150 and 200 kg S /ha/yr) for cinnamon did not significantly influence the yield parameters. But, length and diameter of harvested stick, number of sticks harvested, fresh stick weight and the bark yield increased 2.93, 26.53, 63.63, 23.16 and 17.94 percent respectively due to application of 200 kg sulphur per ha over the control.

Studies conducted to find out better combination of raw materials using cinnamon leaves and scrapings revealed that cinnamon leaves and scrapings can successfully be used as raw materials in making compost. Cinnamon leaves and cow dung mixture prepared at the ratio of 5:1 with Eppawala Rock Phosphate gave better decomposing ability after 4 months period.

The study clearly showed that nursery potting mixture can satisfactorily be made using sub soils supplemented with little saw dust and cow dung (sub soil 6: cow dung 1: saw dust1) and inoculated with bio-fertilizers viz Phosphate Solubilising Bacteria (PSB) and *Trichoderma*

- ✓ **Post Harvest Technology**

- **Comparative study on oil, oleoresin and coumarin content in cassia bark and true cinnamon bark**

Results showed the highest oil content in Sri Gemunu is higher (3.06 %), than Cassia and Cinnamaldehyde (85.85 %) and Coumarin (6.2 mg kg^{-1}) content in Cassia is much higher. Coumarin content in Ceylon cinnamon samples were less than that of cassia. Tolerable daily intake is 9 times of Sri Lankan true cinnamon than that of cassia.

5.2.2 Black Pepper

- ✓ **Agronomy**

Studies on micrometeorological parameters in black pepper canopy

The per cent Photo synthetically Active Radiation (PAR) absorption by support tree canopy increased up to 95 per cent and only less than 5 per cent of PAR penetrated into the pepper canopy when not prune nit regularly. The difference of temperature between inside and outside of pepper canopy was increased gradually with support tree canopy growth while the difference of relative humidity also changed in a same manner. Those values were varied from 1 to 3 C^0 and from 8% to 15%, respectively. The correlation between PAR absorption at different layers of the pepper canopy and its growth and yield attributes showed positive relationship with R^2 values of 0.70 for growth and 0.81 for yield attributes. Therefore, support tree canopy growth modified the microenvironment of pepper canopy and it may also affect on its growth and yield attributes of black pepper.

- ✓ **Genetics and Plant Breeding**

Evaluation of pepper germplasm from the local gene pool

Forty seven accessions of black pepper collected from different locations were field established at the Research Station, Matale to evaluate its performances under uniform conditions and to compare with introduced varieties, Panniyur – 1 and Kuching. According to the yield, the accessions BD/WA3 and BD/MN/41 recorded 4976 and 4370 kg ha^{-1} yr^{-1} of processed black pepper yield whereas Panniyur 1 recorded 3944 kg ha^{-1} yr^{-1}. The longest spikes (17.95cm) were observed in BD/GM28 whereas the accessions BD/MW 23 and BD/MW 26 also showed over 16 cm long spikes. When considered the spike filling percentage, WGB1 had 88.6 % while the best spike filling percentage was 89.7 % (BD/ST1). Fresh weight of spikes shows that the local accession BD/MW23 and the introduction Panniyur 1 have nearly 12 g/spike. while The highest number of berries per spike (88) was shown in the accession BD/KG38 Large berries (> 6 mm in diameter) were observed in the accessions BD/TP1, BD/ST1 and Panniyur1.The highest fresh berry weight per spike (10.9 g) was observed in the introduction Panniyur1 Therefore, when considered the yield, local accessions BD/MN 41 and MT/DM7 could be recommended as the best accessions

Evaluation of pepper introductions

Nine lines from India (In 1 to In 9) and 7 lines from Malaysia (MI 1 to MI7) are evaluating with Panniyur-I, a promising hybrid (Pan x MW21) and three local selections (GK49, MB12 and GM28). Over 1,500 kg/ha of processed pepper were observed in the accession In 01, In 07 and MI 6 where as the Panniyur-1 gave 1,026 kg/ha.

Hybridization of local pepper selections (PNM-1) with Panniyur -1 and Kuching

All ten selections (PNM-1) (MN-1, IW-5, GK-49, MB-12, TG-7, MW-21, KW-27, KW-30, KW-31, KW-33, DM-7) and two introduced pepper varieties (Panniyur-1 and Kuching) are crossed in a reciprocal hybridization scheme. Out of 46 crosses, 13 were successful and 32 lines were obtained. Seedlings from the progeny F1 considered as mother vines and clonal materials from the mother plants were field planted and evaluated for their performances. Thirty two pepper lines are being evaluated at the field. Line No. 27/1, 14/3 and 11/2 performed better yielding over 1,700 g of processed pepper/vine/yr.

Back crossing of elite lines (Hybrids) started and successful pollination was observed on two crossings (2/6 A X 11/1 and 2/6 A X 11/2). Crossing of wild *Piper* spp. with *Piper nigrum* was started. In-order to fulfill the task crossing of *Piper siriboa* and *Piper chuvya* were crossed with MB 12 local selection.

- ✓ **Crop Protection**

Biological control of soil borne diseases of Black pepper – *Piper nigrum* L.

Nursery experiments conducted with the incorporation of *Trichoderma* spp. and VAM into the potting mixture confirmed better growth and higher survival rate of nursery plants. *Invitro* experiments showed inhibition of soil borne pathogens such as *Phytopthora capsici* when grown with the fungi *Trichoderma*. Isolation of the antagonistic bacterium, *Pseudomonas florescence* is in progress.

Detection of microbial contaminations at the different stages of post harvest practices of black pepper, *Piper nigrum* L. and their control.

The level of fungi at four different processing stages has been examined; at the time of harvesting higher levels of fungi detected (1.6×10^6 to 1.3×10^{13} cfu/g). The lower levels of fungi detected immediately after blanching and also immediately after oven drying. This result confirms blanching and oven drying as good practices to produce healthy pepper.

In contrast, very high levels of fungi detected with the samples collected from different market outlets in Matale and Kandy (3.5×10^4 to 8.8×10^7 cfu/g). The common fungi species were *Aspergillus* and *Pennicillum.*

With regard to the detection of bacterial contaminations, the tested samples were positive for bacteria such as *E. coli* and *coliforms*. These samples were obtained from a drying floor in Matale and as the samples are positive these pepper is not fit for human consumption. Suggestions were given to keep the particular drying floor clean and follow healthy practices.

- ✓ **Physiology and plant production**

***In-vitro* propagation of high yielding pepper local selections.**

Shoot tips and nodal explants were collected from two local selections i.e., GK49 and MB12 and culture establishment was continued. Shoots were separated in multiple shoot clusters and sub cultured to raise culture stocks. End of 2010, the number of cultures of GK 49 was 1,436. However MB12 did not multiplied as expected. About 71% success was observed during hardening in the greenhouse. Vigorous growth was observed in tissue culture pepper plants. Sufficient number of plants was produced for field evaluation.

Production and distribution of two high yielding local pepper selections (GK49 and MB12)

The above plant production programme was started using two high yielding local selections i.e. GK49 and MB12 under "Bamboo Rapid Multiplication System" in 2006. In 2010, 1,109 of GK49 and 2,740 of MB12 plants produced and issued. A total of 14,686 plants were produced so far in these two selections and given to central nurseries in Matale, Kegalle, Kurunegala, Nuwaraeliya and registered nurseries in Ratnapura districts.

