HARTI

AGRICULTURAL COMMODITY REVIEW 2005

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FOREWORD

HARTI Agricultural Commodity Review (2005) is the fourth volume of commodity review bulletins published by the Hector Kobbekaduwa Agrarian Research and Training Institute (HARTI) since 1998. Through this exercise, HARTI expects to review time series data by compiling agricultural statistics published by the Department of Census and Statistics, Department of Agriculture, Central Bank of Sri Lanka, Department of Sri Lanka Customs and the HARTI.

As a result of rapid expansion of information technology, the demand for accurate and reliable agricultural information is increasing from a wider range of users involved in farming, agri-business and agricultural industries. Consequently the HARTI undertakes this project with the aim of providing accurate and up to date data required by farmers, entrepreneurs, policy makers and students. Accordingly, the HARTI has published three volumes of commodity review bulletins that included time series data of food commodities, vegetables and fruits.

The current volume highlights the trends of extent, production, market prices, external trade and per capita consumption of 14 agricultural commodities, namely, paddy, kurakkan, maize, green gram, cowpea, black gram, soya bean, big onion, red onion, potato, manioc, sweet potato, gingelly and groundnut.

The report was prepared by a multi disciplinary team coordinated by Dr. G. M. Henegedara, the Head of Statistics and Data Processing Division (SDPD). The research team comprised Dr. M. S. Senanayaka (Research Associate), Mr. M. M. M. Aheeyar (Research Associate), Dr. (Mrs) W. D. Wickramasinghe (Senior Research Officer), Mr. W. H. A. Shantha (Research Officer) and Mrs. R. P. Vidanapathirana (Research Officer). The statistical team comprised Mr. K. D. S. Ariyasinghe (Data Analyst), Mr. E. N. R. Fernando (Data Analyst), Mr. M. D. L. Senarath (Senior Analyst Programmer) Mrs. N. P. Jayanetthi (Data Assistant), Miss P. Rananasinghe (Data Assistant) and Mrs. B. C. Munasinghe (Data Entry Operator).

The findings of the report were discussed and refined at the workshop held with Hon. Minister of Agriculture Hemakumara Nanayakkara and the key subject experts of the respective commodities. I welcome any comments from users of this report, which will help HARTI to improve this series.

V. K. Nanayakkara
Director

ACKNOWLEDGEMENT

As the report that completely based on secondary sources information, It is my duty to appreciate the invaluable services rendered by the Department of Census and Statistics, Department of Agriculture, Central Bank of Sri Lanka and Department of Sri Lanka Customs that published comprehensive data base of agricultural production, marketing, input distribution, external trade and marketing.

I appreciate the service of Mr. V. K. Nanayakkara, the Director who advised us to conduct the study and provided necessary logistic support to publish the report. I also appreciate the service of Dr. W. G. Jayasena, Deputy Director (Research) who encouraged us throughout the study. I must thank every body, who provided valuable comments to improve the report at the workshop.

This is an outcome of a team effort. Hence, I acknowledge the excellent contributions made by the research team comprised of Dr. M.S. Senanayake, Research Associate; Mr. M.M.M. Aheeyar, Research Associate; Dr. (Mrs.) W.D. Wickramasinghe, Senior Research Officer, Mr. W.H.A. Shantha and Mrs. R.P. Vidanapathirana, Research Officers of HARTI. The dedication and commitment of Mr. K.D.S. Ariyasinghe, Mr. E.N.R. Fernando, Data Analysts; Mr. M.D.L. Senarath, Senior Analyst/Programmer, Mrs. N.P. Jayanetti and Miss. P. Ranasinghe, Data Assistants; Mrs. Deepthika Rupasinghe, Secretary; Mrs. B.C. Munasinghe and Mr. W.H.P. Yasaratne, Data Entry Operators are highly appreciated.

I wish to thank Mr. S. Rameswaran, Head of Publication Unit for his editorial assistance. Also, I appreciate the services rendered by the printing staff.

Dr. G.M. Henegedara
Head/Statistics and Data Processing Division

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INTRODUCTION

Agricultural commodity review is an outcome of an analysis of the time series data on the main agricultural food commodities released by various government institutions in Sri Lanka. This report by the Hector Kobbekaduwa Agrarian Research and Training Institute is a sequel to collecting, compiling and analyzing time series data to ascertain the current status of the main food commodities and to make recommendations to the policy makers accordingly. Continuous food supply is a very crucial factor of any country which determines not only the food security of the nation but also the cost of living. Therefore, the Food Commodities Review, which reflects the present status and the future prospects, indicate necessary indicators that need to be taken into account by the policy makers. The HARTI Food Commodities Review, which has been published since 1998, emphasizes three basic objectives.

(a) Analyze vital agricultural statistics collected by different sources and institutions that are maintained as the main function of the HARTI data bank.
(b) Encourage the policy makers, the project implementers, the farmers, the academic user and the other interested parties to make use of HARTI data.
(c) Publish HARTI data as a commodity review and crop profiles by focusing on the policy issues, the constraints and the future trends.

2. Objectives

The main objective of the report is to analyze the vital statistics of food commodities for the purpose of identifying their sectoral importance and contribution to food production and food security of the country along with their potentials and the constraints for future development. Specific objectives are:

(a) To analyze the time series data of crops such as paddy, maize and millet (kurakkan) and cowpea, green gram, and soya bean, big onion and red onion, potato, cassava (manioc) and sweet potatoe, gingerly and groundnut.
(b) To review the trends of the main food commodities with special reference to extent, production, marketing, prices and trade.
(c) To publish the report and to disseminate the information among the policy makers and the other interested parties.

3. Methodology

The review was entirely based on secondary information published by the Department of Census and Statistics, the Central Bank of Sri Lanka, the Department of Agriculture, the Sri Lanka Customs and the HARTI. The data analysis consisted of simple trend analysis, based on statistical and graphical analysis that indicated mean value of time series data over the past few decades. Except for the extent and production of many commodities, the trend analysis of market and prices mainly focused on the recent ten year period (1996-2005) assuming that the recent trends are more crucial from policy makers' point of view. Some statistical analysis such as regression analysis followed to see the trends and variations of production and price data. Graphical presentation was observed to show the variation of extent and production prices over the years. GIS analysis was also included to present the geographical

distribution of extent and production. Following 14 food commodities were selected representing cereals, pulses, bulbs, tubers and oil crops.

Cereals	-	paddy, maize, kurakkan
Pulses	-	green gram, cowpea, black gram, soya bean
Bulbs	-	big onion, red onion
Tubers	-	potatoes, manioc, sweet potato
Oil crops	-	gingelly, ground nut

A unique format was followed in the data analysis and it included the following factors.

1. Introduction
   Based on general background information of the crop

2. Production
   - 2.1 Major producing districts and main contributing areas within the districts
   - 2.2 The extent and number of farmers according to cultivation seasons
   - 2.3 A review of the use of agricultural inputs, cost of production, returns and income
   - 2.4 Trends in production and average yield
   - 2.5 Marketable surplus

3. Domestic Marketing
   - 3.1 Price determination & price behavior
   - 3.2 Marketing channels
   - 3.3 A review of marketing margins
   - 3.4 A review of marketing cost

4. External Trade
   - 4.1 Major imports/exports by countries of origin/destination
   - 4.2 Trends in imports in quantity
   - 4.3 Export trade regulations, tariff and taxes etc.

5. Consumption

6. A review of government policy

7. Forecasting future trends

8. Conclusions and policy recommendations

1. PADDY

Introduction

Rice is a staple food for a larger segment of the population in tropical and sub-tropical countries of Southern and South-eastern Asia, Eastern Europe, Latin America and Africa. It is the third largest crop grown followed by maize (corn) and wheat. Of the world rice producers, the Republic of China is the largest and it accounts for 31 percent of the world production. India is the second largest with 20 percent and Indonesia produces 9 percent as the third largest producer. The balance, 40 percent is produced by Thailand, Burma, Pakistan, Vietnam, the Philippines, Brazil and Japan. However only 5-6% of rice is traded at the world market indicating that bulk of the production remains as domestic consumption. According to the world trade figures, Thailand is the main rice exporter and accounting for 26% of the world rice exports. Vietnam and the USA are the second and third largest exporters by contributing 15% and 11 % of total exports respectively. On the other hand, Indonesia (14%), Bangladesh (4%) and Brazil (3%) are the main rice importers of the world.

According to Wikipedia, the free encyclopedia, rice is defined as two species of grass (*Oryza glaberrima*) native to tropical and sub-tropical countries. The term "wild rice" refers to wild species of *oryza*, but conventionally refers to species of the related genus *Zizania*, both wild and domesticated. It further explains that rice is a monocarpic annual plant, growing to 1-1.8 m tall occasionally more depending on the variety and soil fertility, with long slender leaves 50-100 cm long and 2-2.5 cm broad. The wind-pollinated small flowers are 30-50 cm long. The seed is a grain 5-12 mm long and 2-3 mm thick.

Rice provides more than one fifth of the calory intake of the human diet (Smith, Bruce 1998). The nutritional value of rice contains of moisture, energy, proteins, carbohydrates, calcium, phosphorus, iron, thiamine, riboflavin and niacin. Starch is the main constituent of the seed and it also contains globulin, albumen, oryzagenin and vitamin B.

1.2 Production

Being the staple food of Sri Lankans, rice has been grown from ancient time with water from man-made irrigator structures as human settlements from river deltas spread to interior lands. At present, 14 percent of the arable lands are utilized for paddy cultivation and nearly 700,000 farmers are engaged in farming as their mainstay. According to the statistics of the Department of Census and Statistics, the total extent of arable land has increased from 390,313 ha in 1951/52 to 937,175 ha in 2005.

Paddy lands are distributed according to water availability in terms of irrigated and rain fed areas. Irrigated paddy areas are classified again as major and minor irrigations, based on the size of the command area of the irrigation schemes. Thus, an irrigated command area of 80 ha or above is considered as major irrigation and below 80 ha as minor irrigation. Accordingly 55% of the total extent of paddy lands is cultivated under major irrigations and 21% under minor irrigations. The balance 24% are rain-fed farms. The table 1.1 presents the extent of paddy lands according to irrigated and rain-fed areas.

Table 1.1: The Cultivated Extent of Paddy by Mode of Irrigation

Source of water	Extent (Ha)	Percentage
Major irrigation	515,683	55.0
Minor irrigation	195,483	20.9
Rain-fed	226,009	24.1

Source: Department of Census and Statistics

Of the total extent cultivated, nearly 65 percent of the farmers own smallholdings in extent of less than 2 acres. About 28 percent of the farmers own 2-5 acres (1-2 hectares) and nearly 20 percent more than five acres ranging from 5-20 acres. The number of farmers who own more than 20 acres is 4.3. Eleven percent of the farmers own less than one acre (Department of Census and Statistics, 2005).

1.2.1 Extent and Production

The total paddy production of Sri Lanka in 2005 was 3,246 thousand metric tons and it fulfils 96 percent of the consumer requirements. As shown in fig. 1.1, the paddy production of Sri Lanka has increased steadily in the past 25 years, in view of the increasing cropping intensity and technological improvements in cultivation methods resulting in an observal in the average yield. According to table 1.2, the total extent of arable paddy lands has increased from 844,647 ha in 1980 to 937,175 ha in 2005, while the paddy production has increased from 2,120 thousand metric tons to 3,246 thousand metric tons during the respective period. The average paddy yield also increased from 2,929 kg/ha in 1980 to 4,080 kg/ha in 2004. However, the table indicates that both the extent and the production fluctuated during this period while registering an overall increasing trend.

Fig. 1.1: Production of Paddy

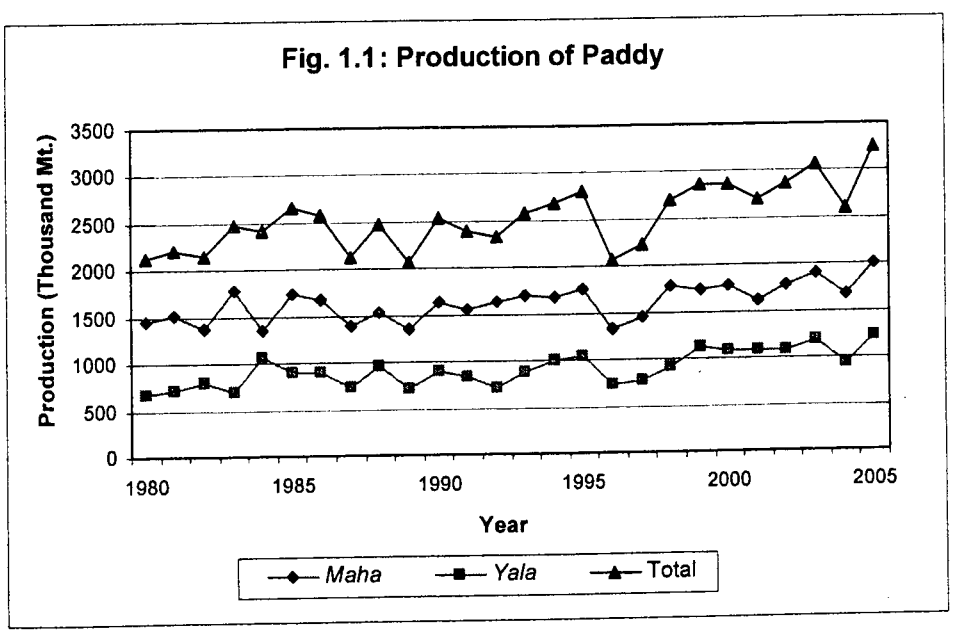


Fig 1.2 highlights the paddy land distribution according to *yala* and *maha* seasons in the past 25 years. Notable feature of the trend line is that it is steady for the whole period despite the

fact that the total extent fluctuated for some seasons. Since the cultivable extent fluctuates according to agro climatic conditions, the average trend line tradesoff the variation effects.

Fig. 1.2: Extent of Paddy

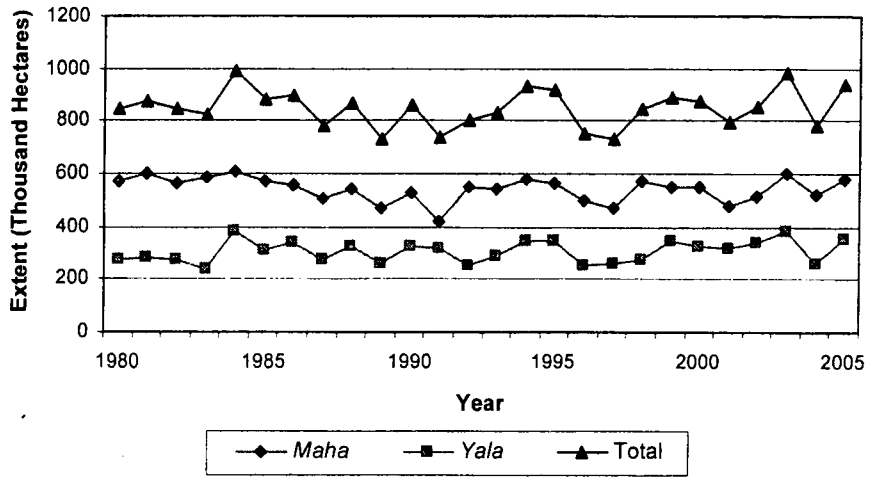
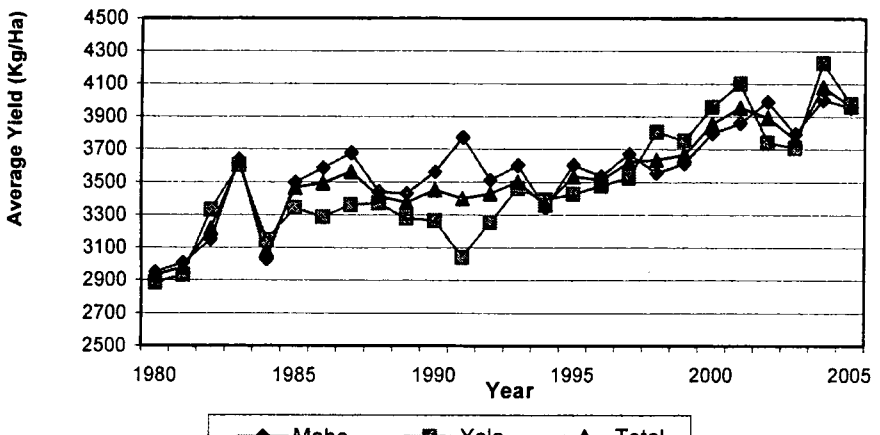


***Fig. 1.3* : Average Yield of Paddy**



The time series data presented in table 1.2, figs.1.1 and 1.2, brings towards some important occurrences with regard to the variation of extent, the production and the average yield of the paddy crop in Sri Lanka.

1. No remarkable difference is observed in the ten-year averages of the paddy land extent, the production and the average yield of paddy. But, the five year period from 2000-05 indicates remarkable improvements in the production and the average paddy yield despite constant variations in the paddy land extent cultivated. The increase would be an outcome of the technological improvements associated with the high yielding varieties and the extensive farming.

2. Though the average paddy yield has increased significantly, still it is lower than the potential yield under better condition.
3. *Maha* is the main cultivation season that produces nearly 70 percent of the total paddy production.
4. Cropping intensity had marked on upward trend in the past along with an increase in the paddy land extent.

As indicated in map 1.1, the bulk of the paddy production comes from the irrigated areas such as Ampara, Polonnaruwa, Anuradhapura and Kurunegala districts. Approximately 48 percent of the total production is from these areas. The Mahaweli H area, Batticaloa, Trincomalee and Hambantota districts also account for nearly 19 percent and the balance (33%) from the other districts of the country. It includes both irrigated and rain-fed farming areas. When we take into account the total extent cultivated by districts, Ampara, Polonnaruwa, Anuradhapura and Kurunegala districts account for 44 percent, while the Mahaweli H area, Batticaloa, Trincomalee and Hambantota districts are responsible for 19 percent of total extent cultivated. The balance (37%) was spread over other districts (See table 1.3).

Table 1.2: Extent, Production and Average Yield of Paddy – Sri Lanka

	Extent (Ha)			Production ('000 M.tons)			Average yield (Kg/Ha)		
Year	***Maha***	***Yala***	**Total**	***Maha***	***Yala***	**Total**	***Maha***	***Yala***	**Total**
1980	573,436	271,212	844,647	1,443	677	2,120	2,950	2,886	2,929
1981	596,692	280,054	876,746	1,509	707	2,216	3,005	2,933	2,981
1982	567,245	276,918	844,163	1,362	793	2,155	3,149	3,331	3,215
1983	582,887	241,213	824,101	1,783	698	2,480	3,637	3,603	3,627
1984	606,429	383,769	990,197	1,359	1,060	2,419	3,030	3,145	3,079
1985	568,743	311,948	880,691	1,748	907	2,655	3,497	3,342	3,466
1986	555,209	342,238	897,448	1,684	903	2,587	3,585	3,287	3,493
1987	507,834	273,396	781,232	1,390	735	2,126	3,677	3,361	3,562
1988	544,628	323,179	867,807	1,525	952	2,477	3,439	3,370	3,412
1989	468,845	258,108	726,954	1,343	721	2,064	3,428	3,278	3,374
Avg 80-89			**853,399**			**2,530**			**3,314**
1990	530,729	325,981	856,710	1,647	891	2,538	3,563	3,264	3,453
1991	422,282	316,134	738,416	1,554	835	2,389	3,771	3,040	3,398
1992	548,190	254,983	803,173	1,630	710	2,340	3,512	3,253	3,429
1993	545,689	288,574	834,263	1,692	877	2,569	3,601	3,462	3,501
1994	581,064	348,557	929,621	1,670	1,013	2,683	3,344	3,393	3,362
1995	566,650	348,371	915,021	1,761	1,049	2,810	3,603	3,427	3,534
1996	498,930	249,815	748,745	1,331	730	2,061	3,534	3,477	3,512
1997	472,998	256,817	729,815	1,457	784	2,241	3,670	3,526	3,622
1998	573,845	274,419	848,264	1,781	911	2,692	3,555	3,807	3,636
1999	546,586	345,467	892,053	1,736	1,121	2,857	3,612	3,752	3,665
Avg 90-99			**829,608**			**2,518**			**3,511**
2000	549,246	328,748	877,994	1,781	1,079	2,860	3,798	3,958	3,856
2001	478,986	319,273	798,259	1,613	1,082	2,695	3,860	4,102	3,954
2002	510,403	342,126	852,529	1,774	1,086	2,860	3,990	3,742	3,893
2003	601,584	381,033	982,617	1,895	1,177	3,072	3,794	3,709	3,762
2004	520,662	257,887	778,549	1,670	939	2,609	4,002	4,228	4,080
2005	580,562	356,613	937,175	2,013	1,233	3,246	3,955	3,976	3,963
Avg 00-05			**871,187**			**2,890**			**3,918**

Sources: Department of Census and Statistics
Data Bank of HARTI

Figures presented in table 1.3 show the total extent and the production over the five-year periods between 1980-2005. Though the total extent has increased in the past two decade, increased production was weighted towards the irrigated areas because of the extensive farming in those areas. The cropping intensity was also more efficient in irrigated areas.

Table 1.3: Variation of Extent and Production by Districts/ Major Areas -1980-2005

Ha/Kg

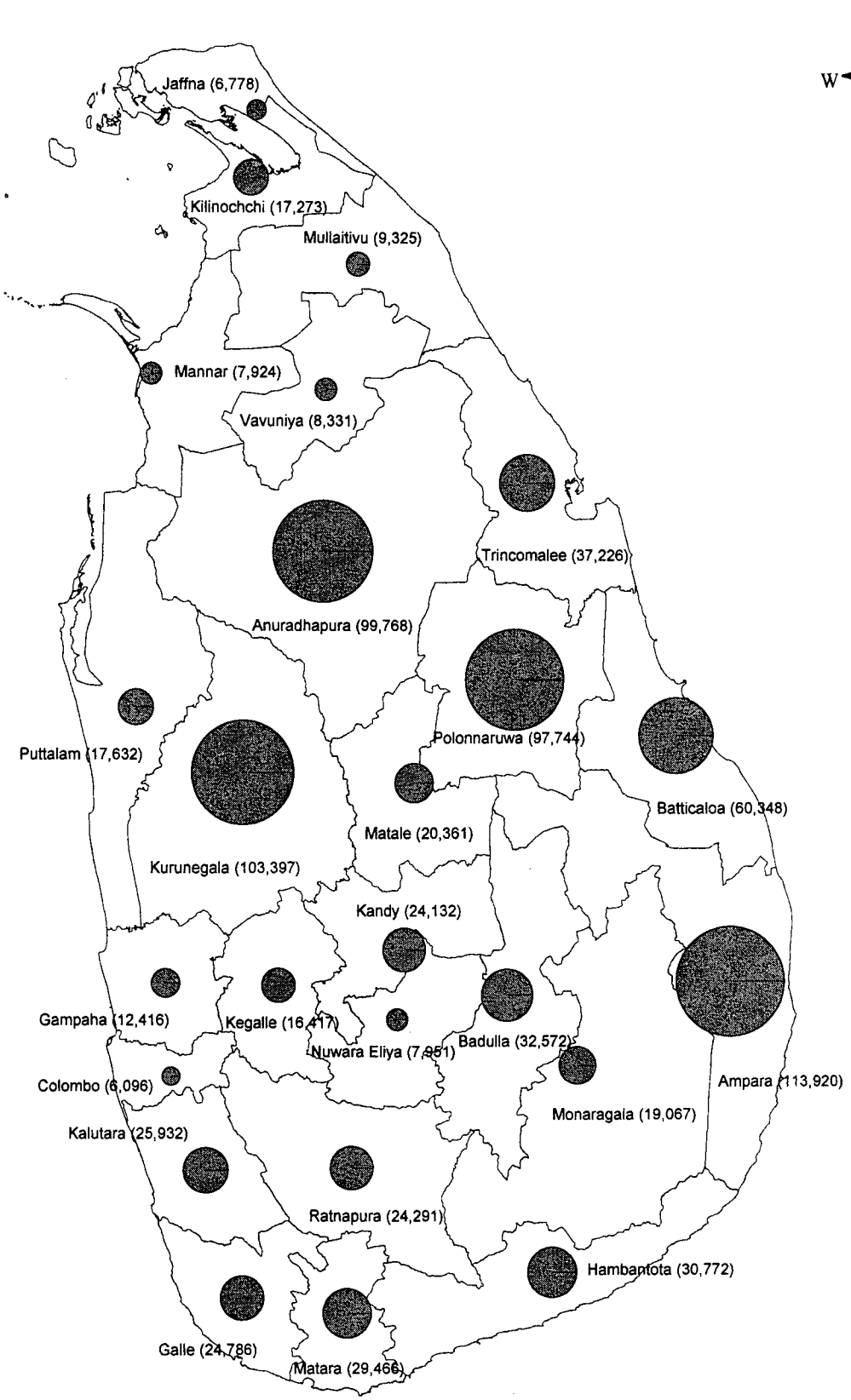
District		Average 1980-85	Average 1986-90	Average 1991-95	Average 1996-00	Average 2001-05	Percentage
Ampara	Extent	79,471	93,712	96,171	105,900	113,920	13.1
	Production	287	313	332	415	479	16.5
Kurunegala	Extent	110,007	105,271	115,121	101,907	103,397	11.9
	Production	347	283	354	282	293	10.1
Polonnaruwa	Extent	56,163	68,465	82,748	90,054	97,744	11.2
	Production	208	257	314	342	398	13.7
Anuradhaura	Extent	58,830	39,052	61,289	57,939	67,020	7.7
	Production	141	110	178	185	223	7.7
Mahaweli-H	Extent	28,063	25,992	29,096	30,118	32,748	3.8
	Production	95	106	125	131	149	5.1
Batticaloa	Extent	54,670	44,320	36,013	43,916	60,348	6.9
	Production	116	102	81	100	148	5.1
Trincomalee	Extent	42,481	17,841	24,766	30,535	37,226	4.3
	Production	112	48	66	81	130	4.5
Hambantota	Extent	32,301	33,838	36,319	39,620	30,772	3.5
	Production	109	126	130	137	116	4.0
Badulla	Extent	24,764	30,248	30,419	30,983	32,572	3.7
	Production	68	100	96	93	115	4.0
Matara	Extent	37,425	35,959	34,433	32,451	29,466	3.4
	Production	72	82	77	82	78	2.7
Others*	Extent	359,164	331,327	293,812	258,041	264,612	30.4
	Production	753	738	685	611	687	23.7
Sri Lanka	Extent	883,180	826,030	844,099	819,374	869,826	100.0
	Production	2,385	2,358	2,558	2,542	2,896	100.0

*Total of Colombo, Gampaha, Kalutara, Galle, Kandy, Matale, Nuwara Eliya, Puttalam, Moneragala, Jaffna, Mannar, Vavuniya, Mullaitivu, Kilinochchi, Ratnapura, Kegalle and Udawalawa special project area

Sources: *Department of Census and* Statistics
Data Bank of HARTI

Map 1.1: Average Extent of Paddy Cultivated during 2001 - 2005 by Districts

(Figures given in parenthesis are in hectares)



1.2.2 Cost and Returns

The analysis of cost and returns of paddy cultivation was based on seasonal estimates of the Department of Agriculture. Accordingly two districts namely Polonnaruwa and Kalutara were chosen in order to compare the value differences of irrigated and rain fed farming systems. The cost of production was estimated on unit cost for cultivating one-acre of paddy land or producing one kg of paddy, while returns were estimated as net returns per acre or kg by counting the average yield and the producer price. Return to capital was also estimated by dividing the gross return by the cost of cultivation excluding imputed costs.

The Cost

According to the statistics of the Department of Agriculture, the cost of production of paddy was counted in terms of the main inputs i.e. labour, seed, fertilizer, agro chemicals, draught power and other expenses incurred for cultivating one-acre of paddy land. Accordingly the total production cost including the imputed cost per acre in irrigated Polonnaruwa district was Rs. 21,741 in 2003/04 *maha* and it varied slightly according to two cultivation seasons i. e. *yala* and *maha.* Similarly, the cost of production including the imputed cost per acre in Kalutara (rain fed) district was 20,051 in *yala* 2004 and it also had seasonal variations.

Table 1.4 reveals that on an average, the cost for two five year periods from 1996/2000 to 2001-04, the cost of production for cultivating one acre of paddy land in Polonnaruwa district has increased from Rs.13,364 in 1996-2000 to Rs.19,794 in 2001-04. It changed from Rs. 12392 to Rs. 16,725 in Kalutara district during the same period. According to market rates that prevailed during the two consecutive periods, labour is the main cost item, accounting for approximately 50 –57 percent of the total cost in irrigated and rain fed areas. Draught power/ machinery equipment and fertilizer are the second and third important cost items, which account for 20-24 percent and 12-14 percent of the total cost respectively in both areas.

The total production cost was estimated including as well as excluding the imputed cost of family labour and own resources of the farmers (As shown in table 1.4, the total cost drops by 30-35 percent when the imputed values are excluded). But, it is not prudent to exclude the value of family labour and own resources under high opportunity cost of the market in an economic analysis. The table also highlights the percentage variation of the production inputs in accordance with two seasons.

The cost incurred for producing one kg of paddy was estimated by dividing the total cost by average yield received from the respective farm unit. The table 1.5 shows the cost for producing one kg of paddy in irrigated and rain fed districts. In Polonnaruwa district, the unit cost excluding the imputed cost varied from Rs. 4.31 to Rs. 4.86 during the 1995-99 period and Rs. 6.29 to Rs. 6.05 during 2000-04 period. The corresponding figures for Kalutara district were Rs. 6.26 to Rs. 7.71 and Rs. 5.95 to Rs. 12.66 for the respective periods.

Table 1.4: Cost of Cultivation Per Acre of Paddy by Inputs

Input	Polonnaruwa (Irrigated)								Kalutara (Rainfed)							
	Maha				*Yala*				*Maha*				*Yala*			
	Avg(1996-2000)		Avg(2001-2004)		Avg(1996-2000)		Avg(2001-2004)		Avg(1996-2000)		Avg(2001-2004)		Avg(1996-2000)		Avg(2001-2004)	
	(Rs/Acre)	%	(Rs/Acre)	%	(Rs/Acre)	%	(Rs/Acre)	%	(Rs/Acre)	%	(Rs/Acre)	%	(Rs/Acre)	%	(Rs/Acre)	%
Labour	6,334.40	47.40	9,251.50	49.46	6,757.40	48.39	9,980.00	50.42	7,662.75	61.84	9,414.00	58.33	7,768.40	65.55	9,454.75	56.53
Seed	723.80	5.42	968.75	5.18	745.60	5.34	1,038.00	5.24	731.75	5.91	975.25	6.04	816.00	6.89	1,027.00	6.14
Fertilizer	1,898.80	14.21	2,640.75	14.12	2,016.00	14.44	2,905.00	14.68	1,463.25	11.81	1,985.75	12.30	1,303.80	11.00	2,011.75	12.03
Agro - Chemicals	1,201.40	8.99	1,400.50	7.49	1,148.00	8.22	1,312.75	6.63	311.25	2.51	523.00	3.24	304.40	2.57	677.50	4.05
Other													301.00	2.54	458.00	2.74
Draught Power, Machinery and Equipments	3,205.80	23.99	4,441.50	23.75	3,297.00	23.61	4,558.00	23.03	2,223.00	17.94	3,240.50	20.08	1,539.20	12.99	3,325.50	19.88
Total Cost – Including Imputed Cost	13,364.20	100.00	18,703.75	100.00	13,964.60	100.00	19,793.75	100.00	12,391.75	100.00	16,138.00	100.00	11,851.80	100.00	16,725.75	100.00
Total Cost - Excluding Imputed Cost	9,778.80		13,099.75		9,160.40		13,228.25		7,159.75		11,271.75		7,566.00		12,169.75	

Sources: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture
Data Bank of HARTI

Table 1.5: Cost per Kg of Paddy in Polonnaruwa and Kalutara Districts

Rupees

Year and Season	Polonnaruwa		Kalutara	
	Including Imputed Cost	Excluding Imputed Cost	Including Imputed Cost	Excluding Imputed Cost
1995 *Maha*	6.25	4.31	10.69	6.26
Yala	6.13	4.68	10.99	6.48
1996 *Maha*	6.07	4.30	10.39	7.04
Yala	7.37	4.66	11.00	6.00
1997 *Maha*	6.36	4.38	na	na
Yala	7.37	4.93	11.53	6.73
1998 *Maha*	8.17	6.26	13.70	6.76
Yala	7.29	5.01	11.49	7.90
1999 *Maha*	7.05	5.28	12.20	7.94
Yala	7.20	4.86	11.82	7.71
2000 *Maha*	8.50	6.29	11.55	5.95
Yala	8.22	5.10	12.72	8.82
2001 *Maha*	8.46	6.08	14.11	8.70
Yala	7.94	5.19	13.13	8.48
2002 *Maha*	8.62	5.48	14.19	8.78
Yala	10.26	6.88	13.02	9.79
2003 *Maha*	10.26	7.12	15.43	12.04
Yala	10.69	7.67	18.29	14.45
2004 *Maha*	10.53	7.84	15.65	11.86
Yala	9.62	6.05	17.78	12.66

Sources: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture
Data Bank of HARTI

Returns

As estimated by the Department of Agriculture for *maha* 2003/04, the returns of paddy cultivation were analyzed on three criterions such as net returns to per acre, returns to unit of capital and net returns per kg, etc.

Net returns per acre = Gross returns-cost of cultivation
Return to unit of capital = Gross returns/cost of cultivation excluding the imputed cost
Net return per kg = Net returns/average yield in kgs

The table 1.6 presents three criteria both exclusive and inclusive of the imputed values for family labour and own resources. Accordingly, net returns per acre per kg in Polonnaruwa district marked an increase during the two consecutive periods despite some negative values for net returns per unit of capital. However, all the net return values in Kalutara district were not attractive as in irrigated Polonnaruwa district indicating that paddy cultivation is not viable under rain fed farming.

Table 1.6: Returns from Paddy Cultivation

Rupees

Type of Return	Season	Polonnaruwa (Irrigated)						Kalutara (Rainfed)					
		Including Imputed Cost			Excluding Imputed Cost			Including Imputed Cost			Excluding Imputed Cost		
		(1996-2000)	(2001-2004)	% Change	(1996-2000)	(2001-2004)	% Change	(1996-2000)	(2001-2004)	% Change	(1996-2000)	(2001-2004)	% Change
Net Return per Acre	*Maha*	3,389.90	6,203.50	83.0	6,839.76	11,807.75	72.6	-2,162.75	-2179.00	-0.8	3,68.75	2,687.00	-12.4
	Yala	6,487.82	8,963.00	38.2	11,358.80	15,528.25	36.7	-1,226.76	-1,558.75	-27.1	3,.59.20	2,997.25	-2.0
Net Return per Unit of Capital	*Maha*				1.78	1.92	7.9				1.42	1.28	-9.9
	Yala				2.20	2.19	-0.4				1.44	1.31	-9.0
Net Return per Kg	*Maha*	1.83	3.10	69.4	3.74	5.94	58.8	-2.17	-2.01	7.4	2.87	2.49	-13.2
	Yala	3.48	4.16	19.5	6.09	7.34	20.5	-1.20	-1.57	-30.8	3.08	2.64	-14.2

Sources: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture
Data Bank of HARTI

The table 1.7 further illustrates the fact that the profitability of paddy cultivation depends on two factors such as irrigated water supply and the use of family labour and own resources. Irrigation water supply is a crucial factor for high production efficiency. Rain-fed farming is still uncertain and its efficiency depends on water availability and its returns get negative values. Net returns are positive only in situations excluding imputed values. But, if included by counting the opportunity cost of family labour and other own resources, the paddy cultivation is no more a profitable investment even under irrigated water supply, compared with other cash crops.

Table 1. 7: Cost and Returns of Paddy Cultivation in Two Selected Districts, 2004/05 *Maha* Season

Rupees

Cost/Returns	Polonnaruwa	Kalutara
Cost		
Including Imputed cost	22954.00	19019.00
Excluding Imputed cost	16723.00	14511.00
Returns		
Including Imputed cost	4536.00	-2747.00
Excluding Imputed cost	10767.00	1761.00.

Sources: Cost of Cultivation of Agricultural Crops, (2004/2005 maha) Department of Agriculture

1.2.3 Marketable Surplus

Except in smallholdings in rain-fed areas, the rice production in Sri Lanka is mainly market-oriented. Therefore, many farmers retain a sufficient quantity of the harvest as a marketable surplus. According to field observations in major irrigation areas, nearly 65% of the paddy crop remains as a marketable surplus and the balance 35% use for home consumption, seed requirements and labour payments. However, in other areas there are variations in quantity used for consumption and marketable surplus.

1.3 Rice Production

Since rice is the main product of paddy, it is worthwhile to assess the cost of milling and processing to ascertain the price behaviour of rice. Rice production commences after selling the marketable surplus of paddy to millers or middlemen, involved in paddy marketing. The millers convert paddy into rice as a value added product. Therefore, milling, processing and transport cost involved in processing paddy into rice should be taken into account to calculate the price of rice. According to field observations in main rice producing areas, the millers said that they got approximately 65 kg of rice from 100 kg paddy bag. They spend nearly Rs. 200/- to mill the 100 kg of paddy as labour, electricity and maintenance cost. According to current paddy prices for par boiled (nadu) and samba varieties, the millers obtain very minimal profit as mentioned in table 1.8. The return from rice production is conditioned by the purchasing prices of paddy and selling prices of rice.

Table1. 8: Milling and Processing Cost of Paddy

Item	Unit	Par boiled (Nadu)	Samba
Prevailing producer price	Rs	15.00	18.00
Producer price for 100 kg of paddy	Rs	1500.00	1800
Cost of milling	Rs	200.00	200.00
Total cost	Rs	1700.00	2000.00
The quantity of rice received from 100 kg of paddy	Kg	65	65
Selling price of rice	Rs	28.00	35.00
Price of rice for 65 lg of rice (65xRs. 28/)	Rs	1820.00	2275.00
The return from 100 kg of paddy	Rs	120.00	275.00
The return per1kg of paddy	Rs	1.20	2.75

Source: HARTI Field Observations in Anuradhapura District (October, 2006)

Cost of transport is Rs. 50 per 50 kg or an agreed rate according to distance. The millers claimed that despite the reasonably good prices fetched at the Colombo wholesale market, they have to pay additional costs as broker fees, loading/unloading cost and a commission to the buyers. Accordingly, the millers have to pay an additional 50 cents per kg of rice in addition to transport cost of Rs. 1/- per kg.

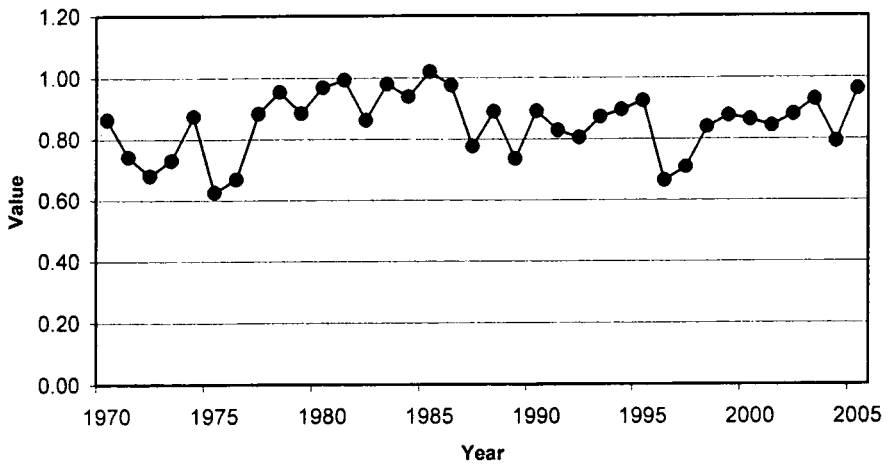
1.4 Marketing

As mentioned in flow chart 1.1, the paddy marketing is a flow of exchange from the farmer to the miller and from the miller to the consumer at various stages. It includes, the village collectors, outside traders from distance areas, the farmer organizations, the marketing agents, the private millers and the government institutions such as the Sathosa, the Paddy Purchasing Authority and the cooperatives. During the harvesting period, all these parties are active in purchasing paddy on a competitive basis. According to flow chart 1.1, the private sector dominates the sphere of paddy marketing and it purchased nearly 70 percent of the total output. The balance (30%) is purchased by the public sector through the farmer organizations, the cooperatives and the marketing agents. The role of the private traders and the local millers is important and they had nearly 80 percent of the total purchase of private sector. The balance, 20 percent is purchased by the outside traders from Maradagahamula, Kurunegala and Hambantota areas. The traders from Maradagahamula and Kurunegala areas travel to Anuradhapura and Polonnaruwa districts, while the traders from Tissa, Hambantota and Embilipitiya areas travel to Ampara and Akkaraipattu areas. The role of the outside traders is also important in determining both paddy and rice prices. The total paddy produce, collected either by the private or the public sector finally go to the large-scale paddy millers for milling. Once paddy is processed as rice, it comes to the wholesalers from whom it goes to the retailers and the consumers through marketing networks of the country.

Self-Sufficeny and Imports

Despite the fact that rice marketing rested on the domestic supply and the imports in early 1980s, now it entirely depends on the domestic supply since the country's produce is adequate to meet nearly 95 percent of its consumer requirements. The fig. 1.4 and table 1.16 show the variation of self-sufficiency ratios of Sri Lanka in the past 35 years. Accordingly fig. 1.4 shows that the self-sufficiency ratio has approximated 100 even it fluctuated in some years due to the uncertainty of agro-climatic factors. Therefore, the domestic rice marketing is determined mainly on the local factors such as agro-climatic conditions and buffer stocks, etc.

Fig. 1.4 : Rice Self Sufficiency Ratio



However, when considering the total grain requirement including wheat flour consumption of the people, the rice consumption is nearly 70 percent of the total grain consumption.

As indicated in table 1.9, imports of rice have gradually declined from 336 mt. in 1996 to 51.7 mt in 2005. Consequently value of imports also dropped from Rs. 5,038 m. to Rs. 1,554 m. during the respective period. Increasing domestic production led to a drop in imports. The major part of our imports was from India, Pakistan and Thailand but during the period 1996-99, Myanmar, Vietnam and Singapore figured prominently.

Table 1. 9: Rice Imports, 1996-2005

Year	Quantity (000' Mt)	Value (Rs/Mn.)
1996	336	5038
1997	306	4323
1998	168	2621
1999	214	3289
2000	14	288
2001	52	969
2002	95	1732
2003	34	813
2004	222	6186
2005	58	1554

Source: External Trade Statistics, Sri Lanka Customs

Price Behaviour

Price behaviour of paddy and rice was estimated on three strata, i.e. the producer prices at farm level, the wholesale prices and the retail prices. Only two rice varieties were considered in price analysis as mentioned in section 1.4. Paddy prices at farm level were determined mainly on the demand and supply factors at the market. A common phenomenon is price fluctuations during the harvesting time and the relatively high prices during the off-farm period. The government planned a key role in offering a guaranteed price or a floor price in early 1980 period, but its intervention is negligible now because the government paddy purchasing mechanism is not effective enough to compete with that of the private sector. As mentioned in the table 1.10, the seasonal index of producer prices was estimated by counting the five-year (2001-2005) monthly producer price average and comparing the monthly average price values with the overall average price considering the latter value as 100. Accordingly it reflects the deviation of the monthly price values as percentage of five-year producer price average (13.83). According to fig. 1.4, the value of producer price index is less than 100 except for November, December and January.

The tables 1.11 and 1.12 show the price indexes for the wholesale and the retail prices for samba and nadu for the period 2000-05. As reflected in figs. 1.6 and 1.7, both the wholesale and the retail prices increased during November, December and January for the main reason that it was the off-farm season.

It seems that the marketing cost of rice is not so much high as in the case of other perishable products such as vegetables and fruits. According to field observations, the estimated cost of paddy/rice marketing shows that the Colombo wholesale market price for one kg of rice is almost double the price of the rice millers. The price difference between the miller and the wholesaler is mainly because of the transport, loading and unloading cost paid by the millers and the intermediaries. Compared to that of the wholesalers, the retail prices are not high because retailers keep a small profit margin.

Table 1.10: Monthly Average Producer Prices of Paddy in Sri Lanka and Seasonal Price Indicies

Rs/Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Avg (2001-05)	Seasonal Index	Varia -tion
Jan	8.22	11.27	12.48	11.84	12.10	12.72	15.02	14.32	14.45	17.88	14.88	107.54	7.54
Feb	8.49	10.59	10.02	12.66	10.67	12.10	14.86	12.86	14.04	15.97	13.97	100.95	0.95
Mar	8.14	10.06	9.98	12.50	10.25	12.21	13.18	12.08	13.63	15.36	13.29	96.07	-3.93
Apr	8.54	10.08	9.74	12.59	10.77	12.12	13.17	12.08	14.40	14.67	13.29	96.05	-3.95
May	8.79	10.11	9.99	12.90	10.54	11.52	13.45	12.14	14.97	14.50	13.32	96.25	-3.75
Jun	9.59	10.13	10.32	12.90	10.57	12.28	13.67	12.42	15.01	14.21	13.52	97.71	-2.29
Jul	10.16	10.41	10.21	13.09	11.09	12.32	13.22	12.45	16.10	13.53	13.52	97.75	-2.25
Aug	10.60	10.83	9.90	12.80	11.64	12.49	12.82	12.08	16.03	12.71	13.23	95.60	-4.40
Sep	11.08	10.97	9.60	12.40	10.66	12.17	13.46	11.85	16.92	13.57	13.59	98.27	-1.73
Oct	10.99	11.46	9.97	12.77	10.32	12.73	13.84	12.05	16.87	13.96	13.89	100.40	0.40
Nov	11.59	12.03	10.61	12.60	11.51	13.36	13.76	13.06	18.05	14.68	14.58	105.40	5.40
Dec	11.84	11.96	11.12	12.83	12.68	13.66	14.28	14.02	17.85	16.07	15.18	109.70	9.70
Ann. Avg.	9.95	10.80	10.25	12.66	11.08	12.47	13.76	12.60	15.66	14.68	13.83	100.00	

Sources: Department of Census and Statistics

Data Bank of HARTI

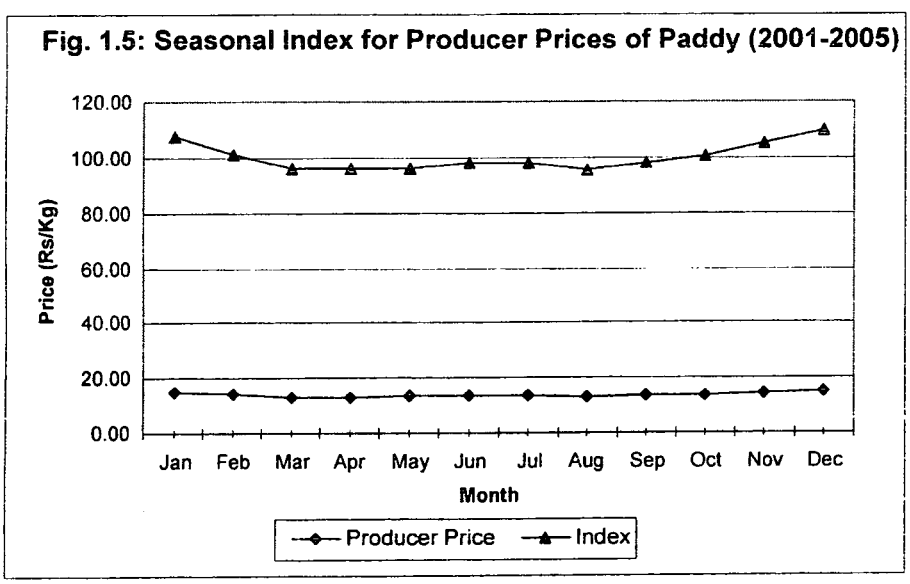


Fig. 1.6 : Seasonal Price Index for Retail & Whole-Sale Prices (2001-2005) Samba 2

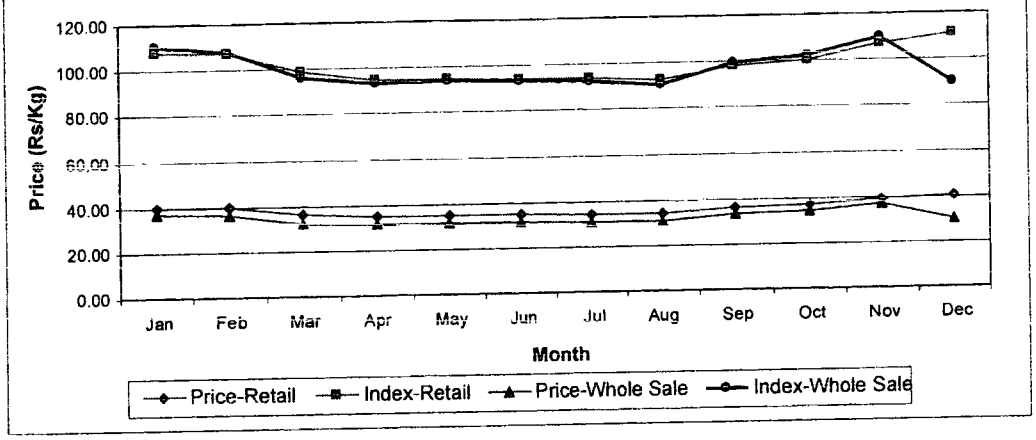


Fig 1.7 : Seasonal Price Index for Retail & Whole-Sale Prices (2001-2005) Nadu 2

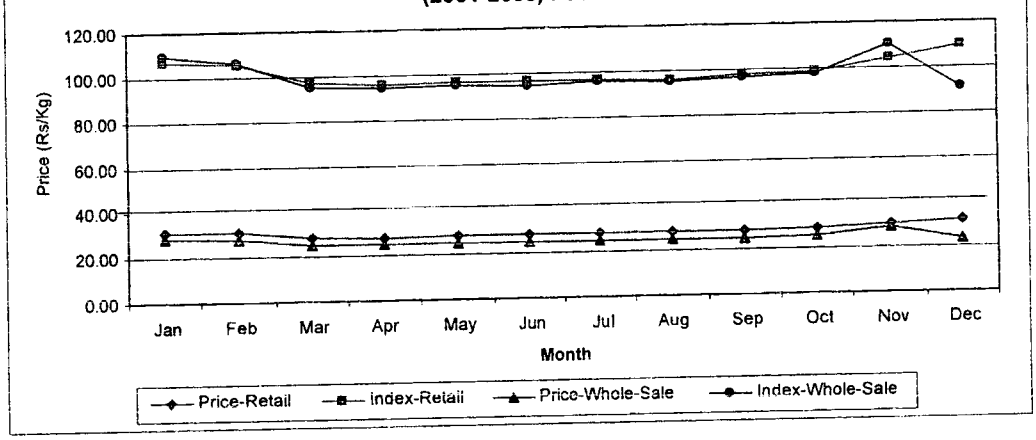


Table 1.11 Monthly Average Wholesale Prices of Rice at Pettah Market and Seasonal Price Indices

Rs/Kg

Month	Nadu II								Samba II							
	2001	2002	2003	2004	2005	Average (2001-05)	Seasonal Index	Variation	2001	2002	2003	2004	2005	Average (2001-05)	Seasonal Index	Variation
January	23.50	29.53	27.20	29.13	33.79	28.63	109.52	9.52	30.59	34.31	42.08	31.47	46.62	37.01	110.13	10.13
February	24.18	31.04	24.92	30.54	27.58	27.65	105.78	5.78	31.75	33.79	40.66	31.38	43.07	36.13	107.50	7.50
March	21.64	25.14	23.11	27.79	26.16	24.77	94.75	-5.25	29.88	33.28	29.32	31.90	36.44	32.16	95.71	-4.29
April	20.68	25.61	22.18	28.91	26.07	24.69	94.44	-5.56	26.95	31.80	27.65	34.90	35.49	31.36	93.31	-6.69
May	20.36	25.51	22.66	29.63	26.02	24.83	95.00	-5.00	27.13	32.77	26.78	36.09	34.53	31.46	93.60	-6.40
June	19.99	25.22	23.98	29.16	25.33	24.74	94.62	-5.38	26.57	31.53	28.41	35.49	34.33	31.27	93.03	-6.97
July	21.82	24.01	23.20	30.76	24.86	24.93	95.38	-4.62	26.81	30.63	27.21	36.46	34.08	31.04	92.35	-7.65
August	23.12	24.02	21.91	31.03	24.16	24.85	95.06	-4.94	25.38	31.42	26.23	37.26	32.34	30.53	90.84	-9.16
September	22.14	23.41	22.51	32.89	24.83	25.16	96.24	-3.76	26.51	32.61	26.15	43.85	37.68	33.36	99.27	-0.73
October	22.49	24.25	22.93	32.65	25.53	25.57	97.82	-2.18	28.12	34.32	27.26	43.48	39.02	34.44	102.47	2.47
November	26.01	25.41	27.54	36.41	28.89	28.85	110.38	10.38	31.47	37.89	30.66	45.76	38.93	36.94	109.92	9.92
December	27.29	26.83	29.27	35.06	0.00	23.69	90.62	-9.38	31.68	39.77	32.22	46.79	0.00	30.09	89.54	-10.46
Annual Average	22.77	25.83	24.28	31.16	26.66	26.14	100.00		28.57	33.68	30.39	37.90	37.50	33.61	100.00	

Source: Marketing Food Policy and Agri Business Division of HARTI

Table 1.12 Monthly Average Retail Prices of Rice in Colombo & Suburb Markets and Seasonal Price Indices

Rs/Kg

Month	Nadu II								Samba II							
	2001	2002	2003	2004	2005	Average (2001-05)	Seasonal Index	Variation	2001	2002	2003	2004	2005	Average (2001-05)	Seasonal Index	Variation
January	25.80	32.95	29.38	31.53	37.19	31.37	106.75	6.75	33.83	37.14	42.97	33.82	50.74	39.70	107.91	7.91
Febuary	26.12	34.25	28.62	32.38	33.89	31.05	105.66	5.66	34.42	36.74	42.76	33.69	49.67	39.46	107.25	7.25
March	24.71	30.35	26.72	30.95	30.17	28.58	97.25	-2.75	32.91	36.38	35.77	33.91	42.95	36.38	98.90	-1.10
April	24.66	27.96	26.20	31.42	30.02	28.05	95.46	-4.54	32.01	34.87	32.27	35.49	39.89	34.91	94.88	-5.12
May	25.08	28.32	26.20	32.75	29.29	28.33	96.40	-3.60	31.59	34.93	30.96	37.68	38.38	34.71	94.34	-5.66
June	24.98	28.25	27.16	32.68	28.83	28.38	96.57	-3.43	31.20	34.68	31.29	37.88	38.28	34.67	94.23	-5.77
July	25.58	27.84	26.41	33.76	28.00	28.32	96.36	-3.64	31.48	34.11	30.47	38.59	37.77	34.48	93.73	-6.27
August	26.11	27.41	25.86	34.06	27.69	28.23	96.05	-3.95	30.44	34.10	29.91	39.03	37.15	34.13	92.76	-7.24
September	26.31	27.20	25.97	35.55	28.28	28.66	97.53	-2.47	30.85	34.65	29.77	45.90	39.36	36.11	98.14	-1.86
October	26.46	27.55	26.07	35.81	28.52	28.88	98.28	-1.72	31.67	35.52	29.91	46.57	41.09	36.95	100.44	0.44
November	28.05	27.94	28.53	37.91	30.72	30.63	104.23	4.23	33.33	38.65	32.18	49.37	42.65	39.24	106.65	6.65
December	30.50	28.40	30.78	36.98	34.18	32.17	109.46	9.46	34.81	39.91	33.86	50.78	44.43	40.76	110.79	10.79
Annual Average	26.20	29.04	27.33	33.82	30.57	29.39	100.00		32.38	35.97	33.51	40.23	41.86	36.79	100.00	

Source: Marketing Food Policy and Agri Business Division of HARTI

1. 5 Consumption

According to consumer finance and socio-economic surveys conducted by the Central Bank of Sri Lanka, overall per capita consumption of rice per annum in Sri Lanka has increased substantially from 86.80 kg in 1973 to 106.21 kg in 2003/04. However, the rice consumption is distributed unequally among the sectors indicating a concentration of higher consumption of rice in the rural and the estate sectors. Thus, per capita consumption rate in urban sector has declined from 80.30 kg in 1973 to 79.17 kg in 2003/04, while it has registered an increase in the rural sector from 88.10 kg to 110.28 kg during the respective period. Similarly, the situation in the estate sector also shows an increasing trend from 89.60 kg to 109.72 kg during the respective period. (table 1.13)

Table 1.13: Per Capita Consumption of Rice per Annum by Sectors

Kgs

Year	Urban	Rural	Estate	All Sectors
1973	80.30	88.10	89.60	86.80
1978/79	77.20	95.90	88.40	90.90
1981/82	87.50	104.60	103.20	101.30
1986/87	82.56	107.60	114.89	103.66
1996/97	77.59	110.34	110.39	106.14
2003/04	79.17	110.28	109.72	106.21

Source : Consumer Finance and Socio Economic S urvey, Various Issues Central Bank of Sri Lanka

Table 1.14: Per Capita Consumption of Rice Per Annum by Income Deciles and Sectors 2003/04

Income Decile	Minimum (Rs)	Maximum (Rs)	Urban (Kg)	Rural (Kg)	Estate (Kg)	All Sectors (Kg)
1	0	4,520	74.65	105.98	106.37	104.28
2	4,527	6,214	84.61	109.71	105.43	107.95
3	6,220	7,728	82.62	112.71	105.99	110.55
4	7,733	9,430	88.45	111.71	112.58	110.29
5	9,435	11,350	76.23	111.00	116.80	107.09
6	11,357	13,755	80.07	113.44	114.06	109.79
7	13,757	17,271	84.21	112.01	107.88	108.24
8	17,275	22,036	77.00	107.39	103.12	102.48
9	22,037	32,778	82.86	109.80	126.89	104.70
10	32,793	825,694	74.00	107.72	136.86	97.77
Overall Average	12,513	95,078	79.17	110.28	109.72	106.21

Source: Consumer Finance and Socio Economic Survey - 2003/04, Central Bank of Sri Lanka

Statistics of the consumer finance survey further discloses that rice consumption is rather high among the low-income groups. The table 1.14 shows how rice consumption has changed according to income deciles.