Comparison of growth and plant production of pepper (*Piper nigrum*) tissue culture plantlets and single nodal cuttings under "Bamboo Rapid Multiplication System" (BRMS).

No significant differences were found in plant survival, growth parameters and final plant production suggesting tissue culture plants could be used successfully in "Bamboo Rapid Multiplication System" for further multiplication. High cost of tissue culture plants could be reduced by using tissue culture plants in BRMS.

Comparison of growth and yield of pepper raised from orthotropic (terminal), lagiotropic and rooted cuttings of local selections

High field establishment was shown in all above cutting types (73.3-96%). Significantly lower vine length, number of lateral branches and stem diameter were observed in cuttings from plagiotropic branches whereas the significantly higher lateral spread was found in orthotropic top cuttings. Significantly higher number of spikes was produced from plagiotropic cuttings after one year (2.6 spikes/ vine). Low number of spikes was produced from orthotropic top cuttings (0.1 spikes per vine) and spikes were not produced from single nodal cuttings plants. Cultivar differences were not found for any parameter observed.

- ✓ **Soil and Plant nutrients**

Pepper green manure studies

Application of *Gliricidia* at the rate of 10 Kg/vine/year with half doze of recommended amount of inorganic fertilizer gave highest yield at Wasanagama (2,899 Kg/ha/year) in Badulla district. The yield of Ethulgama (1,075Kg/ha/year) in Kandy district was low

compared to the other years. In Matale district, application of 15Kg of *Gliricidia* with half doze of inorganic fertilizer recorded the highest yield (1,989Kg/ha/year) in year 2010.

Pepper Eppawala Rock Phosphate (ERP) experiment

Application of ERP at the rate of 120g P_2O_5/ plant /year is recommended for pepper instead of IRP (Imported Rock Phosphate) at a rate of 120g P_2O_5 / plant /year at Badulla and Matale Districts. Highest yield of 2,135 Kg/ha/year was recorded in the treatment of ERP at the rate of 120g P_2O_5/ plant /year.

- **Pepper Nursery potting mixture**

The best growth performance and highest survival rate was recorded in the potting mixture of sand :1 top soil :1 coir dust :1 compost :1.Therefore instead of cow dung, compost can be used for the nursery potting mixture of Pepper

5.2.3 Cocoa

✓ **Agronomy**

Improvement of Cocoa *(Theobroma cocoa)* Rooting Technique using Arbuscular Mycorrhizal (AM) Inoculum

Overall observations suggest that incorporation of AM inoculum into the potting media of cocoa rooting for single pot technique is beneficial. Potting media treatment combination of equal parts of top soil, cattle manure and river sand as outer mixture with equal parts of PBPH, coir dust and AM inoculum as inner mixture can be recommended as good potting media combination for cocoa rooting.

Studies on rehabilitation of old Cocoa plantation at Matale

Mean estimated production of 964, 968 and 949 kg beans /ha were observed for improved cultivars of SCA12xNa34, SCA6xICS6 and W5/5 respectively. It indicates that all three improved cultivars performed almost similarly during 2010 (4^{th} year after commencement of the rehabilitation trial). Number of old cocoa trees that successfully activate to produce a young chupon as an inducement through ring bark found to be low in number. Therefore, adoption of a combination of practices in treatments T2, T3 and T4 (bud grafting of a sprouting water shoots with chupon buds and train a new canopy (T2), gap filling with bud-grafted plants originated from fan buds (T3), gap filling with bud-grafted plants originated from chupon buds (T4)) is appeared to be appropriate for rehabilitation of an old cocoa cultivation.

✓ **Genetics and Plant Breeding**

Selection of high yielding cocoa lines for mixed cropping

Cocoa lines of A (1) and F (24) were selected by considering of pod yield (92 & 81 No of Pods/Yr), and number of seeds per pod (41 & 45) and pod value (18 &21) as parameters.

✓ **Crop Protection**

Cocoa die-back disease

Koch's postulate confirmed *Lasiodiploidia theobromae* syn. *Botrydiploidia theobromae* as the cause of the disease. Out of tested fungicides, spraying Carbendazim @ 07g in 10 L of water found to be the best in controlling the disease. Before application of Carbendazim, removing/pruning dead plant parts are essential for efficient control of the disease. Further, it is recommended to destroy them by burning. Symptoms are, wilting and then drying off of newly emerged branches of either old cocoa trees or budded plants. If the disease progress, trees may die.

✓ **Physiology and plant production**

Soil and Plant nutrients

Application of *Gliricidia* at the rate of 10 Kg/ plant/year with half doze of inorganic fertilizer has recorded highest yield performance (2,000Kg/ha/year) followed by application of 10 Kg/ plant / year of dried cocoa pod husk with half doze of inorganic fertilizer.

5.2.4 Coffee

✓ **Genetics and Plant Breeding**

Evaluation of coffee germplasm for mid country intermediate zone

In this trial, Robusta [Indian Introductions: C x R, BS (I), BS (II), BS (III), BS (IV), BS (V) and IMY] and Arabica [catimor, S9 (K), H(K) and Indian Introduction S4711] coffee varieties are evaluating at the Research Station, Matale. According to the yield data, Indian introduction CxR and BS I gave the highest yield with more than 2,000 kg/ha/yr of parchment coffee yield whereas IMY and catimor have given over 1,900 kg/ha**.**

Evaluation of coffee germplasm for intercropping with tea in up country wet zone

In this trial prominent arabica varieties catimor, S9, HDT with local selections S9 (K), H (K) are evaluating with Indian introductions S4711 for high elevations (1,750m). Apart from that Indian Introduction CxR (a robusta variety) also included. This trial was established in a tea estate as a tea/coffee intercropping system. The introduction S4711 performed better giving more than 2,800 kg/ha while the local selection H(K) has given 2,400 kg/ha of parchment coffee yield in up country wet zone.

Evaluation of coffee germplasm for mid country wet zone

In this trial prominent arabica variety catimor, S9, HDT with local selections S9 (K), H (K) are evaluating with Indian introduction S4711 for high elevations (800m AMSL). Apart from that Indian Introduction CxR (a robusta variety) also included. Results revealed that the local selection H(K) performed better giving more than 2,500 kg/ha/yr while the introduction S4711 gave over 2,400 kg/ha/yr of parchment coffee for the mid country wet zone.

Selection, hybridization and evaluation of coffee

Diallele crossings were carried out and individual plants from F1 are field evaluated. At the same time, seedlings of selected IMY plants are also evaluated. From the yield data, seven lines were selected for further improvement through back crossing. Vegetative propagated plants obtained from those lines were field planted and are in fruiting stage.

✓ **Soil and Plant nutrients**

- Application of *Gliricidia* at the rate of 15Kg/plant/year could be recommended for highest yield (Over 4,500Kg/ha/year) of Arabica coffee (Variety Catimor) based on the studies on green manure conducted at Matale.
- Application of 20Kg of *Gliricidia* with half doze of recommended amount of inorganic fertilizer is recommended for Robusta coffee (variety IMY) for higher yields (over 1,000Kg/ha/year).

5.2.5 Cardamom

✓ **Genetics and Plant Breeding**

- **Selection of high performing plants from subsequent seedling populations of cardamom under rubber at low elevation.**

Seedling plants obtained from the best performing and well adapted cardamom plants of the second generation were field established at the Elston Estate, Avissawella. Growth and yield data were recorded. Line No. 3-1-1 and 3-2-5 show more than 50 pseudostems per clump whereas the line No. 3-2-8 and 3-7-2 show over 32 panicles per clump. When considered the yield data, Line No. 3-1-1, 3-2-3, 3-2-6 and 3-2-8 performed better giving over 58 g/clump/yr. during the third year after establishment.

✓ **Crop Protection**

Population distribution of the pest.

Greater number of thrips was observed in dry periods than in wet month. No difference of the thrips population was observed between insecticide treated and not treated bushes during the period from March to June 2010. From June population started to increase and reached up to maximum (7.9 thrips/pseudostem) in untreated area and it was 7.0 thrips/pseudostem in treated area.

Effect of insecticides on soil fauna

Species diversity was monitored in insecticide treated and untreated cardamom fields at Kabaragala Estate, Elamulla. Insecticide treated area showed lower number of arthropod orders (eight orders) than untreated area (10 orders). No single insect was observed from the orders of Hymenoptera and Diptera in insecticide treated area whereas untreated plots showed these two orders. Although the other orders were observed from the insecticide

treated area, number of insects is significantly lower than the untreated area except in the orders of spiders and Coleoptera.

Table 5.2.5.1- Effect of insecticide application on soil arthropods in cardamom cultivations

	Not treated		Treated	
Order	**Total No. of individuals**	**Mean**	**Total No. of individuals**	**Mean**
Collembola	774	19.35	123	3.07
Hymenoptera	5	0.125	0	0
Diptera	2	0.05	0	0
Coleoptera	5	0.125	10	0.25
Lepidoptera	11	0.27	1	0.03
Dermaptera	7	0.175	3	0.08
Mites	42	1.05	19	0.47
Spiders	3	0.125	4	0.55
Millipedes	18	0.45	14	0.35

5.2.6 Vanilla

- ✓ **Physiology and plant production**

Comparison of different training systems and effect of foliar fertilizer on growth and yield of Vanilla (*Vanilla fragrans*).

Cumulative yield over five year period in treatments with different training systems (trained on individual shade trees and trained as trellis on bended branches between two shade trees) and foliar fertilizer were not significant suggesting both training systems are equally good for vanilla and foliar fertilizer on vanilla is not effective. Experiment was terminated.

Comparison of establishment, growth and yield of different vanilla nodal cuttings (2, 3 & 4), 1 meter long vines and tissue cultured plantlets in the field.

The percentage of success was lower in tissue culture plants (84%) than vines from other cuttings (100%). Vine length was also significantly lower in the first and second years in tissue culture plants but in the third year (2010) vine length of tissue culture plants were equal to others. Vine diameter (at the third internode) was significantly lower in tissue culture plants in the first year but in the second year onwards vine diameter was similar in all cutting types.

5.2.7 Nutmeg

- ✓ **Physiology and plant production**

Field evaluation of grafted nutmeg (*Myristica fragrans*) selections.

Plants showed bushy appearance with and average height of 152.5 cm and lateral spread of 126.1 cm in Matale and average height of 259.1 cm and lateral spread of 240.1 cm in Gasnawa in 2010. Very first flowering and fruit set was observed after two years and more flowering and fruit set was observed in subsequent years. Flowering was observed in 68.3% of plants in Matale and 86.8% of plants in Gasnawa with few fruit set in 2010.

- ✓ **Post Harvest Technology**

Development of an appropriate technology to preserve the natural colour of mace

The colour of mace was preserved for 2 months blanching at 70 ^{0}C 180 seconds and 70 ^{0}C 120 seconds. Blanching reduces drying time, increase Lycopene content after drying, more attractive appearance, reduction of mould and fungal populations and blanching off the extraneous matter and contaminants adhered to the mace and ensures the clean dried product.

5.2.8 Arecanut

- ✓ **Genetics and Plant Breeding**

Evaluation of arecanut germplasm for mid country intermediate zone.

Evaluation of arecanut germplasm for mid country intermediate zone was carried out at the Research Station, Matale with 1296 lines. Arecanut line J 22 performing better and yielded 1538 nuts/tree for the year 2010. Other good lines were A 14, C 13, D 20, G 24 and J 17 which were yielded over 1,000 nuts/tree/yr. According to the cumulative yield of past nine years the tree J 22, F 34 and G 24 are the best performing arecanut lines yielded over 750 average number of nuts/tree/yr.

Evaluation of arecanut germplasm for dry zone

In this field experiment, seedlings of the selected trees are being evaluated mainly for the adaptability to dry zone ecological conditions. Arecanut plants were established along the irrigation canals of the paddy fields in 2006. Growth data were recorded and observed promising individual trees with over 250 cm height and 40 cm girth.

Selfing and evaluation of arecanut

Seedling plants obtained from selfing of 10 best yielding trees were field planted at the Research Station, Matale. Growth and yield data were recorded. The experiment is in fruiting stage and line No. 14-5, 14-6 and 14-4 show over 300 nuts/tree/yr for the second fruiting year.

Hybridization and evaluation of arecanut

Seedling plants obtained from hybridization among the 10 best yielding trees were field planted at the Research Station, Matale. Growth and initial yield data were recorded. The experiment is in fruiting stage and line No. F3 recorded 925 nuts/yr from 6 bunches whereas Line A6 recorded 844 nuts/yr from 6 bunches. Other good lines were C1 and D10 which were yielded over 625 nuts/yr for the second fruiting year.

- ✓ **Crop Protection**

Studies of Arecanut diseases

Arecanut leaf blight & inflorescence death

The investigations so far done confirmed the fungus Curvularia sp. as the causal organism of arecanut leaf blight. Mancozeb 80% (W/W) @ 3.0g/L of water (0.24% ai) controlled the disease when applied as a spray. However, the above spray application should be done after cleaning the affected trees and destroying all affected plant parts. The symptoms are brown large leaf spots on leaves, Leaf blight and death or drying off of the inflorescence.

5.2.9 Garcinia (Goraka)

- ✓ **Physiology and plant production**

Field evaluation of grafted goraka (*Garcinia quaesita*) selections.

Increasing trends were observed in over all plant height and lateral spread. Average height and lateral spread of grafted plants in 2010 were 116.4 cm and 85.8 cm in Matale and 221.4 cm and 232.9 cm in Gasnawa. Flowering and fruit set was started after 4 years. The percentage of flowering plants in Matale and Gasnawa were 6.3 and 40.7 up to 2010. Average fruits per plant were still low (8 fruits per plant).

- ✓ **Post Harvest Technology**

Extraction and isolation of hydroxy citric acid (HCA) from Goraka (*Garcinia quaesita*) s

Goraka was boiled with water and the extract was filtered. Alcohol was added to precipitate pectin and filtrate was obtained to reflux with sodium hydroxide. Again filtrate was taken and calcium chloride was added to precipitate HCA. A white colored precipitate was obtained. Product was confirmed for the calcium salt of HCA.

Development of technology to produced Goraka powder

Died Goraka was taken and washed well. Then Goraka was dried 48 hours in the oven below 60^0 C temperatures. Dried goraka was ground well using cooling grinder. Goraka powder was

produced. Without adding preservatives, shelf life is 6 months with the use of proper packaging.

5.2.10 Ginger

✓ **Physiology and plant production**

- **Effect of tuber position during planting on growth and yield of Ginger (*Zingiber officinale*)**.

Significant differences were found in plant height (Chinese 48.5 cm and local 40.0 cm). Number of shoots was also higher in local ginger than Chinese variety but no differences were found between the two planting positions. Earthen up was found to be easier and no damage to the tubers when tubers were planted at vertical position along the row.