1.6 The Government Policy

According to the ten-year Horizon Development Framework of the government for 2006-2016, it was emphasized to transform traditional subsistence agriculture to a commercially oriented and highly productive sector as the focal vision (Annual Report, Central Bank of Sri Lanka, 2006).

In relation to the National Policy on Agriculture and Livestock for 2003-2010, the policies in respect of paddy production were targeted to mobilize resources for self-sufficiency in rice within three years with special stress on ensuring food security and enhancing the production efficiency in terms of high profitability and low cost. Promotion of the rice based value added food industry with private sector contribution, increasing employment opportunities and ensuring proper utilization of land and water resources were considered as important policy options.

The government is implementing a variety of policy instruments such as pricing, trade, and monetary and fiscal policy reforms as the main approach of promoting agricultural products in Sri Lanka. Basically tariff and subsidy policies were followed for the sake of empowering the small producers of the paddy-farming sector.

1.6.1 Tariff Policy

The tariff system, which is being followed as the main instrument of trade policy is based on quantitative restrictions (QRs) on imports. Thus most QRs on imports were introduced in 1988 as a six-band duty system ranging from 0 percent tariff for essential consumer items to 500 percent tariff for luxury items. This system was altered in 1992 and a three-band structure was introduced with rates of 10%, 20% and 45% in order to relax the rigidity and correct the distortions in domestic agricultural sector (Presidential Tariff Commission on Trade and Tariff). The introduction of the three-band tariff structure in 1992 helped to reduce market distortions in the non-plantation sector. In 1994, the unweighted average (across 6,050 tariff items) was in the order of 20 percent and the ratio of actual duty revenue to imports was even lower than WTO.

The official import duty rates imposed on paddy were changed from time to time in terms of macro economic reforms and internal political pressures. Thus, the tariff structure of rice has changed since 1986. According to Sri Lanka Customs records, the custom duty for rice in 1986-88 was 25% and it has changed to 45% and Rs. 12/- in 1996. During the 1996-2005 periods, the rate dropped to 35% and it changed again to Rs. 20/- per kg in 2006. The table 1.15 shows the government current tariff rates that are being implemented for rice and rice products.

The Cooperative Wholesale Establishment (CWE), the main government-marketing agency had a monopoly in the import of rice, wheat and wheat flour. After 1990, the private traders were allowed to import and to maintain buffer stocks subject to the payment of import duties when stocks were released to the local market. After 2005, the role of the CWE also faded and the government established a new agency for paddy purchasing.

Table 1.15: Customs Duties for Rice and Rice Products

Description	Customs duty	Surcharge	VAT	CESS	PAL	SRL
Rice in the husk (paddy or rough)	20	0	0	0	3	1
Husked (brown) rice	20	0	0	0	3	1
Semi-milled or wholly milled rice	20	0	0	0	3	1
Broken rice	20	0	0	0	3	1
Rice flour	9	10	15	0	3	1
Liquorice roots of a kind used in perfumery, pharmacy, etc.	6	10	15	0	3	1
Liquorice sap and extract	15	10	15	0	3	1
Brans, sharps and other residues of rice	15	10	15	0	3	1
Dentifrices	28	10	15	25	3	1
New machinery for the rice industry	2.5	10	15	0	3	1
New machinery for rice industry	2.5	10	15	0	3	1
Millet-Kurakkan *(Eleusine coracana sp.)*	28	10	15	0	3	1

Source: Sri Lanka Customs

1.6.2 Subsidies

The fertilizer subsidy introduced in 1962 was aimed at encouraging the use of inorganic fertilizers in line with the Green Revolution. The subsidy was given for urea, triple super phosphates (TSP), imported rock phosphate, muriate of potash (MOP) and the NPLO mixtures with 5:15:15 composition. Imported ammonium sulphate (AS) subsidy was removed in 1981 in order to popularize the local production. Though the fertilizer subsidy was meant for the small producers in paddy-farming sector, the other farmers in the non-plantation sector too were benefited. Consequently the government wanted to revise the subsidy scheme and the fertilizer subsidy was restricted to only urea since 1997. But, it was changed again in 2004 in keeping with the Presidential election manifesto and accordingly the government agreed to provide a direct fertilizer subsidy to the farmers with the government incurring a cost of Rs. 1,300/- for each fertilizer bag of 50 kg. The fertilizer subsidy had a positive effect on productivity and the total production of paddy (Annual Reports, Department of Agriculture). The impact was very significant in the case of high yielding varieties, which responded well to urea. However, the impact on the reduction of the total production cost was marginal due to the fact that the fertilizer accounted for only 12 percent of the total cost.

1.7 Conclusion and Policy Recommendations

The extent, the production and the average yield of paddy have increased over the past due to the tremendous efforts taken by all the successive governments since Independence, and even before 1948. However, the paddy cultivation is turning out to be an inefficient venture due to the high production cost and the negative returns. As shown in the text, the paddy cultivation is profitable only on irrigated areas, where cultivation is done commercially using machinery. It was observed that approximately 50 percent of the total cost of paddy cultivation is on labour and the profitability is conditioned more by labour rates than by the other factors. Accordingly the paddy cultivation is economically viable only in a situation where values of own recourses, mainly family labour are excluded. But such estimates, sans the value of family labour, do not show the real economic value.

Even under some unfavourable situations such as low profit and negative returns, the paddy cultivation is being practiced as the main occupation of the small producers in Sri Lanka due to the absence of appropriate options for food security and surplus labour in the rural sector. The Government also, in recognition of the crisis followed some remedies to overcome the issues through newly introduced policy measures such as increasing the value added products and avoiding marketing difficulties.

Though the rice milling and processing is a viable industry, the prices of rice are almost doubled when the produce reaches the wholesale market from the mills due to high cost related to transport, loading and unloading. Compared with the retailers, the profit margins of the wholesalers are high in view of the oligopolistic competition prevalent in the rice market.

Therefore, any policy recommendations on improving the paddy production and the rice marketing should take into account not only the producers' problems but also the consumer welfare that should assure quality rice at a reasonable price. Otherwise, the local paddy producers cannot compete with rice imports, which has better comparative and competitive advantages for rice production. As shown in the text, the local production fulfills almost 100 percent of the national food requirement. In the circumstances what needs to be done is to improve the quality of products and add more value added products that assure stable market and high profits for the small producers. Such a policy would minimize the gravity of the prevailing issues of the paddy cultivation in Sri Lanka.

Table 1.16: Rice Self-Sufficiency Ratio

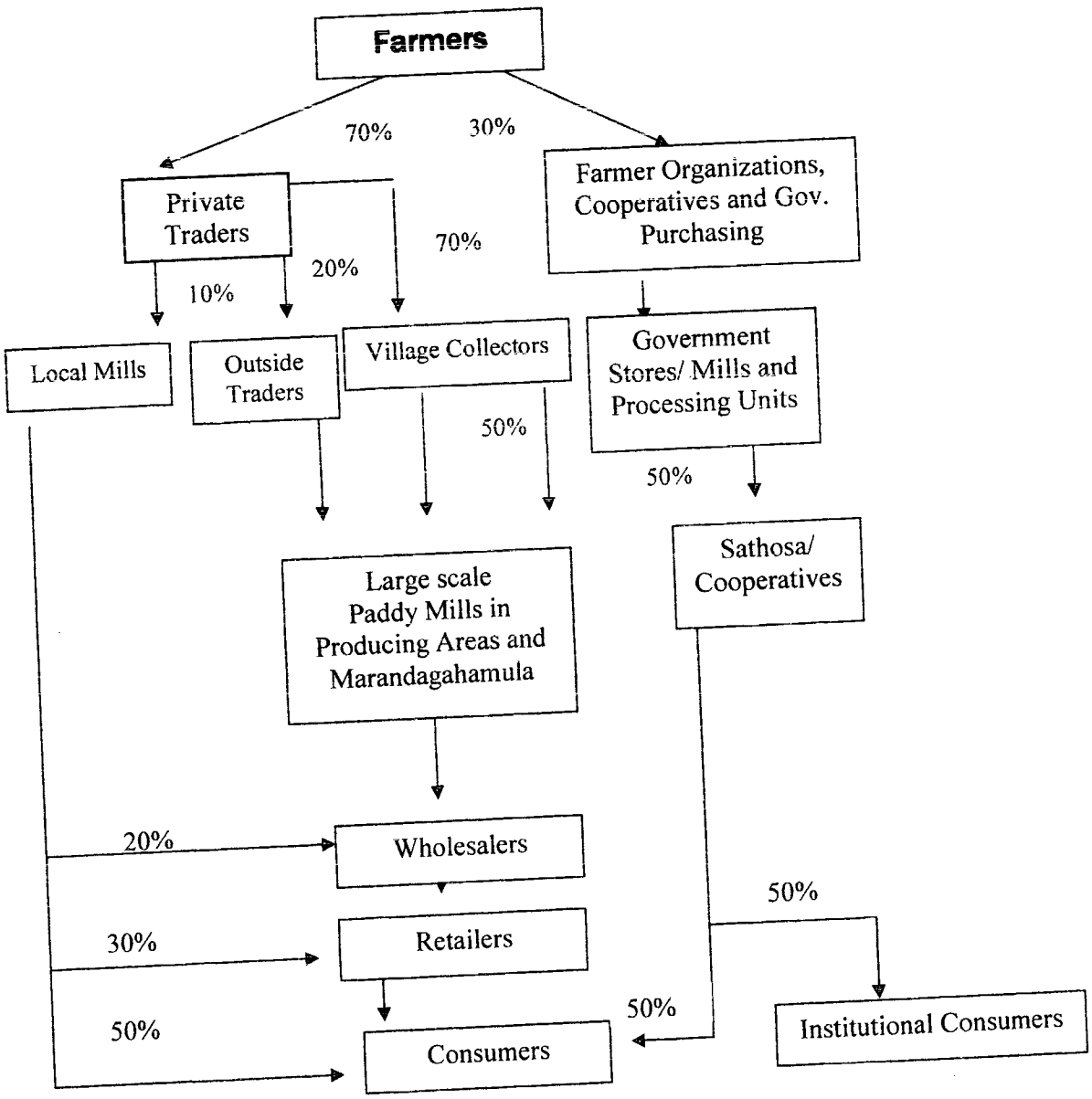
Year	Mid Year Population (000')	Per Capita Consumption Rice (Kg/Year)	Rice Requirement for Consumption (Mt/Year)	Paddy Extent Sown (Acres)	Seed Paddy Requirement (Rice-Mt)	Total Rice Requirement (Mt)	Gross Paddy Production (000 Mt)	Net Paddy Production (000 Mt)	Net Production Rice Equivalent (Mt)	Self Sufficiency Ratio
2001	18,732	106.14	1,988,214	1,972,539	55,982	2,044,196	2,695	2,533	1,722,644	0.84
2002	19,007	106.14	2,017,403	2,106,643	59,788	2,077,191	2,860	2,688	1,828,112	0.88
2003	19,252	106.21	2,044,755	2,428,108	68,911	2,113,666	3,071	2,887	1,962,983	0.93
2004	19,462	106.21	2,067,059	1,923,797	54,599	2,121,658	2,628	2,470	1,679,818	0.79
2005	19,644	106.21	2,086,389	2,315,808	65,724	2,152,113	3,246	3,051	2,074,843	0.96
2006	19,880	106.21	2,111,426	2,440,862	69,273	2,180,699	3,428	3,222	2,191,034	1.00
2007	20,118	106.21	2,136,763	2,572,668	73,014	2,209,777	3,620	3,403	2,313,732	1.05

Average Growth Rate = Average of the growth rate over the years during the period from 2001 - 2005

Seed Paddy Reqirement = Extent Sown x Seed Rate (2 Bu/Acre)
Wastage factor = 6%
1 Mt Paddy = 47.92 Bushels of Paddy
1 Mt Paddy = 0.68 Mt of Rice
Self Sufficiency Ratio = Total Rice Production/Total Rice Requirement

Source: Registrar Generals Department
Central Bank of Sri Lanka
Department of Census and Statistics
Data Bank of HARTI

Flow Chart 1.1: Marketing Flow of Paddy



2. MAIZE

2.1. Introduction

Maize belongs to *Poaceae* family, the botanical name *Zea mays*. Maize originated in the low plains of South America and then it expanded to other countries like China, Russia, Brazil, Mexico, Rumania and Argentina. In the US, pop maize is the most popular variety. The Dutch people introduced it to Sri Lanka.

This is an annual crop mainly cultivated in the *maha* season. The height of the plant varies from 03-15 feet. The diameter of the stalks varies from 1.2-6.2 cm. The stalk consists of nodes and inter nodes, usually 15-19 per stalk. The longer inter nodes are found towards the top of the stalks; towards the base, the inter nodes are very short. The leaves are similar to those of sugarcane; leaves alternately. The leaf blades are long, broadly linear (Rajapaksha 1981).

Both male and female flowers in different parts of the same plant. The male flowers in a cluster (called a tassel) on the top of the ends of the stem as terminal panicles, while the female flowers inside the young cobs which spring from one of the nodes on the stem. Maize is a cross-pollinated crop. Pollination normally occurs by wind. After the fusion, cob is formed with 8-28 seed rows. About 20-70 seeds can be seen in a seed row. Grain is round in shape, flattish and disk-like and is of varying colours such as yellow, red, orange, purple and white depending on the variety.

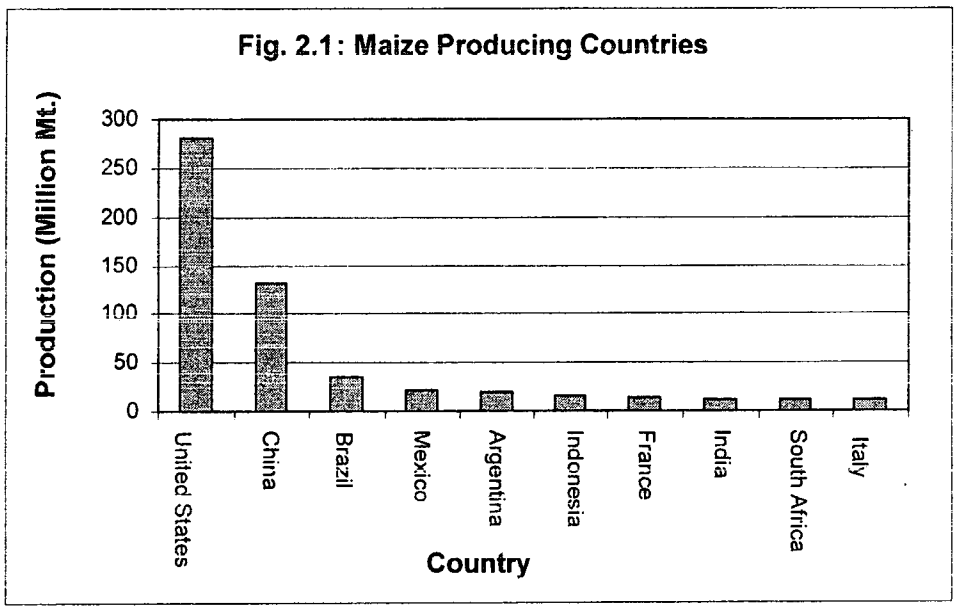
Maize can be grown in a range of soil types, while well drained loam soils with a high organic content and pH of 5.6-8.0 are more suitable. The crop is resistant to drought or various climatic conditions. The optimal temperature is 21 C^0-26.6 C^0 (Rajapaksha,1981) .

Table 2.1 World Production of Maize - 2005

Mn. Metric Tons

Country	Production
United States	280
China	131
Brazil	35
Mexico	21
Argentina	20
Indonesia	15
France	13
India	12
South Africa	12
Italy	11
Other Countries	142
World Total	692

Source: FAO 2005



According to the recent information released by the FAO (through the internet), the highest production of 280 million mt. is in the US, followed by China (Table 2.1). Above statistics illustrate the quantity of production by major maize producing countries in the world. Worldwide production was 692 million mt in 2005. In 2004, around 33 m hectares of maize were grown worldwide, with a production value of more than $ 23 billion.

2.2 Maize Production

Maize flourishes in the dry zone of Sri Lanka. This high yielding crop is easy to process at a lesser cost when compared with other cereals. This can be grown with less inputs such as fertilizer, water and labour in the irrigable highlands of the dry zone under rain fed conditions. It also can be grown under irrigated conditions during dry periods. Planting should commence in the dry zone with the first *maha* rains in October. This requires at least 500-600 mm of rainfall evenly distributed throughout the growing season. It is also cultivated as a single crop as well as a mixed crop.

The first 10 cm of the soil of the land should be prepared to a fine tilt and pulverized to provide a soil free large air spaces in which to plant seeds. Seeds are usually planted in rows, being either dibbled by hand or drilled using seed drills. The seed is buried to a depth of about 12 mm -19 mm (1/2-3/4 inches). The rate amounts to 15 kg per hectare. Spacing when the seed is drilled in rows is 50-25 cm with one seed per hole (Rajapakshe, 1998 April).

Maize Varieties Recommended by the Department of Agriculture

Variety	Days of Maturity	Potential Yield kg/ha
Bhadra	105 - 110	4100
Ruwan	105 - 110	4300
Aruna	90 - 100	4400
Muthu	110 -115	5300

Source: Department of Agriculture

Major Producing Districts

The major producing areas are Badulla (20.6%), Monaragala (18.1%), Ampara (15.6%), Anuradhapura and Matale districts which account for more than 75% of the national production. Of the total production in Badulla District, Ridimaliyadda (49%) and Mahiyanganaya (33%) Divisional Secretary's divisions are prominent. Similarly, Siyambalanduwa (39%), Madulla (15%), and Monaragala (12%) in Monaragala district and Padiyatalawa (46%), Mahaoya (26.6%), and Dehiattakandiya (9.4%) in Ampara district are major producing areas (Table 2.2).

Table 2.2: Percentage Distribution of Maize Extent in Three Major Growing Districts and Divisional Secretariat Divisions in 2005

District	%[1]	D.S. Division	%[2]
1. Badulla	20.6	1. Ridimaliyadda	48.7
		2. Mahiyanganaya	32.6
2. Moneragala	18.1	1. Siyabalanduwa	38.9
		2. Madulla	14.5
		3. Moneragala	11.5
3. Ampara	15.6	1. Padiyathalawa	46.1
		2. Mahaoya	26.6
		3. Dehiattakandiya	9.4

[1] % based on National figure (Extent Cultivated during the year 2005)
[2] % based on District figure (Extent Cultivated during the year 2005)
Sources: Department of Census and Statistics
Data Bank of HARTI

Extent and Production

The table 2.3 indicates the extent and the production of maize in Sri Lanka for the period from 1980 to 2005. Accordingly, the extent cultivated slightly varies between 19,433 ha and 36,812 ha during the reference period. The production data fluctuate in a similar pattern depending on the area under cultivation during the reference period except in the year 2004 in which the highest production was reported in lesser extents of land. This situation may be attributed to high yielding varieties introduced by the Department of Agriculture.

Map 2.1: Average Extent of Maize Cultivated during 2001 - 2005 by Districts

(Figures given in parenthesis are in hectares)

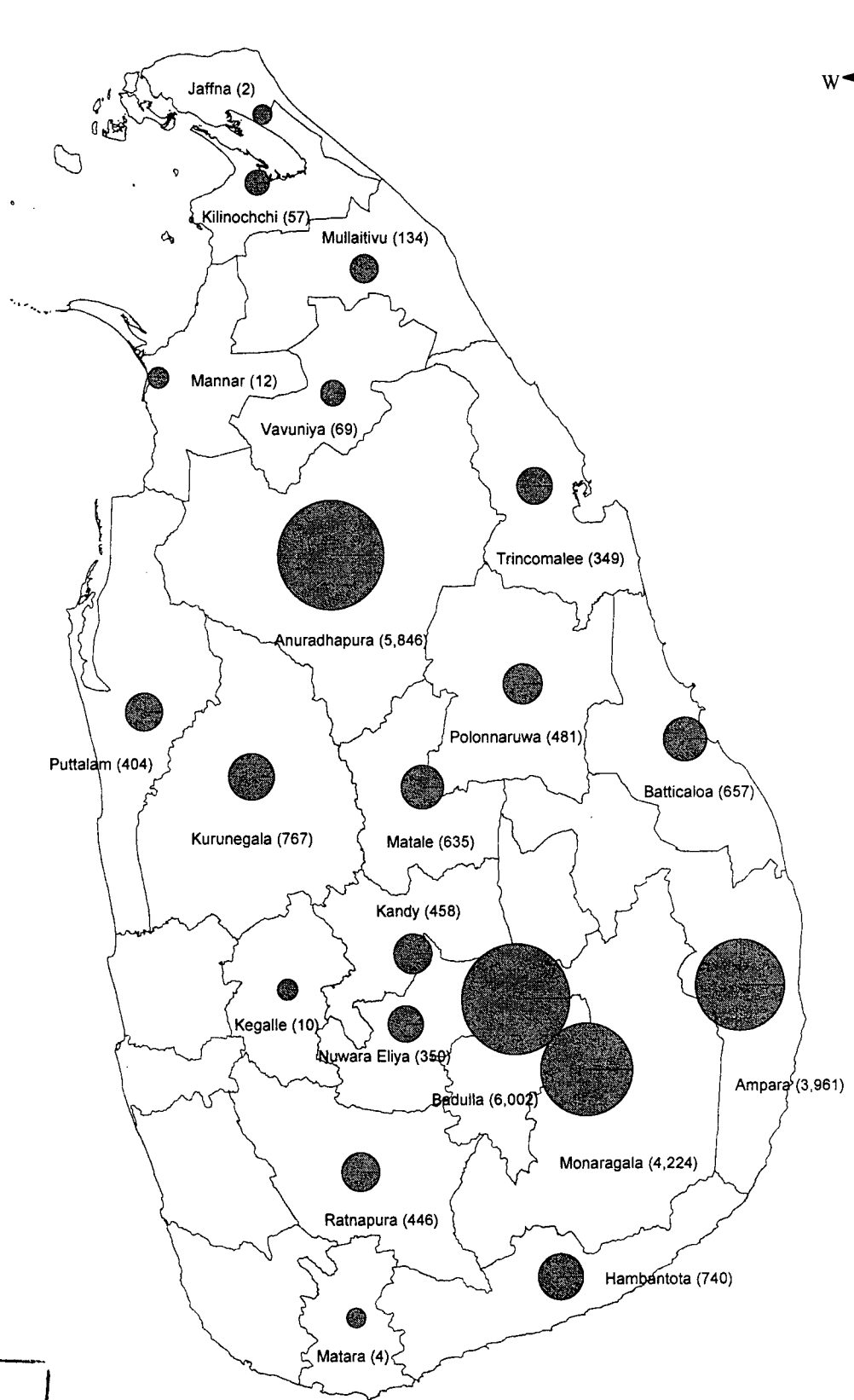
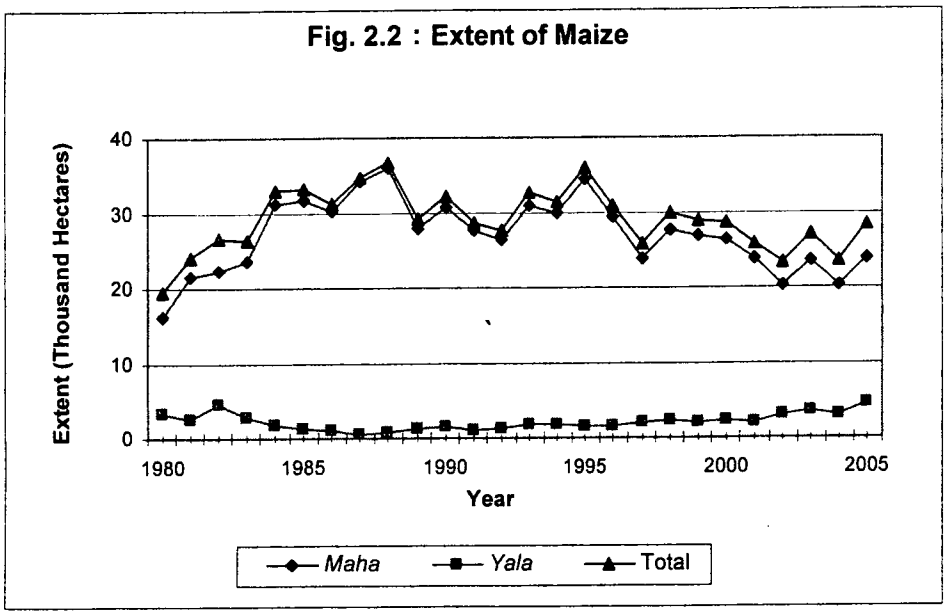
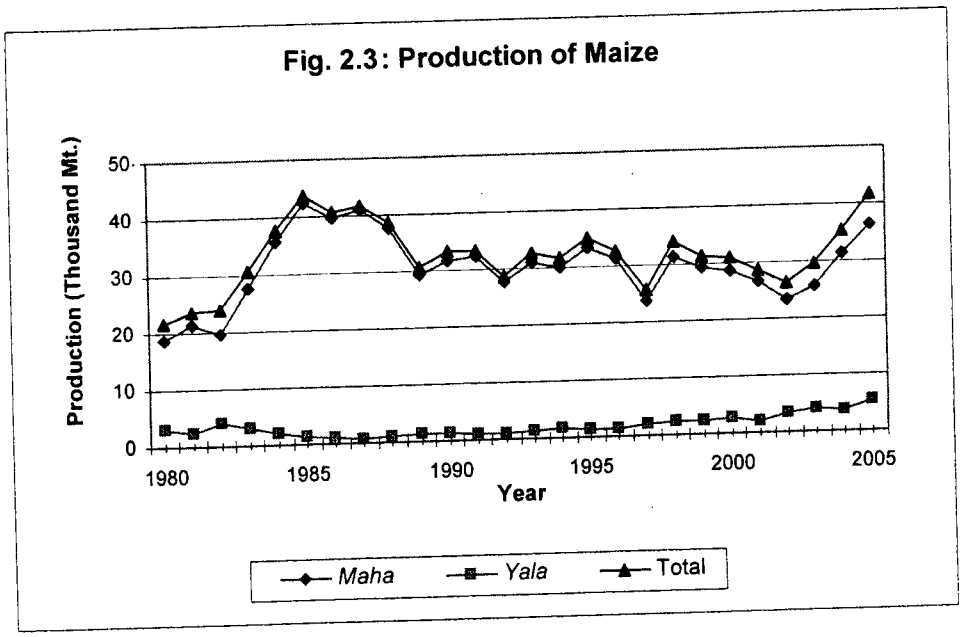


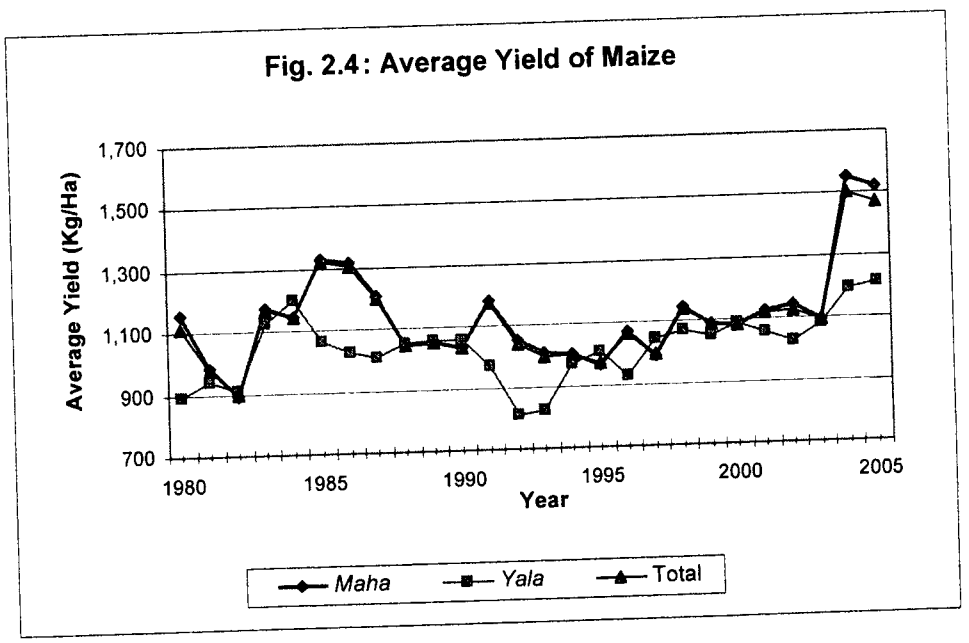
Table 2.3: Extent Production and Average Yield of Maize Sri Lanka, 1996-2005

Year	Extent (Hec)			Production (M.Tons)			Average Yield (Kg/Hec)		
	Maha	*Yala*	Total	*Maha*	*Yala*	Total	*Maha*	*Yala*	Total
1996	29,391	1,504	30,895	31,430	1,394	32,824	1,069	927	1,062
1997	23,824	1,972	25,796	23,630	2,059	25,689	992	1,044	996
1998	27,531	2,259	29,790	31,451	2,423	33,874	1,142	1,073	1,137
1999	26,822	2,082	28,904	29,284	2,187	31,471	1,092	1,050	1,089
2000	26,344	2,302	28,646	28,540	2,512	31,052	1,083	1,091	1,084
2001	23,734	1,978	25,712	26,661	2,094	28,755	1,123	1,059	1,118
2002	20,329	3,084	23,413	23,244	3,173	26,417	1,143	1,029	1,128
2003	23,449	3,611	27,060	25,745	3,900	29,645	1,098	1,080	1,096
2004	20,275	3,146	23,421	31,449	3,752	35,201	1,551	1,193	1,503
2005	23,905	4,496	28,401	36,342	5,462	41,804	1,520	1,215	1,472

Source : Deartment of Census and Statistics







The average yield has slightly fluctuated since 2003 with a marked increase after 2004. This indicates a 40% increase from 1996 (the average yield in 2006 is 1,062 kg/ha) to 2005 in which the average yield is 1,472 kg/ha.

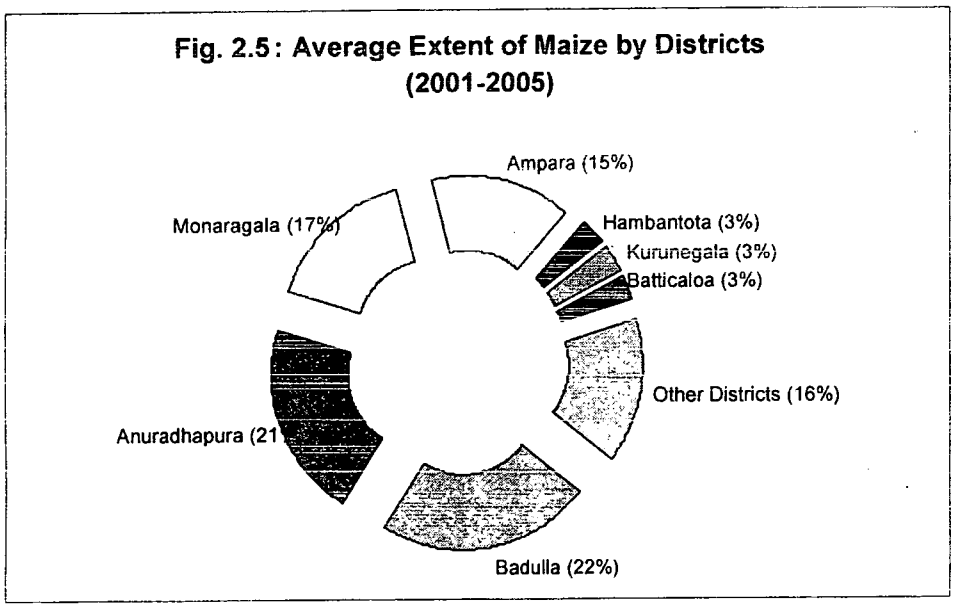


Table 2.4: Percentage Distribution of Average Extent (2001-2005) of Maize by Major Growing Districts

District	Percentage
Badulla	23.4
Anuradhapura	20.6
Monaragala	16.5
Ampara	15.5
Kurunegala	3.0
Hambantota	2.9
Batticaloa	2.6
Other Dists.	15.5

Source: Department of Census and Statistics

2.3 Cost of Production and Returns

Maize can be grown with minimum inputs and technology and therefore the cost of cultivation is lesser than that of other cereals. The Department of Agriculture data indicates that the cost of production in Anuradhapura is Rs.10,271/acre including the imputed cost and Rs.1,182/acre excluding the imputed cost in 2002/2003 under rainfed conditions (Table 2.5). The cost including imputed cost has increased by 55% in 2002/2003 in *maha* to 2003/2004 *maha* season. The increased cost of seeds by 518% from Rs.247.00 in 2002/2003 *maha* to Rs.1,281.00 per acre by 2003/2004 *maha* and the cost of fertilizer from Rs.734 in 2002/2003 *maha* to Rs. 2,077 acre amount to a 282% increase.

Table No.2.5: Cost of Cultivation per Acre of Maize by Type of Inputs in Anuradhapura under Rainfed Conditions

Rs/Acre

Input	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04
	Maha	*Maha*	*Maha*	*Maha*	*Maha*	*Maha*	*Maha*	*Maha*	*Maha*
Labour	na	6,035	7,117	7,482	8,689	8,137	9,541	9,289	9,668
Seed	na	165	123	155	169	128	206	247	1,281
Fertilizer	na					509	409	734	2,077
Draught Power, Machinery & Equipment	na								2,683
Total Cost - Including Imputed Cost	na	6,200	7,240	7,637	8,859	8,774	10,156	10,271	15,710
Total Cost - Excluding Imputed Cost	na	1,327	543	374	1,347	1,448	2,318	1,182	10,175

na denotes not available

Source: Cost of cultivation of agricultural crops, various issues, Department of Agriculture

According to the seasonal production from 1995 (Table 2.6), the net returns from maize under rain fed conditions during the *maha* seasons in 1997, 1998, 2000 and 2001 in Anuradhapura, have been negative when the imputed cost of labour is included. When it is excluded, the highest net return is in 2002 *maha* for the reference period of 1995-2004.

Table 2.6: Net Return per Acre of Maize in Anuradhapura under Rainfed Conditions

Year	Season	Net Return per Acre (Rs.)		Year	Season	Net Return per Acre (Rs.)	
		Including Imputed Cost	Excluding Imputed Cost			Including Imputed Cost	Excluding Imputed Cost
1995	*Maha*	na	3,332.00	2000	*Maha*	-171.00	7,342.00
1996	*Maha*	na	na	2001	*Maha*	-1,367.00	5,959.00
1997	*Maha*	-2,674.00	2,199.00	2002	*Maha*	6,583.00	14,420.00
1998	*Maha*	-2,040.00	4,657.00	2003	*Maha*	1,906.00	10,995.00
1999	*Maha*	769.00	8,032.00	2004	*Maha*	65.00	5,599.00

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

2.4 Trends in Production and Average Yield

For the period from 1996-2005, the highest production in both *maha* and *yala* seasons were reported in 2005. The production of maize has shown an increasing trend during the reference period (fig. 2.3). The highest average yield was in 2005 and it reflects the upward trend during the period from 1996 to 2005 (fig 2.4).

2.5 Domestic Marketing

Every part of the maize plant has an economic value. The grain, leaves, stalk, tassel and cob can be used to produce a large variety of food and non-food products. In Sri Lanka, maize grain and cobs are mostly used as human food and animal feeds. Maize is marketed in two ways. Use of the unripe cobs for human consumption is presently very popular in Sri Lanka. During the harvesting season, the unripe cobs are directly sold after boiling for human consumption. Around 40% of the maize production is used for direct consumption and rest 60% is for the preparation of animal feeds (HARTI). The largest share of the production is sold during the first month of the harvest. The traders of the village or the weekly fair are the commonest source of marketing. A few collecting agents also collect the produce from the farmers during the harvesting season.

Price Determination and Price Behaviour

The price of maize is decided by the traders and the local collectors who decide the price according to their markets for maize. Thus, bargaining power of the farmers is minimal and sometimes they get only Rs.2.00-5.00/Cob.

The major determinant of the price of maize is Colombo market and the seasonal production. The collecting agents and the village traders decide the price in advance depending on the availability of maize and the price at Colombo market.

Price Analysis

The table 2.7 shows the monthly average producer and retail prices of maize from 2001-2005. The average of the five year average for each month is used to calculate the seasonal price index. The percentage of the portion of the month divided by this annual average is referred to as the seasonal price index.

As shown in the table 2.7, the variation of seasonal price index is minimal. January and March depict the lowest price indexes followed by February. The prices have increased since May registering the highest price in July. It is 10 percent higher than the annual price. The price hike is more than 5 percent in June, August and December. Around 2% increase is reported in May, September and October.

Considering the period of 2001-2005, the monthly average producer prices have increased from Rs.10.85/kg in March, 2001 to Rs. 22.01/kg in January, 2005. As a percentage, the price increase is 103%.

Table 2.7: Monthly Average Producer Prices of Maize in Sri Lanka and Seasonal Price Indices

Month	2001	2002	2003	2004	2005	5 Year average	Index	Variation
January	11.95	17.16	15.77	16.39	22.01	16.66	87.70	-12.30
February	11.48	18.11	15.64	17.05	21.57	16.77	88.30	-11.70
March	10.85	17.81	15.39	18.56	20.72	16.67	87.76	-12.24
April	11.28	17.15	22.82	20.43	20.76	18.49	97.35	-2.65
May	14.74	18.47	21.15	21.93	20.98	19.45	102.44	2.44
June	16.14	21.32	22.03	20.59	19.67	19.95	105.05	5.05
July	16.19	20.44	25.32	21.02	21.81	20.96	110.35	10.35
August	15.45	18.11	24.70	21.08	20.39	19.95	105.03	5.03
September	15.72	20.62	21.31	21.44	18.20	19.46	102.46	2.46
October	15.12	14.63	21.18	25.37	21.02	19.46	102.49	2.49
November	16.56	16.30	20.27	24.85	21.29	19.85	104.54	4.54
December	20.47	17.18	18.23	26.59	18.69	20.23	106.53	6.53
Annual Average	14.87	18.10	20.72	21.44	20.68	18.99	100	

Source: Department of Census and Statistics, Data Bank of HARTI

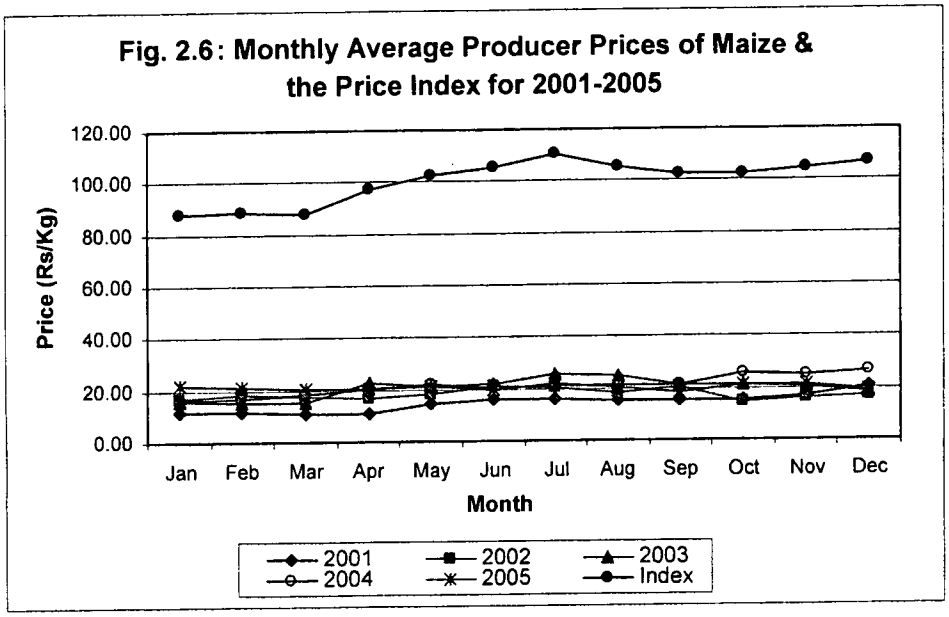


Table 2.8: Monthly Average Retail Prices of Maize in Sri Lanka and Seasonal Price Indices

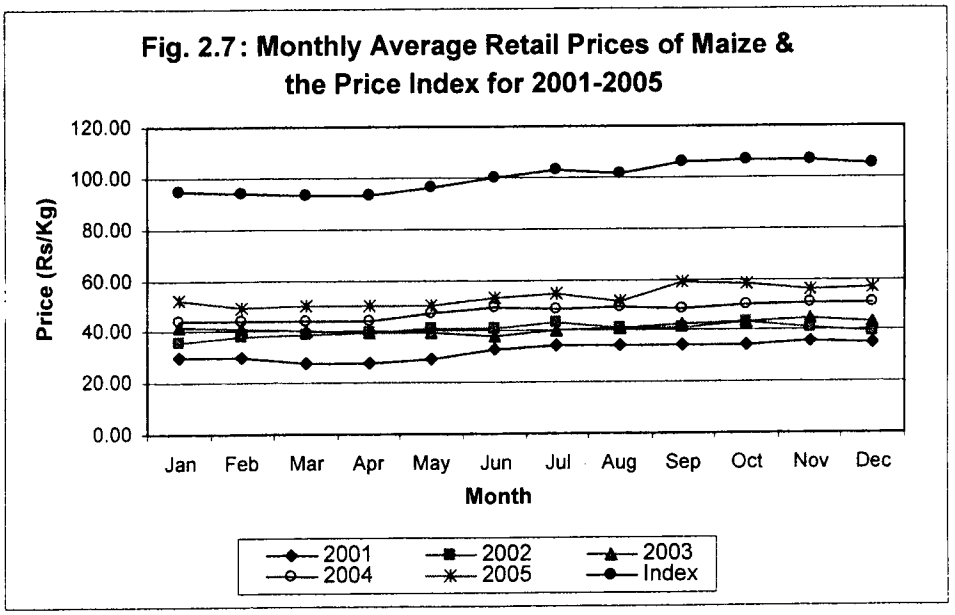
Month	2001	2002	2003	2004	2005	5 Year average	Index	Variation
January	30.13	35.50	41.68	43.62	52.06	40.60	94.76	-5.24
February	29.71	38.06	41.17	43.88	48.89	40.34	94.16	-5.84
March	27.30	38.59	40.46	43.95	49.64	39.99	93.34	-6.66
April	27.57	39.17	39.14	44.14	50.28	40.06	93.51	-6.49
May	29.15	40.95	39.51	47.16	49.75	41.30	96.41	-3.59
June	32.50	41.34	38.31	49.39	52.77	42.86	100.05	0.05
July	33.95	42.97	40.17	48.79	54.14	44.00	102.71	2.71
August	34.17	40.79	41.28	49.01	51.41	43.33	101.14	1.14
September	34.56	41.21	42.68	48.78	58.79	45.20	105.51	5.51
October	34.30	43.08	43.38	50.03	58.07	45.77	106.84	6.84
November	35.89	41.25	44.54	51.05	55.75	45.70	106.66	6.66
December	34.99	39.18	43.56	50.55	56.45	44.95	104.91	4.91
Annual Average	32.07	40.48	41.33	47.47	52.56	42.84	100.00	

Source: Department of Census and Statistics, Data Bank of HARTI

According to the seasonal price indexes for retail prices from 2001-2005 as shown in the table 2.8, the highest prices are reported in October and November and the lowest in March followed by April which marks a decline of over 6%.

During the period from 2001 to 2005, there is a marked increase of Rs. 20/- in the annual average prices of maize. It is evident from the table 2.8 that the prices stagnated in 2002

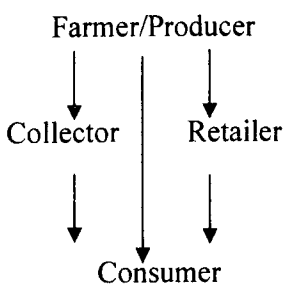
to 2003, but considerable increases were reported during the next two years. The highest price has been reported in September 2005.



Marketing Channels

A two-way marketing channel operates for maize cobs and maize grains.

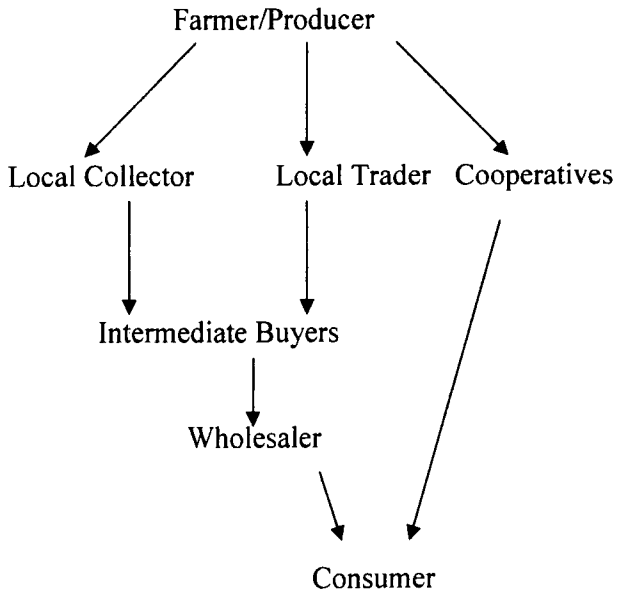
a. Marketing Channels for Unripe Cobs



b. Marketing Channels for Maize Grain

There are three types of major intermediaries between the producers and the end consumers (HARTI Agricultural Commodity Review, 1998).

1. Farm level buyers (local collectors, local traders and co-operatives)
2. Intermediate buyers (who buy from above 1) and
3. Wholesalers



Review of Marketing Cost

The marketing cost of maize is relatively low compared to that of other field crops due to minimal post-harvest losses and minimal number of intermediaries.

2.6 External Trade

The total imported quantity of maize seeds is rather higher than the total imports of maize flour. According to the statistics of the Sri Lanka Customs and the Data Bank of the HARTI presented in the table 2.9, the highest quantity of 157,402 mt had been imported to Sri Lanka as maize seeds in 2001. Main exporters were China (103,171 mt, 65.55 percentage) and Hong Kong (37,550 mt, 23.86 percentage).

Until 2003, China has been the key exporter of maize to Sri Lanka. Since 2004 China was replaced by India. In 2004, 136,819 mt. were imported from India amounting to 91.91 percent of the total imports and in 2005 virtually the total imported quantity was from India.

As shown in table 2.10, the highest extent of maize flour was imported to the country in 1996 (601 mt) followed by 518 mt in 1997. It is significant that after 1997 the total imported quantity of maize flour has declined considerably until 2005.

The value of the quantity of Maize imported from India in 2004 was Rs. 2,519 million and it was Rs. 2,524 million in 2005.

Table 2.9: Imports of Maize by Country of Origin, 1996-2005

M. Tons

Country	1996	1997	1998	1999	2000
Myanmar		2,954	744	1,454	108
Hong Kong		200	9,002	16,734	19,301
India	6,314	12,139	9,075	971	154
Indonesia			7,676		
Singapore	9,281	2,124	661	7,514	15,508
Thailand	21		14,026	3,011	
USA	2	22,006	5	37	
Argentina	33,887	200	21	40,000	42,000
Australia		6	1,988	6,456	5,238
China	4	46,806	63,337	49,426	39,444
S. Africa	35,000			21	21
Malaysia					1,022
Bruma	4,222				
UAE					316
Vietnam	2,800	3,800			
Other	47	5			
Total	91,578	90,240	106,535	125,624	123,112

Country	2001	2002	2003	2004	2005
Myanmar		299	46		
Hong Kong	37,550	33,656	45,227	1,955	
India	1,361	2,518	14,354	136,819	145,550
UAE			20	72	
Singapore	6,200	12,034	6,513	9,527	701
Thailand	989	4,590	2,825	41	
Taiwan		110			
Argentina			192	192	315
Australia	7,582	1,248	46	87	103
China	103,171	40,054	67,297		
S. Africa	64		86	150	43
Malaysia	480				
UK			24		
UAE					170
Japan			46		
Switzerland		86	21	21	
Saudi Arabia					22
Other	5				45
Total	157,402	94,595	136,697	148,864	146,949

Source: External Trade Statistics, Sri Lanka Customs

Major Imports/Exports by Countries of Origin/Destinations

The countries from which the major share was imported in 1990s were China, Argentina, South Africa and Hong Kong. But in 2004 and 2005, almost all the imports of maize were from India.

Maize exports from Sri Lanka were negligible with Singapore, Maldives, Canada and Germany purchasing meager quantities.

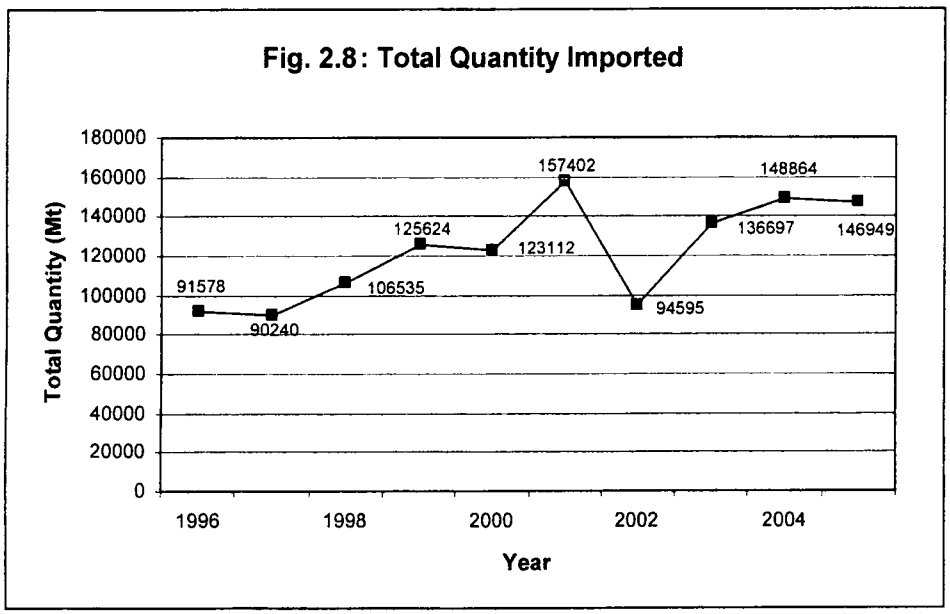
Trends in Imports in Quantity

The local demand for the maize has increased gradually due to the development of the livestock sector especially, poultry and meat industries. The local production of maize flour was insufficient to fulfill the market requirement, necessitating annual imports. Importation of maize from 1996-2005 had marked an upward trend with a sudden drop only in 2002. Figures are tabulated in table 2.10.

Table 2.10: Total Quantity of Maize Imported from 1996-2005

Year	Quantity (Mt)
1996	91,578
1997	90,240
1998	106,535
1999	125,624
2000	123,112
2001	157,402
2002	94,595
2003	136,697
2004	148,864
2005	146,949

Source: External Trade Statistics, Various Issues, Sri Lanka Customs



Export Trade Regulations Tariff and Taxes

Similar trade regulations are applied on maize as on other subsidiary food crops. Since 1996, the rate of duty is 35%. Turnover tax is 6% and national security levy is 4.5% for imports of both seeds and flour (HARTI, 1998).

2.7 Maize Consumption

The maize grains are the edible part. Unripe cobs are consumed after boiling. Unripe seeds can also be prepared as a curry. Ripe seeds are ground into flour and made as *rotti* or *pittu,* items in the Sri Lankan traditional cuisine. When ground into flour, maize yields more flour with lesser bran than wheat does. However, it lacks the protein gluten of wheat.

Nutritional and Therapeutic Value of Maize

The nutritional and therapeutic value is also high. It contains moisture-12.0 gram, energy- 363 kcal, protein-10.0 gram, fat-4.5 gram, carbohydrates-71.0 gram, calcium-12 mg, iron- 2.5 mg, thiamine-350 mg, riboflavin-130 mcg, niacin-2.0 mg (Perera, *et al.*, 1979). Maize is popular in Sri Lanka as a nutritious food called *Thriposha* which is given to pregnant mothers and infants.

According to the table 2.13, the highest per capita consumption of maize is reported among the annual income groups between Rs.17,275 – Rs. 22,036. The Central Bank of Sri Lanka reveals that it is 0.21 kg for the period of 2003/2004. In the rural sector, the consumption is 0.97 kg among those who receive an income between Rs. 0- Rs. 4,520. It is significant to note that the consumption is zero in the estate sector.

Table 2.11: Per Capita Consumption of Maize per Annum by Sectors

Kg

Year	Urban	Rural	Estate	All Sectors
1973	0.07	0.12	0.08	0.11
1978/79	0.01	0.21	0.02	0.15
1981/82	0.04	0.67	0.05	0.51
1986/87	0.01	0.35	0.03	0.26
1996/97	0.00	0.00	0.00	0.00
2003/04	0.03	0.23	0.00	0.19

Source : Consumer Finance and Socio Economic Survey, Various Issues, Central Bank of Sri Lanka

According to per capita consumption statistics of Central Bank of Sri Lanka, the per capita consumption of maize has gradually decreased from 1997 to 2004 in all sectors (table 2.13).

Table 2.12: Per Capita Consumption of Maize by Income Deciles and Sectors - 2003/04

Income Decile	Minimum (Rs)	Maximum (Rs)	Urban (Kg)	Rural (Kg)	Estate (Kg)	All Sectors (Kg)
1	0	4,520	0.00	0.97	0.00	0.83
2	4,527	6,214	0.00	0.41	0.00	0.35
3	6,220	7,728	0.16	0.25	0.00	0.22
4	7,733	9,430	0.00	0.38	0.00	0.32
5	9,435	11,350	0.00	0.11	0.00	0.09
6	11,357	13,755	0.00	0.02	0.00	0.02
7	13,757	17,271	0.00	0.07	0.00	0.06
8	17,275	22,036	0.21	0.14	0.00	0.14
9	22,037	32,778	0.00	0.11	0.00	0.09
10	32,793	825,694	0.00	0.05	0.00	0.03
Overall Average	12,513	95,078	0.03	0.23	0.00	0.19

Source: Consumer Finance and Socio Economic Survey, 2003/04
Central Bank of Sri Lanka

Considering the higher protein content of maize than of rice or wheat, the declining trend in its consumption pattern is an issue that needs more attention to be paid. Corn and corn meal are staple food in many regions of the world. Porridge made out of corn meal is consumed in many countries and it is the main ingredient of Mexican food.

Other Uses of Maize

The leaves, the stalk, the tassel and the cob can be used to produce a large variety of non food products. In the US and Canada, the primary uses of maize vary, for instance, feed for livestock, forage, silage or grain. Silage is made by fermentation of chopped green cornstalks.

In many countries maize is used in crop rotation as a green manure. Alcohol, glucose and high quality edible and technical oil are made out of seeds.

Some forms of plants are occasionally grown for ornamental purposes in gardens. For this purpose, variegated and coloured leaf forms as well as those with colorful cobs are used. The grain also has many industrial uses, including transformation into plastic and fabrics. Some is hydrolyzed and enzymatic ally treated to produce syrups, particularly, high fructose corn syrup, a sweetener, and some is fermented and distilled to produce grain alcohol. Grain alcohol from maize is traditionally the source of bourbon whisky. Maize is sometimes used as a biomass fuel. This crop is also used as fish bait which is particularly popular in Europe for coarse fishing (Evening Journal, Washington).

2.8 Government Policy

The government introduced a Floor Price Scheme in 1979 to protect the local farmers. Under this scheme, the Paddy Marketing Board (PMB) got involved in purchasing maize from the local farmers. According to studies this scheme was not effective as a salvage price. For example, for a long period between 1982/83 *maha* and 1995 *yala* the floor price remained constant, while the production cost was increasing, which resulted in a decline in the net profit. The declining profit discouraged local farmers to invest in maize and this was the reason for the decline in the area cultivated and production as well.

2.9 Conclusion and Recommendations

Maize is one of the high potential, industrial and commercial crops grown in Sri Lanka. The development activities for the maize are slowly moving due to various policy level problems. If proper attention is given for the maize industry, it has the possibility and the potential for development. As it can be produced in huge quantities locally, it can offer an additional income and employment opportunities. Maize has vast uses as a food or non food. Hence, a wide range of market opportunities can be generated in the present globalized world. The local requirement too is complemented with imports, hence the need to increase local production.

As the post harvest losses are minimal for this crop, strategies should be introduced to make such losses zero. Awareness programs among the farmers about the needs mentioned above should also have a component to make the farmers knowledgeable about value added products to generate more and more agri-business enterprises to increase the income level of the maize farmers.

The present policy in respect of grains is to mobilize state and private sector resources for the sustainable production of grains assuring the farmers with profitability, high quality and productivity, and promote the emergence of an industry based on such production targeting the total national requirement of maize from local lands within three years.

3. KURAKKAN (FINGER MILLET)

Introduction

Finger millet (*Eleusine coracana*) known as kurrakkan or kurahan in Sri Lanka is an annual plant widely grown as a cereal in the dry zone areas. Kurrakkan was originally native to Ethiopian highlands and was introduced into India nearly 4,000 years ago (Wikipedia, the free encyclopedia, of the Internet). In Sri Lanka, it has been cultivated since ancient times and considered as the second staple food after rice (Rajapaksha, 1998).

Compared with rice, maize or sorghum, the nutritive value of kurakkan is very high in terms of protein, fat and minerals. According to the website of the Department of Agriculture, the nutritive values of kurakkan are: protein (7.6%), moisture (13.24%), carbohydrate (74.36%), fiber (1.52%), minerals (2.35%), fat (1.35%) and energy (341.6 cal/100 g). In Sri Lanka, the grain is ground into flour and used for a variety of foods such as *pittu, roti, thalapa* and sweet meats. In the early period, the people in the rural areas used to cultivate this as a *chena* crop for consumption as a supplementary main food. But the situation has changed now because the cropping pattern and the consumption pattern have also considered as changed according to market forces. Finger millet is also considered as a safer food with medicinal value for the diabetics.

Kurakkan requires 20-35 inches of rain. As a moisture-loving crop, it grows well in rain-fed uplands in the dry zone and the intermediate zones in Sri Lanka. It also grows under supplementary irrigated water supply. Considering the agronomic factors, the Department of Agriculture has recommended two new varieties, namely Ravi and Ravana as early maturing and high yielding varieties. Both these varieties take 90-100 days for maturity. The Department also introduced some other varieties such as MI 301 and MI 302 that take 115-120 days to mature.