✓ **Soil and Plant nutrients**

- **Fertilizer studies of Ginger**

Different inorganic and organic fertilizer mixtures were tested for local ginger at Kundasale sub research station. More than 30 t of ginger/ha was recorded in the treatments of 20T of compost and 100kg of TSP at the time of planting and 82 Kg of Urea and 42 Kg of MOP twice in 45 days and 90 days after planting per ha. Total amount is 20Kg Compost, 164Kg Urea, 100Kg TSP and 84Kg MOP/ Ha. Application of *Gliricidia* at the rate of 10t/ha/month as surface application at the duration of 4 months gave ginger yield of 24t/ha followed by Indian recommendation (17t/ha) mentioned below.

✓ **Crop Protection**

Investigations on major diseases of Ginger

Samples collected from farmers' fields had three different diseases and are, Soft rot of rhizomes caused by the fungi *Pythium* sp. ,Rhizome rot caused by the bacterium *Ralstonia solanecearum* and the leaf spot caused by another fungi (identification is in progress). The following control measures have been recommended;

1. Use healthy seeds for cultivation
2. Seed treatment with mancozeb is recommended to control the soft rot caused by *Pythium sp.*
3. Use fields with no past infections of ginger diseases
4. Practice crop rotation to avoid build up of pathogens in the fields
5. Solarization of the fields before planting
6. If disease detected, remove all affected plants and destroy. Drench with 0.3% mancozeb and 2% $CuOCl_2$ to control fungal soft rot and bacterial rot respectively.

✓ **Post Harvest Technology**

Development of processing technology for dried ginger

According to the analyzed data from all the treatments, limes (CaO) concentrations (1%, 2% and 4%) and soaking time period (2 hr, 4 hr, 6 hr) and the treatment (6 % CaO for 10 hr soaking time period) soaking six hours in 4% lime solution was the best treatment to produced bleached/limed ginger to gain better chemical and physical qualities. Minimum loss of oil and oleoresin percentage and better color was obtained the treatment.

5.2.11 Turmeric

✓ **Physiology and plant production**

***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 3.0mg/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 nutrients**

Different treatments of inorganic and organic fertilizer recommendations were tested at Matale. The highest yield of 30.9t/ha/yr was recorded in the treatment of 30t/ha compost with Gliricidia green manure at 50t/ha/yr (10t/ha x 5splits) The Indian recommendation gave the second highest yield of 28.2t/ha. Following fertilizer combination is recommended for Turmeric.

Fertilizer recommendation for Turmeric (Kg/ha)

Fertilizer	**Basal**	**45Days**	**90Days**
Compost	40t/ha	-	-
Urea	-	65	65
TSP	104	-	-
MOP	-	100	100

5.2.12 Kitul

✓ **Genetics and Plant Breeding**

Development of short kithul variety

Hybridity of newly produced crosses were confirmed using molecular markers. RAPD markers were predominantly mono-morphic and did not produce bands to detect the Hybridity**.** ISSR primers generated polymorphic bands and the I-22 primer produced meaningful bands which were able to differentiate the hybrid.

I-22 primer produced 100bp band and that was common to the hybrid as well as to the dwarf type but this band was absent on the tall type. The 500bp band produced by the same primer was common to tall and hybrid type but it was absent on dwarf type**.** The results clearly confirm the DNA type under scrutiny is from a hybrid plant between Tall and Dwarf type of Kitul. Hybridity of Kithul could be confirmed with the following morphological features

CHARACTOR	TALL	DWARF	MEDIUM
Height	40-45ft	18-20 ft	25-30ft
Inflorescence length (Un-opened)	6-7 ft	2-3ft	4-5ft
Inflorescence Diameter	5-8 inch	3-4 inch	4-5 inch

5.3 Other Research

Development of technology to produce ready to use spice mix cube

Technology has been developed to produce spice mix cubes. Shelf life studies and further studies to improve the quality were done. It can be store 6 months in refrigerator without adding preservatives. According to Research plan 2010 this project was terminated

Development of an integrated nutrient management system for Export Agricultural crops by increasing the nutrient uptake efficiency using mycorrhizal associations

Under local conditions finger millet found to be appropriate for mass propagation of AM (Vesicular Arbuscular Mycorrhizae) A protocol has been prepared for mass propagation of existing *G. mosseae* on the basis of experimental results. Inoculation of black pepper rooted cuttings with inoculum containing mycorrhizal (*G. mosseae)* spores and fungal structures with sorghum (*Sorghum bicolor* L.) roots and soil lead to a successful inoculation.

5.4. On going Research during the year 2010

5.4.1 Cinnamon

- Evaluation of selected Cinnamon VP lines in the mid country region.
- Study the new pest damage in Cinnamon.
- Development of high yielding, better oil quality and rough bark disease resistant hybrid Cinnamon varieties (*Cinnamomum zeylanicum* Blume).
- Effect of Liming and dolomite application on growth and yield of Cinnamon grown in acid soils
- Effect of different potting mixtures on growth of young cinnamon at Nursery stage
- Effect of growing gliricidia & legume cover crops on growth, yield and soil fertility status in Cinnamon

5.4.2 Black Pepper

- *In- vitro* propagation of Black Pepper
- Formulation of *Beauveria bassiana* for the control of pepper lacebug
- Comparison of the use of gliricidia loppings and inorganic fertilizer mixture for Pepper cultivation (Demonstration)
- Investigation of the effect of light berry harvesting on subsequent yield of black Pepper
- Effect of different types of Pepper cuttings on initial growth and subsequent canopy development
- Investigation of effect Mg on growth and yield of pepper
- Investigation of possibility of substitution of ERP for IRP for pepper
- Field evaluation of the potential use of gliricidia green manure as a source of fertilizer for black pepper under different agro climatic conditions
- Site specific fertilizer recommendation for pepper
- Impact of organic farming in comparison to conventional farming practices on yield and soil properties of pepper
- Investigation of effect of source of nitrogen on growth and yield of black pepper
- Evaluation of local pepper varieties under organic conditions.

- Study the effect of light berry harvesting of black pepper under organic conditions.
- Study the effect of light berry harvesting of pepper on the yield in subsequent years.
- Comparison of pepper yield per unit area of plants originated from orthotropic and plageotropic branches
- Studies on variation of vegetative growth , flowering, fruit setting and yield of black pepper under different agro-ecological zones
- Improvement of resource use efficiency of black pepper to increase the yield through support tree manipulation.

- Effect of micro-irrigation on plant establishment, growth and yield of black pepper.
- Studies on relationship between harvesting stage on flowering and subsequent development of pepper at Matale (IM3a)
- Investigation of the effect of light berry harvesting on subsequent yield of black pepper
- Study the growth performances of different selections of pepper
- Evaluation of Black Pepper mutants for the drought tolerance
- Multi locational evaluation of Black pepper selections
- Quick wilt disease of black pepper: isolation, identification and control of the disease
- Characterization of wild relatives of Black pepper and establishment of a field gene bank

5.4.3 Cocoa

- Development of an integrated nutrient management system for cocoa- intercropped with rubber/coconut (AM component)
- Field evaluation of cocoa rooted cuttings and seedlings as cropping systems
- Studies on rehabilitation of old cocoa
- Evaluation of field performance of rooted cocoa *(Theobroma cacoa.L*) cuttings
- Evaluation of selected cocoa lines for mid country intermediate zone.
- Evaluation of selected cocoa lines for mid country intermediate zone under Rubber
- Characterization of available cocoa (*Theobroma cacao* L.) lines and establishment of a clonel garden

5.4.4 Coffee

- Formulation of *Beauveria bassiana* for the control of coffee berry borer
- Investigations of biological control agents of coffee berry borer
- Effect of different rates of gliricidia green manure on growth and yield of Arabica coffee
- Development of technology to produce coffee cream
- Progeny evaluation of selected Arabica coffee lines.