3.2 Extent and Production

The statistics related to the extent, the production and the average yield of kurakkan in Sri Lanka shows that the extent and the production have dropped sharply in the past 25 years, while the average yield of kurakkan (kg/ha) has upsurged dramatically. The table 3.1 and figures 3.1-3.3 highlight the variation in the extent, the production and the average yield during 1980-2005.

Table 3.1: Extent, Production and Average Yield of Kurakkan – Sri Lanka

Year	Extent (Ha)			Production (Mt)			Average Yield (Kg/Ha)		
	Maha	*Yala*	Total	*Maha*	*Yala*	Total	*Maha*	*Yala*	Total
1980	16,487	4,954	21,441	10,241	2,878	13,119	621	581	612
1981	16,437	3,163	19,600	9,441	1,974	11,415	574	624	582
1982	16,208	4,193	20,401	9,545	2,737	12,282	589	653	602
1983	16,280	3,376	19,656	11,579	2,464	14,042	711	730	714
1984	14,803	2,124	16,927	9,425	1,338	10,763	637	630	636
1985	11,837	1,233	13,070	8,210	819	9,029	694	664	691
1986	12,146	1,081	13,227	8,002	719	8,721	659	665	659
1987	11,002	596	11,598	6,957	367	7,324	632	616	631
1988	11,524	838	12,362	7,731	573	8,304	671	684	672
1989	9,248	951	10,199	6,381	639	7,020	690	672	688
1990	9,808	910	10,718	6,696	520	7,216	683	571	673
1991	8,857	983	9,840	5,964	601	6,565	673	611	667
1992	6,975	1,414	8,389	4,247	790	5,037	609	559	600
1993	8,417	1,898	10,315	5,912	1,127	7,039	702	594	682
1994	7,983	1,465	9,448	5,682	990	6,672	712	676	706
1995	6,208	1,231	7,439	4,088	788	4,876	659	640	655
1996	5,306	823	6,129	3,401	505	3,906	641	614	637
1997	4,734	828	5,562	2,994	506	3,500	632	611	629
1998	5,091	951	6,042	3,797	588	4,385	746	618	726
1999	5,566	917	6,483	4,220	587	4,807	758	640	741
2000	5,667	877	6,544	4,285	564	4,849	756	643	741
2001	4,986	650	5,636	3,774	422	4,196	757	649	744
2002	4,830	647	5,477	3,663	408	4,071	758	631	743
2003	6,235	1,123	7,358	4,544	725	5,269	729	646	716
2004	4,226	887	5,113	4,026	643	4,669	953	725	913
2005	4,975	1,232	6,207	5,531	916	6,447	1,112	744	1,039

Source: Department of Census and Statistics
Data Bank of HARTI

As shown in table 3.1, the total extent of kurakkan has dropped from 21,441 ha. in 1980 to 5,531 ha in 2005. The fig. 3.1 further reflects how the total extent has fluctuated annually in the two seasons i.e. *yala* and *maha.*

In par with the decline in the extent cultivated as shown in fig 3.1, the total production of kurakkan too dropped sharply. The fig. 3.2 highlights the variation of the production over the past 25 years.

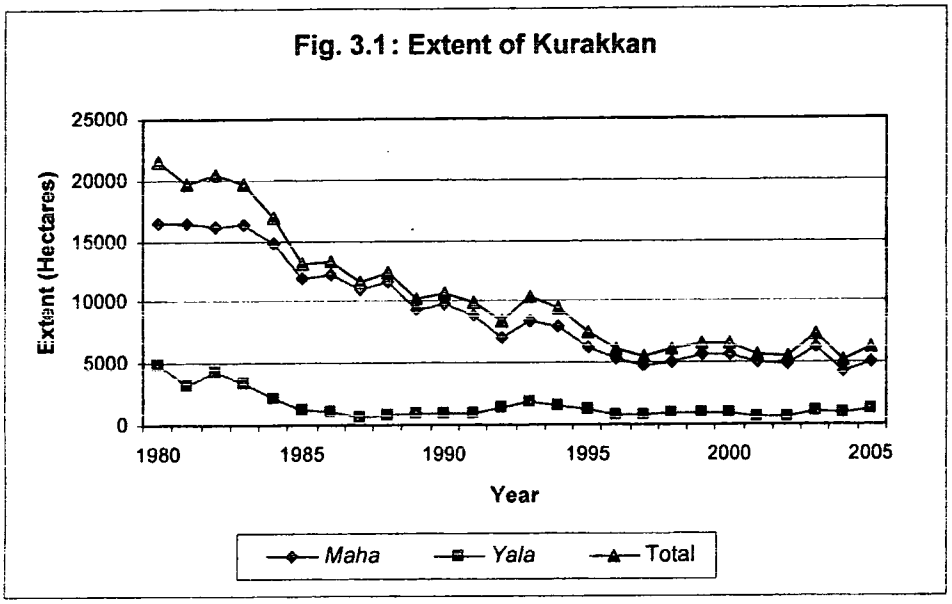


Fig. 3.1: Extent of Kurakkan
25000
20000
15000
10000
5000
0
Extent (Hectares)
1980
1985
1990
1995
2000
2005
Year
Maha
Yala
Total

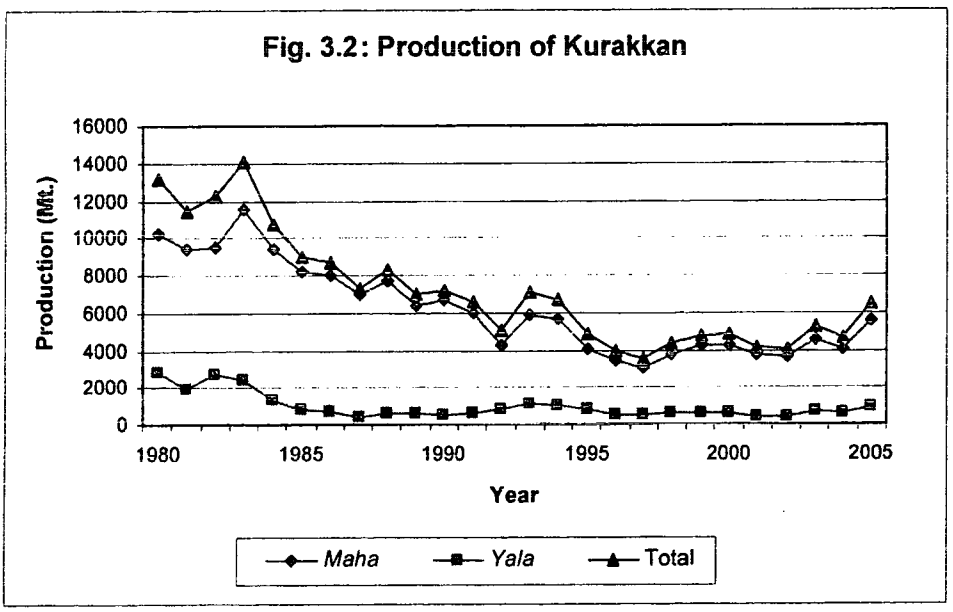
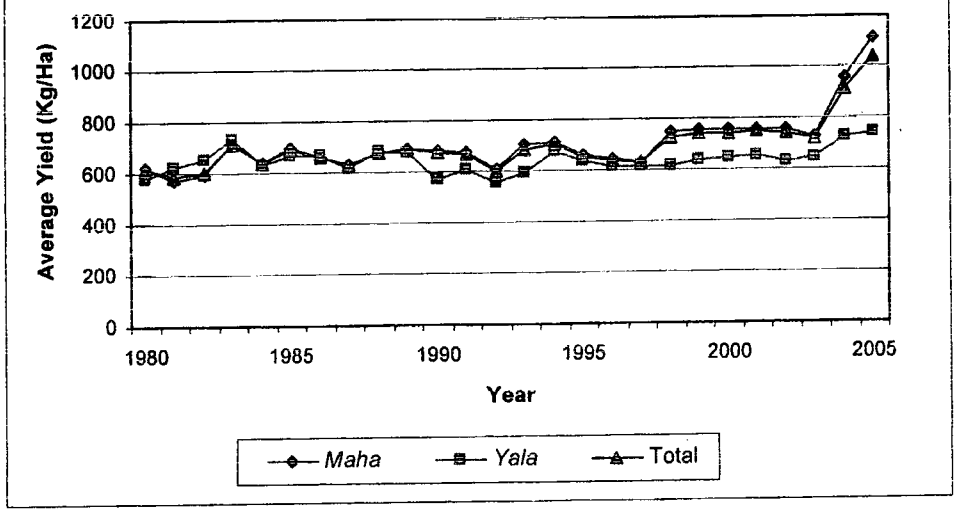


Fig. 3.2: Production of Kurakkan
16000
14000
12000
10000
8000
6000
4000
2000
0
Production (Mt.)
1980
1985
1990
1995
2000
2005
Year
Maha
Yala
Total

3.3 The Average Yield

As shown in table 3.1 and figure 3.3, the average yield has increased from 612 kg/ha in 1980 to 1,039 kg/ha in 2005, resultant on the effect of the newly introduced varieties and better management practices coupled with the subsistence *chena* cultivation.

Fig. 3.3 :Average Yield of Kurakkan



As a subsidiary food crop grown in the rain-fed high lands, the distribution of the total extent and the production of kurakkan mainly concentrated in three districts where highland *chena* cultivation is widespread. Thus as shown in table 3.2, more than 50 percent of the total extent and the production of kurakkan centred in Anuradhapura, Monaragala and Hambantota districts and nearly 25 percent in Ratnapura, Kurunegala, Matale, Ampara and Badulla districts.

Table 3.2: Percentage Distribution of Extent and Production by Major Producing Districts (Based on average figures for 2001-05)

District	Extent (Avg 2001-05)	Production (Avg 2001-05)
Anuradhapura	25.2	28.5
Monaragala	16.4	21.4
Hambantota	12.1	8.3
Ratnapura	6.7	5.3
Kurunegala	6.3	7.2
Matale	5.7	-
Ampara	5.2	-
Badulla	4.1	6.1
Others	18.3	23.2
Sri Lanka-		
Maha	84.8	87.4
Yala	15.2	12.6
Total	100.0	100.0

Sources: Department of Census and Statistics
Data Bank of HARTI

The figure 3.3 also shows that approximately 85 percent of the total extent and the production were reported during *maha* seasons where the farmers are heavily involved in rain-fed high land farming. Compared to the total extents spread in the districts, the yield in Badulla is relatively higher than the yield received from Ratnapura, Ampara and Matale districts.

3.4 Cost and Returns

Despite the fact that kurakkan is a subsidiary food crop mainly based on rain-fed highland farming, the cost of cultivation of kurakkan is very important in determining suitable crops for highland farming because some alternative cash crops available for the farmers are more attractive than kurakkan in receiving a higher yield and better incomes. The information relating to costs and returns of kurakkan cultivation is available only for Anuradhapura district and our analysis is based on limited information. Thus as shown in table 3.3, the total production cost of cultivating one acre of kurakkan is Rs. 11,627 in m*aha* 2002/03 including the imputed cost for labour and own resources. The table also shows that more than 85 percent of the total cost is incurred on labour. So as a labour intensive crop, the farmers used to cultivate kurakkan as an inter crop or mixed crop without considering the labour cost. The total cost of cultivation also increased rapidly in the recent past resultant on the increase of wage rates of labour (see annex 3.3).

Table 3.3: Cost and Net Returns per Acre of Kurakkan in Anuradhapura District Under Rainfed Conditions during *Maha* Seasons

Rs./Acre

Year	Including Imputed Cost		Excluding Imputed Cost	
	Cost	Return	Cost	Return
1997/98	6870.00	780.00	305.00	7346.00
1998/99	8004.00	1149.00	1254.00	7899.00
1999/00	7885.00	2817.00	1025.00	9677.00
2000/01	8534.00	4630.00	385.00	12,779.00
2001/02	10829.00	3389.00	1461.00	12,756.00
2002/03	11627.00	2809.00	393.00	14,043.00

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

The table 3.3 again shows a wider gap in the profit margins depending on the inclusion or the exclusion of the imputed value for family labour. Thus, the net profit margin from cultivating one acre of kurakkan including the imputed value is Rs. 2,809 and it increases up to Rs. 14,043 when the imputed values are excluded.

3.5 Marketing

Marketable surplus of kurakkan cultivation depends on the extent of production, the size of the farm and the cultivation practice i.e, commercial farming. As discussed elsewhere, kurakkan is cultivated as an inter crop or a mixed crop in upland farming areas. Therefore, the farming of this crop is practised mainly for consumption purposes and the surplus if available is marketed. According to field observations in Anuradhapura district, the marketable surplus of kurakkan varies from 20% to 80%, due to the fact that the extent under high land farming varied from area to area. Thus, it was observed that the farm size in Nachchaduwa areas is relatively higher than that in Rajangana areas.

As shown in table 3.4, the total domestic requirements of kurakkan is met with local production and imports. Still, the local producers supply nearly 80% of the country's requirement. The quantity of imports is determined on the variation of local production and accordingly import percentage changed from 10% in 1996 to 28% in 2004 (table 3.4). According to Sri Lanka Customs records for the past five years, kurakkan is imported mainly from India while Singapore, Australia and the UAE contributed with small quantities (Annex 3.5).

Table 3.4: Local Production and Imports of Kurakkan

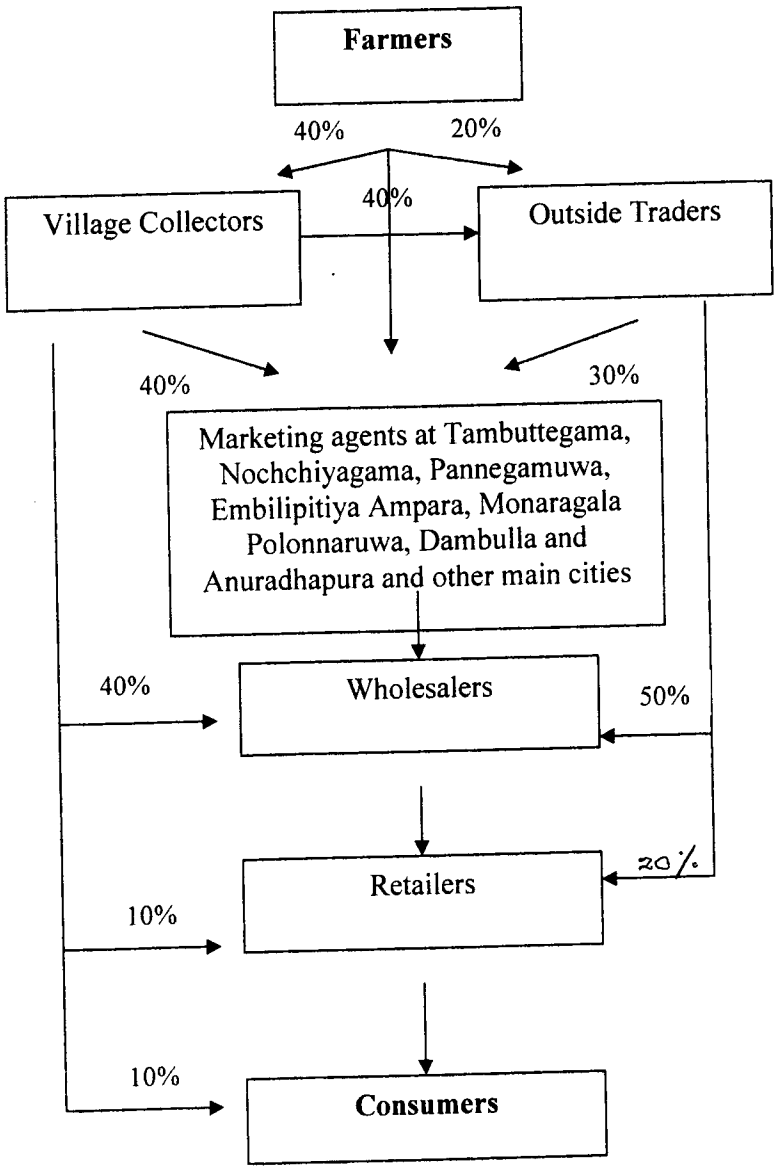
Year	Local Production (Mt)	As a % of Country Requirement	Imports (Mt)	As a % of Country Requirement
1996	3,906	89.7	449	10.3
1997	3,500	73.6	1,253	26.4
1998	4,385	86.3	694	13.7
1999	4,807	94.6	277	5.4
2000	4,849	89.8	552	10.2
2001	4,196	83.7	816	16.3
2002	4,071	78.2	1,134	21.8
2003	5,269	89.6	610	10.4
2004	4,669	71.9	1,829	28.1
2005	6,447	82.4	1,379	17.6

Sources: Department of Census and Statistics, Sri Lanka Customs
Data Bank of HARTI

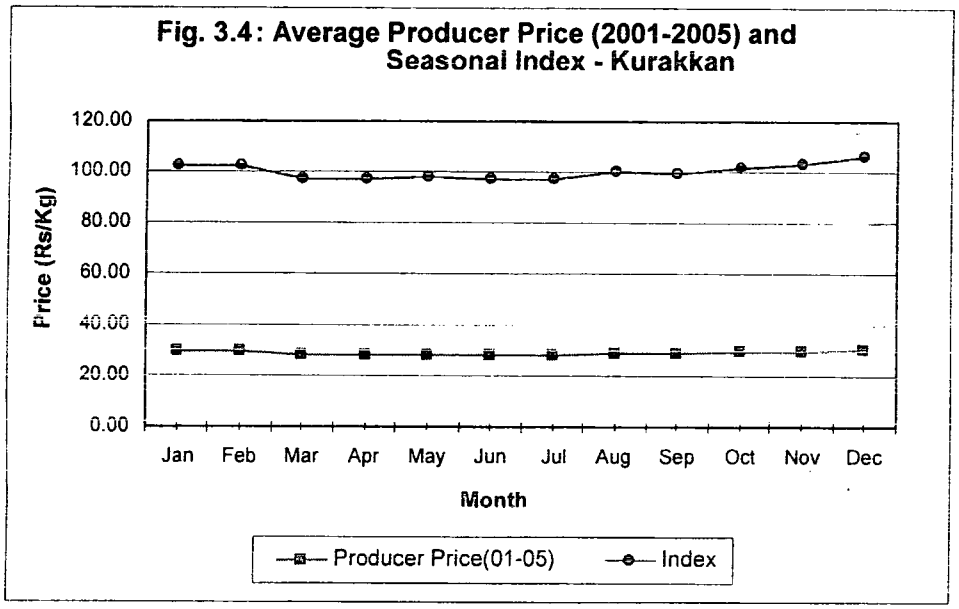
With 80 percent of the requirements produced locally, the marketing channels of kurakkan depend on the local buyers, the wholesalers and the retailers. As shown in the flow chart 3.1, almost 100% of the local production is purchased by the private traders comprising the village traders, the outside traders and the marketing agents. The production is distributed to the consumers through the retail markets. Price difference between the producers and the consumers is nearly Rs.12/- per kilogram and it is shared as the market margins of the collectors, the marketing agents, the wholesalers and the retailers for packing, storing, transport, loading and unloading costs.

Price determination of kurakkan from the producer to the retailer is shown in figs.3.4 and 3.5 and tables 3.6 - 3.8. Thus, the price index for producer prices indicates that the annual five-year (2001-05) price average for twelve months is 28.96 and it fluctuates slightly over the year (fig. 3.4).

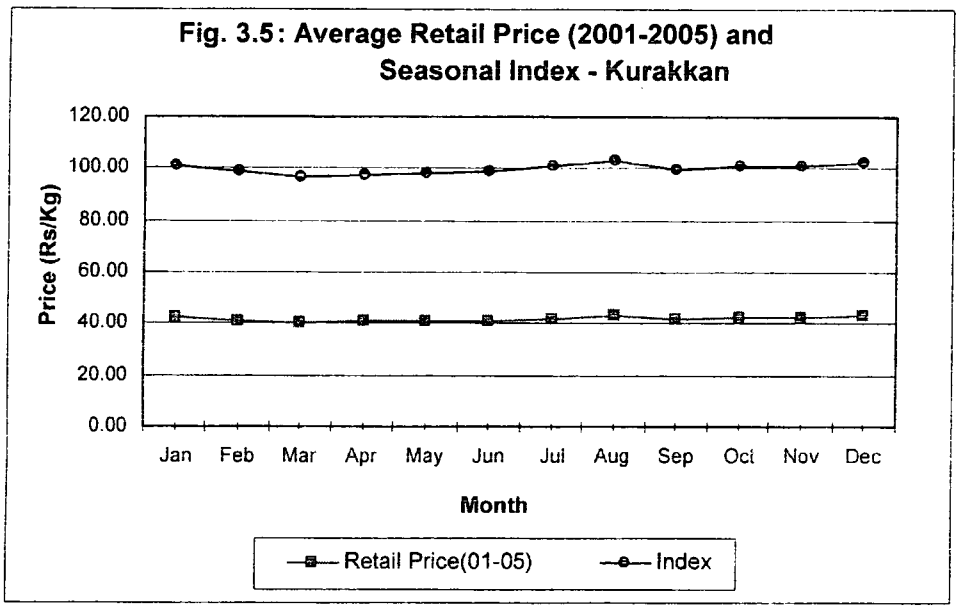
Flow Chart 3.1: Marketing Flow of Kurakkan



Source: Based on field observations in Anuradhapura and Monaragala districts



Source: Department of Census and Statistics and Data Bank of HARTI



Source: Department of Census and Statistics and Data Bank of HARTI

As shown in fig. 3.5, the price index for retail prices of kurakkan for 2001-05 have moved upword slightly indicating fairly high prices during the months of October, November and December of the year.

3.6 Consumption

According to the consumer finance and socio-economic surveys conducted by the Central Bank of Sri Lanka, overall per capita consumption of kurakkan per annum in Sri Lanka has dropped drastically from 3.60 kg in 1973 to 0.08 kg in 2003/04. Consumption

in all the sectors has declined in the past 30 years (Table 3.5) in parallel to the drop in the extent and the production as shown in early sections. The distribution of consumption by the income deciles and the sectors shows that consumption is low among the higher income deciles (See annex 3.9).

Table 3.5: Per Capita Consumption of Kurakkan by Sectors

Kg

Year	Urban	Rural	Estate	All Sectors
1973	0.60	4.80	-	3.60
1978/79	0.10	1.00	-	0.70
1981/82	0.10	1.60	0.10	1.20
1986/87	0.11	0.72	0.26	0.57
1996/97	0.05	0.07	-	0.06
2003/04	0.03	0.09	0.01	0.08

Source: Consumer Finance and Socio Economic Survey, Various Issues, Central Bank of Sri Lanka

3.7 The Government Policy

The National Policy on Agriculture and Livestock planned for 2003-2005 has focused on the need for resource mobilization and technology development for kurakkan and other field crops (OFCs). It was targeted to increase the extent, and the production and to reduce imports through provision of high quality seeds and planting materials along with improving the marketing facilities. The government tariff policy was also adjusted to encourage the local producers. The Customs duty for kurakkan imports was 28% in 2005, an incentive to the local producers. However, the effectiveness of the government policy leaves much to be desired since only a few areas are benefited by the incentives.

3. 8 Conclusion and Policy Recommendations

Obviously the extent under cultivation and the production of kurakkan have dropped drastically in the past three decades with the decline of upland *chena* cultivation over the relevant period. Similarly the per capita consumption of kurakkan also marked a downward slide during the period and consumer preference has moved towards the other substitutes. Though the government has introduced some incentives to boost the local production, the desired goals are yet to be achieved due to the fact that kurakkan cultivation cannot be promoted on a *yaya* basis as rice and maize cultivation. Therefore, a thorough investigation is necessary to find out the viability of growing kurakkan as a commercial crop that could compete with other alternatives.

Annex 3.1: Extent of Kurakkan by Major Growing Districts

Hectares

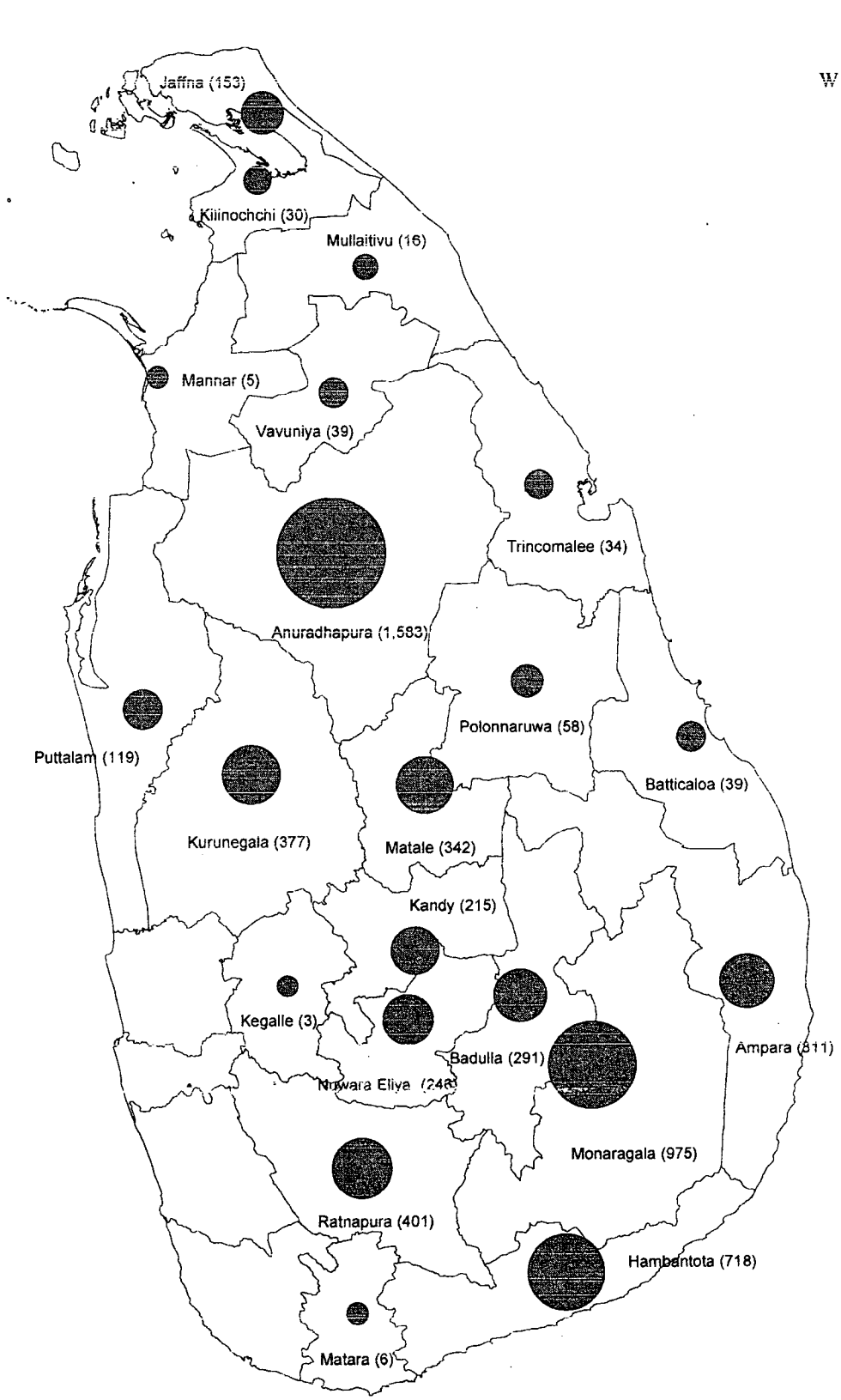
District	Season	Avg. (76-80)	Avg. (81-90)	Avg. (86-90)	Avg. (91-95)	Avg. (96-00)	2001	2002	2003	2004	2005	Avg. (2001-05)	%
Anuradhapura	*Maha*	6,125	3,377	2,392	1,729	1,123	1,183	1,472	1,721	921	1,550	1,369	
	Yala	314	390	12	35	29	38	37	79	77	434	133	
	Total	6,439	3,610	2,399	1,926	1,152	1,221	1,509	1,800	998	1,984	1,502	25.2
Moneragala	*Maha*	3,219	2,079	1,309	920	875	895	831	1,219	743	811	900	
	Yala	750	342	24	44	44	38	15	160	81	82	75	
	Total	3,968	2,421	1,333	964	920	933	846	1,379	824	893	975	16.4
Hambantota	*Maha*	1,665	799	698	866	818	459	351	1,078	646	645	636	
	Yala	657	227	132	214	151	16	66	115	141	72	82	
	Total	2,323	1,026	830	1,080	969	475	417	1,193	787	717	718	12.1
Ratnapura	*Maha*	1,351	1,080	439	333	325	310	219	358	270	259	283	
	Yala	746	522	106	158	174	104	102	131	127	123	117	
	Total	2,097	1,603	585	491	498	414	321	489	397	382	401	6.7
Kurunegala	*Maha*	3,574	1,400	761	566	270	358	362	359	278	287	329	
	Yala	746	191	84	131	33	45	46	45	41	64	48	
	Total	4,321	1,591	845	697	304	403	408	404	319	351	377	6.3
Matale	*Maha*	3,009	2,226	2,092	1,174	521	522	306	281	248	235	318	
	Yala	407	140	20	24	32	34	40	19	17	8	24	
	Total	3,416	2,366	2,112	1,197	553	556	346	300	265	243	342	5.7
Ampara	*Maha*	441	419	312	303	266	276	285	292	266	209	266	
	Yala	503	11	14	14	41	44	28	30	40	85	45	
	Total	642	426	326	317	307	320	313	322	306	294	311	5.2
Others*	*Maha*	5,099	3,733	2,743	1,797	1,074	983	1,004	925	854	979	949	
	Yala	1,948	1,155	488	779	376	331	313	544	363	364	383	
	Total	7,039	4,888	3,231	2,576	1,450	1,314	1,317	1,469	1,217	1,343	1,332	22.4
Sri Lanka	*Maha*	24,483	15,113	10,746	7,688	5,273	4,986	4,830	6,235	4,226	4,975	5,050	
	%	80.9	84.3	92.5	84.6	85.7	88.5	88.2	84.7	82.6	80.2	84.8	
	Yala	5,770	2,818	875	1,398	879	650	647	1,123	887	1,232	908	
	%	19.1	15.7	7.5	15.4	14.3	11.5	11.8	15.3	17.4	19.8	15.2	
	Total	30,253	17,931	11,621	9,086	6,152	5,636	5,477	7,358	5,113	6,207	5,958	
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Total of Badulla, Nuwara Eliya, Kandy, Jaffna, Puttalam, Polonnaruwa, Vavuniya, Batticaloa, Trincomalee, Killinochchi, Mullaitivu Districts and special project Mahaweli H

Sources: Department of Census and Statistics
Data Bank of HARTI

Map 3.1: Average Extent of Kurakkan Cultivated during 2001 - 2005 by Districts

(Figures given in parenthesis are in hectares)



Annex 3.2: Production of Kurakkan by Major Producing Districts

Hectares

District	Season	Avg. (76-80)	Avg. (81-90)	Avg. (86-90)	Avg. (91-95)	Avg. (96-00)	2001	2002	2003	2004	2005	Avg. (2001-05)	%
Anuradhapura	*Maha*	2,762	2,104	1,436	1,220	792	835	1,002	1,270	1,037	2,427	1,314	
	Yala	158	238	8	26	20	25	25	52	54	303	92	
	Total	3,210	2,246	1,441	1,245	812	860	1,027	1,322	1,091	2,730	1,406	28.5
Moneragala	*Maha*	1,984	1,242	959	604	819	1,007	928	1,223	881	953	998	
	Yala	398	208	12	33	38	31	11	119	65	66	58	
	Total	2,382	1,451	972	637	857	1,038	939	1,342	946	1,019	1,057	21.4
Hambantota	*Maha*	994	540	579	796	461	235	189	514	429	386	351	
	Yala	280	184	120	174	84	7	35	65	127	58	58	
	Total	1,273	724	699	971	545	242	224	579	556	444	409	8.3
Kurunegala	*Maha*	2,098	831	382	286	234	333	335	328	330	281	321	
	Yala	362	122	44	75	18	26	26	25	25	55	31	
	Total	2,459	942	426	361	252	359	361	353	355	336	353	7.2
Badulla	*Maha*	913	745	320	209	203	265	235	224	282	255	252	
	Yala	180	25	13	33	18	15	16	81	59	82	51	
	Total	1,093	770	333	242	221	280	251	305	341	337	303	6.1
Ratnapura	*Maha*	798	742	323	256	218	187	135	219	165	243	190	
	Yala	398	359	62	94	106	64	59	76	76	78	71	
	Total	1,196	1,101	385	350	464	251	194	295	241	321	260	5.3
Others*	*Maha*	3,888	3,436	3,153	1,808	1,012	912	839	764	902	986	881	
	Yala	1,094	825	308	424	267	254	236	307	237	274	262	
	Total	4,979	4,260	3,461	2,232	1,263	1,166	1,075	1,071	1,139	1,260	1,142	23.2
Sri Lanka	*Maha*	13,759	9,640	7,153	5,179	3,739	3,774	3,663	4,544	4,026	5,531	4,308	
	%	83	84	93	86	87	90	90	86	86	86	87	
	Yala	2,837	1,866	564	859	550	422	408	725	643	916	623	
	%	17	16	7	14	13	10	10	14	14	14	13	
	Total	16,596	11,506	7,717	6,038	4,289	4,196	4,071	5,269	4,669	6,447	4,930	
	%	100	100	100	100	100	100	100	100	100	100	100	100.0

*Total of Matale, Kandy, Ampara, Nuwara Eliya, Jaffna, Puttalam, Polonnaruwa, Vavuniya, Batticaloa, Trincomalee, Kilinochchi, Mullaitivu Districts and special project Mahaweli H

Source: Department of Census and Statistics

Annex 3.3: Cost of Cultivation per Acre of Kurakkan by Inputs in Anuradhapura under Rainfed Conditions during *Maha* Seasons

Input	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03
Labour	6,777.00	7,914.00	7,776.00	8,425.00	10,670.00	11,454.00
Seed	93.00	91.00	109.00	109.00	158.00	173.00
Total Cost - Including Imputed Cost	6,870.00	8,004.00	7,885.00	8,534.00	10,829.00	11,627.00
Total Cost - Excluding Imputed Cost	305.00	1,254.00	1,025.00	385.00	1,461.00	393.00

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

Annex 3.4: Net Return per Acre of Kurakkan in Anuradhpura under Rainfed Conditions during *Maha* Seasons

Year	Net Return Per Acre		Year	Net Return Per Acre	
	Including Imputed Cost	Excluding Imputed Cost		Including Imputed Cost	Excluding Imputed Cost
1998	780.00	7,346.00	1999	1,149.00	7,899.00
2000	2,817.00	9,677.00	2001	4,630.00	12,779.00
2002	3,389.00	12,756.00	2003	2,809.00	14,043.00

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

Annex 3.5 : Imports of Kurakkan by Country of Origin

Country	2001		2002		2003		2004		2005	
	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)
India	644	9,829	936	14,222	555	8,495	1,787	25,029	1,269	15,023
Singapore									11	164
Australia	87	1,560	65	1,183					36	2,585
U.S.A			41	797						
China					41	829	42	558	63	1,155
U.A.E	85	1,351	92	1,165						
Other					14	231				
Total	816	12,740	1,134	17,367	610	9,555	1,829	25,587	1,379	18,927

Source: External Trade Statistics, Sri Lanka Customs

Annex 3.6: Monthly Average Producer Prices of Kurakkan in Sri Lanka

Rs/Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	11.96	16.77	21.73	22.45	25.76	26.09	30.58	26.22	35.28	30.35
February	15.61	17.68	18.99	20.87	22.68	27.96	26.37	24.38	38.11	31.28
March	16.06	15.51	20.55	24.09	21.71	27.73	26.27	24.25	35.26	27.25
April	15.13	16.54	25.45	26.43	22.35	28.59	26.51	24.69	30.37	29.98
May	16.63	18.83	22.81	26.22	25.00	26.23	26.59	27.73	29.31	32.02
June	15.89	19.03	18.90	23.83	26.88	26.70	25.26	27.06	29.52	32.28
July	14.94	19.50	19.53	23.83	26.82	27.06	25.65	28.29	30.13	28.86
August	16.64	19.90	22.63	26.36	26.88	29.50	25.90	29.46	30.02	30.33
September	16.94	19.30	21.39	27.48	26.09	27.82	27.25	28.21	30.51	30.15
October	17.76	20.36	22.77	27.88	26.36	27.30	27.20	27.75	30.65	34.53
November	17.35	20.89	22.13	28.12	26.68	28.84	29.50	27.57	31.60	31.20
December	19.95	20.69	20.50	28.31	27.37	33.25	29.38	27.91	31.99	30.50
Annual Average	16.70	18.49	21.48	25.46	25.74	28.15	27.18	27.08	31.95	30.45

Sources: Department of Census and Statistics

Data Bank of HARTI

Annex 3.7: Monthly Average Retail Prices of Kurakkan Flour in Sri Lanka

Rs/Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	40.71	53.90	56.59	57.46	56.90	68.17	73.33	69.67	75.37	75.84
February	40.85	54.01	55.89	56.73	57.80	69.41	73.51	69.77	74.53	76.11
March	41.50	54.46	56.93	57.14	57.01	70.56	74.17	70.65	74.43	77.48
April	42.45	54.54	57.18	59.08	59.68	70.54	74.17	70.77	73.75	78.64
May	44.54	55.60	57.71	58.02	59.52	70.63	74.29	71.79	73.86	79.20
June	45.14	54.68	57.39	58.50	58.83	71.50	74.75	71.77	74.32	78.10
July	45.91	55.54	55.67	57.95	61.30	71.55	75.00	72.10	74.33	78.61
August	47.44	55.92	56.98	57.09	63.74	71.55	75.00	72.35	74.56	78.70
September	49.68	55.60	57.06	57.31	63.54	71.89	75.60	72.35	74.78	80.23
October	50.21	55.46	57.07	57.59	63.65	71.82	75.60	72.37	75.16	80.20
November	51.84	55.40	56.79	57.20	63.65	73.17	75.24	72.80	76.16	80.50
December	53.17	55.21	58.45	56.90	63.65	74.83	75.36	73.52	76.16	81.77
Annual Average	46.09	55.03	56.98	57.58	60.76	71.33	74.66	71.68	74.79	78.79

Sources: Department of Census and Statistics
Data Bank of HARTI

Annex 3.8: Monthly Average Retail Prices of Kurakkan in Sri Lanka

Rs/Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	21.47	31.88	30.50	38.35	31.83	41.43	45.09	45.18	39.17	40.39
February	22.67	29.05	31.63	35.27	31.21	42.32	46.73	38.63	38.61	40.14
March	22.97	28.75	33.87	35.38	35.24	41.11	44.98	36.27	37.55	41.53
April	25.11	29.22	35.40	35.62	31.73	42.94	43.11	38.32	37.70	41.03
May	24.39	30.92	35.52	38.69	34.04	43.13	43.07	37.86	38.13	42.52
June	26.14	30.31	36.88	37.68	38.50	44.19	43.26	38.83	37.88	41.82
July	26.64	28.54	36.33	38.83	41.25	44.53	44.50	39.43	39.59	42.25
August	26.95	29.48	36.48	38.70	41.19	45.04	43.78	40.39	40.15	45.65
September	29.32	31.37	33.10	41.19	41.51	42.57	42.51	37.10	39.80	45.91
October	33.20	32.72	32.53	38.97	41.37	42.27	41.96	40.92	40.19	46.06
November	33.39	34.48	31.89	39.10	40.17	43.99	41.31	38.42	42.02	44.91
December	34.09	34.86	33.47	39.53	43.55	44.47	42.98	39.33	41.64	45.77
Annual Average	28.03	30.87	34.42	38.25	38.18	43.19	43.55	39.14	39.54	43.20

Sources: Department of Census and Statistics
Data Bank of HARTI

Annex 3.9: Per Capita Consumption of Kurakkan by Income Deciles and Sectors, 2003/04

Income Decile	Minimum (Rs)	Maximum (Rs)	Urban (Kg)	Rural (Kg)	Estate (Kg)	All Sectors (Kg)
1	0	4,520	0.00	0.18	0.00	0.16
2	4,527	6,214	0.11	0.14	0.00	0.12
3	6,220	7,728	0.00	0.09	0.00	0.08
4	7,733	9,430	0.00	0.06	0.00	0.05
5	9,435	11,350	0.00	0.13	0.00	0.11
6	11,357	13,755	0.00	0.07	0.00	0.06
7	13,757	17,271	0.00	0.05	0.00	0.04
8	17,275	22,036	0.10	0.05	0.00	0.06
9	22,037	32,778	0.05	0.08	0.47	0.08
10	32,793	825,694	0.00	0.06	0.00	0.04
Overall Average	12,513	95,078	0.03	0.09	0.01	0.08

Source: Consumer Finance and Socio Economic Survey, 200304, Central Bank of Sri Lanka

4. GREEN GRAM

4.1. Background

4.1.1 Origin

Green gram or mung bean is botanically known as *Vigna radiata* (formerly *Phaseolus aureus*). The crop is native to India and not found in a wild state. The plant is a popular food crop in Sri Lanka and locally called as Mung (Sinhala) and Pashippayaru (Tamil). *V. radiata* was an early introduction to China and Java and introduced to east and central Africa, the West Indies and the United State in comparatively recent times.

4.1.2 Agro – Ecological Requirements

Green gram is a popular dry land crop in Sri Lanka. It grows on a wide range of soils from light sandy to heavy clay soils, but it does best on well drained loam soils in a pH range of 6-7 with a well distributed rainfall of 750-850 mm per year. It is drought resistant and susceptible to water logging. Temperature requirement is 20-35 C.

4.2 Production

Average annual green gram production in Sri Lanka during the period 2001-2005 was 9,490 mt. in an average annual extent of 10,500 ha (Tables 4.2 and 4.3). MI_5, MI_6, and type 77 are the major varieties of green gram cultivated in Sri Lanka. MI_5 is the most popular variety used by the farmers. The yield potentials of theses varieties vary from 1,250 kg/ha to 1,800 kg/ha. The level of yield obtained varies from 1,250 kg/ha to 1,500 kg/ha. However, the average yield obtained during 2001-2005 in *yala and maha* seasons was 915 kg/ha and 866 kg/ha respectively indicating a big yield gap in the average situation. The cultivation of green gram under rainfed conditions with lesser inputs is the major reason for the lower yield in average situations.

Table 4.1: Extent Production and Average Yield of Green Gram – Sri Lanka

Year	Extent (Ha)			Production (M.Tons)			Average Yield (Kg/Ha)		
	Maha	*Yala*	Total	*Maha*	*Yala*	Total	*Maha*	*Yala*	Total
1996	12934	5327	18261	12112	4473	16585	936	840	908
1997	11680	4956	16636	10960	4040	15000	938	815	902
1998	13487	4022	17509	12240	3406	15646	908	847	894
1999	11705	3657	15362	10671	3154	13825	912	862	900
2000	9716	3253	12969	8904	2791	11695	916	858	902
2001	8438	2627	11065	7589	2127	9716	899	810	878
2002	8501	2747	11248	7881	2443	10324	927	889	918
2003	9603	2413	12016	8560	2045	10605	891	847	883
2004	6438	2169	8607	5881	1927	7808	913	888	907
2005	6889	2754	9643	6520	2477	8997	946	899	933

Source: Department of Census and Statistics

Map 4.1: Average Extent of Green Gram Cultivated during 2001 - 2005 by Districts

(Figures given in parenthesis are in hectares)

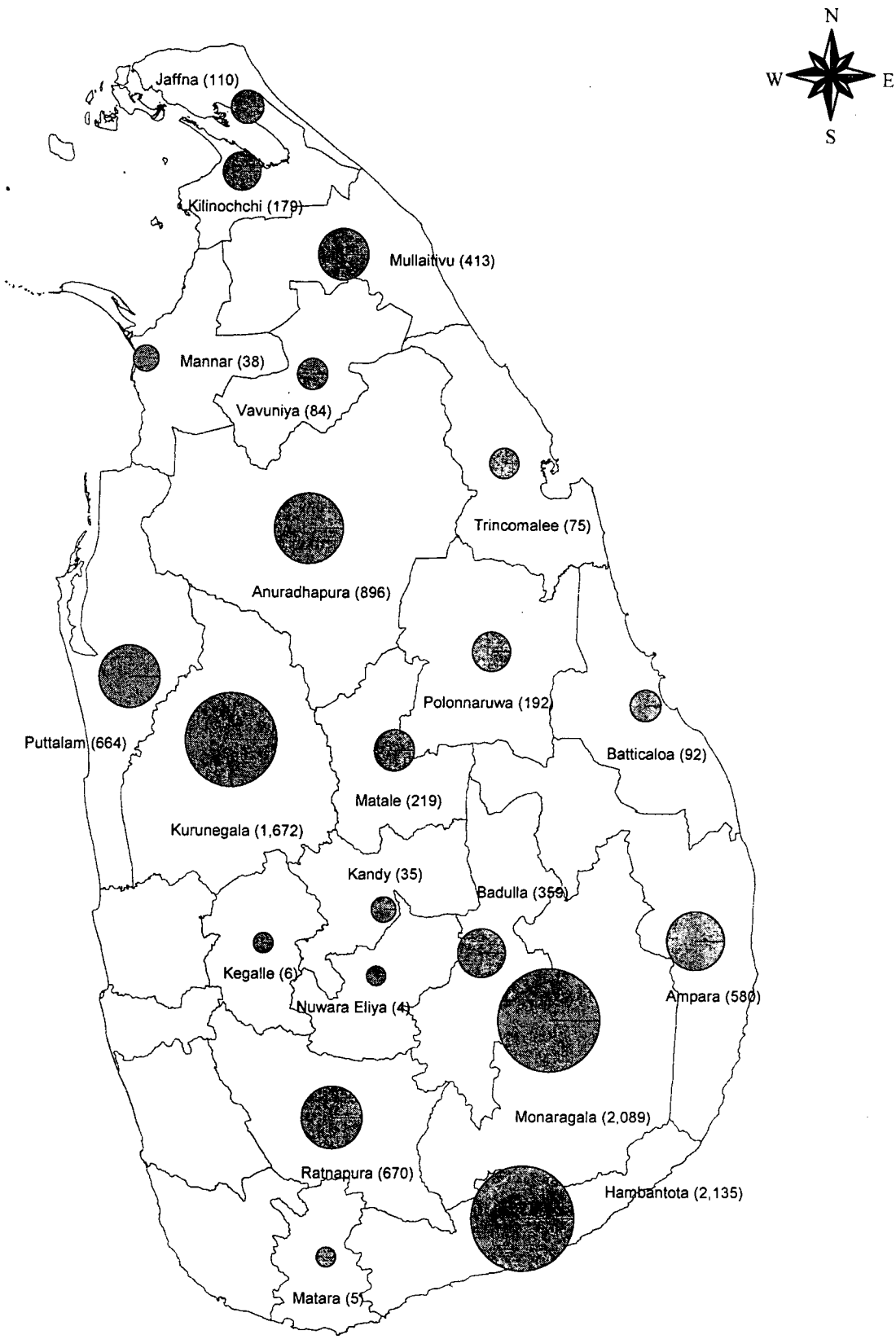


Table 4.2: Production of Green Gram by Major Producing Districts

M.Tons

District	Period	2001	2002	2003	2004	2005	Average (01-05)	%
Moneragala	*Maha*	2,165	2,033	2,474	1,761	1,815	2,050	
	Yala	124	123	342	292	304	237	
	Total	2,289	2,156	2,816	2,053	2,119	2,287	24.1
Hambantota	*Maha*	1,711	2,285	2,342	1,566	1,172	1,815	
	Yala	198	768	75	280	72	279	
	Total	1,909	3,053	2,417	1,846	1,244	2,094	22.1
Kurunegala	*Maha*	801	798	820	569	579	713	
	Yala	305	309	320	365	578	375	
	Total	1,106	1,107	1,140	934	1,157	1,089	11.5
Puttalam	*Maha*	387	453	411	265	759	455	
	Yala	180	168	138	69	105	132	
	Total	567	621	549	334	864	587	6.2
Ratnapura	*Maha*	496	241	399	226	458	364	
	Yala	301	98	162	157	233	190	
	Total	797	339	561	383	691	554	5.8
Anuradhapura	*Maha*	547	378	459	338	543	453	
	Yala	53	61	57	59	201	86	
	Total	600	439	516	397	744	539	5.7
Others*	*Maha*	1,482	1,693	1,655	1,156	1,194	1,436	
	Yala	966	916	951	705	984	904	
	Total	2,448	2,609	2,606	1,861	2,178	2,340	24.7
Sri Lanka	*Maha*	7,589	7,881	8,560	5,881	6,520	7,286	
	%	78.1	76.3	80.7	75.3	72.5	76.8	
	Yala	2,127	2,443	2,045	1,927	2,477	2,204	
	%	22	24	19	25	28	23	
	Total	9,716	10,324	10,605	7,808	8,997	9,490	
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Total of Ampara, Mullaithivu, Badulla, Polonnaruwa, Matale, Jaffna, Trincomalee, Kilinochchi, Vavuniya, Districts and special projects Mahaweli H

Sources: Department of Census and Statistics
Data Bank of HARTI

Table 4.3 : Extent of Green Gram by Major Growing Districts

Hectares

District	Period	2001	2002	2003	2004	2005	Average (01-05)	%
Hambantota	*Maha*	1,663	2,201	2,570	1,633	1,219	1,857	
	Yala	239	723	70	285	70	277	
	Total	1,902	2,924	2,640	1,918	1,289	2,135	20.3
Moneragala	*Maha*	1,972	1,840	2,308	1,504	1,651	1,855	
	Yala	127	130	361	292	262	234	
	Total	2,099	1,970	2,669	1,796	1,913	2,089	19.9
Kurunegala	*Maha*	1,240	1,247	1,242	1,126	1,155	1,202	
	Yala	433	425	425	419	646	470	
	Total	1,673	1,672	1,667	1,545	1,801	1,672	15.9
Ratnapura	*Maha*	674	321	547	239	337	424	
	Yala	413	135	223	196	266	247	
	Total	1,087	456	770	435	603	670	6.4
Puttalam	*Maha*	584	517	475	211	527	463	
	Yala	278	256	218	98	155	201	
	Total	862	773	693	309	682	664	6.3
Anuradhapura	*Maha*	652	460	542	316	613	517	
	Yala	74	81	81	78	270	117	
	Total	726	541	623	394	883	633	6.0
Others*	*Maha*	1,653	1,915	1,917	1,409	1,387	1,656	
	Yala	1,063	997	1,035	801	1,085	996	
	Total	2,716	2,912	2,952	2,210	2,472	2,652	25.2
Sri Lanka	*Maha*	8,438	8,501	9,603	6,438	6,889	7,974	
	%	76	76	80	75	71	76	
	Yala	2,627	2,747	2,413	2,169	2,754	2,542	
	%	24	24	20	25	29	24	
	Total	11,065	11,248	12,016	8,607	9,643	10,516	
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Total of Ampara, Badulla, Nuwara Eliya, Kandy, Jaffna, Polonnaruwa, Vavuniya, Trincomalee, Killinochchi, Mullaitivu, Mannar districts and special project Mahaweli H

Sources: Department of Census and Statistics
Data Bank of HARTI

4.2.1 Major Producing Areas

As perceived in the last five year data (2001-2005), Moneragala is the major green gram producing district in terms of production and productivity (Table 4.2). Moneragala produces an average of 2,287 mt. green gram per year at the average yield level of 1.09 mt./ha. Although, Moneragala is the major green gram production district in Sri Lanka in terms of the average extent during the last 5 years from 2001-05 as shown in table 4.3, Hambantota district has cultivated the largest extent. Moneragala, Kurunegala and Hambantota districts accounted for about 52 percent of the total green gram extent of the country in the year 2005. Buttala, Wellawaya and Thanamalwila are the major green gram producing DS divisions in Moneragala district which accounted for about 70 percent of the total extent under green gram in the district.

Table 4.4: Major Cultivation Areas of Green Gram in Major Producing Districts

District	% in the Country[1]	DS Division	% in the District[2]
1. Moneragala	19.8	1. Buttala	27.2
		2. Wellawaya	26.1
		3. Thanamalwila	16.3
2. Kurunegala	18.7	1. Nikaweratiya	15.8
		2. Giribawa	13.7
		3. Galgamuwa	12.6
		4. Mahawa	11.9
3. Hambantota	13.4	1. Hambantota	28.9
		2. Sooriyawewa	21.2
		3. Lunugamwehera	18.9

[1] % is based on the national extent cultivated during the year 2005
[2] % is based on the district extent cultivated during the year 2005

Sources: Department of Census and Statistics
Data Bank of HARTI

4.2.2 Seasonality of Production

As the production statistics in tables 4.2 and 4.3 reveal, *maha* is the major green gram producing season both in terms of extent and total production. According to the last 5 year production averages (2001-2005), 76 percent of the total annual extent of green gram cultivation and production is from the *maha* season cultivation. According to the seasonal yield figures of the last five years, *maha* yield is little higher than that of *yala.*

4.2.3 Production Trends

The general trend of green gram production in terms of the extent cultivated, the production and the average yield over the last 10 years is illustrated in figures 4.1 – 4.3 which show that the extent cultivated and the production make a decreasing slide over the years. The extent under green gram has dropped from 18,261 ha to 9,643 ha during the period of 1996 to 2005 which is a 47 percent decline. The total annual green gram production too has declined to 8,997 mt. in 2005 from 16,585 mt. in 1996, a 46 percent decline. The yield level of the green gram has stagnated during the last 10 years. The Department of Agriculture has introduced a high yielding new green gram variety known as MI_6 in 2004, but it will take a few years for the farmers to adopt this new variety.

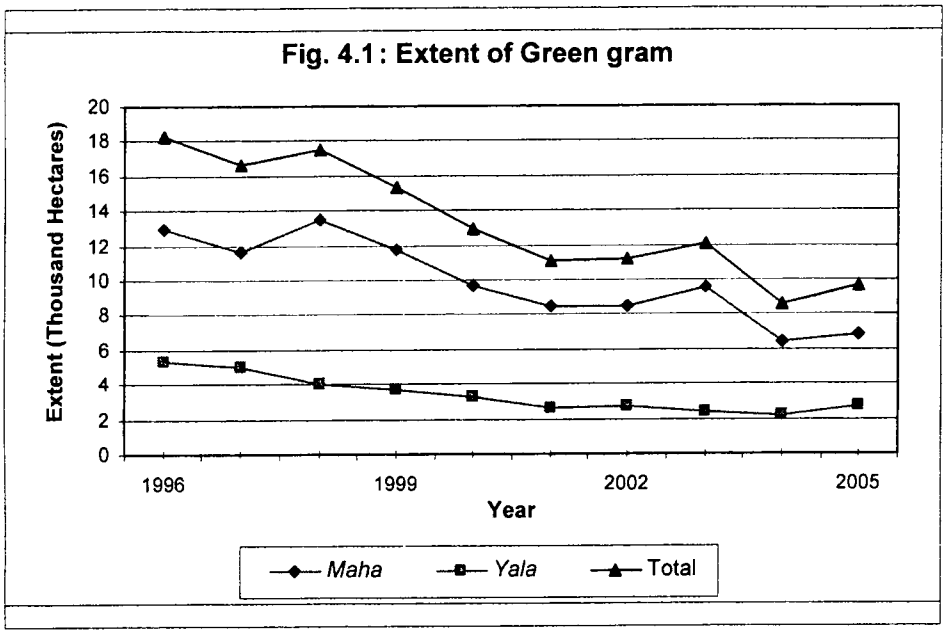


Fig. 4.1: Extent of Green gram
Extent (Thousand Hectares)
20
18
16
14
12
10
8
6
4
2
0
1996
1999
2002
2005
Year
Maha
Yala
Total

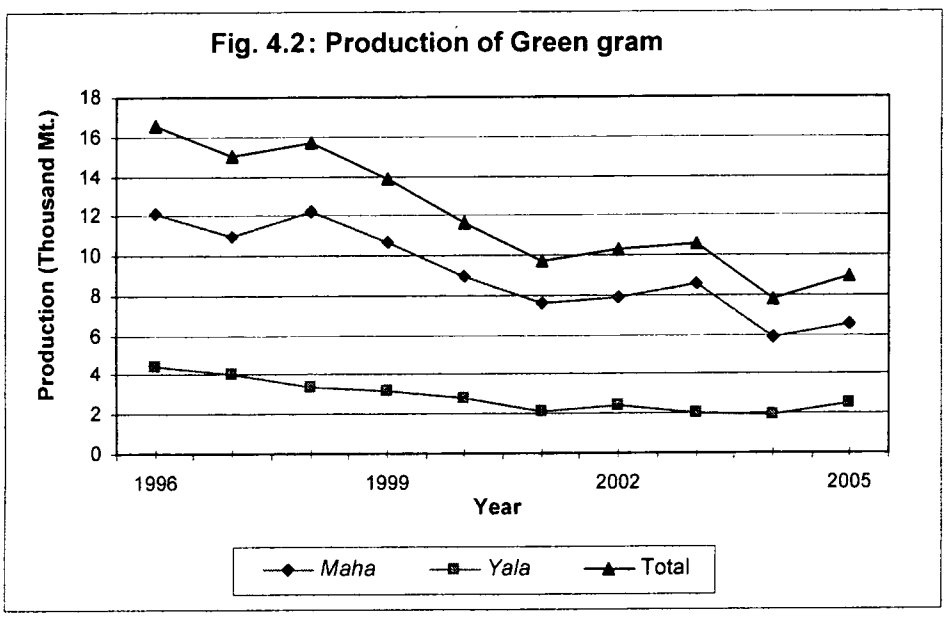
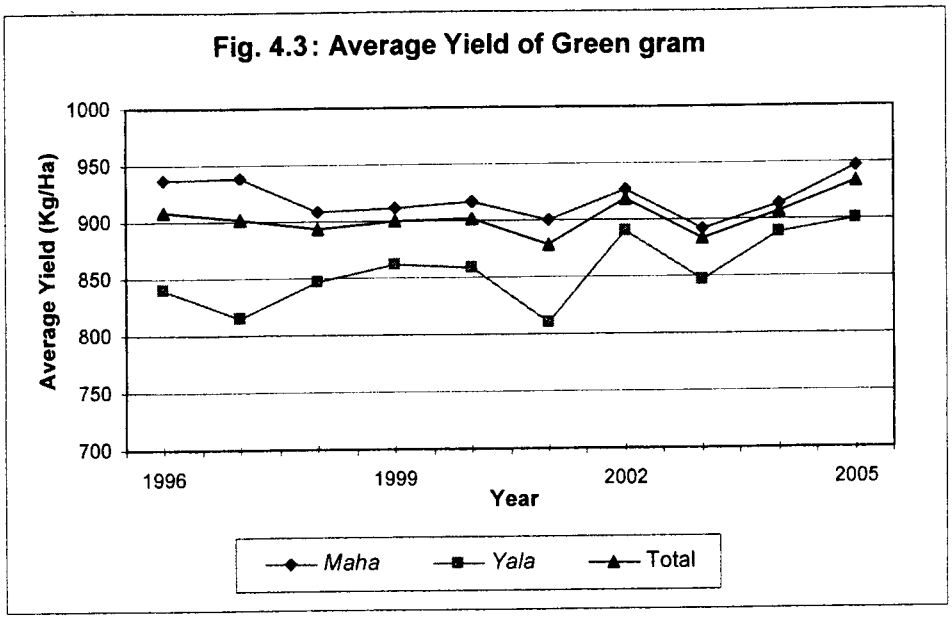


Fig. 4.2: Production of Green gram
Production (Thousand Mt.)
18
16
14
12
10
8
6
4
2
0
1996
1999
2002
2005
Year
Maha
Yala
Total



4.3. Cost and Returns

Cost of cultivation of green gram inclusive of the imputed cost in Hambantota under rainfed condition was Rs 13,407 and Rs. 8,643 in 2002/03 *maha* season and 2003 *yala* season respectively (Tables 4.5 and 4.6). Cost of cultivation in Hambantota during *maha* season was 55 percent higher than that of 2003 *yala*. Labour accounted for about 77 percent of the cost in both seasons and agro chemicals account for about 11 percent of the cost in *maha*, while the cost of chemicals was about 9 percent during the *yala* season in 2002/03.

The net return from an acre of green gram in 2003 *maha* was Rs. 7,611 without imputed cost and Rs. 2,405 with imputed cost (Table 4.7). Capital productivity of green gram cultivation in Hambantota during 2003 *maha* and 2003 *yala* seasons was Rs 1.43 and Rs 1.7 per rupee of investment respectively. Return to labour during *maha* and *yala* in the same year in Hambantota was Rs. 282 per labour day and Rs. 507 per labour day respectively (Tables 4.8 and 4.9)

Table 4.5: Cost of Cultivation per Acre of Green Gram by Type of Inputs in Hambantota District under Rainfed Conditions during *Maha* Seasons

Rs/Acre

Input	1995/96	1997/98	1998/99	2001/02	2002/03	2003/04
Labour	4,087.00	7,336.00	10,170.00	9,589.00	10,618.00	10,617.00
Seed	236.00	441.00	504.00	630.00	674.00	809.00
Agro - Chemicals	452.00	650.00	792.00	491.00	1,651.00	1,557.00
Draught Power, Machinery and Equipment					464.00	1,330.00
Total Cost - Including Imputed Cost	4,776.00	8,428.00	11,466.00	10,710.00	13,407.00	14,313.00
Total Cost - Excluding Imputed Cost	901.00	3,856.00	5,852.00	2,113.00	8,201.00	7,063.00

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

Table 4.6: Cost of Cultivation per Acre of Green Gram by Type of Inputs in Hambantota District under Rainfed Conditions during *Yala* Season

Rs./Acre

Input	2001	2002	2003
Labour	4,907.00	5,866.00	6,626.00
Seed	827.00	922.00	828.00
Agro - Chemicals	1,083.00	1,279.00	769.00
Draught Power, Machinery and Equipment	1,468.00	1,611.00	420.00
Total Cost - Including Imputed Cost	8,285.00	9,678.00	8,643.00
Total Cost - Excluding Imputed Cost	4,907.00	5,866.00	6,626.00

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

Table 4.7: Net Return Per Acre of Green Gram in Hambantota District under Rainfed Conditions

Rs./Acre

Season		Net Return per Acre		Season		Net Return per Acre	
		Including Imputed Cost	Excluding Imputed Cost			Including Imputed Cost	Excluding Imputed Cost
1996	*Maha*	9,987.00	13,863.00	2001	*Maha*	na	na
	Yala	na	na		*Yala*	9,205.00	10,500.00
1998	*Maha*	1,720.00	6,291.00	2003	*Maha*	2,405.00	7,611.00
	Yala	na	na		*Yala*	9,362.00	11,347.00
1999	*Maha*	1,448.00	7,062.00	2004	*Maha*	2,861.00	10,110.00

na denotes not available

Source: Cost of Cultivation of Agricultural Crops, Various Issues Department of Agriculture

Table 4.8: Capital, Labour and Land Productivity of Green gram Cultivation in Hambantota District during *Maha* Seasons

Year	Capital Productivity(Rs/One Rupee investment)	Labour Productivity (Rs/labour day)	Land Productivity (Rs/ha)
1996	15.38	361.48	34,255.47
1998	1.63	132.52	15,545.06
1999	1.25		17,450.20
2002	10.52	487.22	54,922.91
2003	0.93	181.64	18,806.78
2004	1.43	248.76	24,981.81

Sources: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture
Data Bank of HARTI

Table 4.9 : Capital, Labour and Land Productivity of Green gram Cultivation in Hambantota During *Yala* Seasons

Year	Capital Productivity(Rs/One Rupee investment)	Labour Productivity (Rs/labour day)	Land Productivity (Rs/ha)
2001	1.50	425.44	25,945.50
2002	1.58	484.03	28,166.92
2003	1.70	507.01	28,038.43

Sources: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture
Data Bank of HARTI

4.4. Marketing

4.4.1 Marketing Channels

4.4.2 Price Behaviour In and Between Years

Average producer price, the wholesale price and the retail price of a kg of green gram in the year 2005 were Rs. 54.28, 78.32 and Rs. 86.51 respectively (Tables 4.10-4.12). Price is comparatively higher during September to December. As illustrated in figure 4.4, the rate of increase of producer price is much lower than that of the retail price. During the last 10 year period (1996-2005), the average annual producer price of green gram has increased by 62 percent, while the average wholesale price at Pettah market has increased by 112 percent.

Table 4.10: Monthly Average Producer Prices of Green Gram in Sri Lanka

Rs/Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	34.83	31.23	35.03	32.35	31.71	44.30	46.81	46.59	45.32	47.90
February	33.05	29.68	34.57	32.84	31.23	44.67	47.10	41.22	46.31	49.05
March	34.88	31.61	33.50	36.43	34.26	47.34	47.46	43.29	45.87	50.29
April	32.94	33.84	34.41	39.80	35.15	48.32	50.66	43.25	49.43	52.79
May	33.84	33.83	34.60	42.14	38.00	44.89	50.52	45.51	49.45	53.60
June	34.69	36.80	33.82	42.53	37.43	46.04	52.87	42.79	48.38	55.38
July	29.79	38.20	35.03	40.20	40.41	47.72	50.20	44.94	49.34	56.17
August	32.35	38.03	35.49	38.12	43.53	52.28	49.66	44.51	48.80	54.14
September	33.46	39.71	37.87	32.54	39.74	51.45	47.76	45.28	48.93	56.34
October	34.07	42.33	37.97	35.08	39.74	50.75	49.67	47.96	49.90	61.08
November	34.71	40.05	38.67	35.41	41.15	51.60	50.26	47.85	50.68	61.98
December	33.41	38.89	40.33	33.44	42.14	55.01	41.73	46.36	46.53	60.24
Annual Average	33.45	36.40	36.25	36.76	37.98	48.88	48.79	45.01	48.25	54.28

Source : Department of Census and Statistics

Table 4.11: Monthly Average Wholesale Prices of Green Gram at Pettah Market

Rs/50 Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	1,747	1,710	1,679	2,116	1,674	3,228	2,882	2,416	3,041	3,377
February	1,819	1,454	1,636	1,870	1,724	3,184	2,430	2,639	3,041	3,305
March	1,722	1,692	1,866	1,818	2,005	3,490	2,924	2,781	3,118	3,709
April	1,749	2,026	2,098	1,952	2,537	3,444	3,358	2,917	3,235	3,897
May	1,692	2,117	2,119	1,750	3,015	3,265	3,280	2,697	3,042	3,923
June	1,665	2,141	1,987	1,807	3,014	3,086	3,163	2,710	2,980	3,993
July	1,781	2,394	2,120	1,760	2,327	2,961	3,060	2,822	2,942	3,900
August	2,002	2,817	2,194	1,739	2,372	3,137	3,292	2,774	3,075	3,953
September	2,013	2,843	1,924	1,834	2,562	3,609	3,440	2,864	3,330	4,118
October	1,977	2,632	2,153	2,058	2,655	3,312	3,677	3,122	3,290	4,192
November	1,990	2,639	2,487	2,073	3,014	3,164	3,103	3,173	3,349	4,337
December	1,983	2,103	2,435	2,053	3,169	3,015	2,380	3,163	3,487	4,284
Annual average	1,845	2,214	2,058	1,902	2,506	3,241	3,082	2,840	3,161	3,916

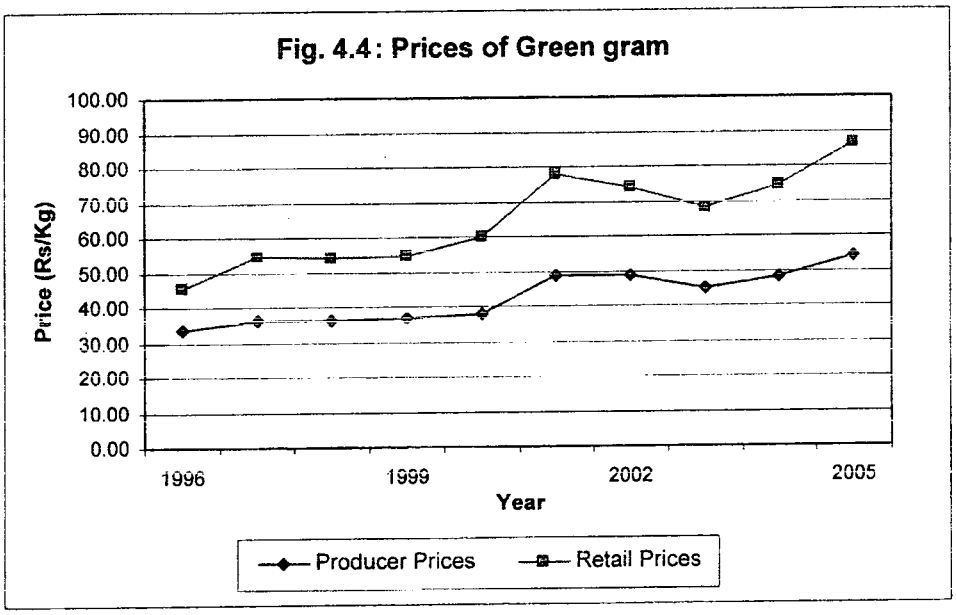
Source: Marketing Food Policy and Agri Business Division of HARTI

Table 4.12: Monthly Average Retail Prices of Green Gram in Sri Lanka

Rs/Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	46.46	46.86	49.72	61.25	49.33	74.16	75.50	67.51	69.90	78.17
February	44.19	44.71	46.81	58.11	49.36	75.92	69.08	66.33	71.50	78.23
March	43.09	43.97	46.54	54.92	51.51	77.33	67.56	65.42	72.86	79.82
April	43.66	46.85	51.55	55.12	56.27	79.55	71.98	66.71	75.89	83.79
May	43.97	49.34	55.24	53.61	65.94	79.01	72.69	67.14	75.47	86.65
June	44.10	50.53	54.55	52.51	64.88	78.16	74.72	68.70	74.74	84.25
July	44.19	56.64	54.15	52.62	64.86	75.94	74.38	69.40	74.45	88.34
August	46.75	62.11	54.52	52.40	62.21	76.18	75.31	66.78	73.64	90.14
September	47.08	66.89	54.86	53.67	61.65	79.76	74.11	66.80	75.05	91.03
October	46.60	64.75	56.30	53.66	62.97	80.87	79.23	68.85	77.78	90.94
November	46.26	62.37	61.32	53.24	66.14	79.24	81.11	70.70	76.83	91.95
December	46.35	57.33	61.94	53.02	68.13	75.67	71.68	71.35	78.24	93.80
Annual average	45.25	54.36	53.97	54.51	60.27	77.65	73.91	67.99	74.69	86.51

Source: Department of Census and Statistics



4.4.3 External Trade

A little over half of the green gram requirement in 2005 was imported from various countries mainly Australia, India, Singapore, Thailand and Pakistan. Out of the total imports in 2005, 73 percent came from Australia (Table 4.13). Table 4.14 reveals that green gram imports during the last 10 years (1996-2005) indicate an increasing trend. Imports to Sri Lanka in 2005 was 345 percent higher than the imported quantity in 1997. The situation indicates the increasing consumer demand for the product and also the greater potentials the crop has for further expansion locally.

The import of green gram is subjected to a 5% customs duty, 15% VAT, 3% ports and airport development levy, 1% social responsibility levy and 10% surcharge. The trade restrictions for green gram is comparatively lower with only 5% customs duty compared with those for other grains which are subjected to a 28% customs duty.

Table: 4.13 Imports of Green Gram by Country of Origin (2001-2005)

Country	2001		2002		2003		2004		2005	
	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)
Australia	2,918	103,860	4,003	130,207	2,107	68,344	7,110	229,928	6,801	218,278
Hong Kong	1,347	35,714	338	9,939	2,021	58,016	1,088	32,530		
India	601	20,363	22	898	71	2,860	313	10,969	1,007	32,398
Pakistan	92	2,964	21	740	141	4,765	1,860	58,734	218	6,977
Singapore	574	15,156	88	2,729	343	9,901	1,240	37,232	658	19,113
Thailand	882	22,938	1,971	57,183	1,530	44,949	22	747	418	14,636
UAE	1,094	39,039	200	5,826	22	586	46	1,331		
Myanmar	1,207	31,387	273	8,833	138	4,098	717	21,821	139	3,377
China			198	5,946	1,785	47,718	230	7,683		
Other	1	12	7	781	23	655	47	1437	80	3278
Total	8,716	271,433	7,121	223,082	8,181	241,892	12,673	402,412	9,321	298,059

Source: External Trade Statistics, Sri Lanka Customs

Table 4.14: Total Quantity and Value of Green Gram Imports (1996-2005)

Year	Quantity (M. tons)	Value (Rs'000)
1996	21	377
1997	2,091	39,938
1998	5,130	113,276
1999	7,528	183,330
2000	6,767	172,547
2001	8,716	271,433
2002	7,121	223,082
2003	8,181	241,892
2004	12,673	402,412
2005	9,321	298,059

Source: External Trade Statistics, Sri Lanka Customs

4.5 Consumption

Average per capita consumption of green gram per annum in Sri Lanka is about 0.5 kg with the estate sector recording the highest and the urban sector the lowest. However, the consumption data indicates that, per capita consumption was higher in the urban sector than in the rural sector in the year 2003/04 (Table 4.15). This may be a sign of urban people moving towards a healthy diet away from the traditional wheat based food items. Table 1.17 also validates the above argument as indicated by the highest per capita consumption of green gram by higher income deciles in all the sectors (Table 4.16).

Table 4.15: Per Capita Consumption of Green Gram per Annum by Sectors

Kg

Year	Urban	Rural	Estate	All Sectors
1978/79	0.01	0.01	0.02	0.11
1981/82	0.40	0.40	0.40	0.40
1986/87	0.72	0.68	0.96	0.71
1996/97	0.48	0.56	0.62	0.55
2003/04	0.55	0.51	0.61	0.52

Source : Consumer Finance and Socio Economic Survey, Central Bank of Sri Lanka

Table 4.16: Per Capita Consumption of Green Gram by Income Deciles and Sectors - 2003/04

Income Decile	Minimum (Rs)	Maximum (Rs)	Urban (Kg)	Rural (Kg)	Estate (Kg)	All Sectors (Kg)
1	0	4,520	0.34	0.27	0.52	0.30
2	4,527	6,214	0.33	0.41	0.88	0.45
3	6,220	7,728	0.18	0.38	0.72	0.40
4	7,733	9,430	0.30	0.46	0.43	0.45
5	9,435	11,350	0.24	0.43	0.50	0.41
6	11,357	13,755	0.35	0.54	0.29	0.51
7	13,757	17,271	0.50	0.63	0.67	0.61
8	17,275	22,036	0.67	0.60	0.63	0.61
9	22,037	32,778	0.66	0.66	0.16	0.65
10	32,793	825,694	0.79	0.69	1.41	0.72
Overall Average	12,513	95,078	0.55	0.51	0.61	0.52

Income deciles for one month house hold income

Source: Consumer Finance and Socio Economic Survey, 2003/04, Central Bank of Sri Lanka

4.6 Concluding Remarks

Green gram is one of the popular foods in Sri Lanka, for which demand has been on the rise over the years, further triggered by the increasing interest of the people in a wholesome diet. Green gram is a good source of vegetable protein, consisting of about 24 percent of protein. However, the extent of green gram cultivation, both in *maha* and *yala* season has dropped significantly leading to reduced local production which resulted in more imports to meet the increasing local requirements. Therefore, it is necessary to find out the causes for the drop in production and take suitable actions for the formulation of policies to address the problems in green gram cultivation and marketing. The farmers too need to be boosted to take the green gram cultivation.

5. COWPEA

5.1. Background

5.1.1 Origin

The botanical name of the cowpea is *Vigna unguiculata* (Syn: V. sinensis, V. cylindrica). Cowpea is of ancient cultivation in Africa and Asia. As the wild *V. unguiculata* is widespread in Africa, it is assumed that, the crop was domesticated in this region. Cowpea is now widely distributed throughout the tropics and sub tropics.

5.1.2 Agro-ecological Requirements

Cowpea is a warm seasonal crop, well adapted to many areas of the humid tropics. It tolerates heat and dry conditions and can be grown in more adverse conditions. Cowpea performs well on a wide variety of soils and soil conditions, but performs best on well drained sandy loams or sandy soils where soil pH is in the range of 5.5 to 6.5.

5.2. Production

Average annual production of cowpea in Sri Lanka during the last 5 years (2001-2005) was 10,700 mt. in an average annual extent of 11,500 ha (Tables 5.2 and 5.3). It is mainly grown under rainfed condition with less cash inputs such as chemicals and fertilizers. The major cost component of cowpea cultivation is labour. The important cowpea varieties grown in Sri Lanka are MI_{35}, Varunee, Wijaya, Dhawala, and Arlington. The research station yield of these varieties varies from 1,800-2,200 kg/ha with the lowest from MI_{35} and the highest from Dhawala. The yield in the farmers' fields varies from 1,350 kg/ha to 1,600 kg/ha.

Table 5.1 : Extent Production and Average Yield of Cowpea – Sri Lanka

	Extent (ha)			Production (M.Tons)			Average Yield (Kg/Ha)		
Year	*Maha*	*Yala*	Total	*Maha*	*Yala*	Total	*Maha*	*Yala*	Total
1996	13,182	5,702	18,884	11,887	5,110	16,997	902	896	900
1997	12,389	3,820	16,209	10,495	3,476	13,971	847	910	862
1998	10,086	4,741	14,827	9,131	4,268	13,399	905	900	904
1999	9,336	3,813	13,149	8,564	3,542	12,106	917	929	921
2000	9,347	3,600	12,947	8,673	3,448	12,121	928	958	936
2001	7,762	3,030	10,792	7,098	2,741	9,839	914	905	912
2002	8,828	2,948	11,776	7,868	2,568	10,436	891	871	886
2003	10,128	3,708	13,836	9,129	3,771	12,900	901	1,017	932
2004	6,592	3,073	9,665	6,105	3,052	9,157	926	993	947
2005	7,262	4,098	11,360	7,040	4,136	11,176	969	1,009	984

Source: Department of Census and Statistics

Table 5.2: Extent of Cowpea by Major Growing Districts

Hectares

District	Season	2001	2002	2003	2004	2005.00	Avg.(01-05)	Percentage
Ampara	*Maha*	1,621	3,096	3,143	2,063	1,760	2,337	
	Yala	1,347	1,320	1,079	1,057	1,384	1,237	
	Total	2,968	4,416	4,222	3,120	3,144	3,574	31.1
Moneragala	*Maha*	1,192	1,250	1,868	1,374	1,546	1,446	
	Yala	105	105	491	404	496	320	
	Total	1,297	1,355	2,359	1,778	2,042	1,766	15.4
Kurunegala	*Maha*	878	879	876	710	715	812	
	Yala	325	327	325	318	391	337	
	Total	1,203	1,206	1,201	1,028	1,106	1,149	10.0
Anuradhapura	*Maha*	1,123	879	1,017	529	909	891	
	Yala	157	136	151	147	357	190	
	Total	1,280	1,015	1,168	676	1,266	1,081	9.4
Hambantota	*Maha*	667	659	1,172	506	466	694	
	Yala	17	76	31	127	21	54	
	Total	684	735	1,203	633	487	748	6.5
Puttalam	*Maha*	715	580	464	219	399	475	
	Yala	273	292	222	103	148	208	
	Total	988	872	686	322	547	683	6.0
Others*	*Maha*	1,566	1,485	1,589	1,191	1,467	1,460	
	Yala	806	692	1,409	917	1,301	1,025	
	Total	2,372	2,177	2,998	2,108	2,768	2,485	21.6
Sri Lanka	*Maha*	7,762	8,828	10,128	6,592	7,262	8,114	
	%	71.9	75.0	73.2	68.2	63.9	70.6	
	Yala	3,030	2,948	3,708	3,073	4,098	3,371	
	%	28.1	25.0	26.8	31.8	36.1	29.4	
	Total	10,792	11,776	13,836	9,665	11,360	11,486	
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Total of Badulla, Nuwara Eliya, Kandy, Jaffna, Polonnaruwa, Vavuniya, Trincomalee, Killinochchi, Mullaitivu, Ratnapura, Mannar Districts and special project Mahaweli H

Sources : Department of Census and Statistics
Data Bank of HARTI

Map 5.1: Average Extent of Cowpea Cultivated during 2001 - 2005 by Districts

(Figures given in parenthesis are in hectares)

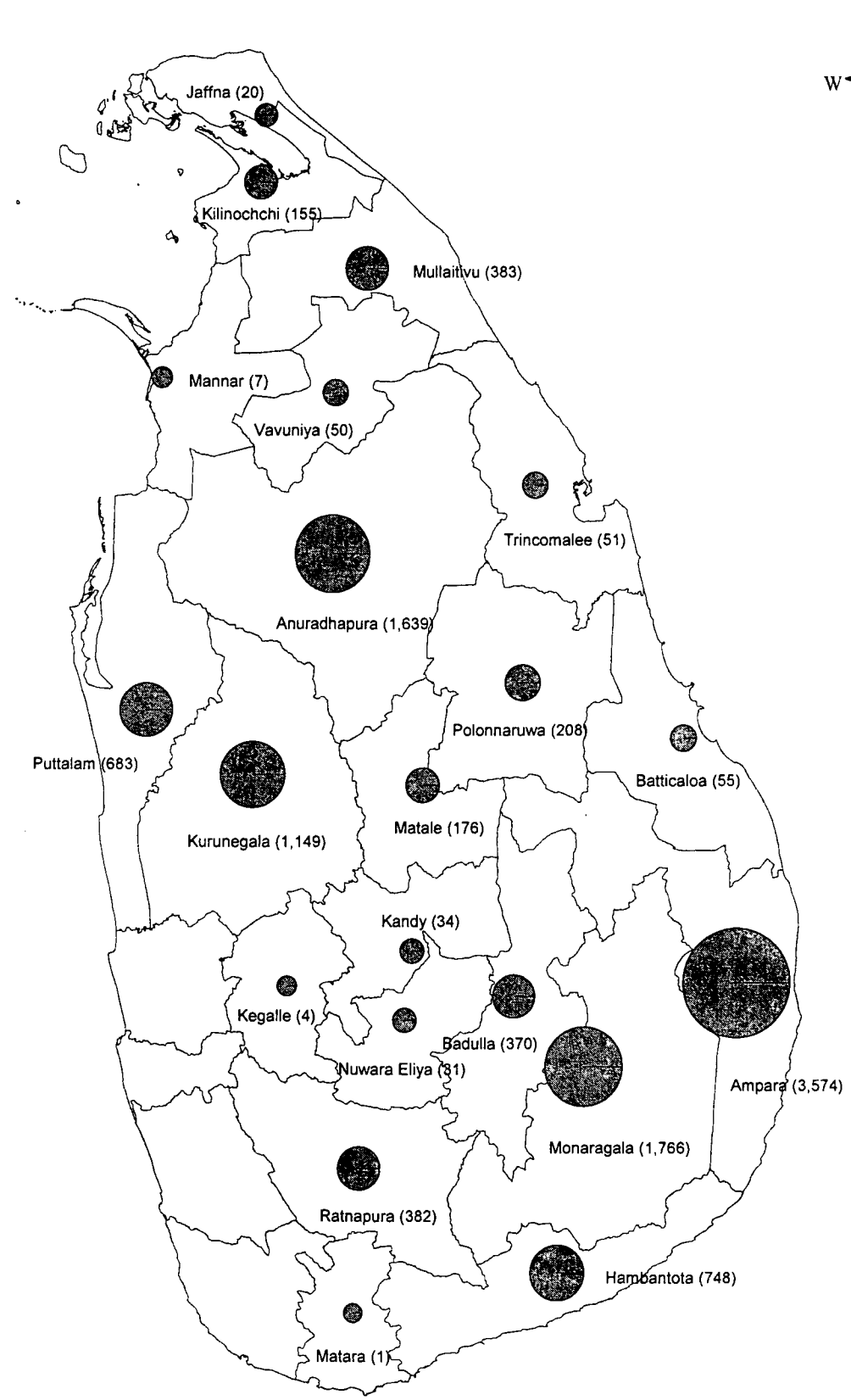


Table 5.3: Production of Cowpea by Major Producing Districts

Metric Tons

Area	Season	2001	2002	2003	2004	2005	Avg (01-05)	%
Ampara	*Maha*	1,495	2,538	2,488	1,569	1,332	1,884	
	Yala	1,077	1,005	874	852	1,051	972	
	Total	2,572	3,543	3,362	2,421	2,383	2,856	26.7
Moneragala	*Maha*	1,248	1,316	1,907	1,629	1,946	1,609	
	Yala	117	118	536	381	462	323	
	Total	1,365	0	2,443	2,010	2,408	2,057	19.2
Anuradhapura	*Maha*	870	679	880	693	881	801	
	Yala	159	143	151	197	480	226	
	Total	1,029	822	1,031	890	1,361	1,027	9.6
Mahaweli-H	*Maha*	188	161	84	113	383	186	
	Yala	380	206	1,237	442	928	639	
	Total	568	367	1,321	555	1,311	824	7.7
Kurunegala	*Maha*	573	594	638	351	324	496	
	Yala	218	214	227	294	356	262	
	Total	791	808	865	645	680	758	7.1
Hambantota	*Maha*	680	614	1,189	403	355	648	
	Yala	13	70	27	119	19	50	
	Total	693	684	1,216	522	374	698	6.5
Puttalam	*Maha*	559	571	439	303	582	491	
	Yala	210	239	186	148	207	198	
	Total	769	810	625	451	789	689	6.4
Others*	*Maha*	1,485	1,395	1,505	1,044	1,237	1,333	
	Yala	567	573	533	619	633	585	
	Total	2,052	1,968	2,038	1,663	1,870	1,918	17.9
Sri Lanka	*Maha*	7,098	7,868	9,129	6,105	7,040	7,448	
	%	72.1	75.4	70.8	66.7	63.0	69.6	
	Yala	2,741	2,568	3,771	3,052	4,136	3,254	
	%	27.9	24.6	29.2	33.3	37.0	30.4	
	Total	9,839	10,436	12,900	9,157	11,176	10,702	
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Total of Badulla, Nuwara Eliya, Kandy, Jaffna, Polonnaruwa, Vavuniya, Trincomalee, Killinochchi, Mullaitivu, Ratnapura, Mannar Districts and Special Project Mahaweli H

Sources: Department of Census and Statistics
Data Bank of HARTI

5.2.1 Major Producing Areas

Ampara district is the major producing district of cowpea in Sri Lanka both in terms of extent of cultivation and annual production. Ampara district has 31 percent of the total extent of cowpea cultivation of the country and produces about 27 percent of the country's local production. Moneragala, Anuradhapura and Kurunegala are other main cowpea producing

districts, contributing to the total cowpea production in Sri Lanka. The total area under the four major producing districts excluding Mahaweli H area accounted for 66 percent of the country's cowpea cultivating extent during the period 2001-2005 (Tables 5.2 and 5.3). Maha Oya and Padiyathalawa DS divisions (in Ampara district) are the major cowpea producing areas within the Ampara district as shown in table 5.4, which accounted for about 83 percent of the land under cowpea in the district during the year 2005.

Table 5.4: Major Cowpea Cultivation Areas in Major Producing Districts

District	% in the Country[1]	DS Division	% in the District[2]
1. Ampara	27.7	1. Mahaoya	27.2
		2. Padiyathalawa	26.1
2. Monaragala	18.0	1. Buttala	22.2
		2. Wellawaya	21.7
		3. Siyambalanduwa	20.5
3. Anuradhapura	19.0	1. Thambuttegama	18.6*
		2. Nochchiyagama	14.8*
		3. Padaviya	14.1*
		4. Thalawa	11.4*

[1]% are based on national, extent cultivated during the year 2005

[2] % are based on district, extent cultivated during the year 2005

*Percentages are based on district total figure during *Yala* 2005

Source: Department of Census and Statistics

5.2.2 Seasonality of Production

As cowpea is mainly cultivated in the dry zone areas as an upland rainfed crop, *maha* is the main season for the cultivation. According to tables 5.2 and 5.3, *maha* season accounts for both, about 70 percent of the total annual extent and the total annual production as well. However, the average yield figures indicated that, *yala* yield is marginally higher than *maha* yield.

5.2.3 Production Trends

Extent of cowpea cultivation and the production figures show a declining trend, while the average yield has increased slightly (Figures 5.1 to 5.3). Extent of cowpea cultivation has reduced from 18,884 ha in 1996 to 11,360 ha in 2005. Average yield during this period has increased from 900 kg/ha to 984 kg/ha. Total cowpea production shows a 34 percent decline during the above reference period (Table 5.1).

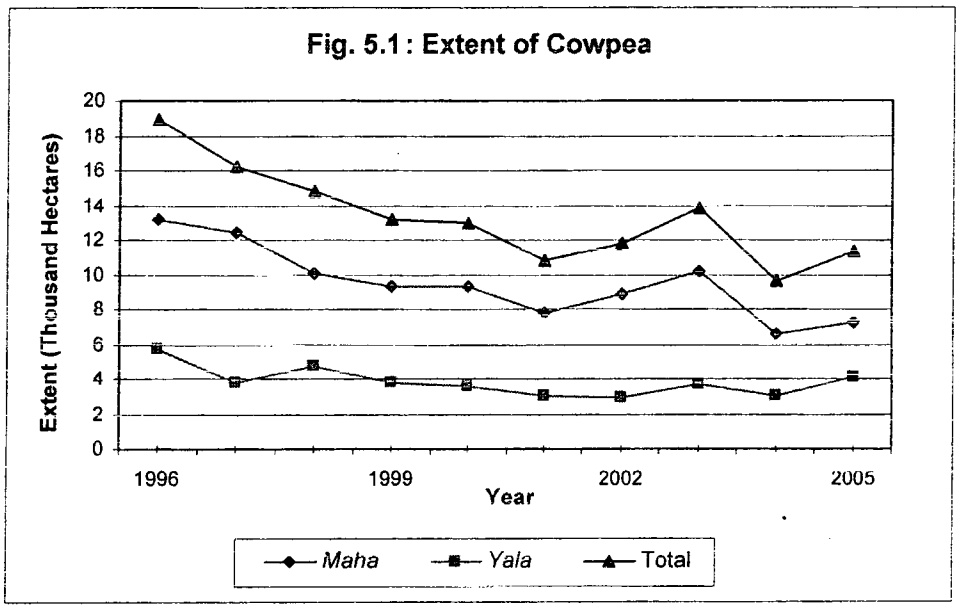


Fig. 5.1 : Extent of Cowpea
Extent (Thousand Hectares)
20
18
16
14
12
10
8
6
4
2
0
1996
1999
2002
2005
Year
Maha
Yala
Total

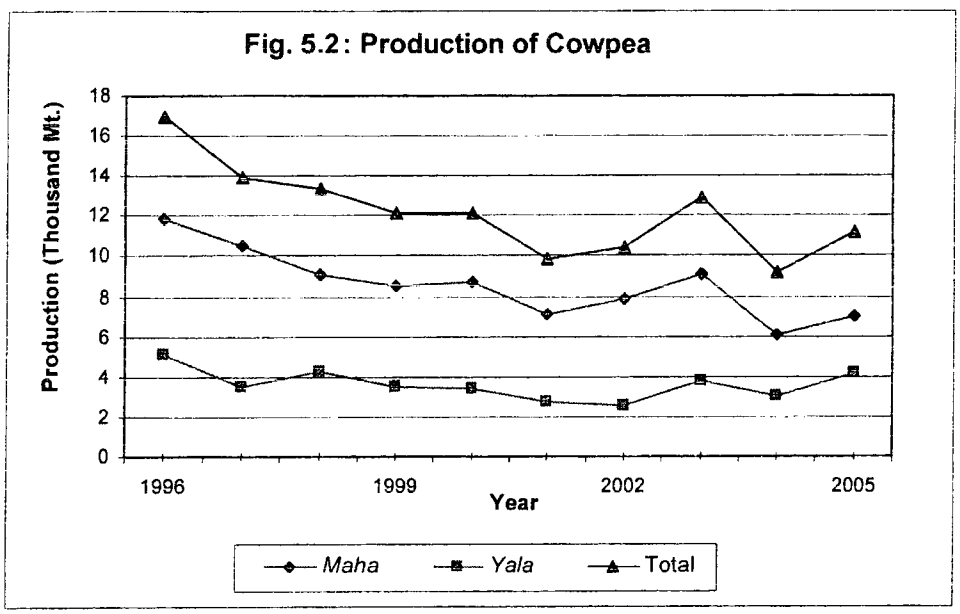
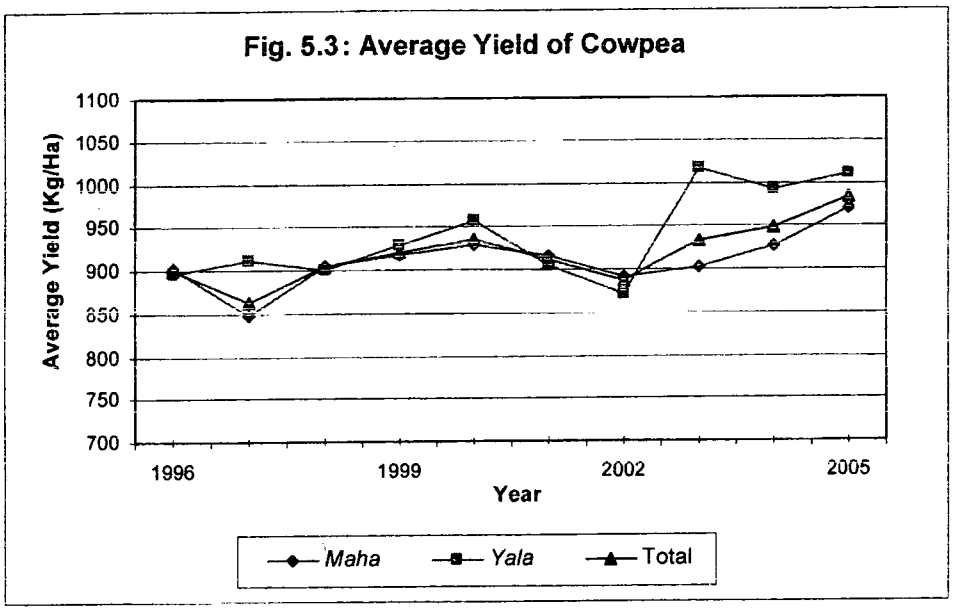


Fig. 5.2 : Production of Cowpea
Production (Thousand Mt.)
18
16
14
12
10
8
6
4
2
0
1996
1999
2002
2005
Year
Maha
Yala
Total



5.4 Cost and Returns

Cost of cultivation of cowpea per acre is about Rs 21,200 under irrigated condition in Kalawewa area (Table 5.5). The major cost component of cowpea cultivation is labour, which is around 80 percent. Machinery and draught power accounts for about 13 percent of the total cost. It is observed that, cowpea cultivation is undertaken in Sri Lanka with less purchased inputs such as fertilizers and agro chemicals.

Return from cowpea inclusive of the imputed cost was negative in Kalawewa under irrigated condition during the past few *yala* seasons. The return without imputed cost is Rs 12,950 per acre during *yala* 2004 (Table 5.6). Return to capital (capital productivity) from the cowpea cultivation during the 2004 *yala* season in Kalawewa under irrigated condition was Rs 1.84 per one rupee investment. The labour productivity was Rs 202.63 per labour day (Table 5.7).

Table 5.5 : Cost of Cultivation per Acre of Cowpea in Kalawewa under Irrigated Conditions during *Yala* Seasons

Rupees

Input	2001	2003	2004
Labour	14,558.00	14,689.00	16858.00
Seed	285.00	283.00	398.00
Fertilizer	787.00		444.00
Agro - Chemicals	684.00	1,937.00	798.00
Draught Power, Machinery and Equipment			2715.00
Total Cost - Including Imputed Cost	16,314.00	16,909.00	21213.00
Total Cost - Excluding Imputed Cost	2,046.00	3,749.00	7008.00

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

Table 5.6: Net Return Per Acre of Cowpea in Kalawewa under Irrigated Conditions during *Yala* Seasons

Rupees

Season		Net Return per Acre		Season		Net Return per Acre	
		Including Imputed Cost	Excluding Imputed Cost			Including Imputed Cost	Excluding Imputed Cost
1996	*Maha*	na	na	2001	*Maha*	na	na
	Yala	na	na		*Yala*	-4,258.00	10,010.00
1998	*Maha*	na	na	2003	*Maha*	na	na
	Yala	na	na		*Yala*	-4,461.00	8,697.00
1999	*Maha*	na	na	2004	*Maha*	na	na
	Yala	na	na		*Yala*	-1,256.00	12,949.00

na denotes not available

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

Table 5.7: Capital, Labour and Land Productivity of Cowpea Cultivation in Kalawewa during *Yala* Seasons

Year	Capital Productivity (Rs/One Rupee investment)	Labour Productivity (Rs/labour day)	Land Productivity (Rs/ha)
2001	4.89	140.53	24734.71
2003	2.32	145.09	21490.28
2004	1.84	202.64	31996.97

Sources : Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture
Data Bank of HARTI

5.5 Marketing

5.5.1 Price Behaviour in and between Years

The average producer price, the retail price and the wholesale price of cowpea fluctuated without much change during the period 1996-1999 as described in tables 5.8 to 5.11. The prices sharply increased in the year 2001 and fluctuated thereafter with lesser changes until 2004.

The monthly average retail price of cowpea is comparatively higher from August to January in an year. The average producer price of cowpea in the year 2005 was 63 percent higher than the price of that in 1996. However, the average wholesale and the retail prices of cowpea increased by 95 percent and 98 percent respectively during the same period.

Table 5.8: Monthly Average Producer Prices of Cowpea in Sri Lanka

Rs/kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	23.66	26.61	23.27	26.30	24.36	33.46	36.27	35.20	35.62	39.03
February	25.32	23.31	21.17	23.60	24.42	35.14	36.23	37.59	36.62	39.15
March	24.99	24.13	21.57	25.75	24.96	34.45	35.47	35.33	37.29	42.48
April	25.30	24.16	21.04	24.96	25.18	35.17	33.66	35.40	35.56	42.34
May	24.01	24.54	21.95	26.35	26.89	39.17	36.02	38.07	37.35	42.71
June	25.08	24.24	22.42	26.82	27.07	39.25	38.32	37.75	40.21	42.12
July	24.31	24.05	24.25	25.98	30.86	39.57	36.40	37.99	39.64	42.66
August	26.58	26.17	24.64	26.95	31.99	38.78	36.38	37.28	38.78	41.89
September	26.28	26.60	25.75	26.45	30.84	40.80	36.45	37.39	40.59	41.21
October	26.17	28.25	26.77	27.83	31.33	40.31	34.61	37.55	40.23	44.07
November	26.59	27.88	27.27	27.80	34.30	38.01	40.27	38.86	41.11	42.50
December	27.23	29.16	27.56	27.13	34.08	42.22	39.16	38.90	40.62	44.52
Annual Average	25.58	25.81	24.30	26.37	28.99	38.47	36.61	37.36	38.62	41.80

Sources: Department of Census and Statistics
Data Bank of HARTI

Table 5.9: Monthly Average Wholesale Prices of Cowpea at Pettah Market

Rs/50 Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	1,681	1,307	1,332	1,775	1,610	2,341	2,281	2,549	2,596	3,073
February	1,376	1,120	1,154	1,594	1,669	2,450	1,880	2,185	2,445	2,315
March	4,208	1,217	1,171	1,630	1,665	2,564	1,699	1,948	2,394	2,188
April	1,303	1,395	1,213	1,471	1,670	2,216	1,667	1,812	2,341	2,235
May	1,166	1,410	1,228	1,362	1,669	2,238	1,700	1,739	1,989	2,261
June	1,085	1,208	1,277	1,281	1,677	2,239	1,715	1,879	2,142	2,638
July	1,214	1,111	1,468	1,254	1,791	2,295	2,167	2,161	2,631	3,017
August	1,400	1,110	1,774	1,292	1,931	2,301	2,345	2,181	2,858	3,002
September	1,415	1,213	1,953	1,178	2,361	2,559	2,700	2,045	3,123	2,982
October	1,407	1,457	1,953	1,531	2,430	2,466	3,207	2,096	3,100	4,100
November	1,411	1,587	2,007	1,742	2,524	2,590	2,985	2,140	3,279	4,645
December	1,401	1,420	2,045	1,752	2,379	2,578	2,975	2,360	3,337	4,689
Annual average	1,589	1,296	1,548	1,488	1,948	2,403	2,277	2,091	2,686	3,095

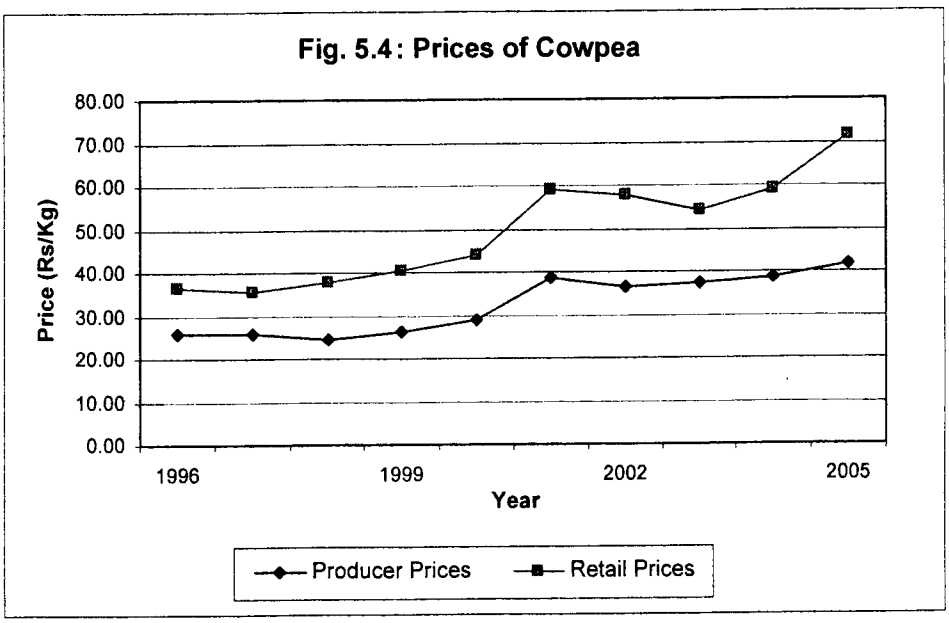
Source: Marketing, Food Policy and Agri Business Division of HARTI

Table 5.10: Monthly Average Retail Prices of Cowpea in Sri Lanka

Rs/kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	37.87	35.88	36.71	42.86	40.82	54.69	61.49	58.81	54.18	69.02
February	36.75	35.30	36.07	42.60	39.67	56.61	59.25	57.31	54.22	69.56
March	37.04	33.68	35.11	42.48	40.18	57.90	55.06	57.46	54.78	69.16
April	36.96	34.64	34.54	42.24	40.26	56.46	55.51	55.77	55.59	69.45
May	36.72	34.94	34.65	38.75	41.44	58.31	54.82	55.34	56.94	67.04
June	36.45	34.94	35.43	39.33	42.03	59.83	55.23	52.45	55.87	69.01
July	34.40	33.50	37.03	38.78	42.88	59.65	57.38	51.56	55.09	69.65
August	35.56	34.44	38.31	38.90	45.62	59.98	57.51	52.57	56.92	70.43
September	35.40	35.67	38.55	38.60	47.04	61.08	55.65	52.78	62.35	70.85
October	35.52	36.08	39.91	38.84	48.98	61.77	58.00	53.57	65.53	73.70
November	35.43	37.15	42.74	40.29	50.43	61.51	61.85	53.31	66.72	81.37
December	36.95	37.85	44.07	41.45	51.50	61.89	60.67	53.25	68.40	84.51
Annual average	36.25	35.34	37.72	40.41	44.16	59.16	57.63	54.36	58.97	71.73

Sources: Department of Census and Statistics
Data Bank of HARTI



5.5.2 External Trade

Cowpea is not imported or exported on a commercial basis in Sri Lanka, but can be imported with the same tariff and non tariff barriers as stipulated for green gram (5% custom duty, 15% VAT, 3% ports and airport development levy, 1% social responsibility levy and 10% surcharges).

5.6 Consumption

Per capita consumption of cowpea in Sri Lanka during 2003/04 had dropped by 46 percent compared with that of 1978/79. People in the estate sector had marked the highest consumption rate of cowpea during early 1980s, but in 2003/04 it was the lowest. Reduction of cowpea consumption in the urban sector is 63 percent (Table 5.11).

Consumption level of cowpea has increased with increasing income deciles in the urban sector, but, it has come down with that deciles in the estate sector. Rural sector does not show much difference in the level of cowpea consumption with income deciles (Table 5.12)

Table 5.11: Per Capita Consumption of Cowpea per Annum by Sectors

Kg.

Year	Urban	Rural	Estate	All Sectors
1978/79	0.57	0.60	1.31	0.65
1981/82	0.34	0.67	1.63	0.67
1986/87	0.17	0.25	0.42	0.25
1996/97	0.11	0.40	0.20	0.35
2003/04	0.18	0.33	0.12	0.30

Source: Consumer Finance and Socio Economic Survey, Various Issues
Central Bank of Sri Lanka

Table 5.12: Per Capita Consumption of Cowpea by Income Deciles and Sectors 2003/04

Income Deciles	Minimum (Rs)	Maximum (Rs)	Urban (Kg)	Rural (Kg)	Estate (Kg)	All Sectors (Kg)
1	0	4,520	0.00	0.29	0.05	0.25
2	4,527	6,214	0.00	0.35	0.12	0.31
3	6,220	7,728	0.00	0.35	0.00	0.30
4	7,733	9,430	0.12	0.26	0.21	0.25
5	9,435	11,350	0.00	0.29	0.20	0.25
6	11,357	13,755	0.38	0.36	0.00	0.35
7	13,757	17,271	0.17	0.36	0.36	0.34
8	17,275	22,036	0.08	0.35	0.00	0.29
9	22,037	32,778	0.24	0.29	0.00	0.28
10	32,793	825,694	0.29	0.43	0.00	0.38
Overall Average	12,513	95,078	0.18	0.33	0.12	0.30

Income deciles for one month household income

Source: Consumer Finance and Socio Economic Survey, Various Issues Central Bank of Sri Lanka

5.7 Concluding Remarks

Cowpea is a high nutritious, fast growing, dry zone crop. The crop has the ability to withstand adverse climatic conditions. Therefore, it is grown both under rainfed and irrigated condition. With no substantial imports, the local production has to meet the entire local demand. Since cowpea is mainly consumed in Sri Lanka as dhal, the commodity should be competitive in terms of the prices and the quality of other types of dhal. Therefore, attention and policy measures are necessary to reduce the cost of production and varietals improvement.

6. BLACK GRAM

6.1.1 Background

6.1.1 Origin

Botanically black gram is called as *Vigna mungo* (formerly *Phaseolus mungo*). Black gram is one of the most popular pulses of India, particularly in the vegetarian diet. The crop is of very ancient cultivation in India and is not known in a wild state. It has been introduced in comparatively recent times elsewhere in the tropics, mainly by Indian migrants. Black gram is locally known as *undu* (Sinhala) and *ulundu* (Tamil)

6.1.2 Agro Ecological Requirements

Black gram is a drought resistant crop and well grown in areas where rainfall is not more than 750 mm per year. The crop is easy to cultivate, requiring little attention and therefore a popular crop among the dry zone farmers in rainfed cultivation. It is not suitable for wet tropics and in areas with heavy rainfall. Black gram can be grown in a wide range of soils from light sands to heavy clay soils, but preferred soil in the well drained sandy loams with a pH of 5.5-7.5. Black gram is more tolerant to water logging than green gram. The temperature requirement is 20^0C-35^0C.

6.2 Production

Black gram has been grown in Sri Lanka in an average extent of 6,195 ha/year during last 5 years. The average annual production during the reference period was 5,609 mt (Tables 6.2 and 6.3). The main black gram variety cultivated in Sri Lanka is MI_1 which has the yield potential of 2,000-2,200kg/ha under the research station condition and 12,000 kg/ha in farmers' fields.

Table 6.1: Extent Production and Average Yield of Black Gram - Sri Lanka

Year	Extent (Ha)			Production (M.Tons)			Average Yield (Kg/Ha)		
	Maha	*Yala*	Total	*Maha*	*Yala*	Total	*Maha*	*Yala*	Total
1996	7,602	1,463	9,065	5,442	1,921	7,363	716	1,313	812
1997	7,034	1,748	8,782	4,718	2,126	6,844	671	1,216	779
1998	9,323	848	10,171	7,290	759	8,049	782	895	791
1999	7,738	920	8,658	5,872	858	6,730	759	933	777
2000	6,013	690	6,703	4,807	613	5,420	799	888	809
2001	5,642	719	6,361	4,476	651	5,127	793	905	806
2002	5,492	992	6,484	4,185	909	5,094	762	916	786
2003	6,245	935	7,180	4,959	982	5,941	794	1,050	827
2004	4,303	437	4,740	4,448	511	4,959	1,034	1,169	1,046
2005	4,402	1,808	6,210	4,763	2,160	6,923	1,082	1,195	1,115

Source: Department of Census and Statistics

Table 6.2 : Extent of Black Gram by Major Growing Districts

Hectares

District	Season	2001	2002	2003	2004	2005	Average (01-05)	Percentage
Anuradhapura	*Maha*	1,819	2,009	2,337	1,208	1,836	1,842	
	Yala	242	219	167	164	929	344	
	Total	2,061	2,228	2,504	1,372	2,765	2,186	35.3
Mullaitivu	*Maha*	1,521	1,521	1,882	1,619	1,372	1,583	
	Yala	0	0	3	0	0	3	
	Total	1,521	1,521	1,885	1,619	1,372	1,584	25.6
Vavuniya	*Maha*	1,295	1,305	1,334	1,030	689	1,131	
	Yala	0	0	0	0	247	247	
	Total	1,295	1,305	1,334	1,030	936	1,180	19.0
Mahaweli-H	*Maha*	64	24	10	10	9	23	
	Yala	374	635	672	198	550	486	
	Total	438	659	682	208	559	509	8.2
Others*	*Maha*	943	633	682	436	496	638	
	Yala	103	138	93	75	82	98	
	Total	1,046	771	775	511	578	736	11.9
Sri Lanka	*Maha*	5,642	5,492	6,245	4,303	4,402	5,217	
	%	88.7	84.7	87.0	90.8	70.9	84.2	
	Yala	719	992	935	437	1,808	978	
	%	11.3	15.3	13.0	9.2	29.1	15.8	
	Total	6,361	6,484	7,180	4,740	6,210	6,195	
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0

**Total of Killinochchi, Mannar, Kurunegala, Puttalam, Batticaloa, Monaragala, Trincomalee and Jaffna Districts*

Source: Department of Census and Statistics
Data Bank of HARTI

Map 6.1: Average Extent of Black gram Cultivated during 2001 - 2005 by Districts

(Figures given in parenthesis are in hectares)

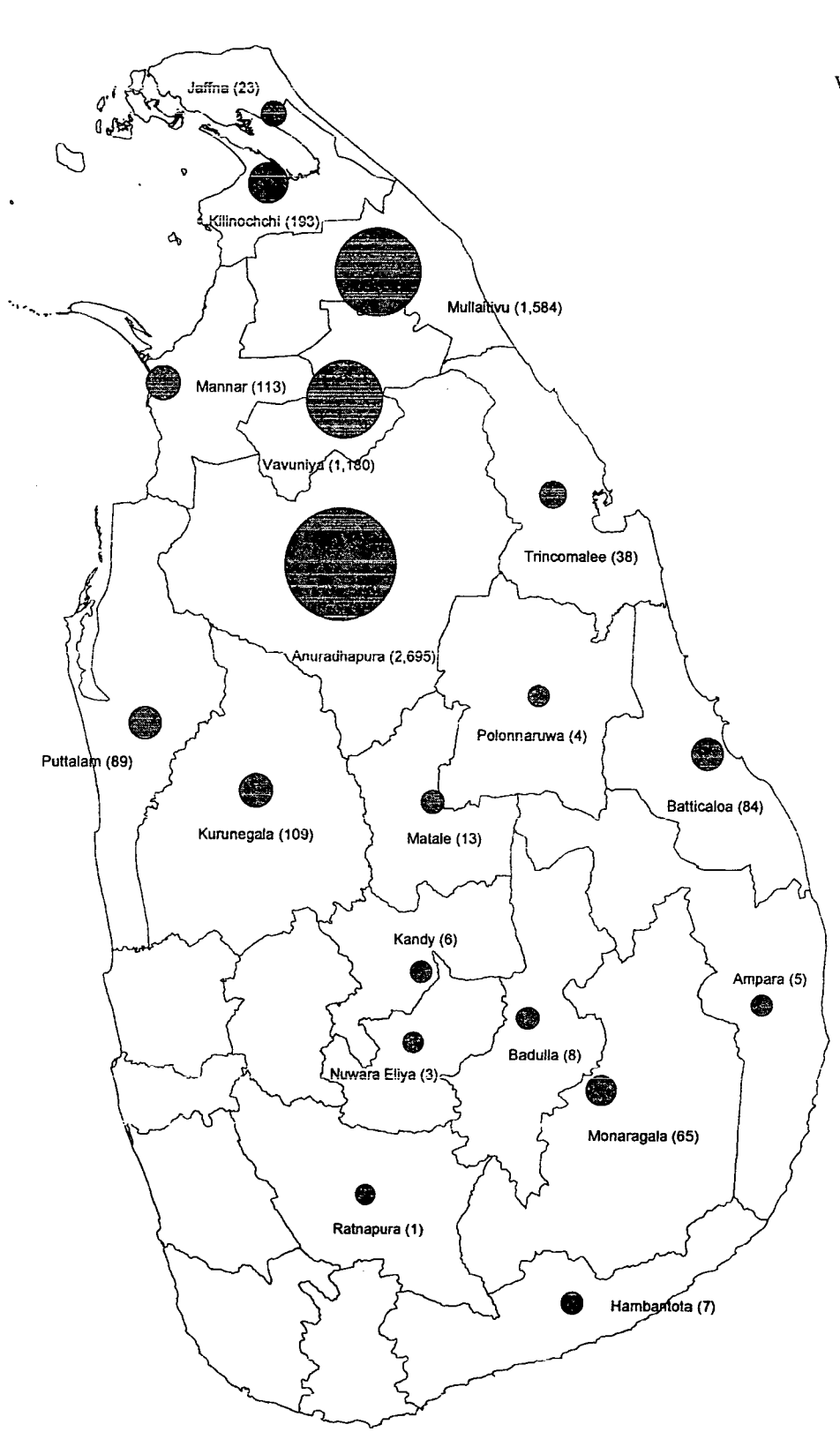


Table 6.3: Production of Black Gram by Major Producing Districts

Metric Tons

District	Season	2001	2002	2003	2004	2005	Average (01-05)	Percentage
Anuradhapura	*Maha*	1,461	1,605	1,880	1,214	2,057	1,643	
	Yala	243	223	168	197	1,147	396	
	Total	1,704	1,828	2,048	1,411	3,204	2,039	36.4
Mullativu	*Maha*	1,330	1,330	1,767	1,297	1,302	1,405	
	Yala	0	0	2	0	0	2	
	Total	1,330	1,330	1,769	1,297	1,302	1,406	25.1
Vavuniya	*Maha*	808	767	800	1,595	1,009	996	
	Yala	0	0	0	0	282	282	
	Total	808	767	800	1,595	1,291	1,052	18.8
Mahaweli-H	*Maha*	46	17	7	7	7	17	
	Yala	327	570	734	238	655	505	
	Total	373	587	741	245	662	522	9.3
Others*	*Maha*	831	466	504	335	388	505	
	Yala	81	116	78	76	76	85	
	Total	912	582	582	411	464	590	10.5
Sri Lanka	*Maha*	4,476	4,185	4,959	4,448	4,763	4,566	
	%	87.3	82.2	83.5	89.7	68.8	81.4	
	Yala	651	909	982	511	2,160	1,043	
	%	12.7	17.8	16.5	10.3	31.2	18.6	
	Total	5,127	5,094	5,941	4,959	6,923	5,609	
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0

**Total of Killinochchi,Mannar, Kurunegala, Puttalam, Batticaloa, Monaragala, Trincomalee and Jaffna Districts*

Source: Department of Census and Statistics
Data Bank of HARTI

6.2.1 Major Producing Areas

Anuradhapura is the major production area of black gram both in terms of the total extent cultivated and the total national production. According to last five year production averages, Anuradhapura district (including Mahaweli H areas) accounts for about 45 percent of the country's total black gram production, followed by Mullaitivu (25 percent) and Vavuniya (19 percent). However, the extent cultivated in Anuradhapura district including Mahaweli H during year 2005 was 54 percent of the total extent cultivated in Sri Lanka. It is worthwhile to note that the major production districts are geographically located towards north of the country, where, vegetarian diet is most popular among the people, in which black gram is one of the key ingredients.