- Planting density and plant training system effect on growth and yield of arabica coffee cv.HDT
- Evaluation of arabica coffee accessions for yield, quality and resistant to major pests and diseases

5.4.5 Cardamom

- Screening of cardamom selections against cardamom thrips
- Productivity improvement of cardamom using better cultural practices (irrigation)

5.4.6 Betel

- Breeding of 'Maneru' and 'Mala bulath' with 'Ratadalu' and comparison of the yield parameters of their subsequent generations with 'Ratadalu'
- Evaluation of department fertilizer mixture for single supporting system in betel (*Pipper betle* L) cultivation.
- The effect of different combinations of green manure, cow dung and Department recommended fertilizer mixture, on quality and yield of betel
- Collection and evaluation of Betel *(Piper betle L.)* germplasm for high yielding betel cultivars with promising leaf quality characters

5.4.7 Ginger

- Pest complex of ginger and turmeric
- Ginger cultivation under pepper new planting
- Effect of time of planting (month of planting) on growth and yield of Ginger
- Effect of different type of mulches on growth and yield of ginger
- Fertilizer studies on ginger
- Development of processing technology for dried ginger
- Response of organic and inorganic fertilizer on the yield and quality of ginger under coconut cultivation
- Evaluation of ginger germplasm *(zingiber officinale)* under coconut cultivation
- Effect of the size of planting material on the yield and quality of ginger *(Zingiber officinale).*
- Effect of plant spacing and time of field planting on yield of Ginger

5.4.8 Turmeric

- Pest complex of ginger and turmeric
- Fertilizer studies on turmeric
- Development of new technology for turmeric processing
- Determination of curcumin content in turmeric in different locations in Sri Lanka
- Effect of spacing and time of field planting on yield of Turmeric
- *In- vitro* propagation of Turmeric

5.4.9 Citronella

- Effect of growing gliricidia on growth, yield and soil fertility status in Citronella

5.4.10 Other

- Development of tray drying technology to improve quality of export agricultural crops
- Development of technology to produce spice flavoured biscuits
- Development of an integrated nutrient management system for export agricultural crops by increasing the nutrient uptake efficiency using mycorrhizal associations
- Soil moisture conservation and productivity improvement studies at Kandyan home Gardens

5.5 Progress of Other Activities of the Research Division

5.5.1 Planting material issued by the Research Division

Cinnamon - 242,842
Pepper - 72,173
Coffee - 15,702
Cardamom - 25,371
Clove - 199
Vanilla - 78
Cocoa - 5,903
Nutmeg - 1,677
Kitul - 1,939
Arecanut - 944
Arecanut - 133,050 (seeds)
Cocoa (pods) - 1,797
Coffee (parchment coffee seeds) - 48.450Kg

5.5.2 Field visit (Plant protection)

Poojapitiya, Kandy – ants damage in pepper vines

Uva Paranagama, Badulla – pepper stem borer

Rathnapura Erathna – Clove stem borer

Panwila- Wattegama– Clove stem borer

Doragamuwa– Clove stem borer

Bualathsinghala, Ginger Shoot borer

Kurunegala, Malsiripura –Ginger stem borer

Millawana Estate and Dankanda Estate - Advisory

Madolkale – Cardamom thrips problem

5.5.3 "Api wavamu Rata nagamu " Programme

Ginger yield – 250 Kg
Turmeric yield – 45 Kg
Compost Production- 250 cubic ft + 66 cubes
Vegetable production income – Rs 16,000.00

5.5.4 Maintenance of Germplasm / seed garden

Coffee 5 blocks
Cocoa 4 blocks
Cardamom 3 blocks
Arecanut 1 block

5.6 Economics & Market Research on EAC

5.6.1 Studies and Surveys

5.6.1.1 Comparative Study on Economics of Drying Practices for EAC

In the study fourteen dryers funded by the department and five dryers funded by external agencies were evaluated. Forty seven small scale farmers, thirteen medium and large scale farmers and seven large scale collectors were interviewed. No sampling techniques can be applied as there was no opportunity for random selection of individuals in selecting dryers and collectors. Cost of family labor was considered at the market rate as family members play an important role in drying. All dryers provided by both the department and external agencies were designed to use Fuel wood, especially Glyricidia, as the energy source. Dryer located at the Kotmale processing centre used kerosene as the fuel. However, some farmers had modified dryers to use cheaper energy sources such as other fuel wood saw dust, nutmeg shells etc. mainly because of the scarcity of Glyricidia wood. Only one flat bed dryer was provided under the assistance scheme and all others were multi purpose cabinet type dryers which had been used by some farmers and farmer organizations to dry other products such as vegetable, fruits, curry leaves, jak etc. Two dryers provided by the department and three dryers provided by the external agencies were in out of order as their inside temperature could not be kept at the optimum level. Since the analysis has not been over yet the crude results showed that the average per kilo cost (dry) of drying pepper in a dryer was around 22.53 while the same for drying pepper in a drying yard was Rs. 8.71. Large and medium scale farmers had spent 25.98 for drying a kilo of pepper and the figure for small farmers was 28.32. However nearly 50-60% of cost incurred by large and medium scale farmers was for family labor and the same for small scale farmers was 90-100%. Analysis showed that the break even time for the use of dryer was 43 times per year.

5.6.2 Extent of EAC

The extent of new planting of EAC in 2010 was computed using the progress reports of the EAC Assistance scheme, collected by the ERU (table 5.6.2.1) In 2010 new planted extent was 1,178.3 including 622 ha of cinnamon and 403ha of pepper.

Table 5.6.2.1: Newly Planted Extent of Major EACs - 2010 **Hectares**

District	Cocoa	Coffee	Cinnamon	Cardamom	Pepper	Clove	Nutmeg	Citronella	Total
Kandy	1.0	17.7	4.8		91.4	1.6	18.0		134.5
Matale	12.0	3.4	10.6		70.3		0.5		96.8
Nuwaraeliya		24.6	1.2		6.3				32.1
Kurunegala		1.0	3.8	1.4	34.6	0.8	0.1		41.7
Badulla			8.0		23.5				31.5
Monaragala	13.8		8.6		14.8				37.2
Kegalle		0.6	20.9		90.4	0.4			112.3
Ratnapura			151.7		31.6			20.4	203.7
Colombo			14.0		1.8				15.8
Kalutara			103.8		1.2				105.0
Gampaha			16.5		34.3				53.1
Galle		2.3	112.3						112.3
Matara			77.6		1.5				79.1
Hambantota			88.5		1.6			33.1	123..2
Total	**26.8**	**49.6**	**622.3**	**1.4**	**403.3**	**2.8**	**18.6**	**53.5**	**1,178.3**

Source: Monthly Progress Reports of the ERU

Considering above performances and taking 'Agriculture Census 2002' as the base line district wise extent figures and total extent of EAC in 2010 were estimated. (table 5.6.2.2)

Table 5.6.2.2: Estimated Extent of EAC by Districts - 2010 Hectares

District	Cocoa	Coffee	Cinnamon	Cardamom	Pepper	Clove	Nutmeg	Areca nut	Betel	Citronella	Total
Kandy	256	1,270	77	719	5,671	2,995	760	2,144	68		13,961
Matale	1,037	639	201	1,129	6,123	665	64	1,135	57		11,049
Nuwaraeliya	5	1,059	29	116	863	337	3	490	28		2,929
Kurunegala	144	703	122	8	2,945	403	50	855	1,024		6,254
Badulla	30	324	161	10	2,441	55		1,308	54		4,383
Monaragala	591	192	57		1,764	6	1	867	70		3,548
Kegalle	173	594	185	434	2,832	1,701	43	1,670	205		7,836
Ratnapura	23	226	3,766	338	3,097	403	6	1,895	132	386	10,273
Colombo	2	58	184	1	240	59	2	215	77		838
Kalutara	4	139	3,134	3	304	130	4	737	284		4,739
Gampaha	8	366	186	2	1,596	114	6	1,032	522		3,832
Galle	3	107	10,948		454	192	2	711	187		12,604
Matara	4	171	8,182	34	762	489	5	920	87		10,655
Hambantota		111	2,875	1	1,785	54		456	36	784	6,101
OtherDistricts		50			54			647	240		991
Total	**2,279**	**6,008**	**30,106**	**2,795**	**30,931**	**7,603**	**946**	**15,082**	**3,071**	**1,171**	**99,992**

Sources: Dept. of Census & Statistics /Monthly Progress Reports of the ERU

5.6.3 Trends in EAC Exports and Export Earnings

The year 2010 was remarkable to the EAC sector (with Ginger & Turmeric) as both export volume and earnings recorded the highest figures in its history. The export volume was 43,364mt. with foreign exchange earnings of Rs.24,017.7mn. The volume and earnings recorded 49% and 56.6% growth rates over 2009 respectively. Increased production of EAC in 2010 and boosted consumer confidence after the recovery of global recession may have been the reason for such increase especially for crops such as cinnamon, pepper, clove, nutmeg etc. Pepper export recorded a historic figure of 12,218.9mt. with Rs. 4825 mn. of earnings. Clove(with clove stems) too showed the highest export performance in the history with the export volume of 8,316mt. and Rs.4,222mn. of earnings. Cinnamon, still the top foreign exchange earner among EAC, had showed a slight decline in volume over 2009, but

earnings showed a 10% growth. Since cinnamon is a fertilizer loving crop declined fertilizer application in 2009 due to high fertilizer prices (well reported situation) could be pointed out as the closest reason for this draw back. Comparative to 2009 export volumes and values of all other perennial EAC, except betel and cardamom, had showed considerable satisfactory performances in 2010. However export of cocoa and cocoa products increased by 160% mainly due to the re-export of cocoa fat and butter which were produced by specified companies from imported cocoa beans. Export of ginger and turmeric showed slight declines over 2009 (Annex i).

5.6.4. Production Trends in 2010

Due to the non availability of accurate on site farm level data on extent and annual productivity the production is 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), imports and withholding stocks in the market channel. Substantial amounts were allocated for unreported exports too (table 5.6.4.1)

Table5.6.4.1: Estimated Production of EAC s – 2007/10

Crop	Estimated Production (Mt.)			
	2007	2008	2009	2010**
Cocoa	605	624	467	520
Coffee	2,979	3,081	3,125	3,163
Cinnamon	16,795	14,691	15,765	16,435
Pepper	16,377	12,897	15,767*	17,332
Cardamom	91	70	61	48
Clove	2,990	8,553	3,032	9,551
Nutmeg (& mace)	2,267	2,265	1,740	2,376
Areca nut	22,605	24,955	23,540	24,361
Betel	32,716	30,571	30,454	30,046
Citronella oil	19	22	7	19
Ginger(Raw)	8,271	10,053	10,780	12,052
Turmeric(Raw)	4,400	7,135	7,747	8,304

Source: Dept. of Census & Statistics & DEA data base.

* Revised figure ** Provisional

5.6.5 Behaviour of Prices

All farm gate, auction and international prices of EAC had showed satisfactory performances in 2010. Farm gate prices of all EAC showed positive growth rates but mace, cardamom and pepper showed highest performances of 100.2%, 91.7% and 19% respectively. It is also noteworthy that the farm gate prices of certain EAC such as pepper, clove, nutmeg and cinnamon were much higher in certain months than what was shown as the annual average figure in the annex II. Only the coffee prices were stagnating at around 2009 level with only 1.2% growth (Annex II).

5.6.6 Trends in EAC Imports in 2010

Almost all of the Export Agriculture Crops have imported to Sri Lanka in 2010 at least in minor quantities Total imports in 2010 was 12,327.1mt. to which cocoa, turmeric and ginger accounted by 7,198mt., 4,196mt. and 240.7mt. respectively. None of the other items exceeded 100mt. Imports increased in 2010 by 37% over 2009 mainly due to the import of cocoa beans by specified companies for re-exporting value added products. Total import cost of EAC in 2010 was Rs. 4394.5mn. and increase over 2009 was 124.7%. From total spending, about Rs.3197.4mn. was spent to import cocoa and Rs. 992mn.was spent to import turmeric.

5.7 Research publications

Ariyatilaka,D.G.I., Sumanasena H.A and Yapa Y.M.D.B. (2010): Effect of plant spacing on yield of ginger (*Zingiber officinale* L.) at mid country inter- mediate zone. *Proceedings of the 66th annual session of the Sri Lanka Association for the Advancement of Science.* 66(1): 133.

Darshanee, H. L. C, Samaraweera. D. N. and Wijesinghe, K. G. G. (2010) Impact of long-term application of inorganic fertilizer on Vesicular Arbuscular Mycorrizae (VAM) population in cinnamon. (*Cinnamomum zeylanicum* Blume) fields. *International symposium, Faculty of Agriculture, University of Ruhuna, Sri Lanka*, 16 November 2010.

De Silva, D.P.P. (2010). Insect vector transmissions; with special reference to viral diseases of *Piper nigrum* L. and *Theobroma cacao* L., A paper presented for the workshop on insect vector transmissions organized by CARP. 30th December.

Dharmadasa, M., Yapa S.W.C.R.Y.M.U.S. B. and Amarasinghe K.G.A.P.K. (2010), Use of locally available *Beauveria bassiana* (Balsamo) Vuillemin isolate for the control of coffee berry borer, *Hypothenemus hampei* (Ferrari) (Coleoptera: Scolytidae), *Tropical Agriculturist*, Vol. 158, 1-13.

Dharmaparakrama, A.L.S. and Rajapaksha, I.G.M.(2010) Screening local black pepper (*Piper nigrum* L.) accessions for the yield in mid country of Sri Lanka. *Proceedings of the 66th annual session of the Sri Lanka Association for the Advancement of Science,* 18 pp.

Dharmaparakrama, A.L.S. Rajapaksha, I.G.M.. and Gunapala, K.R.D. (2010), Morphological variation of flower buds of clove (*Eugenia caryophyllus*) in mid country, Sri Lanka. *Proceedings of the 66th annual session of the Sri Lanka Association for the Advancement of Science*. 19 pp.

Dharshanee, H. L. C., Jayasinghe, G. G. and Wijesinghe, K. G. G. (2010) Evaluation of the efficacy of water soluble sulfur to control leaf blight disease (*Colletotricum gloesporioides*) and leaf gall mites (*Eriophyes boisi*) of Cinnamon (*Cinnamomum zeylanicum* Blume) nursery. *Proceedings of the 66th annual session of the Sri Lanka Association for the Advancement of Science*, 36 pp

Fernando, K.B.S.S., Senanayake, S.P. and Dharmaparakrama, A.L.S. (2010). Floral and vegetative morphometrics and phenolic contents of selected *Piper nigrum* L. cultivars; correlation eith taxonomy. P*roceedings of the 30th annual sessions of Institute of Biology, Sri Lanka. Abs*, 02 pp.