In Anuradhapura district, black gram cultivation is mainly concentrated in four DS divisions namely, Medavachchiya, Padaviya, Kekirawa and Palagala, where about 60 percent of the total black gram extent in Anuradhapura district was cultivated in the year 2005. The main black gram producing areas in Mullaitivu district are, Thunukkai, Manthai (east) and

Oddusudan DS divisions. Vavuniya and Vavuniya (town) DS division consisted of 61 percent of the total black gram extent cultivated in the Vavuniya district in the year 2005 (Table 6.4).

Table 6.4 : Major Cultivation Areas of Black Gram in Major Producing Districts

District	% in the country[1]	DS Division	% in the district[2]
1. Anuradhapura	53.5	1. Medavachchiya	23.6*
		2. Padaviya	15.8*
		3. Kekirawa	10.5*
		4. Palagala	9.9*
2. Mullaithivu	22.1	1. Thunukkai	31.0
		2. Manthai (East)	28.2
		3. Oddusudan	26.5
3. Vavuniya	15.1	1. Vavuniya	34.7
		2. Vavuniya (Town)	26.4

[1]% are based on national, extent cultivated during the year 2005
[2] % are based on district, extent cultivated during the year 2005
*Percentages are based on district total figure during *yala* 2005
Source: Department of Census and Statistics
Data Bank of HARTI

6.2.2 Seasonality of Production

Black gram is a seasonal crop. All major production areas except in Mahaweli H area, *maha* is the major production season mainly as a rainfed crop. However, the black gram cultivation in Mahaweli H is pursued under irrigated condition. According to the last 5 year average, the extent cultivated during the *maha* season was five times higher than that of the *yala*. The *maha* seasons accounted for about 81 percent of the total annual black gram production (Table 6.3). The seasonal yield figures indicate that, although the extent under black gram cultivation in *maha* is higher than *yala*, the average yield per unit area is little higher in *yala* season.

6.2.3 Production Trends

Both the extent under cultivation and the production of black gram are declining over the years (figures 1 and 2). The extent declined to 6,200 ha in 2005 from 9,000 ha in 1996 as shown in Table 6.1, which is a 31 percent drop. The total production also has reduced from 7,400 mt to 6,900 mt during the same period, which is a 7 percent decline. The lower rate of decline in the production compared with the higher level of decline in the extent of cultivation is due to the increased productivity achieved during last couple of years. The reason for the increase of productivity is not known, but obviously not due to any technological breakthrough.

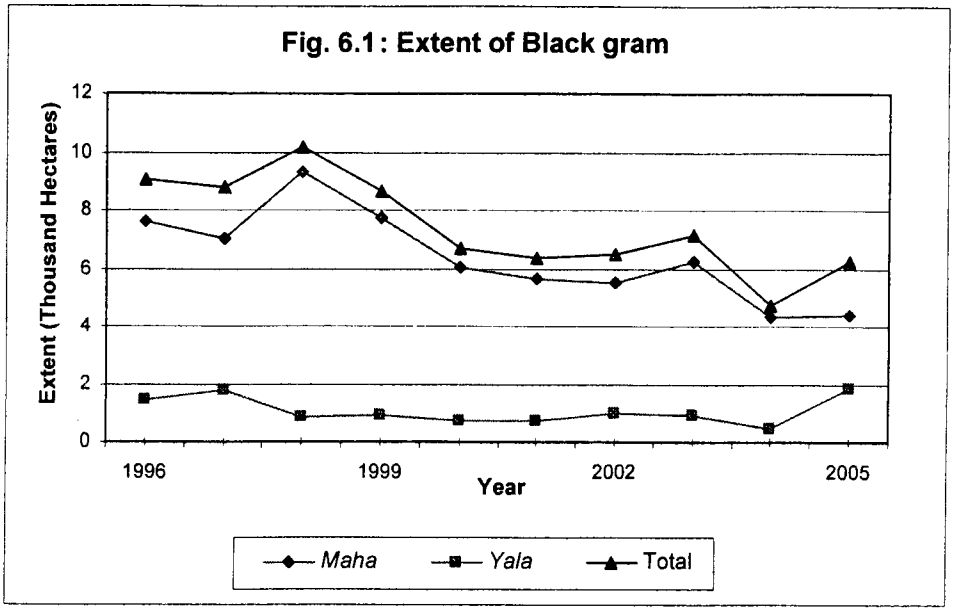


Fig. 6.1: Extent of Black gram
Extent (Thousand Hectares)
12
10
8
6
4
2
0
1996
1999
2002
2005
Year
Maha
Yala
Total

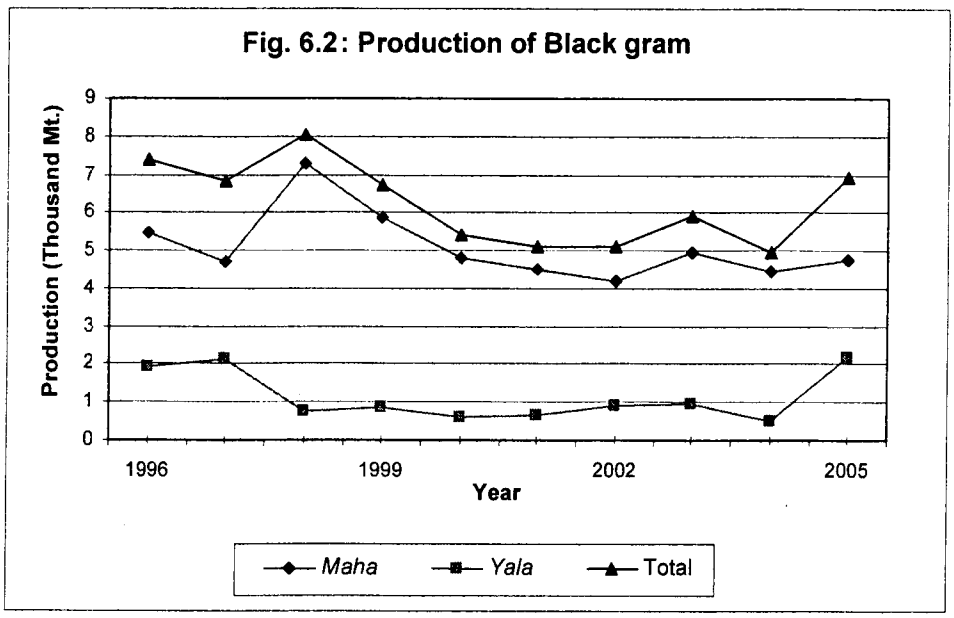
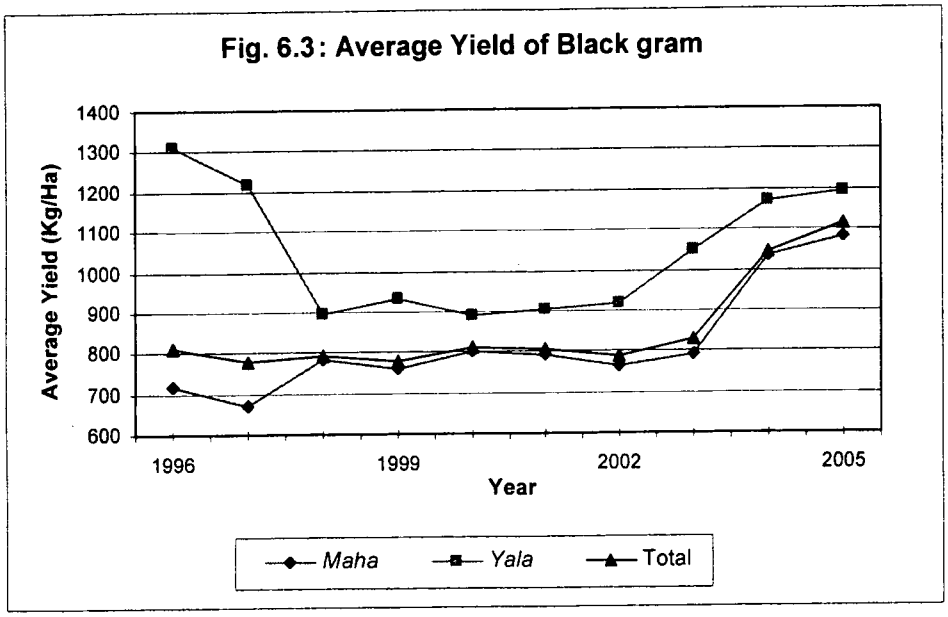


Fig. 6.2: Production of Black gram
Production (Thousand Mt.)
9
8
7
6
5
4
3
2
1
0
1996
1999
2002
2005
Year
Maha
Yala
Total



6.3. Cost and Returns

According to the latest information available the cost of cultivation of an acre of black gram in Anuradhapura district under rainfed condition in *maha* season was Rs 11,420 (Table 6.5) and in Kalawewa area in the same district under irrigated condition in *yala* season it was Rs 15,519 (Table 6.6). The major reason for the difference in cost of production in both water regimes was the higher cost incurred for draught power and machinery under irrigated condition for land preparation.

Labour is the major input, which accounts for over 75 percent of the total cost of production under rainfed condition, followed by agro chemicals (15 percent). Under irrigated condition labour takes 60 percent of the total cost, followed by draught power (21 percent).

The net return received from black gram cultivation under rainfed condition in Anuradhapura district in 2003 *maha* was Rs 3,619 including imputed cost and Rs 10,671 excluding the imputed cost (Table 6.7). The corresponding figures for 2004 *yala* under irrigated condition in Mahaweli H were Rs 6,447 with imputed cost and Rs 14,241 without imputed cost (Table 6.8). As given in Table 6.9, the capital, and labour productivity of black gram cultivation in Anuradhapura during *maha* 2003 were Rs 2.44 per Rupee investment and Rs 307.87 per labour day.

Table 6.5: Cost of Cultivation per Acre of Black gram in Anuradhapura under Rainfed Conditions during *maha* Seasons

Rs/Ac

Input	1996/97	1997/98	1998/99	2000/01	2001/02	2002/03
Labour	5,201	3,040	5,508	4,507	6,983	8,528
Seed	481	533	541	546	548	449
Agro - Chemicals	1,034		269	293	215	1,697
Draught Power, Machinery and Equipment	660	1,871	1,898	2,336	2,218	751
Other					1,028	
Total Cost - Including Imputed Cost	7,376	5,442	8,216	7,683	10,993	11,420
Total Cost - Excluding Imputed Cost	3,677	3,267	4,238	4,084	4,116	4,369

Source: Cost of Cultivation of Agricultural Crops, Department of Agriculture

Table 6.6: Cost of Cultivation per Acre of Black gram in Kalawawa under Irrigated Conditions During *yala* Seasons

Rs/Ac

Input	1998	1999	2001	2003
Labour	8,728	8,738	9,795	9,424
Seed	576	559	538	538
Agro - Chemicals	580	508	1,788	1,699
Draught Power, Machinery and Equipment	2,463	2,351	3,118	3,197
Other				662
Total Cost - Including Imputed Cost	12,347	12,157	15,238	15,519
Total Cost - Excluding Imputed Cost	4,825	6,427	8,988	11,270

Source: Cost of Cultivation of Agricultural Crops, Department of Agriculture

Table 6.7: Net Return Per Acre of Black Gram in Anuradhapura under Rainfed Conditions during *maha* Seasons

Rs/Ac

Year	Season	Net Return per Acre		Year	Season	Net Return per Acre	
		Including Imputed Cost	Excluding Imputed Cost			Including Imputed Cost	Excluding Imputed Cost
1997	*Maha*	3,724.00	7,423.00	2002	*Maha*	17,761.00	24,637.00
1998	*Maha*	3,338.00	5,513.00	2003	*Maha*	3,619.00	10,671.00
1999	*Maha*	-169.00	3,810.00	2004	*Maha*	n.a.	n.a.

n.a denotes not available

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

Table 6.8: Net Return Per Acre of Black Gram in Kalawewa under Irrigated Conditions during *Yala* Seasons

Rs/Ac

Year	Net Return per Acre		Year	Net Return per Acre	
	Including Imputed Cost	Excluding Imputed Cost		Including Imputed Cost	Excluding Imputed Cost
1996	8,188.00	12,226.00	2001	2,349.00	8,599.00
1998	290.00	7,811.00	2003	-5,116.00	-867.00
1999	6,108.00	11,838.00	2004	6,447.00	14,241.00

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

Table 6.9: Capital ,Labour and Land Productivity of Black Gram Cultivation in Anuradhapura during *Maha* Seasons

Year	Capital productivity (Rs/one Rupee)	Labour productivity (Rs/labour day)	Land productivity (Rs/ha)
1997	2.02	193.81	18,342
1998	1.69	256.06	13,623
1999	0.89		9,415
2001	2.3	394.58	23,235
2002	5.98	787.62	60,878
2003	2.44	307.87	26,368

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture
Data Bank of HARTI

6.4. Marketing

6.4.1 Price Behaviour in and between Years

Average producer prices and the retail prices of black gram recorded slight fluctuations during the period 1996-2000, but the prices showed a sharp increase in 2001 and then fluctuated over the year (Tables 6.10-6.11). The monthly average retail prices of black gram are slightly higher from August to January. Black gram prices tend to decrease slightly from May to July, which is the time, the *yala* harvest reaches the market.

Table 6.10: Monthly Average Producer Prices of Black Gram in Sri Lanka

Rs/Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	30.87	38.06	37.67	25.93	36.92	49.93	42.43	27.17	43.65	46.11
February	43.11	37.81	36.85	24.61	36.28	44.63	40.43	39.31	40.33	47.91
March	43.02	38.12	34.84	28.87	36.97	48.50	42.82	40.22	42.55	46.91
April	38.54	39.78	34.84	33.58	38.13	49.81	42.51	42.01	42.38	47.47
May	39.20	38.57	38.03	34.55	35.38	49.38	46.90	43.62	43.84	46.12
June	38.70	37.42	26.25	35.86	37.42	48.88	48.95	44.16	43.37	45.85
July	40.27	38.18	34.83	34.55	41.92	48.82	46.75	44.45	44.44	44.70
August	40.15	38.02	34.68	34.77	40.27	50.71	47.14	43.99	44.42	45.51
September	40.73	37.19	35.50	36.09	41.59	48.00	43.64	43.91	44.75	47.31
October	37.50	38.15	36.75	36.12	41.20	46.40	43.75	43.57	44.81	48.54
November	38.39	39.55	38.90	37.82	44.07	67.50	44.93	44.78	44.73	49.67
December	40.83	41.58	40.45	38.25	44.53	50.70	45.00	43.49	44.73	Nil
Annual Average	38.84	38.61	36.33	33.88	39.60	50.50	44.66	42.84	43.66	46.60

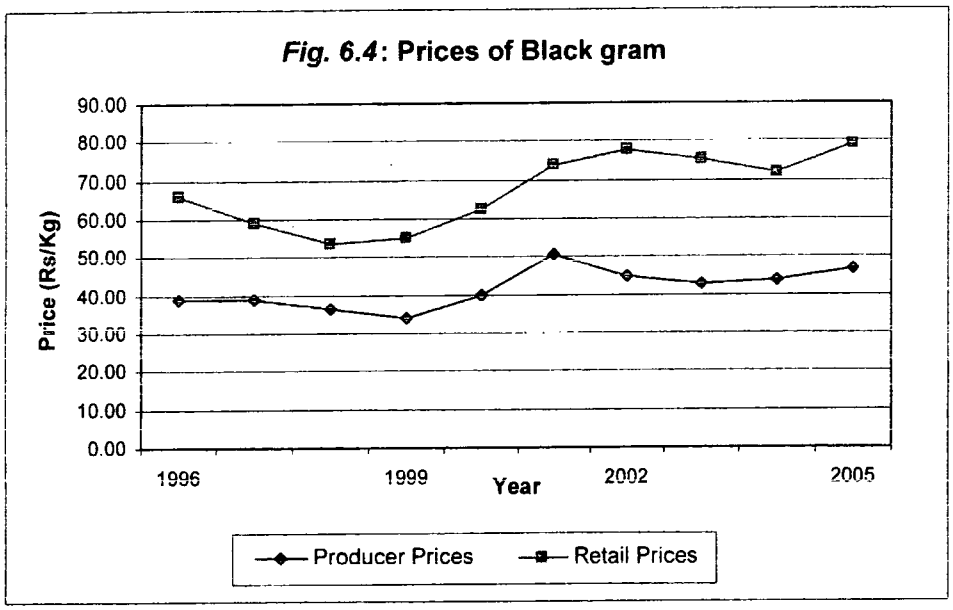
Source: Department of Census and Statistics

Table 6.11 : Monthly Average Retail Prices of Black Gram in Sri Lanka

Rs/Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	58.73	63.37	52.63	51.51	57.96	70.66	79.41	78.09	72.02	75.05
February	61.97	64.89	53.64	51.20	56.52	69.79	76.13	79.38	71.92	73.43
March	62.68	59.03	56.06	53.82	56.31	71.66	76.86	78.60	69.23	72.89
April	63.39	57.83	57.32	53.44	58.95	71.51	76.28	77.49	68.91	74.49
May	64.99	59.58	54.50	52.07	57.94	72.46	76.19	77.63	68.90	75.01
June	67.25	52.86	54.37	53.57	57.69	73.53	78.27	76.86	69.82	77.19
July	70.26	55.72	55.11	53.88	64.12	73.76	79.08	76.13	70.20	77.53
August	70.92	58.91	55.35	54.82	66.78	75.97	78.23	74.04	70.79	79.05
September	67.97	58.78	51.20	56.66	65.81	75.75	77.67	72.29	72.21	79.71
October	67.02	60.72	49.74	56.93	66.39	76.10	79.37	71.63	74.24	82.61
November	65.33	56.57	48.47	57.27	66.80	75.45	78.26	70.65	75.48	87.22
December	66.24	55.47	51.26	58.04	69.73	77.14	79.46	69.82	76.38	93.04
Annual Average	66.09	58.88	53.62	54.84	62.58	73.65	77.86	75.17	71.67	79.01

Source: Department of Census and Statistics



6.4.2 External Trade

A considerable portion of the local black gram requirement is imported, mainly from India and Myanmar (Table 6.12). In 1996, 46 percent of the total annual requirement of black gram was imported, and in 2003 it rose to 56 percent. This shows the inability of current level of local production to meet the exisiting local requirement. The import of black gram is allowed with a 15% custom duty, 15% Value Added Tax (VAT), 3% ports and aviation development levy, 1.5 % social responsibility levy and 10% surcharge. In other words the import of black gram is subject to a 44% tax.

Table 6.12: Imports of Black Gram by Country of Origin

Country	2000		2001		2002		2003		2005	
	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)
Hong Kong	807	17,586	1,473	37,271	987	26,530	1,080	24,978		
India	339	8,903	2,030	72,019	1,924	76,774	2,981	102,919	566	18,492
Malaysia			45	1,621			115	2,429	72	2,176
Myanmar	1,042	25,225	1,098	28,894	1,360	42,119	1,881	51,884	612	15,038
South Korea							69	1,573		
Australia	756	16,219	43	1,123						
Singapore	462	9,440	1,278	34,030	780	22,920	967	23,937	263	6,818
Saudi Arabia							69	1,649		
Pakistan	47	1,466	49	1,750						
Thailand	2,781	57,749	1,766	45,520	1,800	53,122	434	11,382	75	2,378
U.A.E.	254	5,646	44	1,142						
Mongolia			22	559	45	1,226				
Turkey					43	1,160				
Jordan			43	1,125						
Russia	45	974								
Total	7,333	170,114	7,891	225,054	6,939	223,851	7,596	220,751	1,588	44,902

Source: External Trade Statistics, Various Issues, Sri Lanka Customs

Table 6.13: Total Quantity and Value of Black Gram Imports, 1996-2005

Year	Quantity (M. tons)	Value (Rs.'000)
1996	6,382	77,296
1997	1,660	29,583
1998	677	13,275
1999	4,927	99,525
2000	7,333	170,114
2001	7,891	225,054
2002	6,939	223,851
2003	7,596	220,751
2005	1,586	44,902

Source: External Trade Statistics, Various Issues, Sri Lanka Customs

6.5 Consumption

In the past the people in the estate sector were the highest black gram consumers, but, urban sector had the highest per capita black gram consumption in the recent past. However, as shown in table 6.14, per capita consumption has been decreasing over the years in all the sectors. The consumption has increased among those with increasing income levels. A salient feature observable is that the annual highest consumption of black gram is recorded among the people in the income deciles of over Rs. 32,000, in the estate sector (Table 6.15).

Table 6.14: Per Capita Consumption of Black Gram per Annum by Sectors

grams

Year	Urban	Rural	Estate	All Sectors
1973	107.52	36.96	278.88	70.56
1978/79	114.24	47.04	268.80	84.00
1981/82	58.80	22.80	42.00	31.20
1986/87	13.20	8.40	55.20	13.20
1996/97	58.80	6.84	27.60	10.08
2003/04	96.46	30.45	5.53	37.68

Source : Consumer Finance and Socio Economic Survey, Various Issues
Central Bank of Sri Lanka

Table 6.15 : Per Capita Consumption of Black Gram by Income Deciles and Sectors - 2003/04

Income Deciles	Minimum	Maximum	Urban	Rural	Estate	All Sectors
	(Rs)	(Rs)	(gms)	(gms)	(gms)	(gms)
1	0	4,520	*	7.91	*	6.72
2	4,527	6,214	273.56	8.90	*	22.07
3	6,220	7,728	0.00	0.00	*	0.00
4	7,733	9,430	94.65	45.07	*	43.92
5	9,435	11,350	20.54	25.64	*	23.73
6	11,357	13,755	22.80	18.19	*	18.06
7	13,757	17,271	159.36	44.65	*	57.36
8	17,275	22,036	75.36	38.51	*	43.09
9	22,037	32,778	74.47	49.66	*	53.96
10	32,793	825,694	149.91	58.27	333.33	88.18
Overall Average	12,513	95,078	96.46	30.45	5.53	37.68

* *Negligible*
Income deciles for one month household income

Source: Consumer Finance and Socio Economic Survey 2003/04, Central Bank of Sri Lanka

6.6 Government Policy

There is no specific government policy for black gram other than the tariff and non tariff barriers imposed for the import of the commodity.

6.7 Concluding Remarks

Black gram is one of the important ingredients of the vegetarian diet. The pulse also has a growing demand as a health food, especially in the urban sector. However, over 50 percent of the total annual requirement is imported to Sri Lanka although the crop can be grown easily in the dry zone as a rainfed crop. There is a good market potential for expanding the black gram cultivation. New technologies, or new varieties had not been introduced in the recent past to improve the crop productivity. It is also important to study the ways and means of reducing the labour cost, which accounts for over 75 percent of the total cost of production.

7. SOYA BEAN

7.1 Introduction

The Soya plant is introduced by the botanical name *Glycine max* and it belongs to the *Leguminocea* family. First cultivated in China in 3,000.B.C., the crop has been widely consumed in the Western countries since the 1960s. Soya was introduced to the US in the early 19th century, but soya farming in the US expanded dramatically, only after the Second World War.

Soya bean is an annual legume, a small, erect plant with stems of 20 – 90 cm high, and some varieties grow up to 182 cm. Pinnately trifoliate, ovate or lanceolate in shape, about 2.5-10 cm in length and 1.9- 2.5 cm in width.

Flowers are irregular in shape. Peduncles are shortly stalked or sessile, and flowers are in an auxiliary inflorescence. Some 2/3 -3/4 flowers are without the ability of generating pods. Corolla is white or purple in color with about 10 stamens in single bundle. Stigma is small in size with hairs. Seeds may be round or elliptic. A pod contains 1-5 seeds in the same colour. Accordingly to the variety, seeds may be brownish yellow, greenish yellow, brown or black. Maturing of pods occurs at once. Hence, the whole plant could be removed at the time of harvest. Sun drying is suitable to remove the seeds.

pH value of 6-7 is optimal. Areas 5,000 feet above sea level are not suitable for the crop. Soya bean can be grown in most agro climatic regions, but the dry zone and the drier part of the intermediate zone are the most suitable areas. The recommended varieties to be grown by the Department of Agriculture are:

Variety	Days of Maturity	Potential Yield (Kg/ha)
Pb - 1	80 – 85	1,700 – 2,000
Pm - 13	90 – 95	1,700 – 2,100
Pm - 25	95 – 100	1,700 – 2,300

Soya bean is considered as one of the five holy crops, besides rice, wheat, barley and millet. Soya bean is currently a global staple food. About 110 million tons of beans are produced, mainly in the US (50%), Brazil (20%), Argentina (10%) and China (8%). European oil mills process about 15 million mt soya bean annually.

7.2 Production

In Sri Lanka, soya bean has become a popular dry-zone crop cultivated in paddy fields. The variation of the extent, the production and the average yield of soya bean cultivation are summarized in figs. 7.1, 7.2 and 7.3.

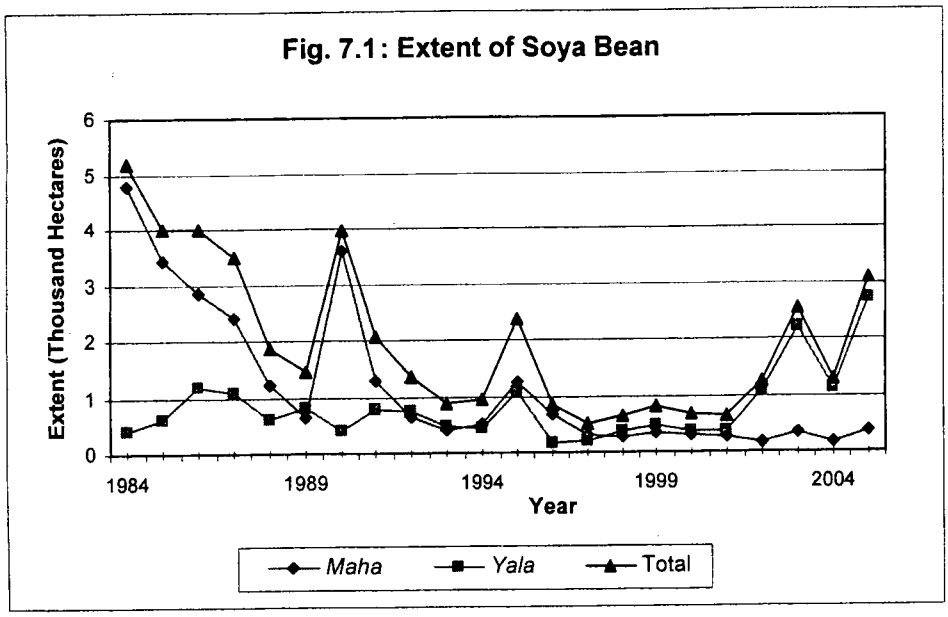


Fig. 7.1: Extent of Soya Bean
Extent (Thousand Hectares)
0
1
2
3
4
5
6
1984
1989
1994
1999
2004
Year
Maha
Yala
Total

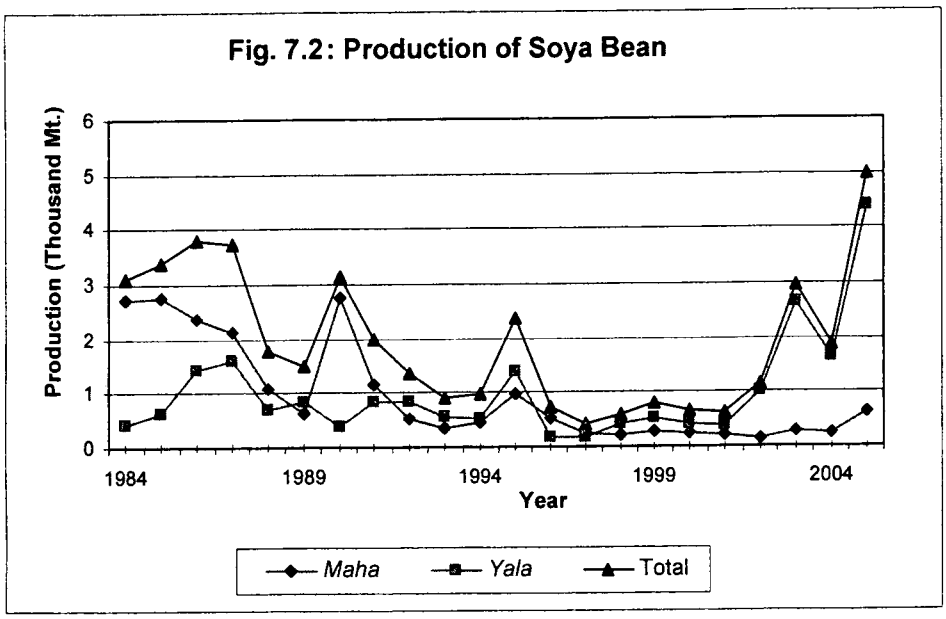
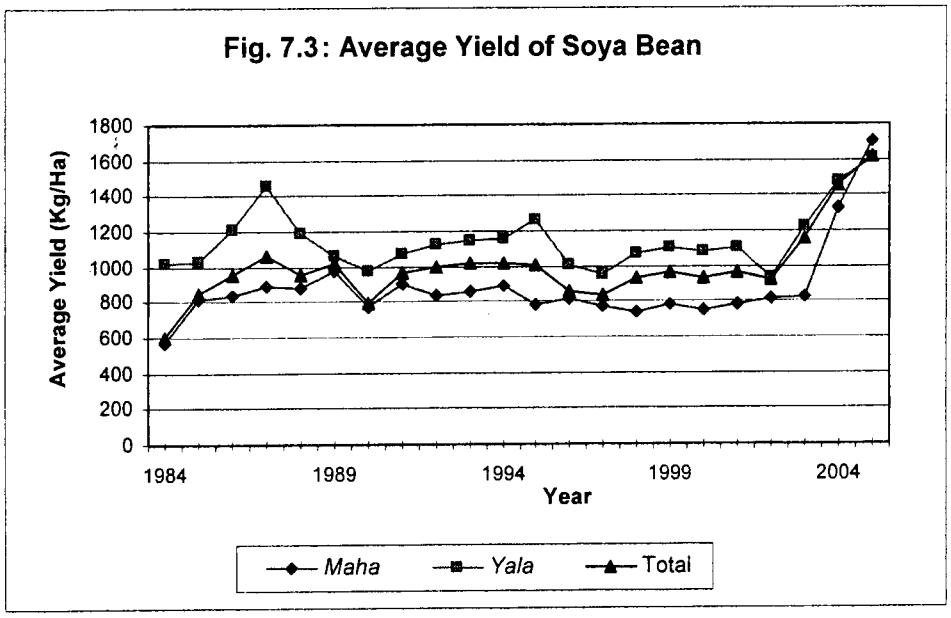


Fig. 7.2: Production of Soya Bean
Production (Thousand Mt.)
0
1
2
3
4
5
6
1984
1989
1994
1999
2004
Year
Maha
Yala
Total



Major Producing Districts and Main Contributing Areas within Districts.

As shown in table 7.1, of the 5 year average extent for the period of 2001-2005 Mahaweli H area contributed nearly 60% of the national extent, followed by Anuradhapura district (32%), Matale district (5%) and other districts such as Badulla, Nuwara Eliya, Kandy, Polonnaruwa, Trincomalee and Kilinochchi (3%). According to the extent cultivated during the year 2005, the main Divisional Secretariat Divisions in Anuradhapura district which grew soya bean were Galnewa (22.9%), Eppawela (6.4%), Thalawa (15.9%) and Ipalogama (13.8%).

Table 7.1: Extent of Soya Bean by Major Growing Districts

Hectares

District	Season	2001	2002	2003	2004	2005
Mahaweli-H	*Maha*	15	15	46	58	181
	Yala	215	320	1,730	552	2,118
	Total	320	335	1,776	610	2,299
Anuradhapura	*Maha*	176	84	226	84	130
	Yala	80	703	435	433	466
	Total	256	787	661	517	596
Matale	*Maha*	50	24	35	15	11
	Yala	32	29	7	122	124
	Total	82	53	42	137	135
Others	*Maha*	44	56	49	21	37
	Yala	35	26	20	9	13
	Total	79	82	69	30	50
Sri Lanka	*Maha*	285	179	355	178	359
	%	44.0	14.2	13.9	13.8	11.7
	Yala	362	1,078	2,192	1,116	2,721
	%	56.0	85.8	86.1	86.2	88.3
	Total	647	1,257	2,547	1,294	3,080
	%	100.0	100.0	100.0	100.0	100.0

* Total of Badulla, Nuwara Eliya, Kandy, Polonnaruwa, Trincomalee, Killinochchi districts

Source: Department of Census and Statistics

The percentage contribution of production from Mahaweli H area to the national production over the years 2001 to 2005 is given in table 7.2. Percentage share of the *maha* season in Mahaweli H has increased from 8.9 percent to 51.9 percent during the period of 2001- 2005.

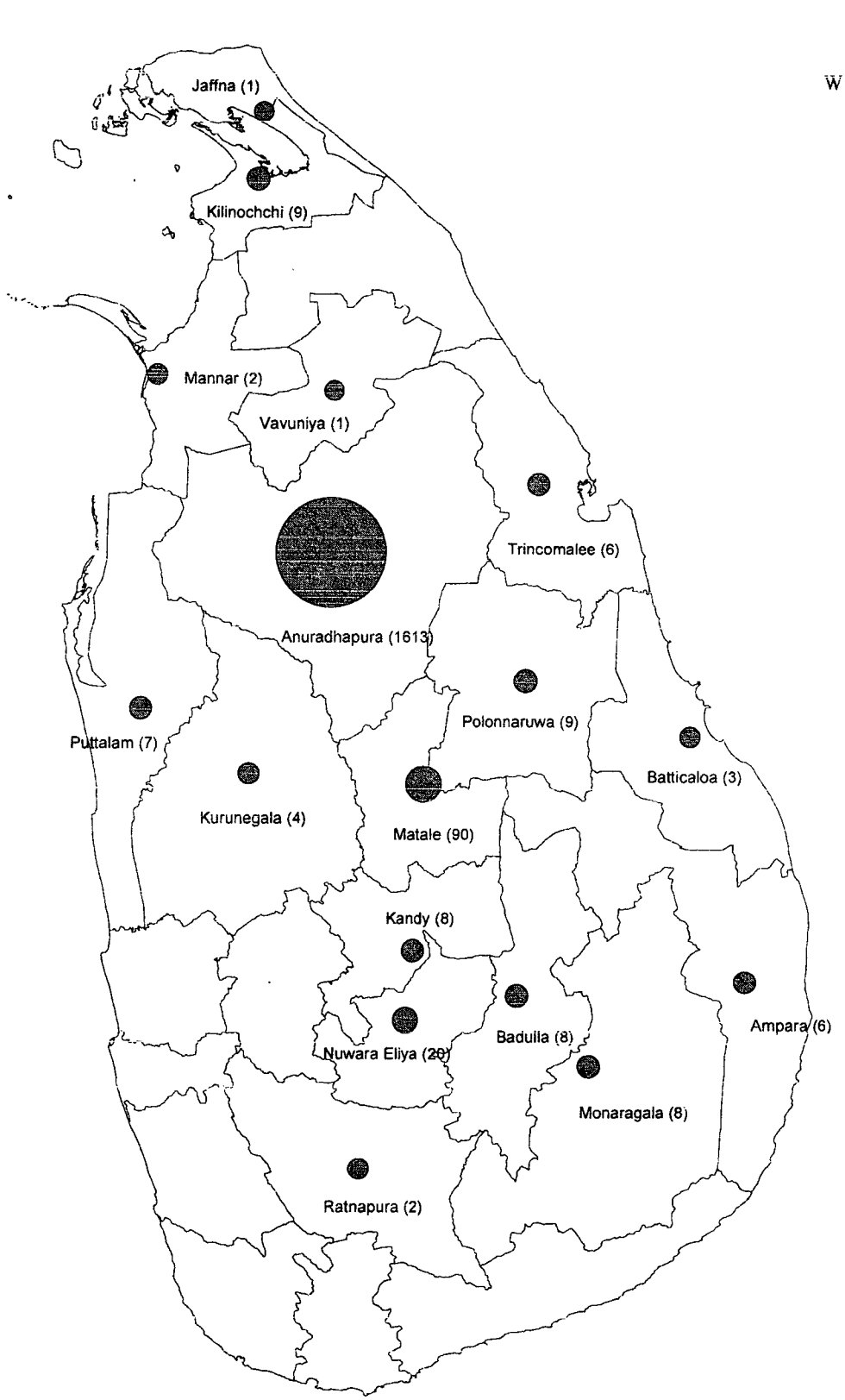
Table 7.2: Production of Soya bean in Mahaweli H and Sri Lanka by Seasons 2001-2005

Area	Season	2001	2002	2003	2004	2005
Mahaweli H	*Maha* (Mt)	20	21	62	78	361
	%	8.9	14.4	21.3	33.1	59.1
	Yala (Mt)	290	431	2,326	997	3,812
	%	72.8	42.7	87.2	60.3	87.1
Sri Lanka	*Maha* (Mt)	224	146	291	236	611
	Yala (Mt)	398	1,010	2,666	1,654	4,379

Sources: Department of Census and Statistics
Data Bank of HARTI

Map 7.1: Average Extent of Soya beans Cultivated during 2001 - 2005 by Districts

(Figures given in parenthesis are in hectares)



The Extent

Eventhough, soya bean is popular as mainly a *yala* crop, from 1984 to 1998, the *maha* extent cultivated was larger than that of *yala.* But from 1998 to 2005 during *yala* seasons (Table 7.3), the extent has increased considerably, due to the intervention of some private companies by way of incentives. As given in table 7.4, the extent during the *maha* seasons in the period of 2001-2005 marked an increasing trend from 5.3% to 50.4% .

Soya bean is mainly cultivated in Anuradhapura district. With the incentives given by some private companies, it has become a cash crop. Simultaneously the extent in the *yala* season has substantially increased after the *yala* 2003 (Table 7.3).

Table 7.3: Extent of Soya Bean in Sri Lanka

Hectares

Year	*Maha*	*Yala*	Total
1984	4,787	398	5,185
1985	3,407	602	4,009
1986	2,835	1,174	4,009
1987	2,405	1,089	3,494
1988	1,224	624	1,848
1989	652	802	1,454
1990	3,588	395	3,983
1991	1,273	780	2,053
1992	629	731	1,360
1993	405	479	884
1994	508	449	957
1995	1,270	1,089	2,359
1996	665	184	849
1997	298	199	497
1998	261	380	641
1999	352	470	822
2000	310	384	694
2001	285	362	647
2002	179	1,078	1,257
2003	355	2,192	2,547
2004	178	1,116	1,294
2005	359	2,721	3,080

Source: Department of Census and Statistics

Table 7.4: Extent Cultivated under Soya Bean in Mahaweli H and Sri Lanka by Seasons, 2001-2005

Area	Season	2001	2002	2003	2004	2005
Mahaweli H	*Maha* (Ha)	15	15	46	58	181
	%	5.3	8.4	13.0	32.6	50.4
	Yala (Ha)	215	320	1,730	552	2,118
	%	59.4	29.7	78.9	49.5	77.8
Sri Lanka	*Maha* (Ha)	285	179	355	178	359
	Yala (Ha)	362	1,078	2,192	1,116	2,721

Source: Department of Census and Statistics
Data Bank of HARTI

7.4 Cost of Production, Returns and Income

Taking into account the *yala* 1998 and *yala* 2002 for Anuradhapura district under irrigated regime, the percentage cost including the imputed values for each input is given below,

Table 7.5: Percentage Share of Cost of Production by Inputs in Anuradhapura under Irrigated Conditions during *yala* Seasons

Input	1998	2002
Labour	65	62
Seed	7	6
Fertilizer	3	7
Agro-chemicals	3	2
Draught power, machinery and equipment	22	21
Other	-	2

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture
Data Bank of HARTI

Nearly 62% of the cost of cultivation is for labour every year, making it the costliest input. Family labour had been widely used by the farmers who cultivate less than one acre, and commercial farmers depended on hired labour for some activities. The next line was the cost on draught power, machinery and equipment. The lowest consideration had been for agro chemicals and fertilizer (Table 7.5).

Table 7.6: Net Return per Acre of Soya Bean in Anuradhapura under Irrigated Conditions

Rs/Acre

	1998 *Yala*	2002 *Yala*	2003/2004 *Maha*
Including family labour	5,032	9,100	9,215
Excluding family labour	10,613	16,242	17,969

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

The net return for the above 3 seasons in Anuradhapura district has increased, both including and excluding family labour (Table 7.6).

7.5 The Trends in Production and Average Yield

Extent of land cultivated with soya bean in Sri Lanka from 1996 to 2005 has rapidly increased (260%). In 1996, the extent of soya bean was 849 ha and it increased up to 3,080 ha in 2005 mainly due to allocation of land for high potential crop varieties.

The soya bean production increased from 726 mt in 1996 to 4,990 mt in 2005, due to high yielding varieties and increased fertilizer application.

The average yield has increased registering a higher percentage over the years between 1996 to 2005. In 1996, the average yield was 855 kg/hectare and in 2005 it was 1,620 kg/hectare (Table 7.7).

Table 7.7: Production and Average Yield of Soya Bean in Sri Lanka

Year	Production (M.Tons)			Average Yield (Kg/Hec)		
	Maha	*Yala*	Total	*Maha*	*Yala*	Total
1984	2,708	406	3,114	566	1,020	600
1985	2,763	621	3,384	811	1,032	844
1986	2,380	1,424	3,804	840	1,213	949
1987	2,131	1,588	3,719	886	1,458	1,064
1988	1,071	698	1,769	875	1,186	957
1989	637	851	1,488	977	1,061	1,023
1990	2,764	387	3,151	770	980	791
1991	1,147	832	1,979	901	1,067	964
1992	525	826	1,351	835	1,130	993
1993	349	547	896	862	1,142	1,014
1994	451	521	972	888	1,160	1,016
1995	988	1,379	2,367	778	1,266	1,003
1996	540	186	726	812	1,011	855
1997	229	189	418	768	950	841
1998	193	406	599	739	1,068	934
1999	277	520	797	787	1,106	970
2000	234	414	648	755	1,078	934
2001	224	398	622	786	1,099	961
2002	146	1,010	1,156	816	937	920
2003	291	2,666	2,957	820	1,216	1,161
2004	236	1,654	1,890	1,326	1,482	1,461
2005	611	4,379	4,990	1,702	1,609	1,620

Source: Department of Census and Statistics

7.6 Domestic Marketing

In Sri Lanka, soya bean is mainly used as raw materials for an infant food called Thriposa by the Ministry of Health and Animal Feeds. Some private companies use a limited quantity of soya bean as semi finished human food. Soya bean is dehulled and its oil extracted before being ground into flour. Texturised soya protein (TSP or TVP) is made from soya flour, which is compressed until the fibres changes in structure. It is available as a dried, granular product and in chunk-sized pieces for re-hydrating and use as meat re-placer (TVP is made from soya bean processed into high protein low fat food. It has 40% protein, very much more than in fish, meat, poultry and dhal).

Table 7.8: Monthly Average Producer Prices of Soya Bean in Sri Lanka

Rs/Kg

Month	2001	2002	2003	2004	2005	5 year Average	Index	Variation
January	32.50	46.40	43.15	23.00	32.00	35.4	89.5	-10.5
February	47.50	37.92	43.75	27.83	32.83	38.0	96.0	-4.0
March	47.50	35.25	36.31	31.67	43.19	38.8	98.0	-2.0
April	47.50	39.71	36.09	31.67	42.00	39.4	99.6	-0.4
May	48.88	41.25	34.93	32.67	44.74	40.5	102.4	2.4
June	48.50	48.11	35.57	34.25	44.20	42.1	106.5	6.5
July	50.63	46.53	37.14	34.25	41.80	42.1	106.3	6.3
August	51.00	46.50	35.82	34.25	42.10	41.9	106.0	6.0
September	43.70	46.28	35.07	34.25	40.73	40.0	101.1	1.1
October	44.36	46.33	34.57	35.00	35.00	39.1	98.7	-1.3
November	42.86	44.84	32.71	35.05	40.00	39.1	98.8	-1.2
December	45.60	44.75	29.29	35.05	37.50	38.4	97.2	-2.8
Annual Average	46.10	43.60	35.82	32.41	41.09	39.6	100.0	

Source: Department of Census and Statistics
Data Bank of HARTI

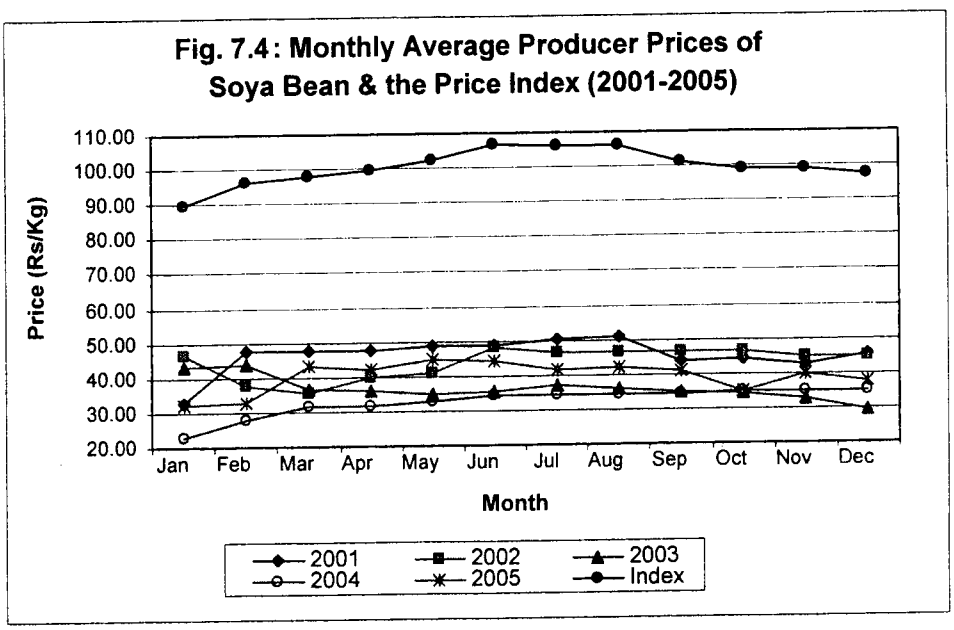
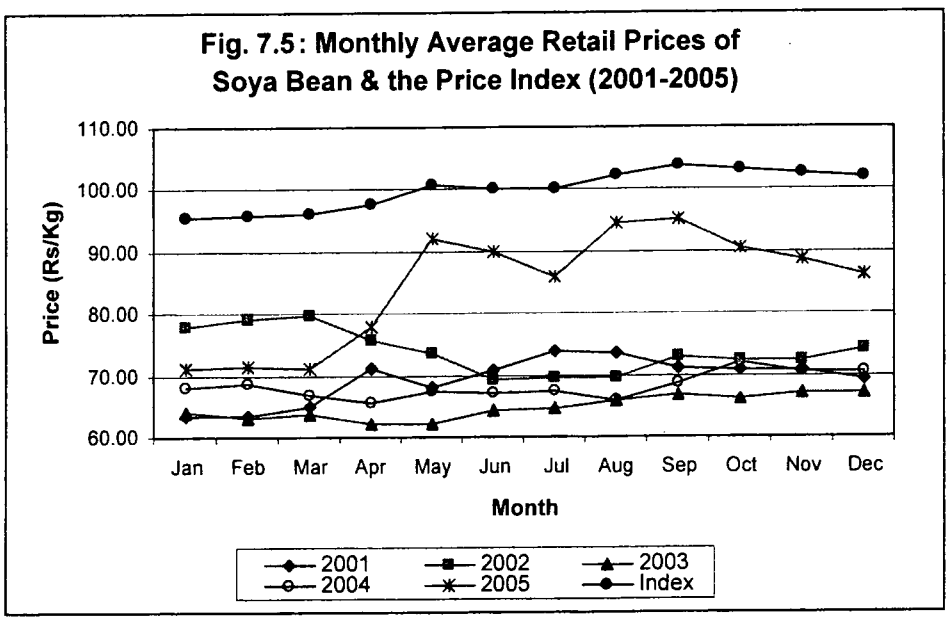


Table 7.9: Monthly Average Retail Prices of Soyabean in Sri Lanka

Rs/Kg

Month	2001	2002	2003	2004	2005	5 year Average	Index	Variation
January	63.33	78.00	64.11	67.89	71.11	68.9	95.5	-4.5
February	63.33	79.06	63.21	68.70	71.39	69.1	95.8	-4.2
March	65.00	79.69	63.57	66.94	71.06	69.3	96.0	-4.0
April	71.25	75.64	62.21	65.63	77.90	70.5	97.8	-2.2
May	68.13	73.68	62.04	67.50	92.00	72.7	100.7	0.7
June	70.82	69.34	64.25	67.14	89.94	72.3	100.2	0.2
July	73.96	69.70	64.57	67.31	86.00	72.3	100.2	0.2
August	73.44	69.55	65.82	65.88	94.69	73.9	102.4	2.4
September	71.10	73.11	66.81	68.50	95.29	75.0	103.9	3.9
October	70.88	72.25	66.03	71.94	90.66	74.4	103.1	3.1
November	70.75	72.36	67.16	70.63	88.63	73.9	102.5	2.5
December	69.38	74.14	67.00	70.63	86.25	73.5	101.9	1.9
Annual Average	69.54	73.38	64.86	68.24	84.06	72.1	100.0	

Source: Department of Census and Statistics
Data Bank of HARTI



Seasonal price variation can be given by the price index, computing the monthly average producer price into 5 years average price (2001-2005) as at the table given above. The values of seasonal index are close to hundred, indicating that monthly producer price is close to the five year annual average price. Soya bean producer price reach the lowest in January which is 10.5 percent below the annual price and this decreasing trend, continues until April (range between 10 percent to 0.4 percent).

According to the monthly average retail prices of soya bean, computing the seasonal price index for the same five year period as for the producer prices, the lowest price prevailed in January. The highest price were in September, followed by October, which were 3.9 percent and 3.1 percent respectively, according to the seasonal index.

Marketing Channels

The soya bean market channel comprises:

Farmer ⟶ Collector ⟶ Wholesaler ⟶ Retailer ⟶ Consumer

In addition, some government institutes also buy the bean (eg: Thriposha). They directly buy from the wholesalers or the collectors, in addition to the imports.

7.7 External Trade, Major Imports and Trends

Soya bean is used for multi- purposes, like infant foods and animal feed. Hence, the local production is still inadequate to meet the demand, necessitating annual imports.

According to the table 7.10, considering the period of 1996-2005, the highest quantity was imported in 2001 (3,165 mt) mainly from Australia and in 2002 (3,512 mt) mainly from the US. After 2002, the quantity imported has not exceeded 2,000 mt, although the value of annual imports remained less than Rs. 50 million from 2003 to 2005. It was very high in 2001 (Rs. 80.4 million) and 2002 (Rs. 98.6 million) the peak imports for the concerned period.

Table 7.10: Imports of Soya Bean by Country of Origin

Mt/Rs '000

	1996		1997		1998		1999		2000	
Country	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
Australia					18	318	129	2,628	1,710	37,113
Canada							117	3,495	39	112
India	285	4,854	100	2,159	125	2,233	18	281		
Switzerland							1,189	23,287	626	12,545
UAE							377	7,486		
Singapore					19	216				
South Africa			100	2,958	17	850				
China									170	3,444
USA									426	8,600
Total	285	4,854	200	5,117	179	3,617	1,830	37,177	2,971	61,824

	2001		2002		2003		2004		2005	
Country	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
Australia	1,394	36,334					242	6,513		
Canada	869	20,564	780	21,529	236	6,740	136	3,807	58	1,613
India			113	2,706	245	6,969	184	4,212		
UAE	800	20,669	956	26,391			487	15,425	1,074	29,929
Singapore					19	388				
South Africa	60	1,666					101	3,104		
China			22	579						
USA			1,305	38,188	950	26,342	457	14,043	176	4,733
Saudi Arabia	42	1,160								
Hong Kong			136	3,723						
Thailand			107	2,959						
South Korea			93	2,537						
Total	3,165	80,393	3,512	98,612	1,450	40,439	1,607	47,104	Qua	36,275

Source : External Trade Statistics, Various Issues, Sri Lanka Customs

In 1996, the tariff rates for imports was 35% for duty, 6% for turnover tax and 4.5% for national security levy.

7.8 Soya Bean Consumption

According to the latest figures of the Central Bank of Sri Lanka, the annual per capita consumption in the rural sector in 2003/04, recorded the highest (0.06 kg), followed by the urban sector (0.05 kg) and the estate sector (0.04 kg) (Table 7.11).

Table 7.11: Per Capita Consumption of Soya Bean per Annum by Sectors

Kg

Year	Urban	Rural	Estate	All Sectors
1978/79	0.10	-	0.50	0.10
1981/82 *	0.80	0.30	0.20	0.50
1986/87	★	★	★	★
1996/97	0.02	0.02	0.02	0.02
2003/04	0.05	0.06	0.04	0.05

* Soya Bean + Soya Products

★ denotes negligible

Source: Consumer Finance and Socio Economic Survey, Various Issues Central Bank of Sri Lanka

Per capita consumption of soya bean by those in the income decile of Rs.0 - Rs. 4,520 for all the sectors is 0.09 kg, the highest consumption rate compared with those in other higher income deciles for all the sectors (Table 7.12).

Table 7.12: Per Capita Consumption of Soya Bean by Income Deciles and Sectors, 2003/04

Income Decile	Minimum (Rs)	Maximum (Rs)	Urban (Kg)	Rural (Kg)	Estate (Kg)	All Sectors (Kg)
1	0	4,520	0.17	0.08	0.12	0.09
2	4,527	6,214	0.12	0.06	0.02	0.06
3	6,220	7,728	0.02	0.08	0.04	0.07
4	7,733	9,430	0.04	0.07	0.01	0.06
5	9,435	11,350	0.01	0.04	0.02	0.04
6	11,357	13,755	0.08	0.05	0.04	0.06
7	13,757	17,271	0.06	0.05	0.08	0.05
8	17,275	22,036	0.02	0.05	0.00	0.04
9	22,037	32,778	0.03	0.05	0.00	0.04
10	32,793	825,694	0.05	0.04	0.23	0.05
Overall Average	12,513	95,078	0.05	0.06	0.04	0.05

Source: Consumer Finance and Socio Economic Survey, 2003/04, Central Bank of Sri Lanka

Soya bean protein has the effect of reducing cholesterol levels in hypercholesterolemia cases. The Food and Drug Administration has proposed to use foods which contain soya protein to reduce the risk of heart disease (New Nutrition Business, 1999).

Soya oil is commercially used to manufacture soap with the refuse used to feed cattle. Soya sauce is also used in cooking. True soya sauce, called *shoyu*, is made by fermenting soya beans with cracked roasted wheat, salt and water, for about one year. It is a dark rich sauce with a savoury salty taste as well.

Various cheese and other milk products such as tofu can be made by fermenting soya protein. Tofu cuts the risk of stomach cancer and it has anti-carcinogenic properties. Soya bean is soaked, crushed and heated to produce soya milk to which a coagulating agent such as calcium sulphate or calcium chloride is added. The resulting soya curd is then pressed to give tofu. It is sometimes known as soya cheese. Tofu contains high protein, calcium, iron and vitamin B1, B2 and B3 (The vegetarian society information).

Soya bean is also used as an ingredient for non-food products, such as soya candles and bio-diesel. Soya candles are becoming popular because they burn longer and eco-friendly.

Brown and black seeds are not suitable to make oil and other products as discolouration may reduce the quality.

7.9 Government Policies

The government policy during 1970-77 was to increase local food production. Import bans and marketing facilities were provided through co-operatives, which created a better environment for investment on soya bean, as a commercial crop.

The import liberalization policies of post 1977 period led to the import of soya bean and processed products which adversely affected the market that prevailed for local farmers.

The government introduced a Floor Price Scheme in 1979 to protect the local farmers under which the Paddy Marketing Board (PMB) got involved in purchasing soya bean from the local farmers. According to studies, this scheme was not effective as a salvage price. For example, for a long period between 1982/83 *maha* and 1995 *yala* the floor price remained constant, while the production cost was increasing, leading to a decline in the net profit. The declining profit discouraged the local farmers to invest on soya bean and this was the reason for the drop in the area for cultivation and production as well (Food Commodity Review, 1998).

7.10 Policy Recommendations

Soya bean has a high potential to be developed both commercially and industrially. A high percentage of consumption is covered by imports, annually involving a considerable amount of foreign exchange. Soya bean can be easily cultivated as it has a minimal cost of production. Because of its high nutritional value in protein and low cost of production it can be developed as a major agri-business industry with prospects for expansion. It has a high commercial value and is a substitute for meat. Modern technology can be used to develop effective machines and tools that reduce the traditional processing time and labour as well as production losses and post harvest losses.

New soya bean products can be also introduced for the day-to –day diets.

Protein contained livestock feed can be produced with soya bean saving the much needed foreign exchange. Production of soya oil can be developed as an export industry to earn foreign incomes and thereby generate more agri-business employment opportunities. The prospective farmers need to be educated about the viability and the capacity of the crop to be developed on a commercial basis.

Recommendations

1. The extent under high yielding newly developed soya bean has to be increased.
2. Limit the imports by increasing government barriers.
3. Giving incentives to the farmers to boost the cultivation on more extents of land.
4. Develop soya bean entrepreneurs by giving locally grown crops for their industries under a subsidy scheme.
5. Creating subsidy scheme to low income soya bean farmers.
6. Awareness programmes for housewives about the nutritional value of soya bean to motivate them to add more and more soya for the day-to-day meals.
7. Increase the private sector contribution for the soya bean industry by giving subsidies for those industries under the government sponsorship.

8. BIG ONION

8.1. Introduction

Big onion (*Allium cpa Var. Cepa of family Alliaceae)* cultivation was started as a cash crop in the 1980s' in order to supplement the income of the paddy farmers during the dry season. Initial cultivation got under way in rice fields in the mid country intermediate zone which was then spread towards the areas in the low country dry zone. It is well adapted to the dry zone, and can be grown from sea level to an elevation of 2,000 m. Rainfall should not exceed 750 mm during the growing season. Sunny weather of 1–1½ months is needed for crop maturity. Big onion can be grown on a wide range of soils, except ill drained and heavy soil types.