Heenkende A.P., Idamekorala,P.R. and.Gunaratne, W.D.L. (2010) Effect of gliricidia green manure on soil chemical properties and the yield of Black Pepper (*Piper nigrum* L.) in the mid country intermediate zone of (IM1a), Sri Lanka, *Proceedings of the 66th annual session of the Sri Lanka Association for the Advancement of Science* -17 pp

Heenkende A.P., Gunaratne, W.D.L. and Bandara, W.M.S.R. (2010) Effect of different rates of gliricidia green manure on soil chemical properties and the yield performances of Coffee (*Coffea arabica* L.) (Var. Catimor). *Proceedings of the 66th annual session of the Sri Lanka Association for the Advancement of Science* -16 pp

Indrasena I.K, Induruwa, I. V. A. D. C. S, Liyanage, T., Edirisinghe, E. D. K. (2010) Comparative assecement of oil and coumarin content in bark of cassia (*Cinnamomum cassia*) and true cinnamon (*Cinammomum zeylanicum*) *International Symposium Faculty of Agriculture, University of Ruhuna.*.26 pp

Jayasinghe, G. G. and Mallik, B. (2010) Growth stage based Economic Injury Levels for two spotted spider mites, *Tetranychus urticae* Koch (Acari: Tetranychidae) on Tomato *Lycopersicon esculentum* Mill., *Tropical Agriculture Research*., **22 (1):** 54 – 65.

Jayasinghe, G. G. and Mallik, B. (2010) Seasonal abundance of the two spotted spider mites, *Tetranychus urticae* Koch (Acari: Tetranychidae) in tomato ecosystem., *International*

Symposium 2010, Faculty of agriculture, University of Ruhuna, Proceedings Part 1 – Abstract, p. 9

Kumari S.A.A.P., Subasinghe H.M.P.A and Gunathilaka, H.A.W.S. (2010): Variation of micrometeorological parameters in the canopy of black pepper (*Piper nigrum* L.) between two consecutive support tree *(Gliricidia sepium* L*.)* pruning, *Proceedings of 10th Agricultural Research Symposium.*203-207

Kumari, IS., Kodituwakku, RD and de Silva, DPP. 2010. A study on cocoa die back disease *Sri Lanka. Proceedings of the 66th annual session of the Sri Lanka Association for the Advancement of Science*

Liyanage , T., Indrasena I.K, Edirisinghe E.D.K. (2010) Effect of blanching on curcumin content in dried product during processing of turmeric.. *Proceedings of the 66th annual session of the Sri Lanka Association for the Advancement of Science*-.35 pp

Wijekoon, WMRWB., de Silva, DPP ., Kodituwakku, RD and Pillai, DS. 2010. A study on leaf blight disease of Arecanut (Areca catechu L.). *Proceedings of the 66th annual session of the Sri Lanka Association for the Advancement of Science*.

Annex I: Export Volume and Value of Export Agriculture Crops – 2009/10

Commodity	Units	2009	2010	Growth% 2009/10
Cinnamon	Vol (mt.)	12,110.2	11,775.7	-2.76
	Val (Rs.mn)	8,517.6	9,369.1	10.00
Cinnamon Leaf Oil	Vol (mt.)	107.2	155.4	44.96
	Val (Rs.mn)	143.0	244.4	70.90
Cinnamon Bark Oil	Vol (mt.)	16.8	26.0	54.21
	Val (Rs.mn)	133.4	251.6	88.58
Clove	Vol (mt.)	2,315.2	6,833.0	195.14
	Val (Rs.mn)	1,333.6	4,084.7	206.31
Clove Stem	Vol (mt.)	600.1	1,482.8	147.11
	Val (Rs.mn)	45.9	137.2	198.95
Clove Oil	Vol (mt.)	1.5	14.6	848.58
	Val (Rs.mn)	11.2	41.1	265.39
Cocoa & Cocoa Products	Vol(mt.)	1,601.1	4,175.7	160.80
	Val (Rs.mn)	775.0	2,089.7	169.64
Coffee	Vol(mt.)	60.1	157.5	161.80
	Val (Rs.mn)	15.3	38.1	148.68
Pepper	Vol(mt.)	6,576.1	12,218.9	85.81
	Val (Rs.mn)	2,365.6	4,824.8	103.95
Pepper Oil	Vol(mt.)	3.8	5.3	37.49
	Val (Rs.mn)	32.3	41.6	28.61
Cardamom	Vol(mt.)	9.2	6.9	-25.05
	Val (Rs.mn)	27.9	30.6	9.72
Cardamom Oil	Vol(mt.)	0.2	0.3	27.31
	Val (Rs.mn)	14.5	16.7	15.19
Citronella	Vol(mt.)	7.3	18.5	155.37
	Val (Rs.mn)	21.2	44.1	107.93
Nutmeg	Vol(mt.)	1,401.3	1,952.0	39.30
	Val (Rs.mn)	717.1	1,358.7	89.47
Mace	Vol(mt.)	205.5	244.8	19.10
	Val (Rs.mn)	212.3	445.3	109.80
Nutmeg Oil	Vol(mt.)	10.2	13.0	27.70
	Val (Rs.mn)	68.2	94.3	38.19
Arecanut	Vol(mt.)	1,425.8	1,984.1	39.16
	Val (Rs.mn)	157.5	246.6	56.51
Betel	Vol(mt.)	2,591.3	2,246.4	-13.31
	Val (Rs.mn)	687.9	576.1	-16.25
Vanilla	Vol(mt.)	0.02	0.3	1680.00
	Val (Rs.mn)	0.7	4.1	496.87
Vanilla Oil	Vol(mt.)		0.01	
	Val (Rs.mn)		0.03	
Lemon Grass Oil	Vol(mt.)	1.5	1.9	28.90
	Val (Rs.mn)	5.6	6.4	14.27
Total EAC	**Vol(mt.)**	**29,044.4**	**43,313.0**	**49.13**
	Val (Rs.mn)	**15,285.9**	**23,945.7**	**56.65**
Ginger	Vol(mt.)	44.6	36.7	-17.64
	Val (Rs.mn)	29.4	46.5	57.82
Ginger Oil	Vol(mt.)	1.6	0.9	-41.88
	Val (Rs.mn)	5.6	14.4	157.09
Turmeric	Vol(mt.)	18.6	13.3	-28.54
	Val (Rs.mn)	14.2	11.2	-21.00
Total (Ginger & Turmeric)	**Vol(mt.)**	**64.8**	**51.0**	**-21.37**
	Val (Rs.mn)	**49.2**	**72.0**	**46.40**
Total (with Ginger & Turmeric)	**Vol(mt.)**	**29,109.2**	**43,364.0**	**48.97**
	Val (Rs.mn)	**15,335.1**	**24,017.7**	**56.62**