This crop is mainly grown during the *yala* season in paddy fields in the districts of Anuradhapura and Matale. Except for a few selections of Indian varieties, big onion cultivation is mainly dependant on seeds imported from India by private traders. Varieties, *Rampur Red, Nasic Red, Pusa Red and Agri found light red* are recommended for Sri Lankan conditions considering the factors such as high yield, seed setting ability, storage adaptability, pungency, colour, etc. *Kalpitiya Selection* and *MI Pusa Red* are some of the selections by the Department of Agriculture. *Dambulu Red* is a farmer selection of *MI Pusa Red.* Their seeds are produced in the country during the *maha* season by a process of vernalisation. *Rampur Red, Nasic Red and Dambulu Red* are widely cultivated in main producing areas. According to field information, *Nasic Red* has the highest production, but lacks the storing quality. *Rampur Red* on the other hand has a higher keeping quality though its yield is somewhat low. The *Dambulu* selection seems to have both yield as well as keeping quality.

8.2 Production

8.2.1 Main Producing Areas

Following the introduction of big onion, its cultivation has mainly spread over the areas in Anuradhapura and Matale districts and the cultivation is mainly confined to localities in Sigiriya, Dambulla, Galewela, Devahuwa, Naula, Mahaweli H area and surrounding areas due to the specific climatic suitability for big onion cultivation. Big onion cultivation is mainly done during the *yala* season by the paddy farmers. Cultivation in main producing areas accounts for about 40% in Matale district, 28% in Mahaweli H area and 24% in the rest of the Anuradhapura district (Table 8.1 and Map 8.1).

Table 8.1: Cultivated Extent of Big Onion in Major Producing Areas During *Yala* Seasons, 2001-2005

District	2001	2002	2003	2004	2005	Average 2001-2005	Percentage
Matale	1,350	1,101	1,219	1,241	1,479	1,278	40.4
Mahaweli H Area	716	864	559	699	1,553	878	27.8
Anuradhapura	445	582	703	954	1,136	764	24.1
Other districts	261	286	217	152	298	243	7.7

Source: Department of Census and Statistics, Data Bank of HARTI

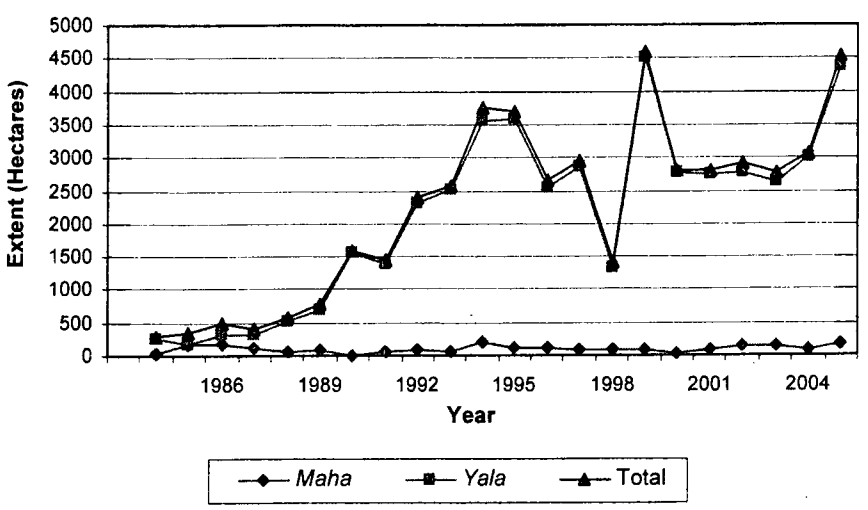
8.2.2 Seasonality in Production

Big onion is a highly seasonal crop and its cultivation is limited to the *yala* season in paddy fields. Therefore, the main big onion production takes place during the months of August to October.

8.2.3 Trends in Production, Cultivated Extent and Average Yield

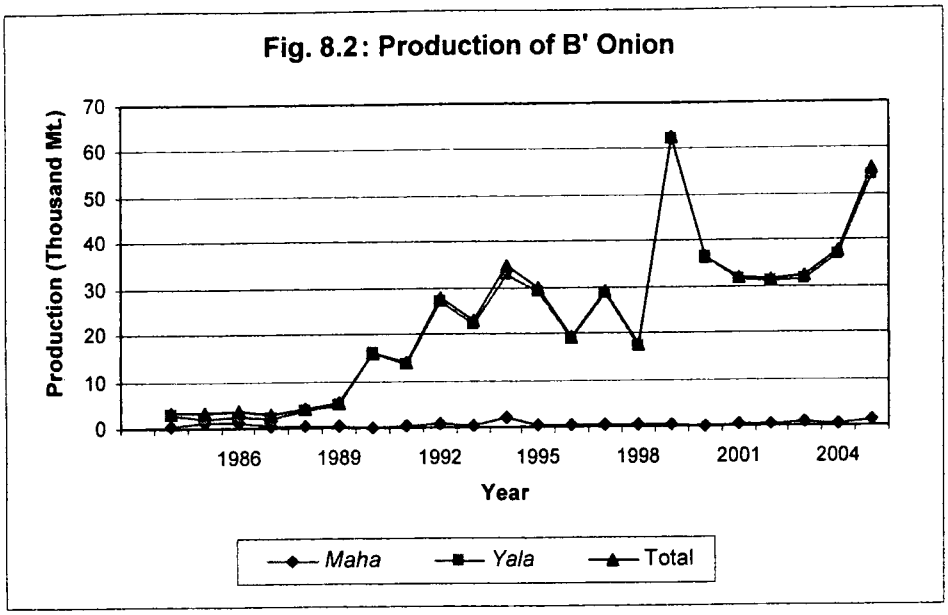
Big onion cultivation is primarily determined by the import policy of the government. Extent cultivated increased over the years with sharp declines in some years. Increasing trend of cultivation continued till 1995 which then declined gradually to about 1,413 ha in 1998. A sudden increase in cultivated extent is observed in 1999 to about 4,597 ha recording the highest ever cultivated extent of big onion in the country. However, the cultivation was stagnating around 2,700 ha – 3,000 ha during last 5 years. Cultivated extent increased by nearly 1,500 ha in 2005 and more than a 50% increase in cultivated extent was observed in Mahaweli H area. This significant increase in cultivated extent was due to the favourable producer prices prevailed during the season owing to the implementation of import restricting policy by the government.

Fig. 8.1: Extent of B' Onion



Big onion production reached the highest in 1999 recording 62,729 mt and again in 2005, the second highest production of 55,552 mt. was recorded (Annex 8.1).

Main factor that determines the yield of big onion is the quality of seeds. The private sector import of seeds on an unofficial basis do not guarantee the yields that are potentially viable. National average yield of big onion was 9 mt/ha before 1998 and it has increased to about 12 mt during the recent past. However, the highest national average yield of 13.8 mt/ha was recorded in the year 1999 (Annex 8.1).



8.3 Review of Agricultural Inputs and Cost of Production

Seeds play a vital role as the important input that determines the yield level of big onion. At present, nearly 80% of the seed requirement is met by imports that are made illegally by the private sector. In order to get a better income from big onion production, good quality seeds with higher yields and better keeping quality are needed.

Labour accounts to the main cost component in big onion production, which is about 60% of the total cost of production (Table 8.2). Next to labour, the fertiliser accounts to the main cost component of big onion production. In the year 2004, the cost of production of big onion was calculated as Rs. 80,000/ac including imputed costs. Big onion cultivation is more or less a family enterprise that utilises the family labour for the operations. Total imputed cost accounts to about 32% of the total cost.

Table 8.2: Cost of Cultivation per Acre of Big Onion by Type of Inputs in Matale under Irrigated Conditions, 2004 *Yala*

Input	Cost (Rupees)	Percentage of Total cost
Labour	47,512.00	60.0
Seed	2,768.00	3.5
Fertilizer	10,595.00	13.4
Agro - Chemicals	8,179.00	10.3
Other	610	0.8
Draught Power, Machinery and Equipment	9,493.00	12.0
Total Cost - Including Imputed Cost	79,157.00	100.0
Total Cost - Excluding Imputed Cost	53,634.00	67.8

Source: Cost of Cultivation of Agricultural Crops, 2004 yala, Department of Agriculture

8.4 Marketing

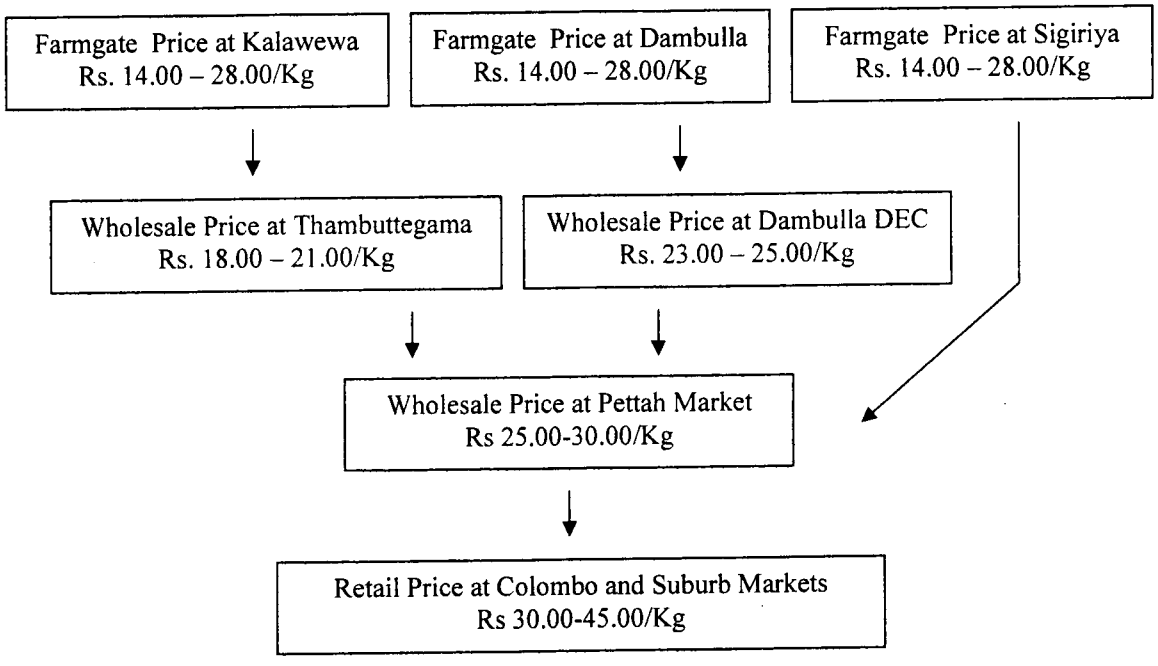
8.4.1 Marketing Channels

Dambulla is the main market centre for big onions. It is the meeting point of the producers/collectors, the wholesalers, and the retailers. Thambuththegama is also an important market for the farmers in the Anuradhapura district. 4th cross street in Pettah also plays a considerable role as a market for producers/collectors from Sigiriya area. It is also important as the main wholesale point of imports.

8.4.2 Price Determination

Prices at the wholesale level are determined by the market forces. CIF price, tax and the quantity of imports are the determinants of the wholesale price at the 4th cross street in Pettah, the main price determination point. During the local production period, the prices are mainly determined at Dambulla. Price determined at the Dambulla DEC gets transmitted to the producer level on a commission basis. Rs. 0.50 – Rs. 2.00 is paid per kg based on the wholesale price fetched. A government minimum price scheme was operated during some years with the intervention of purchasing by the CWE.

Flow Chart 8.1: Prices at Main Price Determining Points During Peak Harvesting Period from 15th –21st September 2006



Source: Marketing and Food Policy Division of HARTI

8.4.3 Review of Marketing Cost and Market Margin

In addition to the main costs of transport and handling, the wastages account for some share of the cost in the marketing operation. Wastages are approximated to about 10% of the

production of big onion. Wholesale-retail margin is about 25%- 39% of the wholesale price according to the table 8.3.

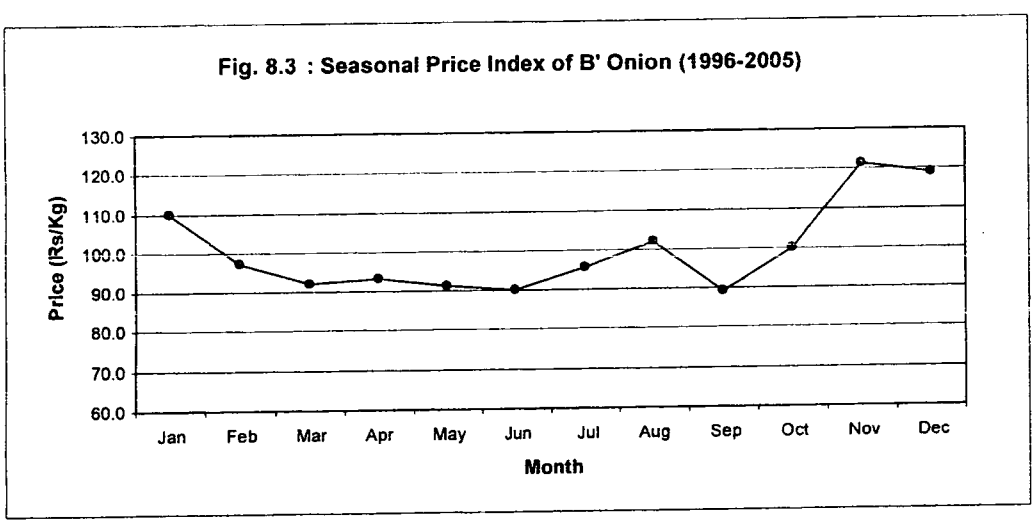
Table 8.3: Annual Average Wholesale and Retail Prices of Big onion and Wholesale-Retail Margin

Year	Wholesale Price Rs/Kg	Retail Price Rs/Kg	Wholesale - retail margin Rs/Kg	Percentage
1996	21.95	28.95	7.00	31.9
1997	19.50	26.50	7.00	35.9
1998	34.06	44.64	10.58	31.1
1999	29.01	40.26	11.25	38.8
2000	24.87	34.27	9.40	37.8
2001	27.45	37.28	9.83	35.8
2002	25.34	34.10	8.76	34.6
2003	29.16	37.50	8.34	28.6
2004	32.45	41.41	8.96	27.6
2005	37.30	46.76	9.47	25.4

Source: Marketing, Food Policy and Agri Business Division of HARTI

8.4.4 Price Behaviour

Except during the local production period from August to October, the main stocks of big onion at the retail market comprise of imported big onion from India and Pakistan. Price of big onion, therefore is mainly determined by the CIF price, the import duty and the quantity of imports. Retail market prices had dropped to a minimum during March and June according to the seasonal price index over the last 10 years excluding the year 1999 (Figure 8.3 and Annex 8.3), because of heavy imports with low duty rate. Conversely, the prices escalate to the maximum during November and December with the end of the local production and the relatively low imports.



Over the last 10 years, the price of big onion at the retail market has increased by about 60% which is below the average inflation in the country.

8.5 External Trade

Main supply of big onion at the domestic market is accomplished by imports. The share of imports has exceeded 80% of the country's requirement in some years. In the years with increased local production this share drops to 50% –60%. Average yearly imports of big onion accounted for about 110,698 mt during the last 10 years. Almost 90% of the imports are traded from India, with meagre quatities from Pakistan too (Annex 8.4).

At present, a 20% duty is imposed on big onion imports in addition to the 5% Value Added Tax (VAT).

8.6 Consumption

Increased cultivation of big onion in the country, has also resulted in a remarkable increase in consumption. Big onion became the main substitute for red onion, the consumption of which dropped in the recent past. According to the CFSE survey of Central Bank of Sri Lanka, per capita consumption of big onion was 1.52 kg/year in 1986/87 and it increased to 6.59 kg /year and 6.62 kg/year during 1996/97 and 2003/04 surveys. Big onion is also an income elastic commodity that consumption considerably increases in the higher income deciles particularly in the urban setting (Annexes 8.5 and 8.6).

8.7 Review of Government Policy

The main policy of the government in favour of big onion production is the regulation of import duty during the harvesting season. Therefore, big onion cultivation is primarily determined by the import policy of the government. Significant increases in cultivated extents are observed if favourable producer prices prevailed during the preceding season. However, the success of the cultivation is dependant on the quality of seeds imported from India by the private traders. Yet, the government has not been able to legalise the seed import industry enabling the restriction of smuggled seeds coming into the country. Nearly 80% of the seed requirement are met by illegal imports.

Fertiliser subsidy continued in this sector and it is a considerable share in the total cost of big onion production. Much of the production is marketed through the open market except for indispensable government interventions very rarely.

8.8 Conclusion

Big onion production in the country is currently done under heavy protection. However, the big onion production is restricted only to the cultivating season (*yala)* and could meet only part of the demand mainly due to the poor storage characteristics of the produce. The share of imports exceeds 80% of the country's requirement in some years. At the time of harvesting, a very high import duty and/or a surcharge is imposed on big onion imports in order to protect the local producer. With the relaxation of import restrictions, the extents under onion cultivation declined resulting in a fall in the production. During last few years, the increased protection during the harvesting season has given a better price support for the farmers and has increased the extent cultivated in both main producing districts. However, such incentives

favour big onion farmers to turn than venture into a more trader enterprise than a family enterprise. Return from big onion production recorded more than Rs. 60,000/ac. including imputed cost in 2003 *yala*, and without the imputed cost it amounted to Rs. 87,000/ac.

Highest prices at the retail market are recorded at the end of the main harvesting season in November and December due to the continuation of high tariff rate even after the peak local production period. On the other hand, the demand for big onion is also at the maximum towards the end of the year.

To make the big onion farming more competitive, a better seed policy is needed which would assure a better margin for the farmers even without heavy protection. Currently, the farmers tend to cultivate high yielding varieties, but with low keeping quality at the beginning of the season. They will cultivate varieties having higher keeping quality even with low yields afterwards to store them to market during the months of October and November. Therefore, good quality seeds with higher yields and better keeping quality would assure a better income for the big onion farmers. Promotion of supply of seeds such as the selection, *Dambulu Red*, that has both high yields and longer keeping quality can fill the needs of the farmers. The current program of producing such seeds that fulfils only about 10% of the seed requirement of big onion production should be broadened.

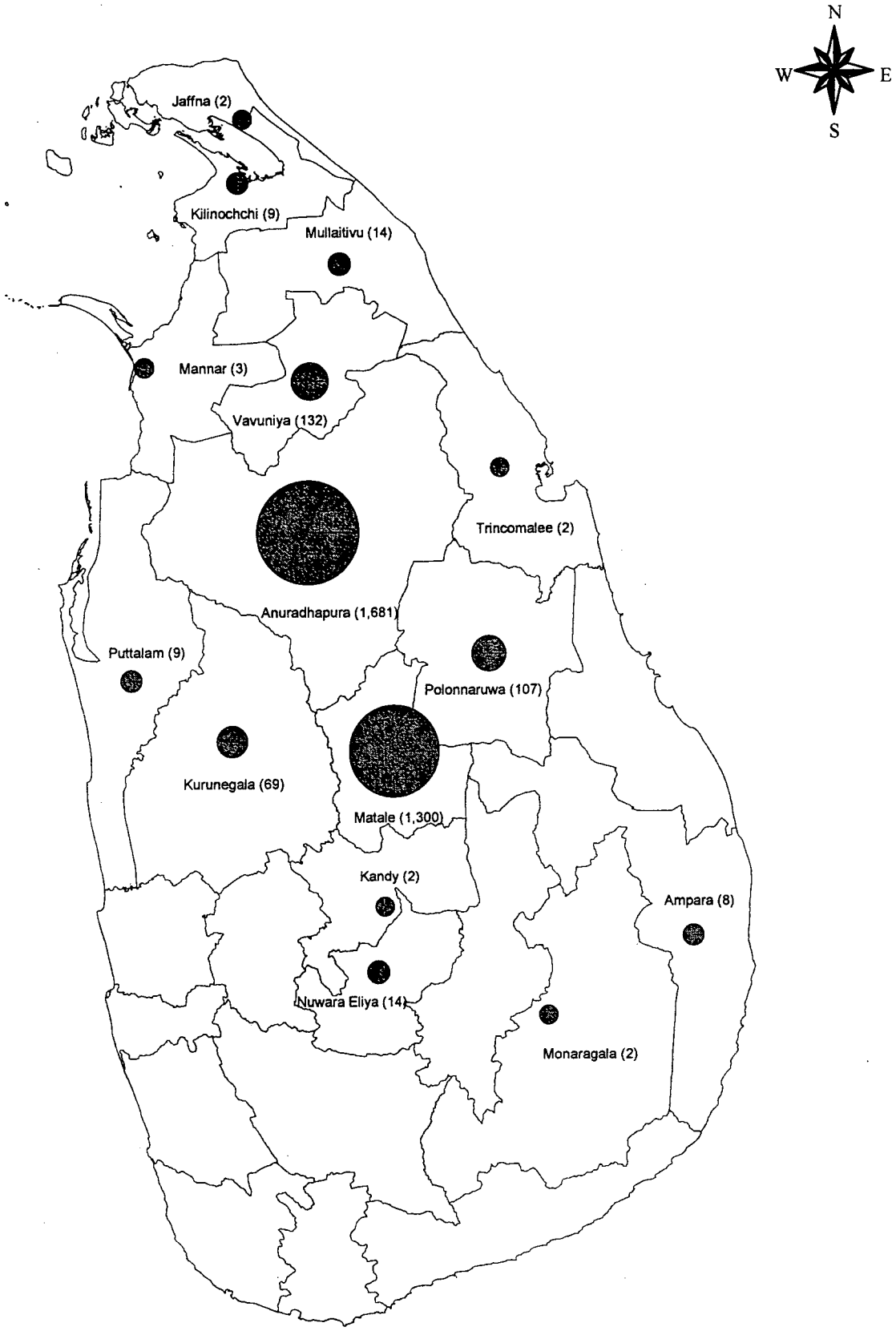
Annex 8.1: Extent, Production and Average Yield of Big Onion – Sri Lanka

Year	Extent (Hec)			Production (M.Tons)			Average Yield (Kg/ha)		
	Maha	*Yala*	Total	*Maha*	*Yala*	Total	*Maha*	*Yala*	Total
1984	25	258	283	222	3,027	3,249	8,880	11,732	11,480
1985	160	175	335	1,319	1,865	3,184	8,244	10,657	9,504
1986	175	306	481	1,213	2,593	3,806	6,931	8,474	7,913
1987	102	314	416	591	2,132	2,723	5,794	6,790	6,546
1988	54	521	575	350	3,872	4,222	6,481	7,432	7,343
1989	78	702	780	364	5,001	5,365	4,667	7,124	6,878
1990	13	1,567	1,580	47	15,856	15,903	3,615	10,119	10,065
1991	64	1,383	1,447	428	13,618	14,046	6,688	9,847	9,707
1992	95	2,300	2,395	803	27,076	27,879	8,453	11,772	11,641
1993	67	2,507	2,574	577	22,261	22,838	8,612	8,880	8,873
1994	210	3,551	3,761	1,884	32,842	34,726	8,971	9,249	9,233
1995	107	3,580	3,687	606	29,113	29,719	5,664	8,132	8,060
1996	119	2,543	2,662	508	18,859	19,367	4,269	7,416	7,275
1997	101	2,855	2,956	565	28,573	29,138	5,594	10,008	9,857
1998	87	1,326	1,413	331	17,113	17,444	3,805	12,906	12,345
1999	82	4,515	4,597	364	62,365	62,729	4,439	13,813	13,646
2000	23	2,773	2,796	63	36,497	36,560	2,739	13,162	13,076
2001	78	2,737	2,815	318	31,648	31,966	4,077	11,563	11,356
2002	136	2,770	2,906	529	31,031	31,560	3,890	11,203	10,860
2003	133	2,637	2,770	646	31,655	32,301	4,857	12,004	11,661
2004	76	2,999	3,075	517	36,991	37,508	6,803	12,334	12,198
2005	185	4,367	4,552	1,381	54,171	55,552	7,465	12,405	12,204

Source: Department of Census and Statistics

Map 8.1: Average Extent of B' Onion Cultivated during 2001 - 2005 by Districts

(Figures given in parenthesis are in hectares)



Annex 8.2: Cost of Cultivation per Acre of B'onion by Inputs in Matale under Irrigated Conditions during Yala Seasons

Rs/Acre

Input	1996	1997	1998	1999	2000	2001	2002	2003	2004
Labour	21,941.00	23,498.00	24,850.00	34,571.00	33,020.00	41,160.00	45,216.00	46,167.00	47,512.00
Seed	2,281.00	1,732.00	1,872.00	3,795.00	1,717.00	2,050.00	2,281.00	2,107.00	2,768.00
Fertilizer	4,166.00	6,392.00	5,806.00	8,642.00	9,402.00	9,781.00	9,081.00	9,127.00	10,595.00
Agro Chemicals	3,294.00	3,800.00	3,351.00	8,861.00	8,284.00	8,677.00	7,173.00	9,206.00	8,179.00
Other	400.00	1,095.00	380.00	745.00	622.00	939.00	962.00	865.00	610.00
Draught Power, Machinery and Equipment	5,767.00	6,605.00	5,560.00	5,525.00	8,608.00	10,443.00	10,918.00	9,317.00	9,493.00
Total Cost - Including Imputed Cost	37,849.00	43,121.00	41,820.00	62,138.00	61,653.00	73,052.00	75,630.00	76,789.00	79,157.00
Total Cost - Excluding Imputed Cost	24,328.00	25,741.00	27,452.00	43,657.00	45,743.00	51,886.00	54,530.00	50,276.00	53,634.00

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

Annex 8.3 Monthly Average Retail Prices of B' Onion in Sri Lanka

Rs/Acre

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	33.56	29.83	45.43	64.52	30.81	45.85	37.93	30.95	54.52	52.22
February	28.05	25.33	46.38	56.13	30.20	46.64	33.96	29.26	50.23	44.95
March	26.64	24.81	44.83	45.51	29.69	41.79	34.71	30.19	44.32	43.29
April	26.35	27.03	35.17	41.70	32.80	69.25	32.96	37.26	42.08	52.90
May	31.26	25.33	32.31	40.34	49.79	72.83	31.28	36.60	36.45	45.63
June	30.60	26.11	35.32	41.04	36.89	41.28	32.60	38.86	36.37	44.13
July	33.99	25.69	39.40	39.73	35.43	37.60	33.02	36.99	37.56	48.58
August	31.88	24.64	39.46	35.95	33.50	35.96	34.30	37.85	38.03	48.33
September	29.52	23.86	40.35	30.82	30.75	34.07	34.31	33.73	36.32	42.57
October	27.19	22.44	40.00	26.70	32.65	32.03	33.95	37.69	35.34	43.88
November	31.43	28.72	72.81	28.62	37.90	37.10	36.87	56.70	48.18	52.63
December	31.81	41.78	57.44	29.43	43.60	42.89	36.86	52.98	55.62	58.12
Annual Average	30.19	27.13	44.08	40.04	35.38	44.69	34.41	38.44	42.75	48.06

Sources: Department of Census and Statistics
Data Bank of HARTI

Annex: 8.4 Imports of B' Onion by country of Origin

Country	1996		1997		1998		1999		2000	
	Qty (Mt)	Value (Rs 000')	Qty (Mt)	Value (Rs 000')	Qty (Mt)	Value (Rs 000')	Qty (Mt)	Value (Rs 000')	Qty (Mt)	Value (Rs 000')
Australia					45	582	44	562		
China					684	12,180	536	9,672	743	9,054
France									10	199
Hong Kong					385	6,495	266	4,700	229	2,899
India	84,904	1,035,900	108,642	1,196,100	52,508	823,956	45,031	759,492	94,400	1,218,539
Japan			25	259					75	1,049
Netherlands			290	3,580	9,112	182,220	3,073	57,298	532	7,662
Pakistan	4,198	52,220	10,105	108,750	34,258	594,253	34,513	799,405	21,419	260,869
UAE			37	511	467	9,570	401	6,707	46	600
UK			45	601	1,472	29,366	45	910	50	667
Singapore					53	973	50	1,233		
Thailand							26	756		
Iran			71	952	1,188	23,067				
Maldives			75	1,022						
Malaysia					24	482				
Ireland					84	1,800				
Hear I.					81	1,452				
S.Korea			25	259						
Other	55	760								
Total	89,157	1,088,880	119,315	1,312,034	100,361	1,686,396	83,985	1,640,735	117,504	1,501,538

Country	2001		2002		2003		2004		2005	
	Qty (Mt)	Value (Rs 000')	Qty (Mt)	Value (Rs 000')	Qty (Mt)	Value (Rs 000')	Qty (Mt)	Value (Rs 000')	Qty (Mt)	Value (Rs 000')
China	135	1,806	75	1,174	86	1,305	51	992		
India	80,951	1,317,457	121,266	1,765,059	121,785	1,937,835	109,642	2,077,802	101,452	1,653,824
Japan			50	714	201	2,791			51	1,064
Netherlands	30	569								
Pakistan	29,065	429,423	8,576	131,220	8,311	112,327	5,276	86,032	9,106	169,135
UAE			50	580						
Thailand			25	339	126	2,499			13	294
Indonesia			50	675			151	3,915		
Jordan					25	340				
Malaysia									41	861
Singapore									49	958
Other	*	113	25	413	1	80	*	19		
Total	110,181	1,749,368	130,117	1,900,174	130,535	2,057,177	115,120	2,168,760	110,712	1,826,136

* - Negligible

Source: External Trade Statistics, Various issues, Sri Lanka Customs

Annex 8.5: Per Capita Consumption of B' Onion per Annum by Sectors

Kg.

Year	Urban	Rural	Estate	All Sectors
1978/79	0.02	0.01	0.01	0.01
1981/82	0.31	1.13	0.06	0.16
1986/87	2.56	1.33	0.85	1.52
1996/97	7.85	6.50	4.87	6.59
2003/04	7.98	6.48	5.55	6.62

Source: Consumer Finance and Socio Economic Survey, Various Issues Central Bank of SriLanka

Annex 8.6: Per Capita Consumption of B' Onion by Income Deciles and Sectors - 2003/04

Kg.

Income Decile	Minimum (Rs)	Maximum (Rs)	Urban	Rural	Estate	All Sectors
1	0	4,520	5.54	5.11	5.19	5.14
2	4,527	6,214	5.01	5.33	5.76	5.36
3	6,220	7,728	5.77	5.34	4.97	5.33
4	7,733	9,430	7.15	5.56	5.65	5.67
5	9,435	11,350	6.27	6.02	5.01	6
6	11,357	13,755	6.11	6.75	5.97	6.66
7	13,757	17,271	7.43	6.67	5.63	6.72
8	17,275	22,036	7.79	7.28	6.08	7.32
9	22,037	32,778	8.71	7.53	8.56	7.77
10	32,793	825,694	10.29	8.82	5.92	9.24
Overall Average	12,513	95,078	7.98	6.48	5.55	6.62

Income decile for one month house hold income

Source: Consumer Finance and Socio Economic Survey, Various Issues Central Bank of Sri Lanka

Annex 8.7: Net Return Per Acre of B' Onion in Matale under Irrigated Conditions during *Yala* Seasons

Year	Net Return Per Acre		Year	Net Return Per Acre	
	Including Imputed Cost	Excluding Imputed Cost		Including Imputed Cost	Excluding Imputed Cost
1995	15,536	23,097	2000	24,389	40,299
1996	44,611	58,132	2001	55,124	76,290
1997	13,057	30,436	2002	46,406	67,507
1998	108,071	122,440	2003	60,766	87,278
1999	19,622	38,103	2004	38,219	63,742

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

9. RED ONION

9.1 Introduction

Red onion, *Allium ascalonium* is a condiment crop that constitutes an important part of the Sri Lankan diet. Red onion cultivation is best adapted to the dry zone and can be grown from sea level to an elevation of 2,000 m. Rainfall should not exceed 750 mm during the growing season. Planting in the wet zone should be timed so the expected dry spell will occur during crop maturation, i.e. 1-1½ months after planting. Red onion can be grown on a wide range of soils, except stony, ill drained and heavy soils.

Red onion is grown for bulb production and spring onions during both seasons under rain-fed and irrigated conditions. Under different cropping systems, red onion is cultivated as a mono crop. Red onion cultivation was mainly concentrated in the Jaffna peninsula. However, at present, the main red onion cultivation takes place in the Kalpitaya belt. Varieties *Jaffna local (Sinnan)* and *Vethalan* are the main varieties recommended by the Department of Agriculture.

9.2 Production

9.2.1 Main Producing Areas

Red onion cultivation was mainly extended over an area in the districts of the North and Eastern provinces and in Puttalam and Ratnapura districts (Annex 9.1, Map 9.1). Its cultivation was mainly confined to Jaffna peninsula until 90's. Kalpitiya belt in Puttalam district became the main producing area afterwards as depicted in table 9.1.

Table 9.1: Five year Averages (1976-2005) of Cultivated Extent of Red onion in Major Cultivating Areas

Hectares

District	Season	Average 1976-1980	Average 1981-1985	Average 1986-1990	Average 1991-1995	Average 1996-2000	Average 2001-2005
Puttlam	*Maha*	146	339	461	773	571	598
	Yala	100	97	352	717	706	665
	Total	246	436	813	1,490	1,277	1,264
		2.8	5.9	10.5	21.6	20.6	25.1
Jaffna	*Maha*	2,025	1,627	1,591	859	496	421
	Yala	1,848	1,476	1,398	575	581	527
	Total	3,873	3,103	2,710	1,434	1,076	948
		43.9	42.0	35.1	20.8	17.4	18.8
Sri Lanka	*Maha*	4,750	4,184	4,154	3,638	3,131	2,405
	Yala	4,066	3,203	3,570	3,256	3,058	2,629
	Total	8,816	7,387	7,724	6,894	6,188	5,034
		100.0	100.0	100.0	100.0	100.0	100.0

Source: Department of Census and Statistics

During the last 5 years, the red onion cultivation in main producing areas accounted for about 25% in Puttalam and 19% in Jaffna. Red onion is also cultivated in hilly areas (during *maha* season) and in paddy fields (after *maha* rice) in Ratnapura district. Considerable extents are also cultivated in Trincomalee, Batticalo, Mullaitivu, Vavuniya, Moneragala, Nuwara Eliya and Kurunegala.

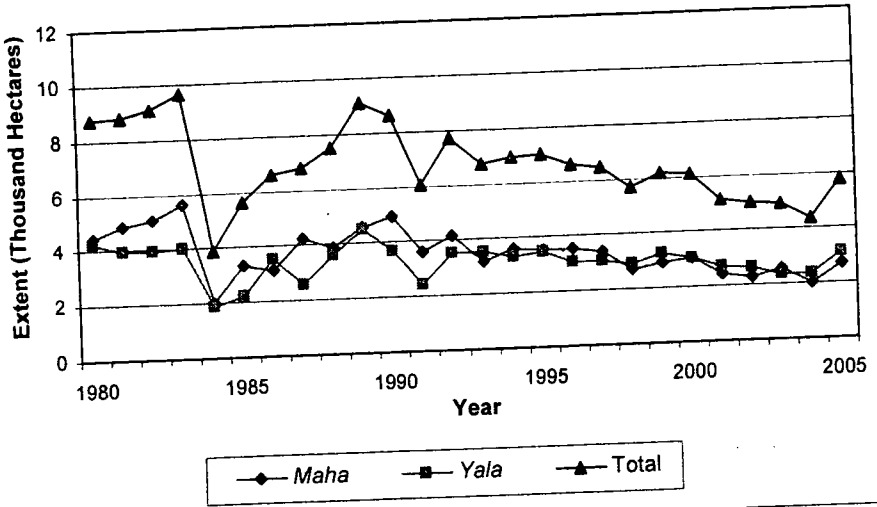
9.2.2 Seasonality in Production

Red onion is cultivated in both seasons under different cropping systems. Main red onion production comes during the months of February to April and July to September.

9.2.3 Trends in Production, Cultivated Extent and Average Yield

Red onion cultivation steadily declined over the last 15 years from about 8,500 ha -9,000 ha to about 5,000 ha as shown in the figure 9.1 mainly due to the abandoning of red onion cultivation in Jaffna peninsula.

Fig. 9.1: Extent of Red Onion



Increased violence in the area and the stiff competition from cheap imports made Jaffna farmers vulnerable to cultivation. Availability of both local and imported big onion also affected the red onion cultivation. Accordingly, red onion production dropped by about 40% over the 15 years (Table 9.2). However, in the year 2005, an increase of cultivated extent was observed as more than 1,000 ha. was brought under red onion cultivation in Puttalam district. Accordingly in 2005, some 53,730 mt of red onion were produced in the country.

National average yields of red onion continue to stagnate with the continuous cultivation of *Jaffna local (Sinnan)* and *Vethalan* varieties. The highest national average yield of 9.9 mt/ha was recorded in the year 1983. However, better yields are observed in the years with increased cultivation (Annex 9.2).

Table 9.2: Five Year Average Production (1976 – 2005) of Red Onion and Annual Production (2001- 2005)

Metric Tons

Period / Year	*Maha*	*Yala*	Total
Avg (76-80)	33,236	29,386	62,622
Avg (81-85)	30,766	29,304	60,070
Avg (86-90)	31,954	30,518	62,472
Avg (91-95)	25,025	23,037	48,062
Avg (96-00)	20,706	21,680	44,387
Avg (01-05)	18.477	21,700	40,178
2001	15,695	21,168	36,863
2002	15,394	19,940	35,334
2003	17,170	18,343	35,513
2004	18,555	20,898	39,453
2005	25,575	28,154	53,729

Source : Department of Census and Statistics

9.3 Review of Agricultural Inputs and Cost of Production

Red onion is also a labour intensive crop that requires around 300 man days per ha of cultivation. However, seeds (bulbs) account for the main cost component of red onion production, which is nearly 50% of the total cost of production. Supply of seeds to the main producing areas mostly come from Jaffna. Therefore, seed is one of the constraining factors for production amidst the increased violence in the region. According to the field information, around 600 kg of seed is planted for the cultivation of an acre.

Labour accounts for more than 30% of the total cost of production which has increased over the years. Due to the increased fuel prices the draught power cost too has increased significantly in the recent years (Annex 9.3). In the 2003/04 *maha* season, the cost of production of big onion was Rs. 80,480.00/ac, including the imputed costs in Puttalam district. Of the total cost, more than 93% is capital. (Table 9.3).

Table 9.3: Cost of Cultivation per Acre of Red Onion by Type of Inputs in Puttalam Under Irrigated Conditions 2003/04 *Maha*

Input	Cost Rs/Ac	% of Total Cost
Labour	27,656.00	34.4
Seed	35,807.00	44.5
Fertilizer	6,381.00	7.9
Agro - Chemicals	1,401.00	1.7
Draught Power, Machinery and Equipment	9,245.00	11.5
Total Cost - Including Imputed Cost	80,489.00	100
Total Cost - Excluding Imputed Cost	75,314.00	93.6

Source: Cost of Cultivation of Agricultural Crops, 2003/04
Department of Agriculture

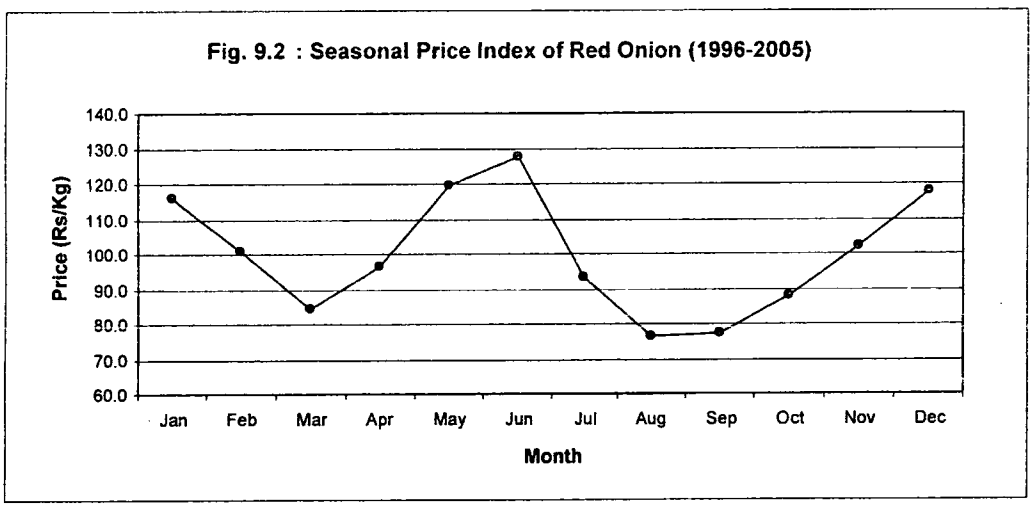
9.4. Marketing

9.4.1 Marketing Channels

Norochchole and Vavuniya are the major market places for red onion buyers. The terminal market in Norochchole provides a main buying point for supplies from Kalpitiya areas.

9.4.2 Price Behaviour and Market Margin

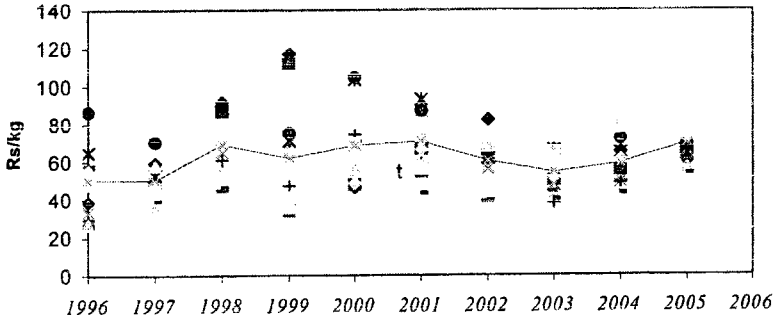
Price of red onion is mainly determined by the local supply of red onion and the relative price of big onion. During the main harvesting periods, the prices fall at the retail markets. Retail market prices have dropped to the minimum during the months of March, August and September according to the seasonal price index over the last 10 years. Meanwhile, the highest prices are recorded in June and December.



Red onion has a very volatile market with a wide fluctuation of prices at the retail market within an year as market channels often get interrupted by violence in the producing areas. In

the year 1999, the retail prices widely fluctuated with a price spread of nearly Rs. 86.00/kg. However, price spread at farm gate was only Rs. 34.00/kg in the same year (Annex 9.5).

Figure 9.3: Monthly Retail Prices of Red Onion (1996 – 2005)



According to the retailer- wholesaler margin, the retailer maintains about 25% to 39% of the wholesale price at the Pettah market. Compared with the marketing cost and the wastage, this margin is relatively high.

Table 9.4: Annual Average Producer Prices, Wholesale Prices, Retail Prices of Red Onion and Margins

Rs/Kg

Year	Producer Price	Wholesale Price (Pettah)	Retail Price (Colombo and Suburbs)	Producer-Wholesaler Margin	Wholesaler-Retailer Margin
1996	30.86	39.20	50.38	8.34	11.18
1997	29.99	37.86	50.25	7.87	12.39
1998	36.89	54.34	69.17	17.45	14.83
1999	31.08	44.65	61.91	13.57	17.26
2000	36.01	53.76	68.63	17.75	14.87
2001	39.01	54.99	70.72	15.98	15.73
2002	33.95	48.18	60.32	14.23	12.14
2003	32.00	40.82	54.32	8.82	13.49
2004	34.13	45.81	59.12	11.68	13.31
2005	38.99	51.45	69.62	12.46	18.17

Source: Marketing Food Policy and Agri Business Division of HARTI
Department of Census and Statistics

9.5 External Trade

The local red onion production virtically meets the demand at the domestic market. The share of imports only accounts for about 5%-10% of the local production which is about 3,500 mt per year. More than 90% of the imports are from India. A custom duty of 5% is levied on red onion imports.

9.6 Consumption

Per capita consumption of red onion has remarkably declined with the drop of production in the country and increased consumption of big onion as a substitute. According to the CFSE survey of the Central Bank of Sri Lanka, per capita consumption of red onion was 3.29 kg/year and 3.36 kg/year in 1981/82 and in 1986/87 respectively. This consumption has dropped to 1.87 kg/year and 2.97 kg/year according to 1996/97 and 2003/04 surveys respectively.

9.7 Review of Government Policy

It is evident from the stagnating red onion yields over the last 25- 30 years that this crop has not been given the pride of place despite the fact that it is a healthier spicy food which has a traditional value in the Sri Lankan diet. The highest yield was recorded in the country as far back as 1983. On the other hand, much emphasis was given by the government to enhance the big onion cultivation with the abandoning of red onion cultivation in main producing areas in the Northern region.

A more or less liberalised market is maintained although very few imports are coming to the country. Under the present fertiliser subsidy policy, the red onion farmers are not getting the fertilisers at subsidised prices and the farmers are also deprived of any state intervention to purchase their products.

9.8 Conclusion

Demand for red onion has been substituted by big onion in the local market over the last 25 years. Big onion made cooking preparations easier and therefore, consumer demand over big onion increased substantially. On the other hand, big onion cultivation has expanded as it is very attractive to the farmers due to its higher land productivity. However, the red onion crop has a very high potential as a cash crop specially to the farmers in the Northern and Eastern Provinces.

Volatility of red onion market is one of the concerns that government needs to give attention to considering the welfare of both the consumer and the producer.

Annex 9.1 Extent of Red Onion by Major Growing Districts (Hectares)

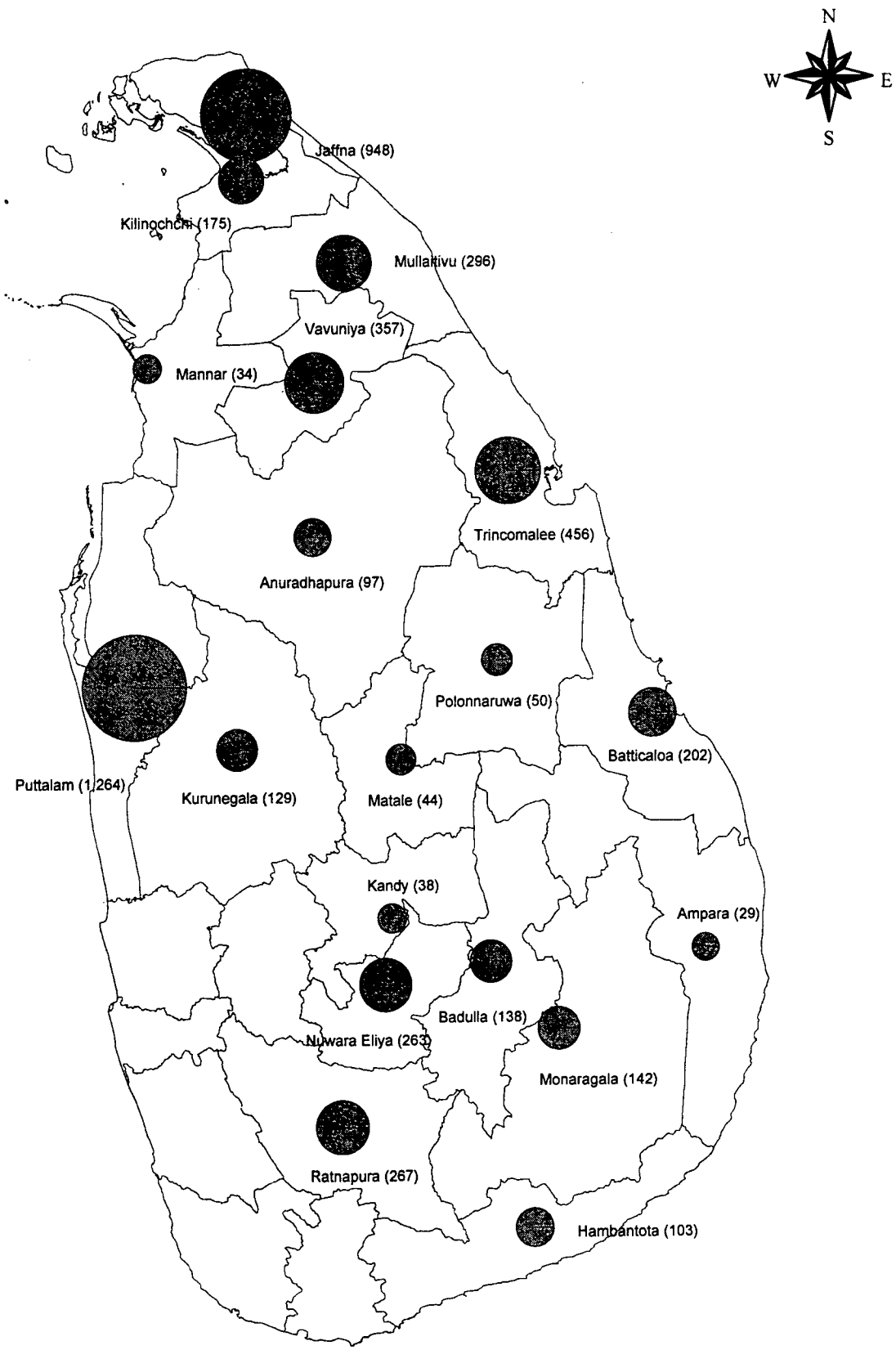
District	Season	Average (76-80)	Average (81-85)	Average (86-90)	Average (91-95)	Average (96-00)	2001	2002	2003	2004	2005	Average (2001-05)	Percentage
Puttalam	*Maha*	146	339	461	773	571	600	493	468	490	940	598	
	Yala	100	97	352	717	706	668	626	473	493	1067	665	
	Total	246	436	813	1490	1277	1268	1119	941	983	2007	1264	25.1
Jaffna	*Maha*	2025	1627	1591	859	496	434	377	410	370	514	421	
	Yala	1848	1476	1398	575	581	526	539	496	496	579	527	
	Total	3873	3103	2710	1434	1076	960	916	906	866	1093	948	18.8
Trincomalee	*Maha*	343	266	83	153	337	267	306	367	233	141	263	
	Yala	53	63	36	62	222	259	233	193	193	90	194	
	Total	396	329	112	176	559	526	539	560	426	231	456	9.1
Vavuniya	*Maha*	116	59	50	0	65	25	44	89	62	258	96	
	Yala	218	118	287	407	194	231	243	251	248	335	262	
	Total	334	177	337	407	233	256	287	340	310	593	357	7.1
Mullativu	*Maha*	226	325	38	23	66	124	124	117	101	106	114	
	Yala	388	237	269	36	91	105	105	182	194	324	182	
	Total	665	562	307	59	158	229	229	299	295	430	296	5.9
Ratnapura	*Maha*	349	389	427	371	353	170	163	184	157	148	164	
	Yala	291	241	151	184	199	125	103	103	99	82	102	
	Total	639	630	578	555	552	295	266	287	256	230	267	5.3
Nuwara Eliya	*Maha*	87	140	226	304	240	195	189	174	154	150	172	
	Yala	76	157	229	225	191	127	97	94	74	62	91	
	Total	163	297	455	530	431	322	286	268	228	212	263	5.2
Others*	*Maha*	1594	1040	1279	1222	1028	620	608	746	472	433	576	
	Yala	1246	813	1134	1151	874	648	718	547	555	561	606	
	Total	2840	1853	2413	2377	1902	1268	1326	1293	1027	994	1182	23.5
Sri Lanka	Maha	4750	4184	4154	3638	3131	2435	2304	2558	2039	2690	2405	
	%	53.9	56.6	53.8	52.8	50.6	47.5	46.4	52.2	46.4	46.5	47.8	
	Yala	4066	3203	3570	3256	3058	2689	2664	2339	2352	3100	2629	
	%	46.1	43.4	46.2	47.2	49.4	52.5	53.6	47.8	53.6	53.5	52.2	
	Total	8816	7387	7724	6894	6188	5124	4968	4897	4391	5790	5034	
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Total of Batticaloa, Killinochchi, Monaragala, Badulla, Kurunegala, Udawalawa, Anuradhapura, Polonnaruwa, Matale, Kandy, Mannar, Ampara districts and special project Mahaweli H

Source : Department of Census and Statistics, Data Bank of HARTI

Map 9.1: Average Extent of Red Onion Cultivated during 2001 - 2005 by Districts

(Figures given in parenthesis are in hectares)



Annex 9.2: Extent, Production and Average Yield of Red Onion - Sri Lanka

Year	Extent (Hec)			Production (M.Tons)			Average Yield (Kg/Hec)		
	Maha	*Yala*	Total	*Maha*	*Yala*	Total	*Maha*	*Yala*	Total
1980	4,454	4,256	8,710	33,108	33,783	66,891	7,433	7,938	7,680
1981	4,858	3,934	8,792	30,586	28,497	59,083	6,296	7,244	6,720
1982	5,098	3,970	9,068	35,030	32,513	67,543	6,871	8,190	7,449
1983	5,631	3,992	9,623	54,525	40,838	95,363	9,683	10,230	9,910
1984	1,989	1,878	3,867	13,210	23,470	36,680	6,642	12,497	9,485
1985	3,344	2,241	5,585	20,480	21,204	41,684	6,124	9,462	7,464
1986	3,110	3,505	6,615	23,313	33,834	57,147	7,496	9,653	8,639
1987	4,253	2,561	6,814	34,724	21,543	56,267	8,165	8,412	8,258
1988	3,896	3,594	7,490	28,274	30,880	59,154	7,257	8,592	7,898
1989	4,597	4,503	9,100	35,462	36,374	71,836	7,714	8,078	7,894
1990	4,913	3,687	8,600	37,997	29,960	67,957	7,734	8,126	7,902
1991	3,593	2,430	6,023	25,901	15,729	41,630	7,209	6,473	6,912
1992	4,196	3,537	7,733	28,468	26,047	54,515	6,785	7,364	7,050
1993	3,218	3,545	6,763	22,890	24,658	47,548	7,113	6,956	7,031
1994	3,634	3,326	6,960	24,356	23,872	48,228	6,702	7,177	6,929
1995	3,551	3,442	6,993	23,513	24,879	48,392	6,622	7,228	6,920
1996	3,553	3,031	6,584	23,154	20,784	43,938	6,517	6,857	6,673
1997	3,414	3,037	6,451	23,798	21,001	54,799	6,971	6,915	8,495
1998	2,720	2,941	5,661	17,684	20,364	38,048	6,501	6,924	6,721
1999	2,898	3,252	6,150	18,515	24,133	42,648	6,389	7,421	6,935
2000	3,068	3,027	6,095	20,380	22,122	42,502	6,643	7,308	6,973
2001	2,435	2,689	5,124	15,695	21,168	36,863	6,446	7,872	7,194
2002	2,304	2,664	4,968	15,394	19,940	35,334	6,681	7,485	7,112
2003	2,558	2,339	4,897	17,170	18,343	35,513	6,712	7,842	7,252
2004	2,039	2,352	4,391	18,555	20,898	39,453	9,100	8,885	8,985
2005	2,690	3,100	5,790	25,575	28,154	53,729	9,507	9,082	9,280

Source : Department of Census and Statistics

Annex 9.3: Cost of Cultivation per Acre of Red Onion by Inputs in Puttalam Under Irrigated Conditions

Rs/Acre

Input	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04
	Maha	*Maha*	*Maha*	*Maha*	*Maha*	*Maha*
Labour	16,873	14,983	19,622	23,045	21,717	27,656
Seed	42,304	26,973	38,965	39,783	33,993	35,807
Fertilizer	4,494	7,800	8,187	7,555	6,547	6,381
Agro - Chemicals	1,836	1,843	1,450	1,326		1,401
Draught Power, Machinery and Equipment	4,226	5,742	9,161	8,467	8,649	9,245
Total Cost - Including Imputed Cost	69,735	57,343	77,385	80,176	70,906	80,489
Total Cost - Excluding Imputed Cost	59,298	53,843	72,524	70,715	67,031	75,314

Annex 9.3 (contd) Cost of Cultivation per Acre of Red Onion by Inputs in Puttalam Under Irrigated Conditions

Rs/Acre

Input	1997	1998	2001	2002	2003	2004
	Yala	*Yala*	*Yala*	*Yala*	*Yala*	*Yala*
Labour	17,785	18,388	15,793	22,146	24,389	28,977
Seed	31,200	37,444	36,376	35,706	35,989	35,514
Fertilizer	7,375	7,607	2,825	10,452	6,871	8,141
Agro - Chemicals	730		1,268	3,132	1,398	
Draught Power, Machinery and Equipment	4,760	4,948	5,036	8,208	10,699	11,132
Total Cost - Including Imputed Cost	61,850	68,387	61,297	79,644	79,345	83,764
Total Cost - Excluding Imputed Cost	45,966	62,325	49,689	70,348	68,408	73,585

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

Annex 9.4: Monthly Average Wholesale Prices of Red Onion (Vedalan) at Pettah Market, 1996 - 2005

Rs/50 Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	1307.27	2,545	3,697	4,486	1,652	3,334	3,203	2,494	2,667	
February	938.86	1,410	3,375	3,887	1,804	2,500	2,556	1,566	1,955	2,519
March	896.16	1,350	2,207	2,275	2,525	3,282	2,394	1,586	1,612	2,252
April	1176.92	1,955	2,675	2,720	2,760	3,666	2,377	1,745	1,828	2,556
May	2822.92	2,130	3,770	2,788	4,268	4,019	2,600	2,545	2,544	2,903
June	3358.86	2,831	3,428	2,723	4,239	3,277	2,579	2,309	2,919	2,683
July	2254.58	1,922	2,223	1,600	2,522	1,957	2,370	1,295	1,698	2,491
August	2380.01	1,383	1,755	1,252	2,839	1,456	1,527	1,439	1,562	1,912
September	2452.93	1,823	1,554	929	1,608	1,996	1,487	1,727	1,816	2,340
October	2193.81	1,707	2,048	1,279	1,835	2,698	2,181	2,098	2,555	3,100
November	1856.71	1,421	2,775	1,356	2,871	1,920	2,649	2,602	3,121	3,409
December	1879.43	2,241	3,095	1,494	3,334	2,886	2,987	3,091	3,209	4,705
Annual Average	1,960	1,893	2,717	2,232	2,688	2,749	2,409	2,041	2,290	2,806

Source: Marketing Food Policy and Agri Business Division of HARTI

Annex 9.5: Monthly Average Retail Prices of Red Onion (Vedalan) in Colombo and Suburbs, 1996 - 2005

Rs/ Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	38.72	59.23	91.76	117.14	46.23	87.01	82.25	66.15	65.05	60.00
February	27.01	44.95	86.76	111.66	47.75	66.73	65.96	50.01	55.00	65.00
March	27.15	36.78	55.69	65.86	55.74	73.42	58.30	43.54	44.00	57.15
April	33.40	48.70	64.87	70.50	68.86	87.08	56.37	47.91	49.26	65.20
May	65.11	52.68	88.78	71.33	103.35	93.02	61.53	66.06	64.48	67.24
June	86.50	70.39	89.69	75.30	104.34	86.84	65.54	65.57	71.94	68.91
July	58.54	55.89	60.86	47.30	74.41	58.97	61.36	37.89	49.31	69.54
August	56.88	39.24	46.50	37.51	70.80	43.21	39.39	39.76	42.98	53.55
September	57.94	46.47	44.67	31.35	49.48	52.14	38.96	44.18	48.80	60.53
October	55.27	47.25	52.12	36.06	48.56	66.11	51.05	51.78	61.02	72.15
November	49.91	43.24	71.08	37.58	69.27	57.57	67.86	64.93	79.59	86.38
December	48.11	58.17	77.25	41.31	84.81	76.53	75.25	74.00	78.05	109.77
Annual Average	50.38	50.25	69.17	61.91	68.63	70.72	60.32	54.32	59.12	69.62

Source: Marketing Food Policy and Agri Business Division of HARTI

10. POTATO

10.1 Introduction

Potato (*Solanum tuberosum* L.) originated in Andes highlands in Peru and the Europeans who settled in hilly areas introduced it to Sri Lanka in 1850s'. It is well grown in the wet and intermediate zones (WU, IU) of the up country in both seasons and in some parts of the dry zone (DL3) during *maha*. Well-drained *latosals, regosols* and *non-calcic brown* soils of the low country and all up country soils are preferable, but ill-drained soils are generally unsuitable for potato cultivation. The optimum day temperature is 20–25°C and the temperature difference between day and night should be 10°C.

Potato cultivation is mainly dependant on imported potato seeds. *Granola* and *Desiree* are the two main imported seed varieties cultivated by more than 60% of the potato farmers. Among the local varieties developed by the Department of Agriculture, the variety called *Hillstar* is getting popular among the farmers which is much resistant to blight. The potato *in-vitro* plant production started in 1999 at the Agricultural Research Station in Sita Eliya which supplies the total demand of tissue cultured plants for the seed potato production programme. The varieties multiplied are *Desiree, Isna, Hillstar* and *Granola.*

Potato is the most preferable cash crop of the farmers in the upcountry farming system. In Nuwara Eliya district, the potato cultivation is mainly done by commercial growers, while in Badulla district it is the livelihood of many of the small farmers. Potato production faces a stiff competition from Indian imports and therefore cultivation decisions are often affected by the import policy of the government. Though the land productivity of potato cultivation is very high, its negative environmental impact in terms of soil erosion and pollution is voluminous.

10.2. Production

10.2.1 Major Producing Areas

At present, potato is widely grown in Badulla district (up country intermediate zone- 1,000 to 1,500 m amsl) in paddy fields and high land (hills) during *yala* and *maha* seasons respectively. This area experiences a rainfall of 1,500 – 2,250 mm annually with 70% RH and 15^0C-22^0C range in temperature. Welimada and Uva Paranagama are the main potato growing areas in Badulla district. During the last five years, nearly 75% of the potato cultivation concentrated in these two DS divisions (Table 10.1 and Map 10.1). *Granola* is the widely cultivated variety.

Potato is extensively cultivated in the district of Nuwara Eliya (Up country wet zone >1,000 m amsl) in two major seasons, *maha* and *yala* where annual rainfall is >2,500 mm and temperature ranges between 10^0C-15^0C with relative humidity of 80%. In Nuwara Eliya district, Lindula, Thalawakele, Kandapola, Ragala and Pattipola are main potato cultivation areas next to Nuwara Eliya. During the recent past, almost 24% of the potato cultivation took place in Nuwara Eliya district.

Jaffna is the other district where the potato is grown in lesser extents during *maha* season. But, the cultivation has dropped to only about 1% in the recent years.

Table 10.1: Five year Averages (1976-2005) of Cultivated Extent of Potato in Major Cultivating Areas

Hectares

District	Season	Average 1976-1980	Average 1981-1985	Average 1986-1990	Average 1991-1995	Average 1996-2000	Average 2001-2005
Badulla	*Maha*	875	1,708	2190	1864	1599	2213
	Yala	1,215	1,964	2577	2368	1560	2003
	Total	1,848	3,673	4767	4232	3159	4216
		(52.1)	(58.5)	(65.5)	(60.2)	(70.1)	(74.6)
Nuwara Eliya	*Maha*	440	1,123	1317	1523	843	546
	Yala	466	954	959	1134	339	808
	Total	906	2,077	2276	2657	1181	1354
		(25.6)	(33.1)	(31.3)	(37.8)	(26.2)	(24.0)
Jaffna	*Maha*	531	482	170	107	116	59
	Yala	0	0	0	0	0	0
	Total	531	482	170	107	116	59
		(15.0)	(7.7)	(2.3)	(1.5)	(2.6)	(1.0)
Sri Lanka	*Maha*	1,920	3,344	3720	3509	2594	2837
	Yala	1,625	2,931	3560	3540	1913	2816
	Total	3,546	6,275	7280	7029	4507	5652
		(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Percentages based on Sri Lanka Total are given in paranthesis

Source : Department of Census and Statistics

10.2.2 Seasonality in Production

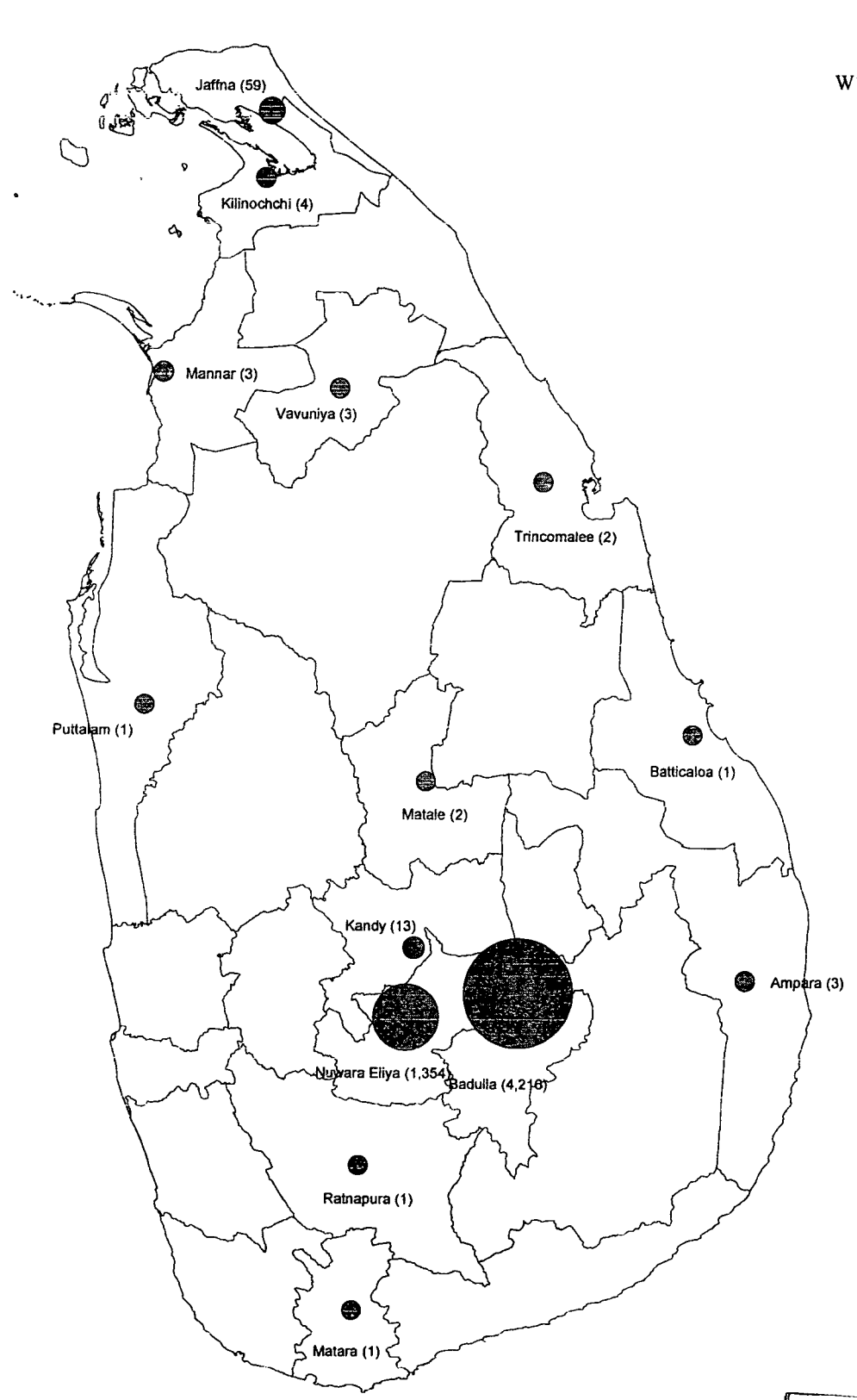
Potato cultivation takes place in two major seasons; *maha* and *yala* in Nuwara Eliya and Badulla districts while in Jaffna district, it is pursued only in *maha*.

In Nuwara Eliya district, *maha* cultivation mainly takes place from January to March and *yala* cultivation from June to September. Accordingly, the main production from Nuwara Eliya district reaches the market from April to June (*maha* harvest) and from October to December (*yala* harvest).

In Badulla district, cultivation for the *maha* season begins in the hills by late October, soon after the land preparation for paddy in lowlands is over. Major planting work takes place in November and December continuing upto January. For the *yala* season, potato is cultivated in paddy fields and main cultivation takes place in July and August. Therefore, two main peak producing seasons are found in Badulla district between February to April (*maha* harvest) and from October to November (*yala* harvest).

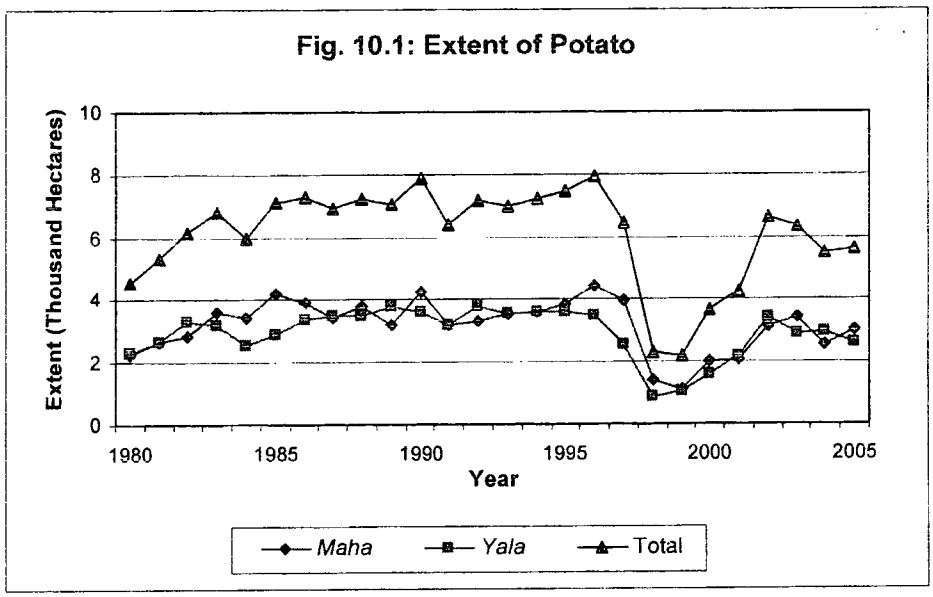
Map 10.1: Average Extent of Potato Cultivated during 2001 - 2005 by Districts

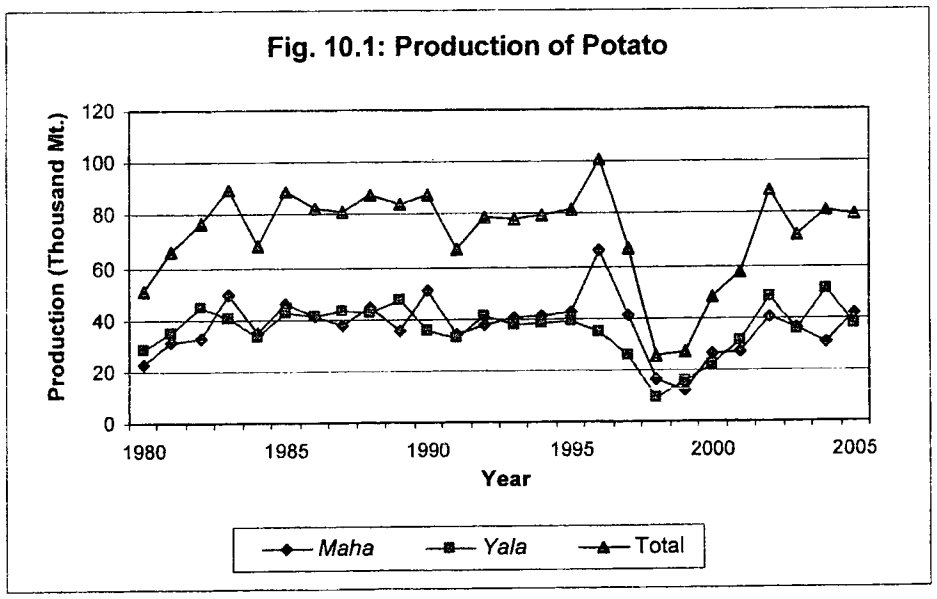
(Figures given in parenthesis are in hectares)



10.2.3 Trends in Production, Cultivated Extent and Average Yield

Potato production increased drastically in the country from 1980 with the restriction on issuing licence and the 100% import duty on potato. Extent cultivated under potato in both seasons increased from about 4,530 ha in 1980 to about 7,880 ha in 1990. The import duty was gradually reduced to about 35%, while the import restriction policy remained intact. As the ban on free imports was lifted in 1996, potato farming was negatively affected due to availability of large stocks of imports in the markets. A sudden drop in the cultivated extent was observed, particularly in Nuwara Eliya district and the national production drastically declined from 100,755 mt to about 27,170 mt in 1999. Again in 2000, the protection was increased for potato farming and the extent under potato increased and thereby local production increased to about 79,500 mt in 2005.





Potential yields of most of the varieties (both local and imported) recommended by the Dept of Agriculture range between 20 to 25 mt/ha. However, the average yield at farm level is dependant on a number of factors including day length, prevalence of diseases and pests, etc. National average yields show an increasing trend during the recent past reaching the maximum national yield of 17 mt/ha during *yala* season in the year 2004 (Annex 10.1).

10.3 Review of Agricultural Inputs and Cost of Production

Potato is one of the crops that requires inputs intensively for its cultivation. Seed potato, the main input represents more than 50% of the capital of potato farming, and the growers are mainly dependant on imports from Europe. The cost incurred on buying seed potato is reported to be about Rs. 71,120/ac. in 2003 *yala* according to the latest available statistics. The other important input that is used in potato farming is fertiliser. Both chemical and organic fertilisers are being used and the cost incurred on fertiliser was Rs. 20,955/ac. in 2003 *yala*. This is about 13% of the total cost of production. Use of agrochemicals for disease and pest control is relatively higher and it was about Rs. 8,610/ac in 2003 *yala* season (Table 10.2).

Table 10.2: Cost of Cultivation per Acre of Potato by Type of Inputs in Badulla Under Irrigated Conditions

Input	2002/03 *Maha*		2003 *Yala*	
	Rs/Ac	%	Rs/Ac	%
Labour	31,752.00	23.8	39,257.00	28.1
Seed	78,450.00	58.8	71,120.00	51.0
Fertilizer	17,593.00	13.2	20,595.00	14.8
Agro - Chemicals	5,708.00	4.3	8,612.00	6.2
Total Cost – Including Imputed Cost	133,504.00	100.0	139,584.00	100.0
Total Cost – Excluding Imputed Cost	116,044.00	86.9	110,073.00	78.9

Source : Cost of Cultivation of Agricultural Crops 2002/03 maha and 2003 yala Department of Agriculture

Seed, fertiliser and agro-chemicals together accounted for about more than 75% of the total cost of production which are mainly derived from foreign sources. The only domestic value addition due to potato production is the use of labour for farming. This accounted for about nearly Rs. 40,000/ac. in 2003 *yala*. However, the potato farming had been a profitable venture due to high protection given to this sector which allows the farmer to make a high return from his small piece of land. In the year 2001, the net return exceeded Rs. 124,000/ac. during *maha* season (Annex 10.2).

10.4 Marketing

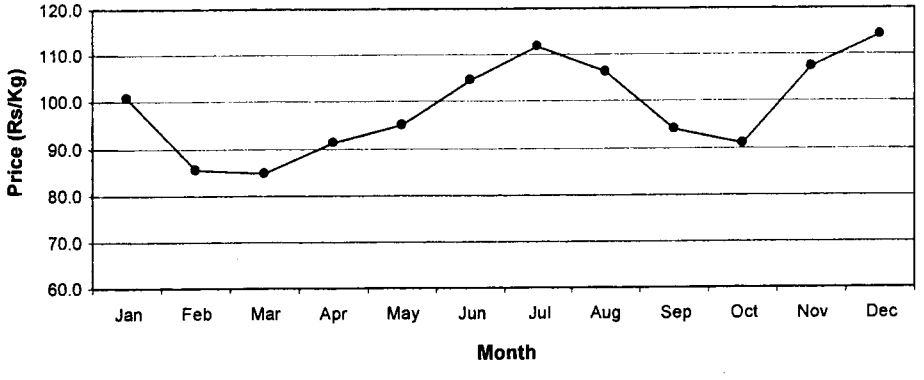
10.4.1 Marketing Channels and Price Determination

Bandarawela, Keppettipola DEC and Nuwara Eliya are the major producer-wholesale meeting points that facilitate potato marketing. Price is determined by both commission basis and price discovery by market forces. Prices fetched for Nuwara Eliya potato that has a longer keeping quality is higher than that of Welimada potato. This price difference varies from 5% to 25% at the retail market.

10.4.2 Price Behaviour and Market Margin

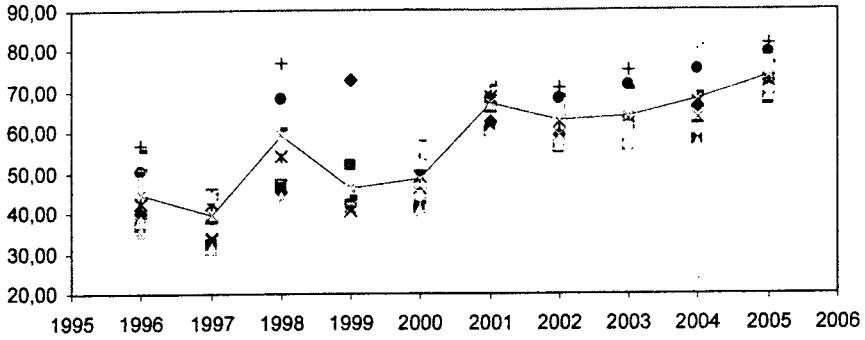
As potato is a seasonal crop, the price fluctuation over an year follows a pattern of increasing prices during off season and a decreasing price towards the season. According to the seasonal price index over the last 10 years, the main price peak is observed during the months of June to August and again another peak during the month of December. Retail prices reach the lowest in the month of March with the peak harvest of *maha* season, particularly from Badulla district (Figure 10.2).

Fig. 10.2 : Seasonal Price Index of Nuwara eliya Potato (1996-2005)



Prices at the retail market have increased over the last 10 years by about 86 %. It shows a continuous trend except in the years of 1998 and 2001. This increase is however somewhat below the general price increase in the country which records about 113 % increase over the last ten years (Figure 10.3 &Annex 10.3).

Figure 10.3: Monthly Retail Prices of Nuwara Eliya Potato, 1996 – 2005



10.5 External Trade

Potato is imported to meet the growing demand in the country specially during the off producing periods. Imports become the main supply to the market during the months of June, July and January.

Relatively cheap imports mainly from India create a competitive market for the local potato producers. However, the local production of potato had hardly been competitive. Therefore, the price protection in the form of an import duty is provided for potato, as one of the important measurers by the government to protect the farmer. Import duty that applies to potato imports is 20%. Moreover, during the season a surcharge is imposed over the import duty depending on the production to protect the local farmer. However, during off season, potato market is liberalised to meet the domestic demand.

10.6 Consumption

Consumption of potato as a vegetable by Sri Lankans has increased in the country with the availability of potato at the market by means of local production and imports. According to the latest consumption survey 2003/04 by the Central Bank of Sri Lanka, per capita consumption of potato was 3.62 kg/year. Consumption among the high income groups is relatively more and the consumption increases with the increasing income. However, per capita consumption in different sectors; urban- rural-estate; does not show a much difference (Annexes 10.4 and 10.5).

10.7 Review of Government Policy

Government policy towards this sector varied widely over the years due to the pressure from different groups including growers, policy makers, consumers and other interested groups. In favour of potato producers, the government imposed a high duty or restricted issuing licence for importers in some years. Conversely, in other years, government relaxes the duty and a more liberalised market is maintained to increase the welfare of the consumers. Therefore, tariff and non tariff policy is the main policy of the government which determines the potato production in the country. Government also has given priority for local seed production.

Until the new fertiliser subsidy scheme implemented in 2005/06 *maha*, the potato farmers received the subsidy that applied to the other field crop sector.

10.8 Conclusion

Potato is a hardly competitive crop being produced in the hills and it requires a huge capital for importing inputs for its cultivation. Due to the pressure from the potato growers in the up country, potato continues to be cultivated as the leading crop in this region. It has a high land productivity compared to other crops grown in the region and it is the livelihood of farmers in the main producing areas in Badulla district. Therefore the government continues to impose a duty during the main producing months in order to safeguard the vulnerable farmers. A Nuwara Eliya farmer receives a net return of more than Rs.131,000/ac. (2004 *maha)* excluding the imputed cost at present incentive structure (Annexes 10.6 and 10.7).

The potential yield of imported varieties are unable to be tapped in our local climatic conditions due to inadequate day length and the prevalence of pests and diseases. The steps taken by the Department of Agriculture such as propagating high yielding local varieties suitable to our climate such as Hillstar and tissue cultured plants should be strengthened to reduce the dependence on imported seed potato. However, in order to continue it as a viable farming sector, measures should be taken to minimise the environmental damage it causes. Potato cultivation in the hills causes several environmental problems including soil erosion, contamination of surface water and soil and reduction in forest coverage. Domestic value addition in relation to environmental cost poses the question whether potato should be continued as a livelihood of farmers in the hills.

Annex 10.1: Extent, Production and Average Yield of Potato - Sri Lanka

Year	Extent (Hec)			Production (M.Tons)			Average Yield (Kg/Hec)		
	Maha	*Yala*	Total	*Maha*	*Yala*	Total	*Maha*	*Yala*	Total
1980	2,244	2,293	4,537	22,786	28,335	51,121	10,154	12,357	11,268
1981	2,641	2,683	5,324	31,196	34,814	66,010	11,812	12,976	12,398
1982	2,830	3,339	6,169	32,466	44,427	76,893	11,472	13,305	12,464
1983	3,617	3,186	6,803	49,390	40,363	89,753	13,655	12,669	13,193
1984	3,438	2,521	5,959	34,879	33,375	68,254	10,145	13,239	11,454
1985	4,193	2,926	7,119	46,483	42,472	88,955	11,086	14,515	12,495
1986	3,907	3,392	7,299	41,221	41,261	82,482	10,550	12,164	11,300
1987	3,453	3,496	6,949	37,669	43,373	81,042	10,909	12,406	11,662
1988	3,758	3,489	7,247	44,696	42,839	87,535	11,894	12,278	12,079
1989	3,223	3,793	7,016	35,716	47,755	83,471	11,082	12,590	11,897
1990	4,260	3,628	7,888	51,451	35,754	87,205	12,078	9,855	11,055
1991	3,211	3,173	6,384	33,740	32,997	66,737	10,508	10,399	10,454
1992	3,336	3,799	7,135	37,335	41,227	78,562	11,192	10,852	11,011
1993	3,532	3,554	6,986	40,154	37,982	78,136	11,369	10,687	11,185
1994	3,624	3,586	7,210	41,139	38,246	79,385	11,352	10,665	11,010
1995	3,842	3,586	7,428	42,764	38,893	81,657	11,131	10,846	10,993
1996	4,430	3,495	7,925	66,236	34,519	100,755	14,952	9,877	12,714
1997	3,946	2,523	6,469	40,995	25,489	66,484	10,389	10,103	10,277
1998	1,437	891	2,328	16,403	9,496	25,899	11,415	10,658	11,125
1999	1,119	1,052	2,171	11,759	15,412	27,171	10,508	14,650	12,515
2000	2,039	1,603	3,642	26,599	21,810	48,409	13,045	13,606	13,292
2001	2,060	2,186	4,246	26,785	30,896	57,681	13,002	14,134	13,585
2002	3,156	3,449	6,605	40,330	48,379	88,709	12,779	14,027	13,431
2003	3,410	2,904	6,314	35,947	35,797	71,744	10,542	12,327	11,363
2004	2,532	2,963	5,495	30,481	50,793	81,274	12,038	17,142	14,791
2005	3,025	2,576	5,601	41,708	37,737	79,445	13,788	14,649	14,184

Source : Department of Census and Statistics

Annex 10.2 Cost of cultivation per Acre of Potato by Inputs in Badulla Under Irrigated Conditions - Rs/Acre

Input	1998/99 *Maha*	2002/03 *Maha*	2003/04 *Maha*
Labour	24,668	31,752	33,740
Seed	44,950	78,450	80,496
Fertilizer	10,850	17,593	18,646
Agro - Chemicals	7,900	5,708	6,288
Total Cost - Including Imputed Cost	88,368	133,504	139,169
Total Cost - Excluding Imputed Cost	70,268	116,044	106,483

Annex 10.2 (contd) Cost of Cultivation per Acre of Potato by Inputs in Badulla Under Irrigated Conditions - Rs/Acre

	1996 *Yala*	1997 *Yala*	1998 *Yala*	1999 *Yala*	2000 *Yala*	2001 *Yala*	2002 *Yala*	2003 *Yala*	2004 *Yala*
Labour	20,682	22,839	24,579	24,457	24,030	25,324	35,068	39,257	36,032
Seed	56,575	54,696	52,038	44,520	46,742	66,484	69,869	71,120	81,590
Fertilizer	10,470	10,209	9,590	11,130	9,067	12,004	18,521	20,595	19,577
Agro - Chemicals	3,700	5,910	7,235	4,345	6,750	5,768	8,548	8,612	6,687
Total Cost - Including Imputed Cost	91,427	93,653	93,442	84,451	86,589	109,580	132,005	139,584	143,886
Total Cost - Excluding Imputed Cost	40,755	59,040	54,922	49,314	47,251	97,169	110,384	110,073	101,602

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

Annex 10.3: Average Retail Prices of Potato in Sri Lanka

Rs/Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	35.57	32.36	35.78	54.03	40.07	61.69	67.42	59.21	61.64	71.68
February	35.28	29.73	32.91	38.42	36.84	60.51	56.84	55.56	56.80	68.27
March	32.30	26.58	33.65	29.48	38.97	56.45	56.30	57.25	53.35	63.85
April	37.37	33.30	39.59	37.69	44.24	58.41	59.96	60.46	58.43	70.10
May	40.42	39.73	40.85	39.89	46.75	65.10	62.81	62.51	62.61	71.91
June	49.50	45.07	47.19	41.51	52.41	69.22	69.19	66.45	70.96	75.37
July	56.58	42.28	49.60	42.23	57.01	67.93	68.96	69.78	74.56	78.47
August	50.96	42.11	46.08	40.86	53.13	69.61	67.42	65.64	68.21	75.38
September	43.66	37.26	42.41	40.16	45.05	65.34	65.08	63.07	61.61	64.77
October	43.66	32.73	46.08	37.17	44.68	58.56	57.46	56.11	56.95	65.19
November	40.82	38.16	50.14	40.73	51.84	71.75	62.09	61.42	71.41	72.66
December	34.90	38.87	55.06	44.20	55.23	74.59	64.13	65.56	75.39	77.18
Annual Average	41.71	36.55	43.29	40.55	47.11	64.94	63.07	61.98	64.33	71.29

Source: Department of Census and Statistics
Data Bank of HARTI

Annex 10.4: Per Capita Consumption of Potato per Annum By Sectors

Kg.

Year	Urban	Rural	Estate	All Sectors
1973	2.20	1.10	1.20	1.30
1978/79	2.80	2.40	2.70	1.50
1981/82	3.50	2.90	2.90	3.00
1986/87	3.50	2.70	2.70	2.80
1996/97	4.81	5.39	4.78	5.28
2003/04	3.46	3.65	3.57	3.62

Source: Consumer Finance & Socio Economic Survey Various Issues
Central Bank of Sri Lanka

Annex 10.5: Per Capita Consumption of Potato by Income Deciles & Sectors - 2003/04

Kg.

Income Decile	Minimum (Rs)	Maximum (Rs)	Urban	Rural	Estate	All Sectors
1	0	4,520	2.53	2.63	2.81	2.64
2	4,527	6,214	2.86	2.86	2.89	2.86
3	6,220	7,728	2.21	2.98	3.09	2.95
4	7,733	9,430	2.48	3.42	4.42	3.45
5	9,435	11,350	2.01	3.35	3.30	3.18
6	11,357	13,755	3.31	3.80	4.16	3.76
7	13,757	17,271	3.64	3.91	3.72	3.87
8	17,275	22,036	2.90	4.08	4.63	3.91
9	22,037	32,778	4.15	4.22	2.77	4.19
10	32,793	825,694	4.39	4.98	7.18	4.82
Overall Average	12,513	95,078	3.46	3.65	3.57	3.62

Income decile for one month house hold income

Source: Consumer Finance and Socio Economic Survey, Various Issues
Central Bank of Sri Lanka

Annex 10.6 Net Return Per Acre of Potato in Nuwara Eliya Under Irrigated Conditions

Rs/Acre

Season		Net Return per Acre		Season		Net Return per Acre	
		Including Imputed Cost	Excluding Imputed Cost			Including Imputed Cost	Excluding Imputed Cost
1995	*Maha*	74,988	86,987	2000	*Maha*	6,876	25,744
	Yala	na	na		*Yala*	29,410	39,798
1996	*Maha*	34,801	52,186	2001	*Maha*	124,510	139,980
	Yala	26,046	43,371		*Yala*	102,363	117,362
1997	*Maha*	28,862	45,959	2002	*Maha*	91,182	113,979
	Yala	2,801	32,459		*Yala*	79,571	100,443
1998	*Maha*	46,689	88,660	2003	*Maha*	116,177	124,313
	Yala	27,252	51,122		*Yala*	92,256	112,569
1999	*Maha*	20,205	32,697	2004	*Maha*	104,383	131,836
	Yala	23,578	40,819		*Yala*	65,946	80,763

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

Annex 10.7 Net Return Per Acre of Potato in Badulla Under Irrigated Conditions

Rs/Acre

Season		Net Return per Acre		Season		Net Return per Acre	
		Including Imputed Cost	Excluding Imputed Cost			Including Imputed Cost	Excluding Imputed Cost
1995	*Maha*	na	na	2000	*Maha*	na	na
	Yala	60,037	76,741		*Yala*	41,503	80,841
1996	*Maha*	na	na	2001	*Maha*	na	na
	Yala	16,573	67,245		*Yala*	102,035	114,446
1997	*Maha*	na	na	2002	*Maha*	na	na
	Yala	19,187	53,800		*Yala*	56,888	78,509
1998	*Maha*	na	na	2003	*Maha*	71,035	88,495
	Yala	34,174	72,694		*Yala*	63,920	93,431
1999	*Maha*	34,852	52,952	2004	*Maha*	67,509	100,195
	Yala	15,849	50,986		*Yala*	74,396	116,680

na denotes not available

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

11. MANIOC

11.1 Introduction

Manioc also called as Cassava or Tapioca is one of the most important tropical tuber crops in the developing countries and the staple diet in many African countries. Cassava is considered as the chief staple food as well as one of the important subsidiary food of millions of people in most of the tropical areas including African, Latin American and some parts of the Asian countries. The tuber as well as tender leaves of cassava is used for human consumption. As livestock feed, cassava is mostly used in raw form and also in processed form of the different parts of the plant (specially leaves and tubers). The main part of cassava used for human consumption, the tuber, consists of 50% to 75% (average 62.5%) of water and around 33% of starch as the main nutrient component. Cassava tuber is a very poor source of protein (1.2%), minerals (1.3%) and fat (0.3%)) while containing 1.3% of fiber.

Cassava is botanically distinguished as *Manihot esculenta/Manihot utilissima* that comes under the family *Euphorbiaceae*. The origin of cassava was in the Andian region in Brazil and was first introduced to Sri Lanka during the Dutch period. Cassava plant prefers warm and moist climate with $25C^0$ – $29C^0$ as the favourable range of temperature. Cassava is a short day plant and tuber formation takes place well in short day periods. Cassava can be grown and harvested at any time of the year and the duration of the crop depends on the variety. The highly recommended varieties of cassava are MU-51 (harvesting in 9-10 months), CARI-555 (harvesting in 9 months), Kirikawadi (harvesting in 6-12 months), Suranimala, Swarna and Shani.

11.2 Major Producing Districts

Kurunegala district has been recorded as the major manioc producing area over the last three decades. Even during the last 10-year period (1996-2005) the highest manioc production, nearly 11% of the total national production had come from this particular district. Ratnapura (9%) and Gampaha (8.2%) districts have contributed as the second and third highest manioc producing areas respectively. Those three major areas are followed by Badulla (7.5%), Moneragala (7%), Batticaloa (6%), Kegalle (5%) and Kalutara (5%) and altogether these areas account for around 59% of total national production of manioc. Table 11.1 shows the contribution of different districts to the national production of manioc.

Table 11.1: Production of Manioc by Major Producing Distiicts

(M.Tons)

District	Season	Average (1996-00)	% (1996-00)	2001	2002	2003	2004	2005	Average (01-05)	% (2001-05)	% (1996-05)
Kurunegala	*Maha*	15,565		14,033	13,938	14,337	12,388	12,528	13,445		
	Yala	11,676		14,045	12,842	13,505	14,345	9,916	12,931		
	Total	27,241	10.7	28,078	26,780	27,842	26,733	22,444	26,375	11.7	11.1
Gampaha	*Maha*	8,344		8,489	9,566	12,554	8,311	8,506	9,485		
	Yala	12,082		9,387	10,582	9,600	9,568	9,553	9,738		
	Total	20,425	8.0	17,876	20,148	22,154	17,879	18,059	19,223	8.5	8.2
Badulla	*Maha*	10,719		10,957	11,347	11,097	13,177	13,145	11,945		
	Yala	6,190		6,607	6,493	7,124	6,582	7,479	6,857		
	Total	16,909	6.6	17,564	17,840	18,221	19,759	20,624	18,802	8.3	7.4
Moneragala	*Maha*	14,655		15,339	11,192	13,536	12,411	14,235	13,343		
	Yala	2,706		2,641	2,353	3,925	4,256	4,105	3,456		
	Total	17,361	6.8	17,980	13,545	17,461	16,667	18,340	16,799	7.4	7.1
Ratnapura	*Maha*	13,072		10,880	10,244	8,632	6,067	5,646	8,294		
	Yala	12,514		9,853	9,106	7,254	7,759	8,233	8,441		
	Total	25,587	10.0	20,733	19,350	15,886	13,826	13,879	16,735	7.4	8.8
Batticaloe	*Maha*	9,363		10,910	10,334	10,892	9,841	8,663	10,128		
	Yala	5,308		5,725	6,289	4,474	4,901	4,004	5,079		
	Total	14,671	5.7	16,635	16,623	15,366	14,742	12,667	15,207	6.7	6.2
Kegalle	*Maha*	6,662		5,961	6,452	5,293	6,213	4,207	5,625		
	Yala	6,558		6,405	6,374	5,540	6,120	6,531	6,194		
	Total	13,220	5.2	12,366	12,826	10,833	12,333	10,738	11,819	5.2	5.2
Kalutara	*Maha*	6,771		6,303	6,104	6,259	4,926	5,132	5,745		
	Yala	6,876		6,721	6,351	4,883	4,621	5,531	5,621		
	Total	13,646	5.3	13,024	12,455	11,142	9,547	10,663	11,366	5.0	5.2
Others *	*Maha*	64,126		52,640	50,917	55,057	57,190	56,970	54,555		
	Yala	42,444		36,683	34,502	34,876	32,165	38,828	35,411		
	Total	106,570	41.7	89,323	85,419	89,933	89,355	95,798	89,966	39.8	40.8
Sri Lanka	*Maha*	149,277		135,512	130,094	137,657	130,464	129,032	132,552		
	%	58.4		58.0	57.8	60.2	59.1	57.8	58.6		
	Yala	106354		98,067	94,892	91,181	90,317	94,180	93,727		
	%	41.6		42.0	42.2	39.8	40.9	42.2	41.4		
	Total	255630		233,579	224,986	228,838	220,781	223,212	226,279		
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Total of Ampara,Anuradhapura, Polonnaruwa, Jaffna, Matara, Matale, Udawalawa, Kandy, Puttalam Nuwara Eliya, Galle, Trincomalee, Killinochchi, Mullaitivu, and Mannar districts

Sources: Department of Census and Statistics
Data Bank of HARTI

As far as the cultivated extent of manioc is concerned, the district of Kurunegala accounting for nearly 11.6% of the total national extent under manioc. According to the table 11.2, the other main manioc cultivating districts are Ratnapura (9%), Gampaha (7.5%), Moneragala (6.5%), Badulla (6.0%), Kegalle (5.8%) and Ampara (5.7%).

Table 11.2: Extent of Manioc by Major Growing Distiicts

Hectares

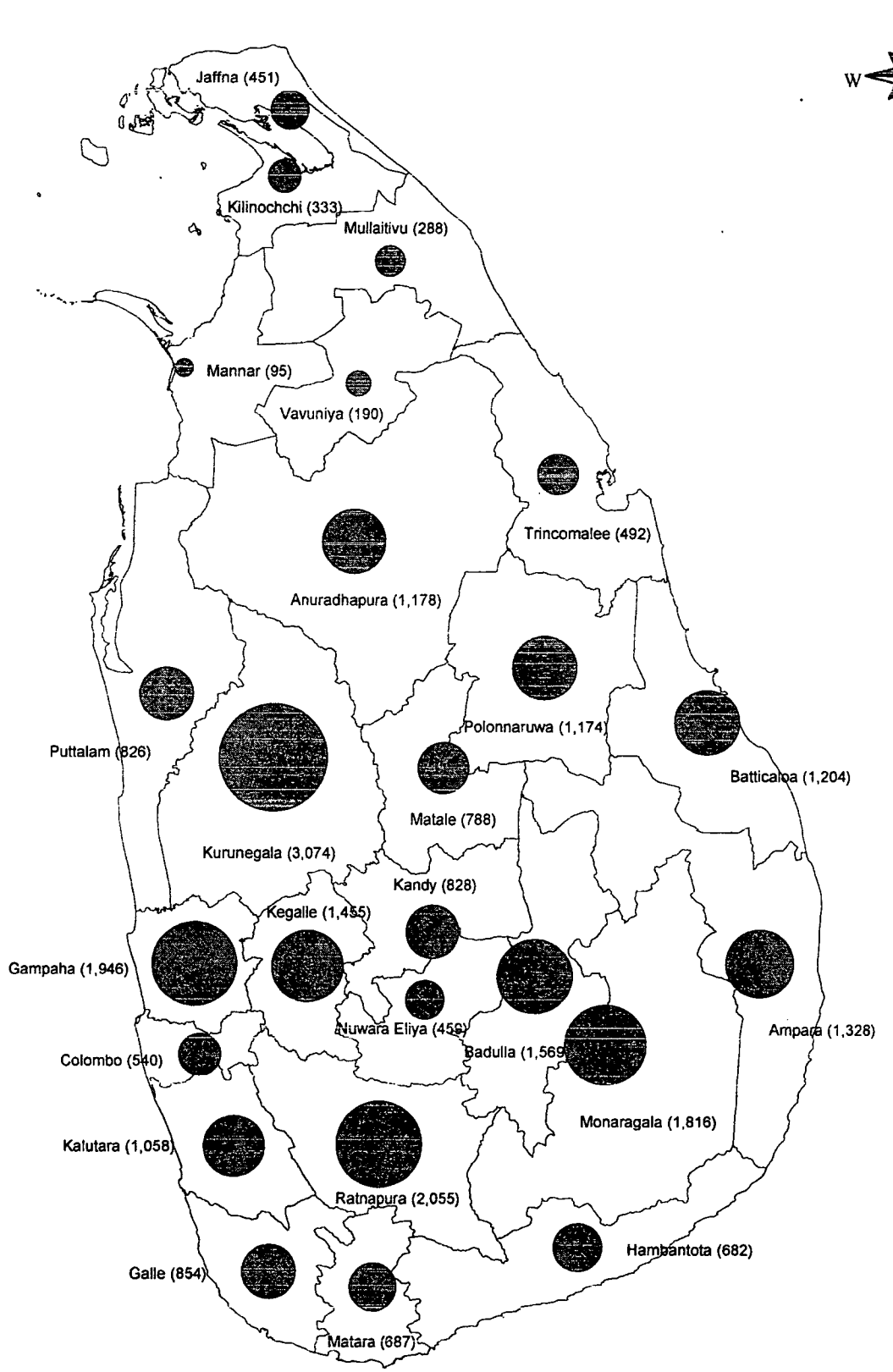
District	Season	Average (1996-00)	% (1996-00)	2001	2002	2003	2004	2005	Average (01-05)	% (2001-05)	% (1996-05)
Kurunegala	*Maha*	1,771		1,633	1,635	1,632	1437.0	1,453	1,558		
	Yala	1,553		1,666	1,650	1,596	1583.0	1,085	1,516		
	Total	3,324	11.2	3,299	3,285	3,228	3020.0	2,538	3,074	12.2	11.6
Ratnapura	*Maha*	1,434		1,378	1,243	1,043	713.0	760	1,027		
	Yala	1,420		1,239	1,162	933	872.0	933	1,028		
	Total	2,854	9.6	2,617	2,405	1,976	1585.0	1,693	2,055	8.1	8.9
Gampaha	*Maha*	1,046		915	968	1,265	877.0	875	980		
	Yala	1,146		902	1,019	919	990.0	998	966		
	Total	2,192	7.4	1,817	1,987	2,184	1867.0	1,873	1,946	7.7	7.5
Moneragala	*Maha*	1,393		1,652	1,194	1,371	1242.0	1,334	1,359		
	Yala	385		361	354	539	532.0	500	457		
	Total	1,778	6.0	2,013	1,548	1,910	1774.0	1,834	1,816	7.2	6.5
Badulla	*Maha*	1,163		1,082	1,074	1,042	901.0	886	997		
	Yala	561		564	557	589	544.0	607	572		
	Total	1,724	5.8	1,646	1,631	1,631	1445.0	1,493	1,569	6.2	6.0
Kegalle	*Maha*	869		798	809	707	764.0	505	717		
	Yala	888		832	826	679	655.0	700	738		
	Total	1,757	5.9	1,630	1,635	1,386	1419.0	1,205	1,455	5.8	5.8
Ampara	*Maha*	1,257		1,334	1,015	1,038	748.0	532	933		
	Yala	526		485	442	393	364.0	288	394		
	Total	1,783	6.0	1,819	1,457	1,431	1112.0	820	1,328	5.3	5.6
Others *	*Maha*	8,457		7,133	7,097	7,613	6377.0	6,629	6,970		
	Yala	7,494		5,327	5,335	4,920	4539.0	5,372	5,099		
	Total	14,350	48.0	12,460	12,432	12,533	10916.0	12,001	12,068	47.7	48.0
Sri Lanka	*Maha*	17,389		15,925	15,035	15,710	13,059	12,974	14,541		
	%	58		58	57	60	56.4	55.3	57		
	Yala	12,372		11,376	11,345	10,568	10,079	10,483	10,770		
	%	42		42	43	40	43.6	44.7	43		
	Total	29,762		27,301	26,380	26,278	23,138	23,457	25,311		
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Total of Batticaloa, Polonnaruwa, Anuradhapura, Kalutara, Galle, Matale, Matara, Hambantota, Colombo, Trincomalee Nuwara Eliya, Jaffna, Kilinochchi, Mullaitivu, Mannar districts and special project Mahaweli H

Source : Department of Census and Statistics
Data Bank of HARTI

Map 11.1: Average Extent of Manioc Cultivated during 2001 - 2005 by districts

(Figures given in parenthesis are in hectares)



11.3 Seasonality of Production

Even though the manioc can be grown throughout the year the national production has a difference between two main seasons, *yala* and *maha*. The production of *maha* seasons accounted for 58% of the average annual national production during the period from 1996 to 2005; a seasonal variation seen specially in the dry zone districts such as Moneragala and Baticaloa. Such a variation can also be observed in one of the main intermediate zone districts, Badulla. As the required soil moisture level is available in the wet zone districts specially Gampaha, Ratnapura and Kegalle throughout the year, a significant difference in production between two seasons cannot be seen (Table 11.3).

Table 11.3 : Production of Manioc by Season

M.Tons

Year	*Maha*	*Yala*	Total
1996	160,329	110,267	270,596
1997	143,418	106,361	249,779
1998	151,027	106,126	257,153
1999	145,444	106,069	251,513
2000	146,165	102,945	249,110
2001	135,512	98,067	233,579
2002	130,094	94,892	224,986
2003	137,657	91,181	228,838
2004	130,464	90,317	220,781
2005	129,032	94,180	223,212
Average	140,914	100,041	240,955

Sources: Department of Census and Statistics
Data Bank of HARTI

11.4 Trends in Production, Extent Cultivated and Average Yield of Manioc (1980- 2005)

There is a significant decline in the average annual production of manioc over the last two and half decades. The highest annual production was reported in the year 1982, as 722,099 mt, and the lowest production, 220,781mt was reported in 2004. Table 11.4 shows the annual production of manioc during the last twenty five year period. The declining trend of the production which started in 1983 continued over the years barring a slight increase in 1988 (15% increase compared to the previous year). The difference of annual average production of manioc between the years of 1980 and 2005 is 276,276 mt and it is a 55.3% of decline. The annual average production for the entire time period is 375,774 mt.

Table 11.4: Annual Production of Manioc

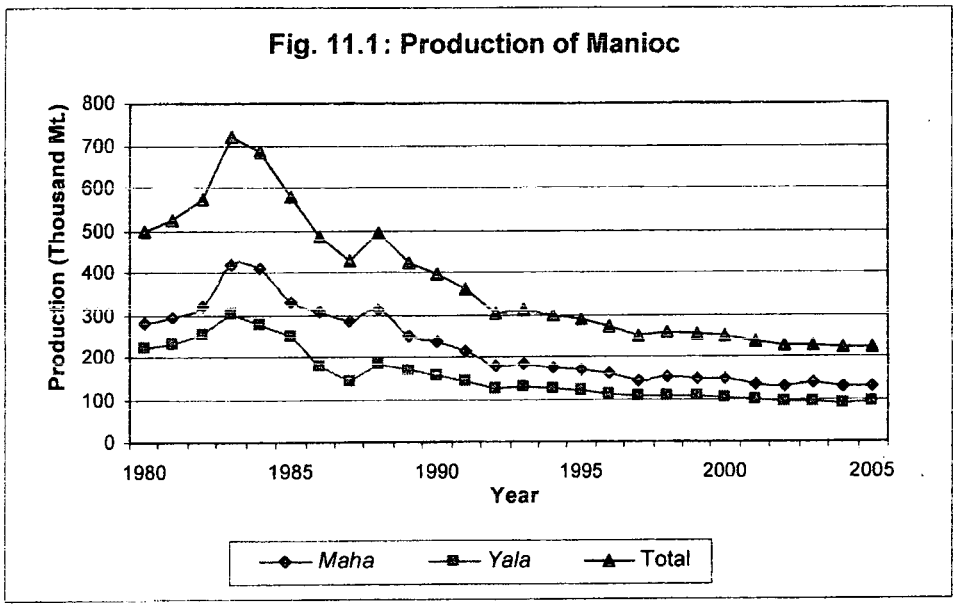
M.Tons

Year	*Maha*	*Yala*	Total
1980	279,058	220,430	499,488
1981	293,550	232,460	526,010
1982	320,907	251,916	572,823
1983	419,356	302,743	722,099
1984	408,776	273,678	682,454
1985	330,127	249,589	579,716
1986	308,883	176,974	485,857
1987	286,463	140,976	427,439
1988	310,807	180,908	491,715
1989	250,569	170,207	420,776
1990	237,365	157,644	395,009
1991	215,085	143,724	358,809
1992	178,819	123,388	302,207
1993	181,008	127,987	308,995
1994	174,801	123,601	298,402
1995	167,647	121,121	288,768
1996	160,329	110,267	270,596
1997	143,418	106,361	249,779
1998	151,027	106,126	257,153
1999	145,444	106,069	251,513
2000	146,165	102,945	249,110
2001	135,512	98,067	233,579
2002	130,094	94,892	224,986
2003	137,657	91,181	228,838
2004	130,464	90,317	220,781
2005	129,032	94,180	223,212
Average	222,014	153,760	375,774

Source: Department of Census and Statistics

As shown in Figure 11.1, a sharp decline could be observed from 1983 to 1992 and since 1993 the trend is lesser.

Considering the seasonal variation of the annual production of manioc, some pattern for both *maha* and *yala* seasons could be observed. The average production in *maha* season (222,014 mt) is higher than that of *yala* season (153,760 mt). The difference between the two seasons has been smaller and fairly constant after the year 1992.



11.5 Extent Cultivated with Manioc

The pattern of extent cultivated with manioc over the last two and half decades is similar to the pattern of annual production during the particular time period. The average extent for the period 1980–2005 is 39,123 ha. The decline of the extent over the respective time period is 27,572 ha and it is 54% of decline compared with the extent in the year of 1980. Annual extent cultivated of manioc during the last twenty five year period is given in the table 11.5.

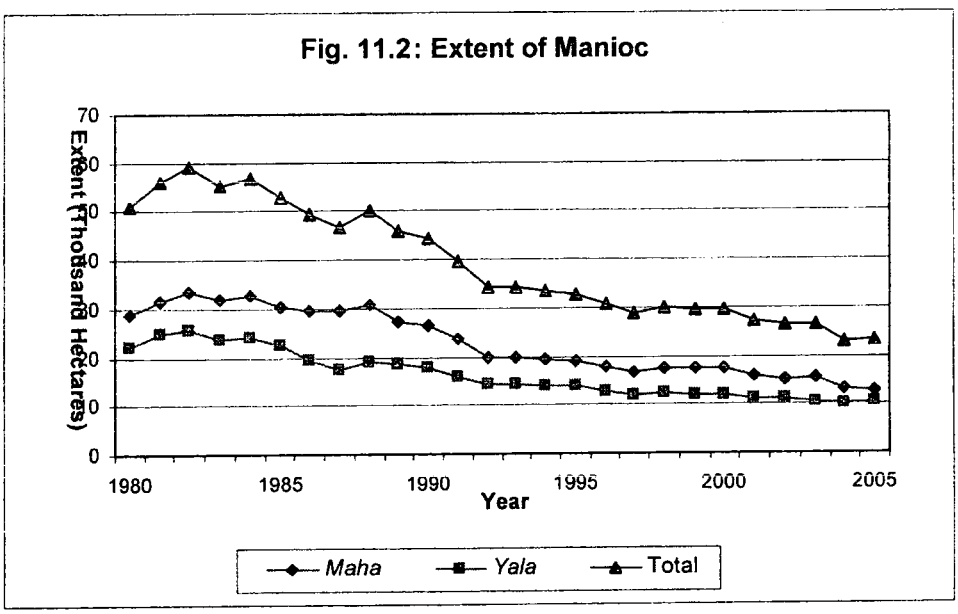


Table 11.5: Extent Cultivated of Manioc by Season

Hectares

Year	*Maha*	*Yala*	Total
1980	28,885	22,144	51,029
1981	31,416	24,700	56,116
1982	33,628	25,517	59,145
1983	31,751	23,622	55,373
1984	32,579	24,194	56,773
1985	30,286	22,604	52,890
1986	29,748	19,535	49,283
1987	29,514	17,309	46,823
1988	30,753	19,228	49,981
1989	27,076	18,696	45,772
1990	26,457	17,764	44,221
1991	23,899	15,827	39,726
1992	19,884	14,325	34,209
1993	19,906	14,327	34,233
1994	19,388	14,040	33,428
1995	18,989	13,835	32,824
1996	18,039	12,876	30,915
1997	16,641	12,214	28,855
1998	17,565	12,499	30,064
1999	17,310	12,122	29,432
2000	17,392	12,150	29,542
2001	15,925	11,376	27,301
2002	15,035	11,345	26,380
2003	15,710	10,568	26,278
2004	13,059	10,079	23,138
2005	12,974	10,483	23,457
Average	22,839	16,284	39,123

Source: Department of Census and Statistics

The seasonal variation of the extent of manioc is clearly shown in the figure 11.2. The higher average value was reported in *maha* season (22,839 ha) and the average value for the *yala* season was reported as 16,284 ha. The decline of extent in *maha* season (15,911 ha) during the respective time period is higher than that of the *yala* season (11,661 ha); 55% in *maha* and 53% in *yala*.

11.6 Average Yield of Manioc

The average yield of manioc for the period 1980 to 2005 is 9,393 kg/ha. Though there is a significant drop in the average yield from 1984 to 2003 with several fluctuations, the values in the last two years, i.e; 2004 and 2005 have been able to reach the values reported in 1980. The government fertilizer subsidy programme may be a reason for this increase of the average yield in these two years. Since 1989 an almost constant value for the average yield could be seen upto the year 2003. The sharp drop of the average yield is observed during the period 1983 to 1987. It is about 9,513 kg/ha, and the average yield of manioc for the *maha* and *yala* seasons is 9,220 kg/ha. The highest average yield (13,041 kg/ha) was reported in 1983, while the lowest value (8,432 kg/ha) in 2000. The changes of average yield during the particular time period is given in table 11.6.

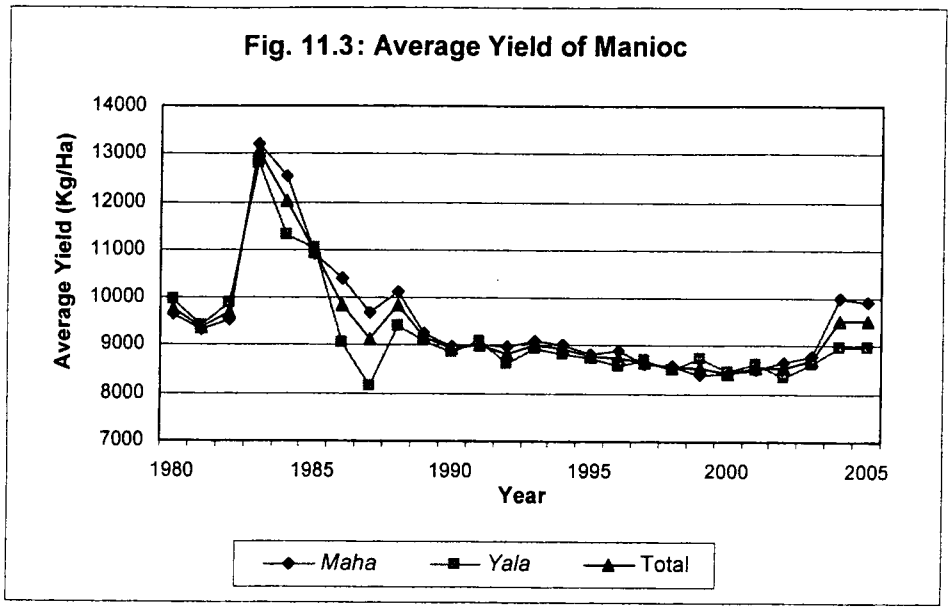
Table 11.6: Average Yield of Manioc by Season

Kg/Ha

Year	*Maha*	*Yala*	Total
1980	9,661	9,954	9,788
1981	9,344	9,411	9,374
1982	9,543	9,872	9,685
1983	13,208	12,816	13,041
1984	12,547	11,312	12,021
1985	10,900	11,042	10,961
1986	10,383	9,059	9,859
1987	9,706	8,145	9,129
1988	10,107	9,409	9,838
1989	9,254	9,104	9,193
1990	8,972	8,874	8,933
1991	9,000	9,081	9,032
1992	8,993	8,613	8,834
1993	9,093	8,933	9,026
1994	9,016	8,803	8,927
1995	8,829	8,755	8,797
1996	8,888	8,564	8,753
1997	8,618	8,708	8,656
1998	8,598	8,491	8,554
1999	8,402	8,750	8,546
2000	8,404	8,473	8,432
2001	8,509	8,621	8,556
2002	8,653	8,364	8,529
2003	8,762	8,628	8,708
2004	9,990	8,961	9,542
2005	9,945	8,984	9,516
Average	9,513	9,220	9,393

Source: Department of Census and Statistics

As for the average yield of manioc, there is no significant difference between seasonal figures except on a few occasions (1984, 1986-88, 2004-05) during the reference period. In the remaining years, the difference is less than 400 kg/ha (Figure 11.3).



11.7 Review of Agricultural Inputs

Labour is the only input incurred in the cultivation of manioc. According to the Department of Agriculture, the cost of cultivation in the Puttalam district in 1990/91 *maha* has been Rs. 2,325/ac. For the same district the net return per acre from the cultivation of manioc has been Rs. 22,569/ac. including the imputed cost and.Rs. 24,426/ac. excluding the imputed cost.

Cost of production of manioc under rainfed condition in the *yala* season in 2005 has been calculated by the Department of Agriculture, to which the unit cost of production of manioc is Rs.3.02/kg and farmers can earn around Rs.12,000 from cultivating a land area of one acre (when the producer price is Rs.12.00/kg). The total cost of cultivation of manioc (one acre) is Rs.30,175.80 and the expected average yield is 10,000 kg/ac which can fetch a return of Rs. 89,824.20.