Source: Sri Lanka Customs

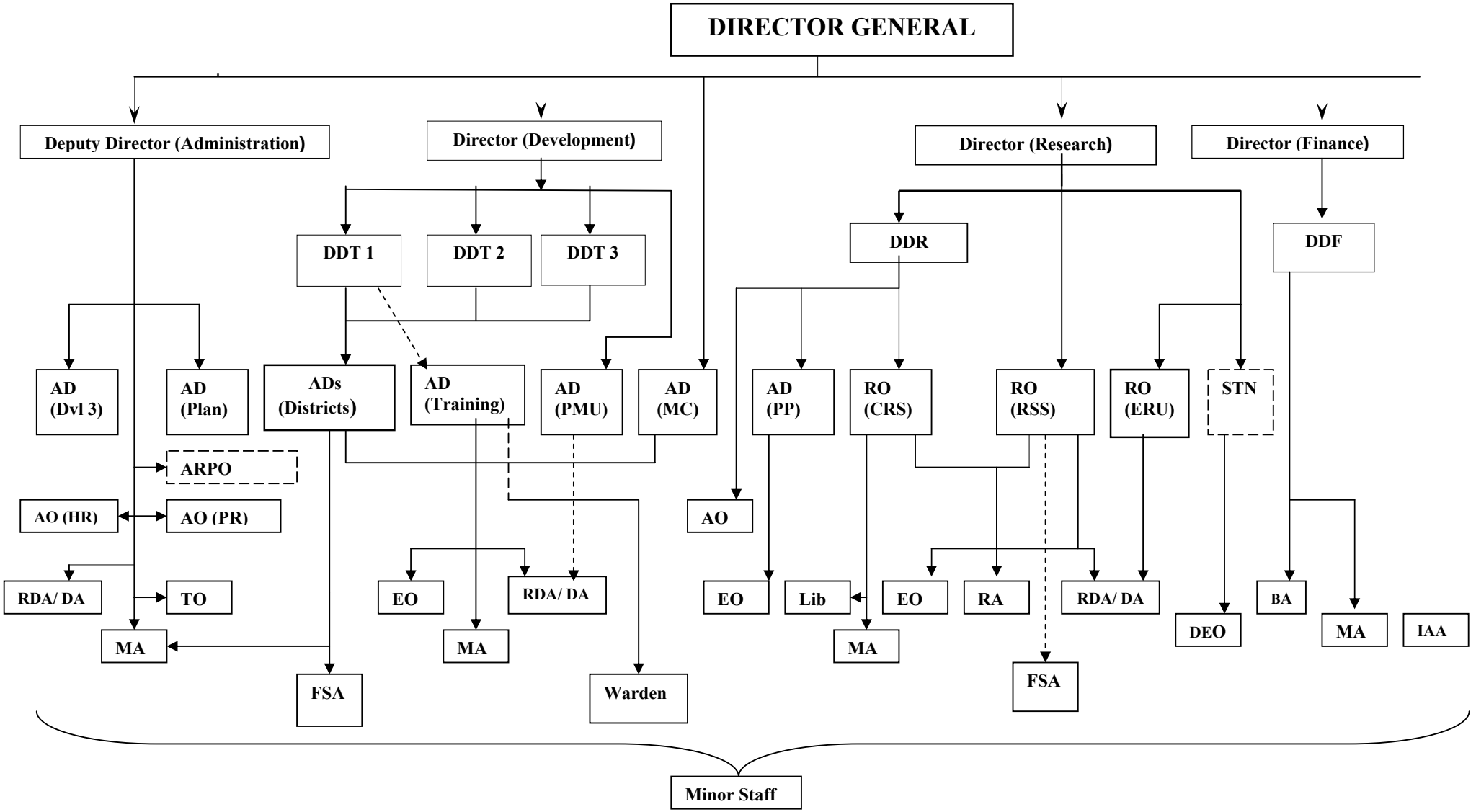
Annex II: Average Prices of Export Agricultural Crops (Rs/Kg) in 2007/10

Crop	Price	Year				Growth % 2009/10
		2007	2008	2009	2010	
Cocoa	FG	113.20	154.61	210.41	282.49	34.3
	AU	159.18	196.34	268.60	359.78	33.9
	WM	214.43	279.08	326.01	354.60	8.8
Coffee	FG	248.41	265.45	220.92	223.63	1.2
	AU	275.57	372.51	293.85	268.00	-8.8
	WM*	214.58	255.58	193.75	207.72	7.2
Pepper	FG	306.60	324.92	287.43	342.14	19.0
	AU	326.35	341.71	294.69	364.31	23.6
	WM	395.28	414.43	326.98	451.94	38.2
Clove	FG	417.85	471.97	484.66	542.99	12.0
	AU	455.95	518.75	529.67	592.13	11.8
	WM	379.14	479.40	534.69	594.37	11.2
Cinnamon Quills	FG	599.62	664.35	621.95	726.57	16.8
	AU	573.84	634.08	558.82	589.02	5.4
	WM					
Nutmeg	FG	278.12	316.23	331.87	459.62	38.5
	AU	298.28	341.70	367.71	513.37	39.6
	WM		963.21	1,018.44	1,430.92	40.5
Mace	FG	738.46	820.70	857.37	1,716.73	100.2
	AU	802.92	887.26	936.99	1,999.13	113.4
	WM	961.03	1,040.29	1,103.21	2,304.88	108.9
Cardamom	FG	913.25	1,718.27	1,732.32	3,320.96	91.7
	AU	1,275.72	2,019.79	1,926.97	3,592.12	86.4
	WM					
Betel (Rs./1000 leaves)	FG	1,363.00	1,937.00	1,383.33	2,208.29	59.6
	AU	-	-			
	WM	-	-			
Areca nut	FG	91.82	113.24	107.28	115.28	7.5
	AU	114.67	124.33	115.27	128.63	11.6
	WM	-	-			
Vanilla	FG					
	AU	435.00	425.00			
	WM	-	3,135.00	3,391.00	2800	-17.4
Ginger (Raw)	FG	98.00	100.00	130.61	114.67	-12.2
	AU	-	-			
	WM	-	-			
Turmeric (Raw)	FG	27.00	25.00	31.02	50.75	63.6
	AU	-	-			
	WM	-	-			

Source: ERU data base FG: Farm-gate Price; AU: Auction Price; WM: World Market Price

* Robusta coffee

Annex III -ORGANIZATION CHART -DEPARTMENT OF EXPORT AGRICULTURE -2010



DDA- Deputy Director Administration , **DDT-** Deputy Director Technical, , **DDR**-Deputy Director Research, **DDF**-Deputy Director Finance , **AD** - Assistant Director, **Dvt**-Development, **Plan-** Planning, **PMU -**Progress monitoring Unit, **MC**- Mass Communication, **PP** – Plant Protection, **CRS –** Central Research Station**, RSS** – Research Sub Station, **ERU**- Economic Research Unit **, STN** – Statistician(attached from **DCS**),**ARPO-**Agriculture Research Productivity Officer (attached from Ministry of Agriculture)) **AO (HR)-**Administrative Officer Human Resource , **AO (PR)**- Administrative Officer Physical Resource, **RDA**-Research and Development Assistant**, DA**- Development Assistant, **BA-**Budget Assistant, **TO** -Technical Officer, **MA-** Management Assistant, **IAA**-Internal Audit Assistant, **Lib**-Librarian, **EO** – Extension Officer, **RA**- Research Assistant, **DEO**-Data Entry Operator ,**FSA** –Farm Service Assistant,


අපනයන කෘෂිකර්ම දෙපාර්තමේන්තුව - අතමිට සරු හෙට දිනකට
ஏற்றுமதி விவசாயத் திணைக்களம் - வளமான எதிர்காலத்திற்கு
DEPARTMENT OF EXPORT AGRICULTURE - FOR A PROSPEROUS FUTURE