The cost components and other relevant information on cost and return of cultivation are given in table 11.7.

Table 11.7: Cost of Cultivation per Acre of Manioc by Operations under Rainfed Conditions

Operation	Input Cost Rs/ac	Power Cost Rs/ac	Labour		Total Cost Rs/ac
			Man Days	Cost Rs/ac	
Crop Establishment					
Land Preparation with 4wt		2,500			2,500
Planting 5,000*	2,500		12	3,600	6,100
Basal fertilizer – Urea 97kg/ac	1,067		6	1,800	2,867
TSP 49kg/ac	1,490				1,490
MOP 73kg/ac	2,219				2,219
Crop Management					
Weeding and loosning soil			22	6,600	6,600
Harvesting and Processing					
Harvesting			29	8,400	8,400
Total Cost	7,276	4,500		20,400	30,176

Average Yield and Prices

Yield (Kg/ac)	10,000
Producer Price (Rs/kg)	12.00
Unit cost of production (Rs/kg)	3.02

Gross and Net Return

Gross return (Rs/ac)	120,000.00
Net return (Rs/ac)	89,824.20

* Planting materials

Source: Department of Agriculture

11.8 Domestic Market

Manioc is mainly consumed within the producing areas and the excess production is forwarded to the outside markets. Therefore, manioc has a relatively simple market channel system mainly including the producer, the retailer and the consumer. On most of the occasions (simplifying the market channel further), the majority of the production goes to the consumer directly from the producer.

The Colombo Manning market is one of the main exchange points between major manioc producing areas and less producing or high consumption areas. Another marketing channel has come up comprising the producer, the collector, the wholesaler, the retailer and the consumer.

Fluctuation of both wholesale and retail prices of manioc are irregular throughout the year. Since manioc does not have a proper cultivation, or harvesting season, a clear pattern of price change cannot be observed. As far as the wholesale price at Colombo Manning market is concerned, it can be observed that the price has increased by only 32% in the first nine years (1996-2004) of the last decade. Thus, the average wholesale price of manioc during the particular time period was around Rs. 5.72/kg. However, the average wholesale price in the year 2005 had increased at a higher rate, nearly by 98% (from Rs.5.72/kg to Rs.11.32/kg) compared to the average price of the first nine-year period, i.e; 1996-2004 (Table 11.8).

Table 11.8: Monthly Average Wholesale Prices of Manioc at Pettah Market

Rs./Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	4.09	5.89	6.83	4.52	6.02	4.69	4.98	5.09	5.72	10.53
February	3.26	5.52	5.89	4.65	6.38	4.74	5.68	4.90	4.75	13.59
March	3.39	5.81	4.74	5.01	5.74	5.17	5.23	5.32	4.91	15.05
April	4.34	5.86	5.13	5.86	5.29	5.28	5.01	5.53	5.21	14.35
May	5.17	5.86	5.04	6.57	7.03	6.02	6.23	6.01	6.34	13.57
June	6.75	6.26	5.22	6.79	6.81	6.66	5.73	5.91	6.46	11.11
July	6.34	6.04	4.75	7.34	6.95	6.25	6.69	4.92	6.75	10.96
August	5.48	5.75	4.57	7.85	5.81	6.58	5.28	5.00	6.07	10.25
September	4.77	5.67	4.54	6.81	5.05	6.50	4.75	5.35	6.98	8.80
October	5.6	5.92	4.96	7.04	5.61	4.70	4.71	5.02	8.95	8.47
November	6.63	6.50	4.73	7.09	4.55	5.30	5.00	4.81	10.33	9.65
December	6.77	7.26	4.47	6.37	4.55	5.39	4.67	4.83	10.09	9.49
Annual Average	5.22	6.03	5.07	6.33	5.82	5.61	5.33	5.22	6.88	11.32

Source: Marketing Food Policy and Agri Business Division of HARTI

A similar kind of price behaviour could be seen in retail price of manioc at the markets in Colombo and suburbs. The price increase has taken place at a slower pace during the last ten year period, but it is a little bit higher than that at the Colombo wholesale market (Manning Market). The price increase in the first nine-year (1996-2004) period is around 50% (Rs. 13.17 to Rs.19.73) and the average retail price is Rs. 16.73/kg for the particular time period. As in the case of the wholesale price, a sharp price increase could be seen in the retail price also in the year 2005, accounting for 62% compared to that of 2004 (Table 11.9).

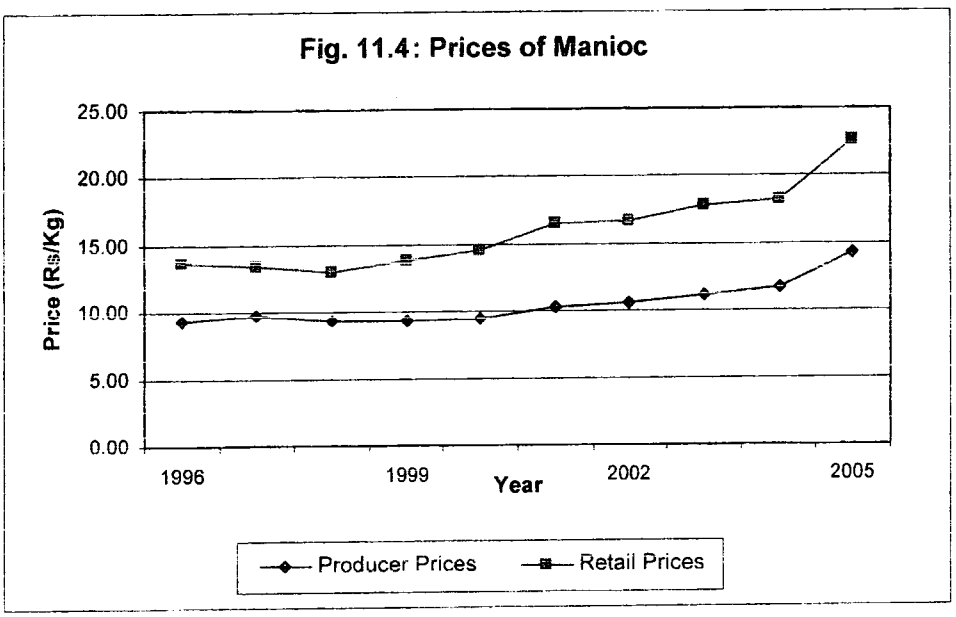
Table 11.9: Monthly Average Retail Prices of Manioc in Colombo and Suburbs

Rs./Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	11.14	15.40	17.52	14.12	16.45	16.71	18.23	19.36	18.16	26.48
February	11.39	15.32	16.75	14.27	17.21	16.93	18.75	19.32	19.01	29.26
March	11.32	15.14	14.55	14.59	17.60	16.69	18.64	17.41	18.19	28.26
April	11.67	13.56	12.23	15.52	17.67	16.76	18.93	19.61	18.85	29.84
May	11.51	13.55	13.56	15.89	17.44	16.77	20.01	20.62	17.89	27.83
June	14.23	14.91	13.86	15.69	17.37	17.20	18.63	18.92	19.82	26.98
July	14.01	15.46	14.01	17.25	17.32	16.99	19.05	19.45	18.97	26.32
August	13.93	15.39	14.35	16.85	17.64	17.22	19.37	18.63	18.84	27.42
September	13.68	15.37	14.02	17.33	17.62	17.44	19.65	17.61	19.96	24.61
October	14.06	15.03	14.37	16.65	17.70	16.89	18.82	18.01	20.36	25.59
November	15.56	16.31	14.04	16.50	15.54	17.47	18.20	18.04	23.51	26.37
December	15.53	17.44	13.86	17.07	16.67	17.59	19.16	18.84	23.17	26.13
Annual Average	13.17	15.24	14.43	15.98	17.19	17.06	18.95	18.82	19.73	27.09

Source: Marketing Food Policy and Agri Business Division of HARTI

The figure 11.4 displays the changing pattern of the producer price and the retail price of manioc in Sri Lanka.



11.9 External Trade

Middle-East countries in the Gulf region are the major export market for the Sri Lankan manioc. An average of 1,213 mt of manioc has been exported annually during the particular time period (1996-2005), fetching an average foreign exchange component of Rs. 502 m. A fluctuated and relatively lesser increase in the quantity of manioc exported could be observed in the last decade. The increase of exports was only by 23% (1,085 mt/year to 1,333 mt/year) in between 1996 and 2005. A maximum of 1,494 mt of manioc, worth Rs. 68 million had been exported in the year 2003.

United Arabic Emirates (UAE) is the main importer of manioc from Sri Lanka accounting for 82% of the total exports in the year 2005. Saudi Arabia was the second major buyer of the Sri Lanka manioc accounting for an average of 148 mt per annum during the time period of 1996-2005. Bahrain, Kuwait and Oman are the other Middle-East countries to which manioc are exported from Sri Lanka (Table 11.10).

Table 11.10: Exports of Manioc by Country of Destination

Country	1996		1997		1998		1999		2000	
	Qty (Mt)	Value (Rs 000)	Qty (Mt)	Value (Rs 000)	Qty (Mt)	Value (Rs 000)	Qty (Mt)	Value (Rs 000)	Qty (Mt)	Value (Rs 000)
U.A.E.	623	19,830	734	22,621	713	24,710	782	27,813	952	36,620
Other Middle East Countries	462	15,040								
Bahrain			52	1,806	67	2,506	92	3,792	91	3,518
Kuwait			52	1,744	44	1,515			42	1,521
Oman			54	1,509	87	2,916	48	1,662	22	776
Saudi Arabia			259	9,961	229	9,309	272	10,169	107	3,604
Other			8	213	9	270	17	569		
Total	1,085	34,870	1,159	37,854	1,149	41,226	1,211	44,005	952	36,620

Country	2001		2002		2003		2004		2005	
	Qty (Mt)	Value (Rs 000)	Qty (Mt)	Value (Rs 000)	Qty (Mt)	Value (Rs 000)	Qty (Mt)	Value (Rs 000)	Qty (Mt)	Value (Rs 000)
U.A.E.	845	37,459	873	44,570	1,195	53,308	1,038	48,092	1,088	51,422
Bahrain	109	4,898	137	5,786	117	5,491	152	8,052	72	3,810
Kuwait	56	2,694	43	2,079	44	2,161	67	3,377	32	1,619
Oman	53	2,614	14	587	7	295	18	854		
Saudi Arabia	108	4,625	127	5,665	119	5,898	151	6,719	112	6,076
Maldives									13	779
Other	7	346	9	653	12	592	6	363	16	800
Total	1,178	52,636	1,203	59,340	1,494	67,745	1,432	67,457	1,333	64,506

Source: External Trade Statistics, Various Issues, Sri Lanka Customs

A tremendous increase in foreign exchange from exporting manioc could be observed during the last ten years of period. There is an 85 percent increase in export value of manioc in 2005 compared with that of 1996. A continuous increase in export could be seen throughout the last ten-year period with a small drop in 2000.

The Maldives has become one of the new export markets for Sri Lankan manioc. New markets are hard to come by barring the Middle East. There is a high fluctuation in export of manioc to other countries (other than Middle-East countries).

Manioc is imported to Sri Lanka as manioc starch mainly for the textile industry. The importation of manioc starch during the last ten year period has registered a severe fluctuation in the amount imported, between 2,290 mt and 5,650 mt. However, there is an increase of manioc starch imports in respect of both quantity and value during the particular time period (Table 11.11).

Table 11.11: Imported Quantity and Value of Manioc Starch

Year	Qty (Mt.)	Value (Rs'000)
1996	2,291	37,549
1997	3,244	49,197
1998	2,848	47,746
1999	2,456	37,172
2000	3,228	48,386
2001	4,775	84,340
2002	3,670	74,712
2003	4,588	90,267
2004	5,649	131,336
2005	3,622	106,189
Average	3,637	70,689

Source: External Trade Statistics, Various Issues
Sri Lanka Customs

11.10 Availability of Manioc

According to the Department of Census and Statistics, the wastage on manioc is 30%. Formation of CN compounds in the damaged tubers of manioc is one of the major reasons for the wastage of this crop. Wastage figures are given in table 11.12. There is an overall drop in the production of manioc.

Table 11.12: Net Production of Manioc

M.Tons

Year	Production	Wastage	Net Production
1996	270,596	81,179	189,417
1997	249,779	74,934	174,845
1998	257,153	77,146	180,007
1999	251,513	75,454	176,059
2000	249,110	74,733	174,377
2001	233,579	70,074	163,505
2002	224,986	67,496	157,490
2003	228,838	68,651	160,187
2004	220,781	66,234	154,547
2005	223,212	66,964	156,248

Source: Food Balance Sheets (1996- 2005), Department of Census and Statistics
Data Bank of HARTI

The total availability of manioc is the difference between the production and exports. Since starch is imported only for the textile industry, it has no effect on the total availability for consumption (Table 11.13).

Table 11.13: Total Availability of Manioc

M.Tons

Year	Net Production	Exports	Availability
1996	189,417	1,085	188,332
1997	174,845	1,159	173,686
1998	180,007	1,149	178,858
1999	176,059	1,211	174,848
2000	174,377	952	173,425
2001	163,505	1,178	162,327
2002	157,490	1,203	156,287
2003	160,187	1,494	158,693
2004	154,547	1,432	153,115
2005	156,248	1,333	154,915
Average	168,668	1,220	167,449

Source: External Trade Statistics, Various Issues, Sri Lanka Customs
Data Bank of HARTI

The per capita availability of manioc has a slight, but a gradual decrease over the last five year period. The pattern of production has directly affected the per capita availability coupled with the effect of population increased. The average value of per capita availability of manioc for the particular time period is 8.18 kg.

Table 11.14: Per Capita Availability of Manioc

Year	Availability (Mt.)	Mid Year Population (000)	Per Capita Availability (kg)
2001	162,327	18,732	8.67
2002	156,287	19,007	8.22
2003	158,693	19,252	8.24
2004	153,115	19,462	7.87
2005	154,915	19,668	7.88
Average	157,067	19,224	8.18

Source: Data Bank HARTI

11.11 Consumption

As shown in the table 11.16, the per capita consumption of manioc has dropped by nearly 21.4% during the last ten year period (from 2.01 kg/annum to 1.58 kg/annum). Specially in the estate sector, this decline is at a higher pace (63.4%). While other two sectors, the urban and the rural account for 30.2% and 18.1% decline respectively. The higher wheat flour consumption in the estate sector has led to this decline.

Table 11.15: Per Capita Consumption of Manioc per Annum by Sectors

Kg.

Year	Urban	Rural	Estate	All Sectors
1973	0.06	0.17	0.11	0.14
1978/79	0.04	0.10	0.04	0.09
1981/82	2.36	9.90	4.36	8.10
1986/87	0.81	2.86	1.57	2.37
1996/97	1.16	2.15	1.94	2.01
2003/04	0.81	1.76	0.71	1.58

Source: Consumer Finance and Socio Economic Survey, Various Issues, Central Bank of Sri Lanka.

There is a clear association between the per capita consumption of manioc and the income group (income deciles) of the society. The highest per capita consumption value are recorded in the lowest two income groups (< Rs. 4,520 and Rs. 4,527- Rs. 6,214 income declines). It is clearly observed in the table 11.17, that there is a gradual decline of the per capita consumption of manioc with the increase of the income level.

Table 11.16: Per Capita Consumption of Manioc by Income Deciles and Sectors 2003/04

Kg.

Income Decile	Minimum (Rs)	Maximum (Rs)	Urban	Rural	Estate	All Sectors
1	0	4,520	0.61	3.28	1.10	2.93
2	4,527	6,214	1.64	2.23	0.60	2.03
3	6,220	7,728	1.25	1.95	0.46	1.77
4	7,733	9,430	0.71	2.08	1.11	1.89
5	9,435	11,350	1.07	1.77	0.00	1.60
6	11,357	13,755	0.89	1.55	0.57	1.44
7	13,757	17,271	0.91	1.45	1.19	1.37
8	17,275	22,036	0.50	1.30	0.00	1.13
9	22,037	32,778	0.89	1.23	0.79	1.16
10	32,793	825,694	0.60	1.18	1.14	1.01
Overall Average	12,513	95,078	0.81	1.76	0.71	1.58

Income decile for one month household income
Source: Consumer Finance and Socio Economic Survey, 2003/04 Central Bank of Sri Lanka

11.12 Government Policy

There is no programme undertaken with the government intervention or support to promote manioc cultivation and popularization of manioc consumption among the public. However, research and development of new manioc varieties are undertaken by the Department of Agriculture as a major intervention made by the government.

However, as a measure to protect the local manioc producers and the other stakeholders who may venture into imports, there are different import duties imposed by the government. The

import duty for manioc (fresh, dried, chilled or frozen) is a total of 57% of the import value and it is a total of 35% for imported manioc (cassava) starch.

11.13 Conclusion and Recommendations

Kurunegala is the major manioc cultivation and producing district accounting for about 12% and 11% of the average annual extent cultivated and production respectively, during last ten year period. A significant decline in average annual production of manioc (55%) could be observed during the period from 1980 – 2005. The decline in the average annual extent in the cultivation of manioc during last 25 year period is 54%. Though there are several fluctuations in average yield during the reference period (1980 – 2005), there is no significant decline in the average yield of manioc.

The average prices of wholesale and retail markets have significantly increased during last two years (2004 and 2005), while a continuous price increase could be observed during last decade. According to the Department of Agriculture, the net cost of product of manioc under rainfed conditions is about Rs. 3.00/kg and the cost of cultivation is about Rs. 30,000/ac. The gross return of manioc (at the producer price of Rs.12.00/kg) is Rs. 120,000/ac and the net return is about Rs. 89,800/ac. As it is a profitable crop, the farmers should be promoted to expand the extent of cultivation of manioc. On the other hand, there should be research and development programmes to introduce short duration varieties with higher tuber quality.

Middle East countries are the major export market for Sri Lankan manioc and the average annual exports is about 1,220 mt during the period of 1996-2005. The increase of exports was only by 23% during the reference period. Therefore, necessary initiatives should be taken to identify the new export markets in the other regions without limiting only to Middle East. At the same time, manioc-based products should be introduced through research and development activities in the field of food science.

12. SWEET POTATO

12.1 Introduction

Sweet potato is one of the main tuber crops grown in Sri Lanka. Sweet potato comes under the family *Convolaceae* and its origin is in the South American region. Sweet potato is botanically distinguished as *Ipomoea Batatas*. The stem of the sweet potato is a runner. According to the length of the runner, sweet potato can be categorized into three types called bush, intermediate runner and runner. The colour of the stem varies from variety to variety like purple, green or green with purple coloured spots. Sweet potato favours warm weather and is a short day crop. Tuber formation is induced under short day conditions. Sweet potato is propagated mainly through vegetative propagation (using cuttings). Roots form the edge of the cuttings, underground auxillary's buds of the cuttings and some auxiliary buds of the runners. Some of these roots develop as tubers getting deposited in food produced in the leaves.

The tuber is used as the main edible part of the plant for human consumption, while tender leaves and other parts of the crop (leaves and cuttings) are used as animal feed. Sweet potato is the main staple food of the North Island of Switzerland. Sweet potato tuber is rich in starch (24.3%), and the leaves contain vitamins and minerals. The moisture content of the tuber accounts for 72%, while a little amount of protein (1.2%), fat (0.5%), minerals (1.0%) and fiber (0.8%) contribute for the composition of the sweet potato tuber.

Sweet potato is an annual (seasonal) crop with duration of 3-4 months. The duration of the crop varies from variety to variety and there are several recommended varieties namely; CARI-9, CARI-42, Wariyapola-Red, Wariyapola-White, Ranabima, Gannoruwa-White, Chithra, Shanthi, Dhawala and Ama.

12.2 Production

The average annual national production of sweet potato is around 49,000 mt. during the last decade. There is a significant decline in production, which could be observed in the second part (2001-2005) of the last ten-year period compared to the first part (1996-2000). The drop in average production during the particular time period was 9,577 mt. (from 53,767 mt. to 44,190 mt.) and it accounts for nearly 18%. Table 12.1 shows the gradual decline in the production of sweet potato over the last decade.

Table 12.1: Production of Sweet Potato by Season (1996-2005)

M.Tons

Year	*Maha*	*Yala*	Total
1996	31,086	27,731	58,817
1997	31,029	23,100	54,129
1998	28,798	23,691	52,489
1999	29,006	22,586	51,592
2000	27,012	24,797	51,809
2001	25,253	23,290	48,543
2002	25,240	22,223	47,463
2003	24,054	20,004	44,058
2004	20,007	19,705	39,712
2005	20,986	20,189	41,175
Average	26,247	22,732	48,979

Source: Department of Census and Statistics

12.3 Major Producing Districts

Districts lying in the Wet Zone and the Intermediate Zone are prominent in producing sweet potato in Sri Lanka. Ratnapura is the main producing area, contributing around 19% of the total national production. However, there is a 40% decrease in average production during the first half of the last decade to the second half in Ratnapura district. Kurunegala is the second highest district in terms of production and its contribution to the national production was nearly 11% during the last ten-year period. There was a considerable increase (21.3%) in production of sweet potato in the Kurunegala district in the last five year period (2001-2005) compared to the first five year period of the last decade. Kalutara (9.6%), Badulla (7.3%), Kegalle (6.6%), Matale (6.3%), Gampaha (5.1%) and Matara (4.4%) are the other major sweet potato producing areas, representating the wet and intermediate zones (Table 12.2).

Table 12.2: Production of Sweet Potato by Major Producing Districts

Area	Average (96-00)	Percentage (96-00)	Average (01-05)	Percentage (01-05)	Average (96-05)	Percentage (96-05)
Ratnapura	11,882	22.1	7,117	16.1	9,500	19.4
Kurunegala	4,701	8.7	5,704	12.9	5,203	10.6
Matale	2,175	4	4,023	9.1	3,099	6.3
Badulla	3,552	6.6	3,572	8.1	3,562	7.3
Kalutara	5,262	9.8	3,566	8.1	4,414	9
Kegalle	3,679	6.8	2,754	6.2	3,217	6.6
Gampaha	2,809	5.2	2,145	4.9	2,477	5.1
Galle	2,444	4.5	1,871	4.2	2,158	4.4
Matara	2,733	5.1	1,865	4.2	2,299	4.7
Others	14,492	27	11,573	26.2	13,033	26.6
Sri Lanka	53,731	100	44,190	100	48,961	100

*Total of Kandy, Ampara, Mullaitivu, Anuradhapura, Nuwara Eliya, Polonnaruwa, Jaffna, Trincomalee, Killinochchi Districts and special project Mahaweli H

Source: Department of Census and Statistics
Data Bank of HARTI

Ratnapura is the major sweet potato growing area, accounting for nearly 14% to the national extent during the last ten year period. Kurunegala district contributes 11% of the total national sweet potato extent, and it comes as the second highest sweet potato growing

area. The other main sweet potato growing districts are Matale (8%), Badulla (6%), Kegalle (7%), Kalutara (6%), Gampaha (6%), Galle (5%) and Monergala (4%). Table 12.3 illustrates the major sweet potato growing areas.

Table 12.3: Extent of Sweet Potato by Major Growing Districts

Hectares

District	Average (96-00)	Percentage (96 - 00)	Average (01-05)	Percentage (01-05)	Average (96-05)	Percentage (96-05)
Kurunegala	787	9.1	922	12.8	855	10.8
Ratnapura	1,397	16.1	867	12.0	1,132	14.2
Matale	481	5.6	793	11.0	637	8.0
Badulla	465	5.4	456	6.3	460	5.8
Kegalle	615	7.1	454	6.3	535	6.7
Kalutara	573	6.6	406	5.6	490	6.2
Moneragala	312	3.6	388	5.4	350	4.4
Gampaha	515	5.9	354	4.9	435	5.5
Galle	460	5.3	330	4.6	395	5.0
Others*	3,055	35.3	2,259	31.2	2,657	33.4
Sri Lanka	8,660	100.0	7,230	100.0	7,945	100.0

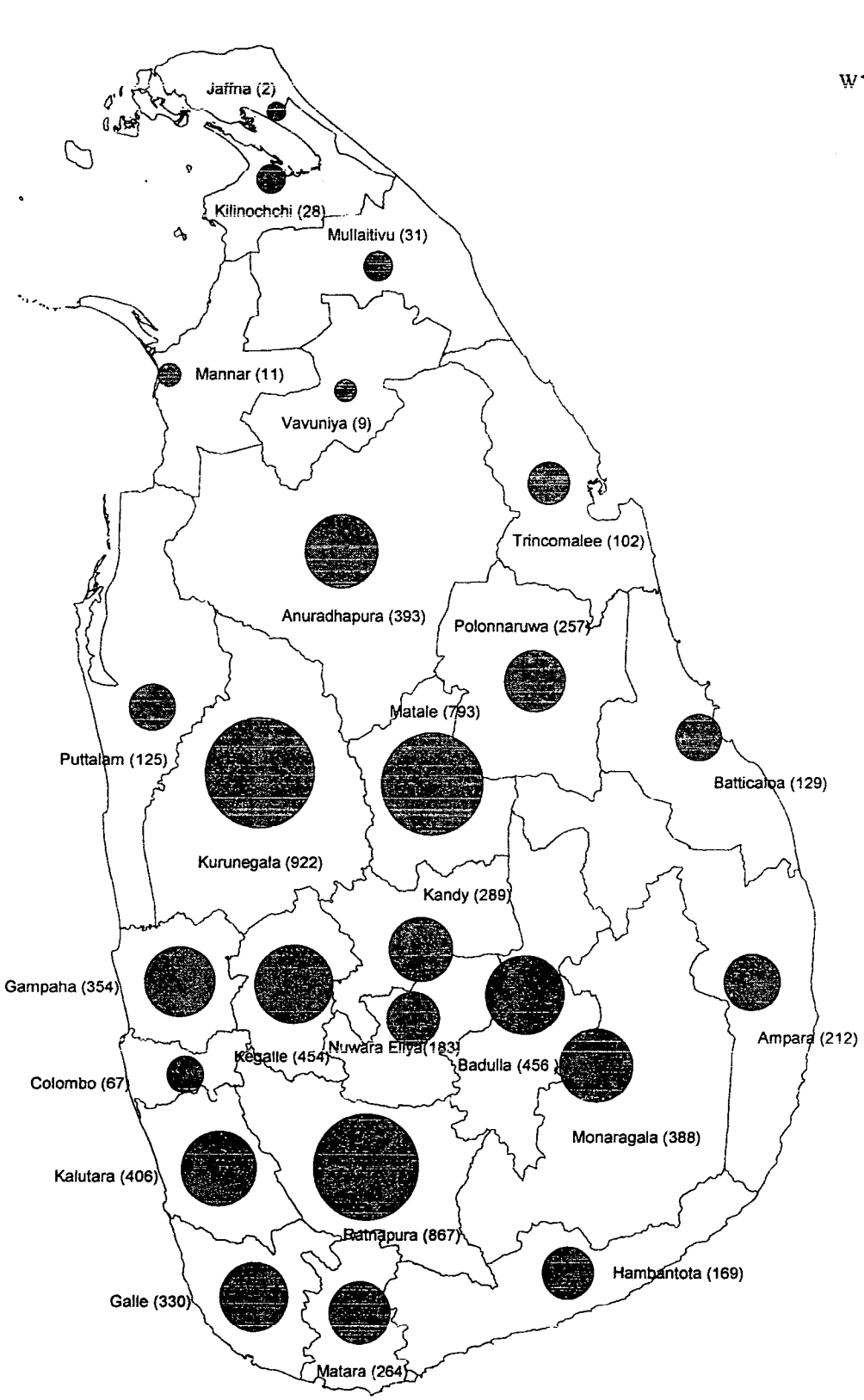
*Total of Kandy, Matara, Ampara, Mullaitivu, Anuradhapura, Nuwara Eliya, Badulla, Polonnaruwa, Jaffna, Trincomalee, Killinochchi Districts and special project Mahaweli H

Source: Department of Census and Statistics

Data Bank of HARTI

Map 12.1: Average Extent of Sweet Potatoes Cultivated during 2001 - 2005 by Districts

(Figures given in parenthesis are in hectares)



12.4 Seasonality of Production

A considerable difference of production of sweet potato between the major two seasons- *maha* and *yala* could be seen throughout the last ten-year period. The larger production comes from the *maha* season. The production details in two cropping seasons over the last ten-year period are given in the table 12.1. The difference in average production between the two seasons in the last decade is around 3,515 mt., and it can be interpreted as a 13.4% drop in *yala* season compared to the average production in *maha* season. However, the difference in production between the two seasons has become lesser in the particular time period (1996 to 2005). The difference in the initial production between the two seasons in 1996 (as a percentage of the *maha* production) is around 10.8% (3,355 mt.) and it has dropped to 3.8% (797 mt.) in the year 2005.

12.5 Trends in Production, Cultivated Area and Average Yield of Sweet Potato (1980 - 2005)

As far as the production of sweet potato during the period (1980-2005) is concerned, a decreasing trend can be observed. Even though there were increases of production in the years of 1981 (24.5% increase compared to that of the previous year), 1984 (25%), 1988 (8.5%), 1994 (8.9%) and 2005 (3.7%) these increases have been negligible. A sharp decline could be observed during the time period from 1984 (147,060 mt) to 1987 (80,430 mt). The production change during the particular period was 45.3%. There was another sharp and continuous drop between 1988 and 1993. After 1994 a continuous and gradual decline could be observed up to 2004. The average annual production of sweet potato during the period (1980-2005) was 78,817 mt. However, after 1989, the annual production has not reached this average value. The difference between the average value of annual production in 2005 and the average value for the period (1980-2005) was 37,642 mt. These values give a clear picture of the plunge, the sweet potato production has taken.

The decline of the average annual production of sweet potato during the particular period is about 86,250 mt or 68%. This decline could be seen in both *yala* and *maha* seasons during the period (1980-2005). The annual production of sweet potato during the last two and half decades is given in the table 12.4.

Table 12.4: Production of Sweet Potato by Season (1980-2005)

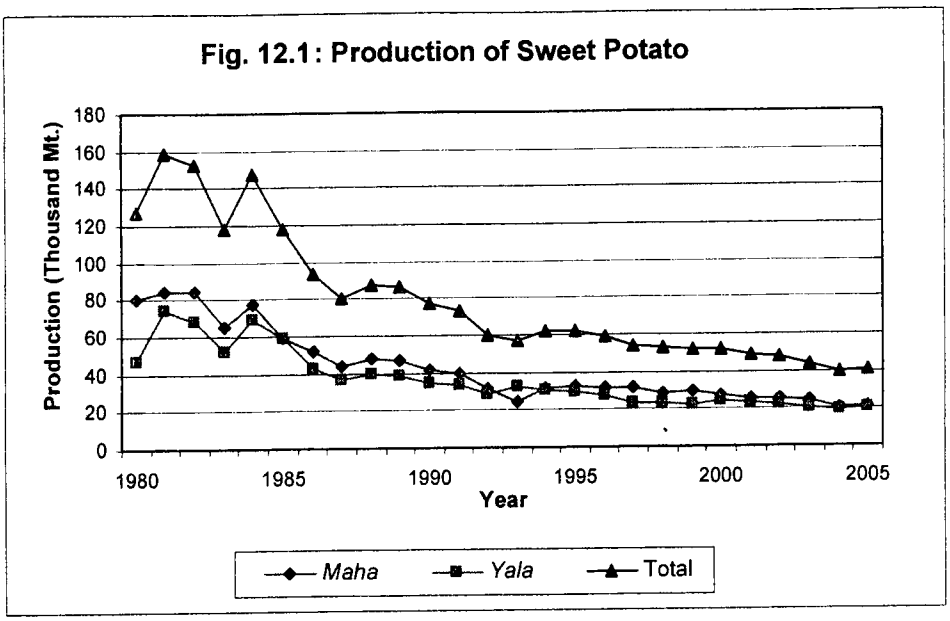
M.Tons

Year	*Maha*	*Yala*	Total
1980	80,573	46,854	127,427
1981	84,243	74,372	158,615
1982	84,410	68,154	152,564
1983	65,569	52,021	117,590
1984	77,649	69,411	147,060
1985	58,809	58,735	117,544
1986	51,438	42,275	93,713
1987	44,066	36,364	80,430
1988	47,634	39,604	87,238
1989	47,016	38,966	85,982
1990	41,798	35,084	76,882
1991	39,617	33,669	73,286
1992	31,746	28,405	60,151
1993	24,584	32,458	57,042
1994	31,911	30,186	62,097
1995	32,506	29,317	61,823
1996	31,086	27,731	58,817
1997	31,029	23,100	54,129
1998	28,798	23,691	52,489
1999	29,006	22,586	51,592
2000	27,012	24,797	51,809
2001	25,253	23,290	48,543
2002	25,240	22,223	47,463
2003	24,054	20,004	44,058
2004	20,007	19,705	39,712
2005	20,986	20,189	41,175
Average	42,540	36,277	78,817

Source: Department of Census and Statistics

The *maha* production was always higher than that of *yala* season except in 1993. However, the decline of production in *maha* season is much higher about 59,590 mt (74%) during the period (1980-2005), while the decline of *yala* production is 26,665 mt (57%).

The average production of sweet potato in *maha* season during the period (1980-2005) was 42,540 mt and that for *yala* season was 36,277 mt. The total annual and seasonal production of sweet potato for the period (1980-2005) has been illustrated in figure 12.1.



12.6 Extent Cultivated of Sweet Potato during the Period (1980-2005)

The annual extent cultivated with sweet potato during the period (1980 - 2005) has been given in table 12.5.

Over the particular time period, a declining trend could be observed in the extent cultivated with sweet potato. This decline had commenced in 1982 and a slight increase could be noted only in three years (1984,1994 and 2005). At the initial stage (in 1981) there was a 16.5% increase compared with that of the previous year. The increases of extent cultivated in 1984 and 1994 were 13.6% (1954 ha) and 10.3% (843 ha) respectively. A slight increase of 3% (194 ha) was reported in the extent cultivated in 2005 over the year 2004. The overall decline of annual extent during the period (1980-2005) was about 7,700 ha (54%). The average annual extent cultivated for the particular period was 10,870 ha. However, after 1991, the annual extent cultivated each year has fallen short of this average. The seasonal extent cultivated of sweet potato during the particular time period is shown in figure 12.2.

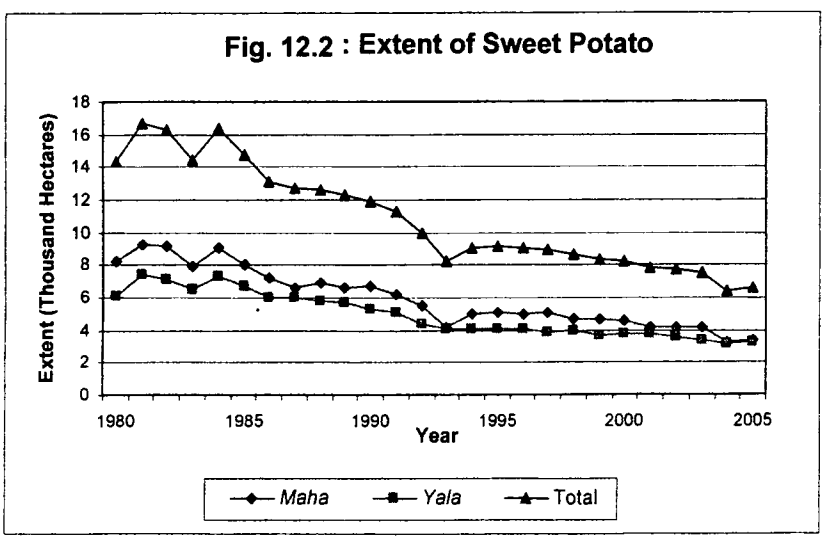
The average extent of *maha* season was 5,954 ha and that of *yala* season was 4,916 ha during the respective time period. The extent in *yala* season has been close to the extent of *maha* season in the years of 1993, 2004 and 2005. The difference of annual average extent between *maha* and *yala* seasons during the respective period was 1,038 ha (17%).

Table 12.5: Extent **Cultivated under Sweet Potato by Season**

Hactares

Year	*Maha*	*Yala*	Total
1980	8,254	6,058	14,312
1981	9,271	7,400	16,671
1982	9,136	7,140	16,276
1983	7,942	6,466	14,408
1984	9,025	7,337	16,362
1985	8,020	6,748	14,768
1986	7,179	5,969	13,148
1987	6,632	6,044	12,676
1988	6,875	5,783	12,658
1989	6,660	5,660	12,320
1990	6,683	5,239	11,922
1991	6,239	5,091	11,330
1992	5,537	4,393	9,930
1993	4,137	4,073	8,210
1994	5,023	4,030	9,053
1995	5,105	4,020	9,125
1996	4,969	4,065	9,034
1997	5,052	3,913	8,965
1998	4,663	3,993	8,656
1999	4,724	3,659	8,383
2000	4,543	3,720	8,263
2001	4,132	3,721	7,853
2002	4,153	3,549	7,702
2003	4,199	3,366	7,565
2004	3,270	3,147	6,417
2005	3,386	3,225	6,611
Average Extent	5,954	4,916	10,870

Source: Department of Census and Statistics



12.7 Average Yield of Sweet Potato

As far as the annual average yield of sweet potato, during the period (1980-2005) is concerned, a highly fluctuated pattern could be observed. After the year 1981, the annual average yield has declined over the time except for slight increases in the years of 1984, 1988, 1989, 1993, 1999, 2000, 2004 and 2005. A fairly constant value for average yield could be seen since 1997 up to 2005. The average yield for the particular time period was about 6,978 kg/ha. The decline of the average yield during the period (1980-2005) was 2,676 kg/ha, a decrease of about 30%.

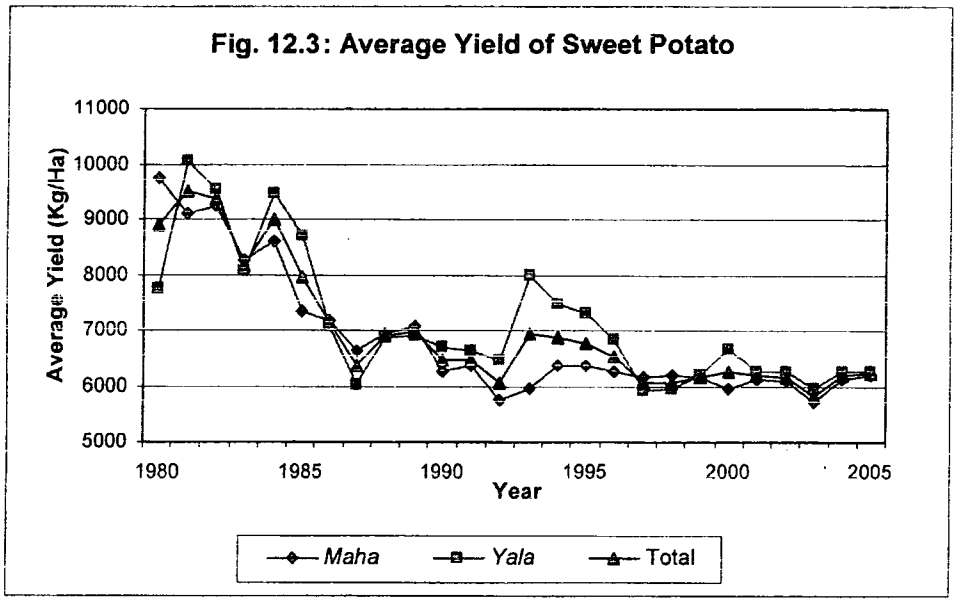
Table 12.6: Average Yield of Sweet Potato by Season

Kg /Ha

Year	*Maha*	*Yala*	Total
1980	9,762	7,734	8,904
1981	9,087	10,050	9,514
1982	9,239	9,545	9,374
1983	8,256	8,045	8,161
1984	8,604	9,460	8,988
1985	7,333	8,704	7,959
1986	7,165	7,082	7,128
1987	6,644	6,017	6,345
1988	6,929	6,848	6,892
1989	7,059	6,884	6,979
1990	6,254	6,697	6,449
1991	6,350	6,613	6,468
1992	5,733	6,466	6,058
1993	5,942	7,969	6,948
1994	6,353	7,490	6,859
1995	6,367	7,293	6,775
1996	6,256	6,822	6,511
1997	6,142	5,903	6,038
1998	6,176	5,933	6,064
1999	6,140	6,173	6,154
2000	5,946	6,666	6,270
2001	6,112	6,259	6,181
2002	6,078	6,262	6,162
2003	5,729	5,943	5,824
2004	6,118	6,262	6,189
2005	6,198	6,260	6,228
Average	6,845	7,130	6,978

Source: Department of Census and Statistics

The seasonal variation of average yield of sweet potato is shown in figure 12.3.



12.8 Review of Agricultural Inputs

Labour and fertilizer are the main inputs incurred in the cultivation of sweet potato. Table 12.7 consists of information related to cost of cultivation of sweet potato under rain fed conditions in Ratnapura in *yala* seasons during the years 1999 and 2004.

Table 12.7: Cost of Cultivation per Acre of Sweet Potato by Inputs in Ratnapura under Rainfed Conditions during *Yala* Seasons

Rs./Acre

Input	1999		2004	
	Rs.	%	Rs.	%
Labour	17,213	83.2	31,321	89.6
Fertilizer	3,480	16.8	3,611	10.4
Total cost Incl. Imputed cost	20,693		34,932	
Total cost Excl. Imputed cost	11,455		25,794	

Source: Cost of Cultivation Agricultural Crops, Various Issues, Department of Agriculture.

The cost of cultivation of sweet potato (including imputed cost) has increased nearly by 69% (by Rs.14,239/ac) in *yala*, 2004 compared with that of the same season in 1999. The labour is the most prominent cost component of the total cost accounting for 87.3%, while fertilizer component amounts to 12.7%. It can be observed that the labour cost has increased drastically (by 82%) resulting in a high cultivation cost.

In accordance with the "Cost of Cultivation of Agricultural Crops" by Department of Agriculture, the unit cost of production of sweet potato is Rs. 6.07/kg in the *yala* season 2005. The cost has been calculated as Rs. 35,211.80/ac. Farmers can earn Rs. 49,300.00

from one acre of sweet potato when the average yield is 5,800 kg/ac and the producer price is Rs. 8.50/kg. Thus the farmers can have a sum of Rs. 14,088.20 as net profit by cultivating one acre of sweet potato. The cost of cultivation of sweet potato and other relevant information are shown in the table 12.8.

Table 12.8: Cost of Cultivation per Acre of Sweet Potato by Operations under Rainfed Conditions during 2005 *Yala*

Operation	Input Cost Rs/ac	Labour		Total Cost Rs/ac
		Man Days	Cost Rs/ac	
Crop Establishment				
Land Preparation manually		20	6,000.00	6,000.00
Cutting planting materials		7	2,100.00	2,100.00
Planting 1500*	375	13	3,900.00	4,275.00
Basal fertilizer – Urea 24kg/ac	264	3	900	1,164.00
TSP 49kg/ac	1,489.60			1,489.60
MOP 49kg/ac	1,489.60			1,489.60
Crop Management				
Top dressing - Urea 24kg/ac	264	1	300	564
MOP 49kg/ac	729.6			729.6
Water management		8	2,400.00	2,400.00
Weeding and earthing up		16	4,800.00	4,800.00
Harvesting and Processing				
Harvesting		26	7,800.00	7,800.00
Cleaning		8	2,400.00	2,400.00
Total Cost	4,611.80		30,600.00	35,211.80

*planting materials

Average Yield and Prices	
Yield (kg/ac)	5,800
Producer price (Rs/kg)	8.5
Unit cost of production (Rs/kg)	6.07
Gross and Net Return	
Gross return (Rs/ac)	49,300.00
Net return (Rs/ac)	14,088.20

Source: Department of Agriculture

12.9 Domestic Market

Though there is a difference in the production of sweet potato between the two main cropping seasons *maha* and *yala*, a significant price variation is not observed throughout the year. This phenomenon (price stability) could be observed in producer price as well as retail price (Tables 12.9 and 12.10).

A continuous increase could be seen in the producer and the retail prices during the last decade with a small drop in the year 1999. The increase of the producer price in 2005 compared to that of the initial year 1996 is 59% (by Rs.6.17/kg) and the average producer price during the last ten-year period is around Rs. 12.65/kg. A significant price increase has occurred in the year 2005 compared to that of the previous year and it accounted for 19% increase (by Rs.2.58/kg).

Table 12.9: Monthly Average Producer Prices of Sweet Potato in Sri Lanka

Rs/Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	9.71	11.13	12.01	10.84	11.55	11.81	13.17	15.17	13.01	16.24
February	9.76	10.63	11.72	10.73	11.4	12.01	12.63	14.64	12.75	17.05
March	9.22	10.63	11.67	10.9	11.22	11.65	12.99	14.26	12.77	16.62
April	10.18	11.23	11.23	11.45	11.51	12.11	12.88	13.93	13.71	18.01
May	10.3	10.03	11.09	11.55	11.52	12.08	13.88	14.72	13.45	17.25
June	11.38	10.77	11.77	11.22	11.92	13.36	13.78	14.09	13.42	17.13
July	11.22	11.01	11.26	11.51	12.16	13.01	13.83	14.17	14.25	17.34
August	10.85	11.2	10.94	11.77	11.52	12.49	13.48	13.04	14.55	17.74
September	10.84	11.13	10.86	11.38	11.33	12.94	13.25	14.14	14.3	15.66
October	10.76	11.01	11.16	10.93	11.61	13.47	13.48	13.41	14.92	15.33
November	10.5	11.87	11.77	10.98	11.87	13.92	13.99	13.58	15.05	15.24
December	10.79	12.06	11.62	11.22	12.34	13.73	13.72	12.92	15.37	16.02
Annual Average	10.47	11.06	11.42	11.21	11.67	12.7	13.43	14	13.96	16.64

Source: Department of Census and Statistics
Data Bank of HARTI

The price increase of sweet potato at the retail market is somewhat higher than the producer price increase during the last ten-year period. The price behaviour of sweet potato at the retail market is given in the table 12.10. An 89.5% (Rs. 5.09/kg) increase of retail price for sweet potato could be observed in the year 2005 compared to the price of the year 1996.

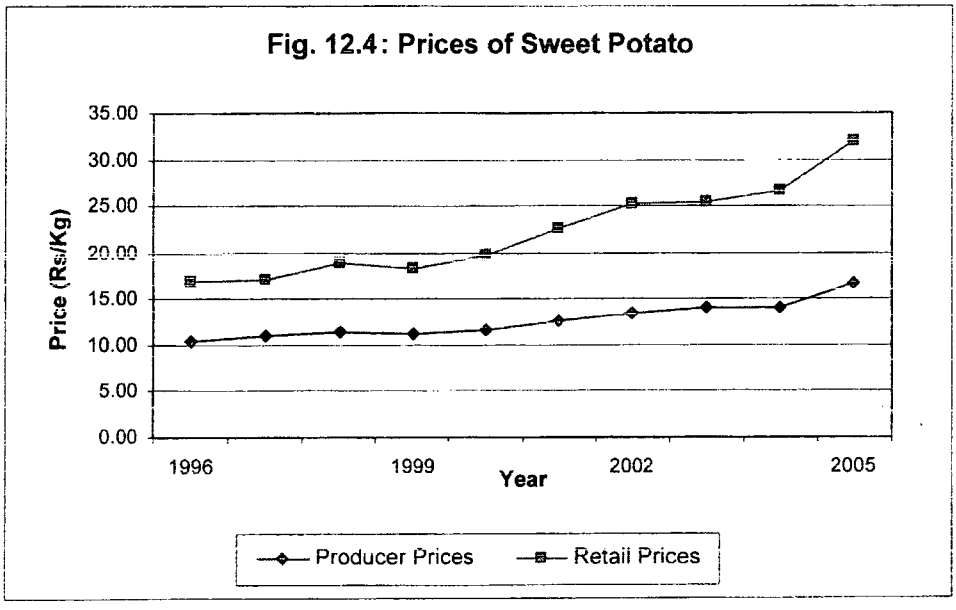
Table 12.10: Monthly Average Retail Prices of Sweet Potato in Sri Lanka

Rs/Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	14.93	17.19	19.88	18.40	19.74	21.84	24.94	26.64	25.49	31.56
February	15.38	17.21	20.05	18.14	18.45	22.33	23.79	27.08	24.51	31.13
March	15.51	16.49	19.62	17.05	18.01	20.78	24.02	25.17	24.70	31.48
April	14.93	16.18	19.33	18.45	18.11	22.25	25.16	25.49	24.61	32.41
May	16.64	16.75	18.38	17.64	18.57	22.10	24.81	26.09	25.80	33.16
June	19.69	15.91	18.90	18.24	18.95	22.90	24.63	25.61	27.62	32.87
July	19.99	16.03	19.69	18.27	19.54	25.15	25.91	25.34	27.82	31.93
August	18.83	17.40	18.52	18.74	19.96	25.36	25.02	24.34	26.39	32.55
September	16.26	17.53	18.20	18.04	21.04	21.76	26.68	24.28	25.35	31.34
October	16.89	18.48	18.55	18.15	21.02	22.30	25.10	24.00	26.87	31.47
November	16.69	17.88	18.26	18.86	20.40	23.16	26.20	25.07	28.60	31.88
December	16.61	18.70	17.67	18.64	23.73	22.01	27.14	25.43	31.13	31.59
Annual Average	16.86	17.14	18.92	18.22	19.78	22.66	25.28	25.37	26.56	31.95

Source: Department of Census and Statistics
Data Bank of HARTI

As shown in the figure 12.4, it is clear that the difference between the producer price and the retail price of sweet potato has increased over the years during the entire period (1996-2005).



12.10 External Trade

Middle East countries were the major importers of the local sweet potato in the first part of the last ten-year period. France, Germany, UK, Canada and Australia are the other western countries to which sweet potato is imported from Sri Lanka. Maldives has become one of the new and main export markets since 2001.

The amount of sweet potato exported to the respective markets mentioned above had a high fluctuation over the last decade. Though the Middle East countries provided the prominent export markets for Sri Lankas sweet potato in the initial stage (contribution of over 42% of the total Sri Lanka sweet potato exports) and it has become negligible by the end of the last decade.

The export earnings from sweet potato continuously increased on a large scale during the first nine years of the last decade. Such earnings in the year 2004 had a 173% increase compared to the year 1996. However, the export of sweet potato in the year 2005 plunged to zero, and it implies the necessity of a proper programme to promote the exports and identify new export markets for Sri Lanka's sweet potato. It is clearly shown in the table 12.11 that Sri Lanka has lost its export market in the Middle Eastern and Western countries during the last ten years.

Table 12.11: Exports of Sweet Potato by Country of Destination

Country	1996		1997		1998		1999		2000	
	Qty (Kg)	Value (Rs)	Qty (Kg)	Value (Rs)	Qty (Kg)	Value (Rs)	Qty (Kg)	Value (Rs)	Qty (Kg)	Value (Rs)
France							442	40,947		
Germany			40	1,740						
Maldives									120	658
U.A.E.	400	15,196	120	4,692	510	20,639			1397	48,377
U.K.							1,600	70,638		
Kuwait	30	2,757					180	10,813		
Oman	360	17,896								
Total	790	35,849	160	6,432	510	20,639	2,222	122,398	1,517	49,035

Country	2001		2002		2003		2004		2005	
	Qty (Kg)	Value (Rs)	Qty (Kg)	Value (Rs)	Qty (Kg)	Value (Rs)	Qty (Kg)	Value (Rs)	Qty (Kg)	Value (Rs)
Maldives	595	23,195	200	9,676	1,510	15,235	1,410	67,626		
Qatar					500	23,702				
Canada			2	193						
U.A.E.			10	422						
Australia							3	1,470		
U.K.							100	28,627		
Other							*	150		
Total	595	23,195	212	10,291	2,010	38,937	1,513	97,873	0	0

* Negligible

Source: External Trade Statistics, Various Issues, Sri Lanka Customs

12.11 Availability of Sweet Potato

The availability of sweet potato for consumption could be calculated on the basis of the production, the wastage and the exports. The wastage of sweet potato is 30% of the production. Thus, the availability of sweet potato during the last ten year period is given in table 12.12.

Table 12.12: Total Availability of Sweet Potato

M.Tons

Year	Production	Wastage	Net Production	Exports	Availability
1996	58,817	17,645	41,172	0.79	41,171
1997	54,129	16,239	37,890	0.16	37,890
1998	52,489	15,747	36,742	0.51	36,741
1999	51,592	15,478	36,114	2.22	36,112
2000	51,809	15,543	36,266	1.52	36,264
2001	48,543	14,563	33,980	0.60	33,979
2002	47,463	14,239	33,224	0.21	33,224
2003	44,058	13,217	30,841	2.01	30,839
2004	39,712	11,914	27,798	1.51	27,796
2005	41,175	12,353	28,823	0.00	28,823
Average	48,979	14,694	34,285	0.95	34,284

Source: Food Balance Sheet (1996-2005), Department of Census and Statistics
Data Bank of HARTI

A gradual decline of the availability of sweet potato could be observed in the respective period as the production of sweet potato had a sharp decline during the relevant period. The effect of exports is negligible (2.8%).

The average per capita availability of sweet potato during the last five year period (2001-2005) is about 1.61kg and it has declined by 21% in the first four year period (2001-2004) while having a slight increase (3%) in 2005 compared with that of the previous year, 2004. The major reason for the gradual decrease of per capita availability of sweet potato is the continuous decline of production of the particular crop during the respective time period.

12.12 Consumption

The per capita consumption of sweet potato has decreased in all three sectors by nearly 49% (0.77 kg to 0.39 kg) during the period of 1996/97 –2003/04. Thus, the drop is higher in the urban sector accounting for 62%, while the decline in rural and estate sectors accounts for 49.4% and 17% respectively. Table 12.13 clearly shows this trend.

Table 12.13: Per Capita Consumption of Sweet Potato per Annum by Sectors

Kg

Year	Urban	Rural	Estate	All Sectors
1978/79	0.26	0.47	0.15	0.39
1981/82	0.65	1.26	0.42	1.09
1986/87	0.30	0.50	0.16	0.44
1996/97	0.58	0.84	0.17	0.77
2003/04	0.22	0.43	0.12	0.39

Source: Consumer Finance and Socio Economic Survey, Various Issues,
Central Bank of Sri Lanka

In accordance with the table 12.15, a clear link between per capita consumption of sweet potato and income of the people cannot be observed.

Table 12.14: Per Capita Consumption of Sweet Potato by Income Deciles and Sectors - 2003/04

Income Decile	Minimum (Rs)	Maximum (Rs)	Urban	Rural	Estate	All Sectors
1	0	4,520	0.00	0.63	0.04	0.54
2	4,527	6,214	0.16	0.41	0.06	0.36
3	6,220	7,728	0.21	0.43	0.26	0.40
4	7,733	9,430	0.24	0.31	0.21	0.30
5	9,435	11,350	0.27	0.30	0.00	0.28
6	11,357	13,755	0.11	0.44	0.00	0.39
7	13,757	17,271	0.38	0.39	0.20	0.38
8	17,275	22,036	0.21	0.49	0.15	0.43
9	22,037	32,778	0.27	0.41	0.00	0.37
10	32,793	825,694	0.17	0.58	0.00	0.45
Overall Average	12,513	95,078	0.22	0.43	0.12	0.39

Income deciles for one month house hold income

Source: Consumer Finance and Socio Economic Survey 2003/04, Central Bank of Sri Lanka

12.13 Government Policy

Import duties imposed by the government can be identified as a protective measure for the local sweet potato growers and other interested parties. A total import duty (including customs duty, surcharge, VAT, etc.) has been imposed, and it is equal to 57% of the import value of sweet potato.

The research and development activities undertaken by the Department of Agriculture can be seen as another government intervention for this crop. Conducting farmer field trials in research activities and demonstrations in farmer fields could be described as measures taken by the Department of Agriculture to popularize and make farmers aware on new varieties of sweet potato.

12.14 Conclusions and Recommendations

The sweet potato cultivation is limited mainly to wet and intermediate zones. Ratnapura is the major producing district accounting for 19% of the total production. Ratnapura district accounts for 14% of the extent cultivated of sweet potato. During the last decade, a

significant decline in the average production could be observed and the average annual national production of sweet potato is around 49,000 mt during the period of 1996-2005. The decline of the average production during the particular time period is about 18% (by 9,577 mt). There is a 68% of decline of average annual production of sweet potato during last twenty five year period (1980-2005). The decline of extent cultivated during the particular time period (1080-2005) is 54%. The average yield has also declined by 30% during the reference time period. Therefore, necessary initiatives should be taken to increase the average yield resulting in increased productivity of the crop.

A continuous price increase could be observed in the producer price and the retail price during the last decade. The price increase is by around 59% and 89% in producer price and retail price respectively during the particular time period. According to the Department of Agriculture, the cultivation cost of sweet potato under rainfed conditions in *yala* season is around Rs. 35,200/ac, while the unit cost of production is around Rs. 6.00/kg. Farmers can earn Rs. 49,300/kg from one acre of sweet potato at the average yield of 5,800 kg/ac and at Rs. 8.50/kg of producer price. Thus, the farmers can have a sum of Rs.14,000 as net profit from one acre of sweet potato. The profitability of the crop is relatively low compared to the other crops. Therefore, high yielding varieties should be developed while creating assured market popularizing sweet potato as a fibrous healthy food item.

The availability of sweet potato has declined over the last five year period (2001-2005) by 30%. Continuous decline in the production of sweet potato has caused for this sharp decline in availability of sweet potato. The export of sweet potato is negligible. It is needed to identify new export market for sweet potato.

13. GINGELLY

13.1 Introduction

The Gingelly plant (*Sesamum indicum)* belongs to family *Pediliaceae*. It is also, known as sesame. It is an annual herb grown largely in tropics and sub tropics. Gingelly is the one of the oldest oil seeds of which India is its native place. Sesame plants require a warm dry climate with 500 – 600 mm of annual rainfall. In Sri Lanka it is widely grown and naturalized in the dry zone, especially along roadsides, abandoned fields and waste area.

In Sri Lanka, gingelly can be grown as a rain-fed or irrigated crop in both *yala* and *maha* seasons. But, gingelly is mainly a *yala* crop, which requires less rain. *Yala* cultivation can be done from mid March to early April and need to avoid high rainy periods. Gingelly can be cultivated on paddy lands at higher elevations where water level is low. Although it is cultivated in various soils, the soils most suited for the cultivation of gingelly are the sandy loams. Temperature requirement is above 25°c.

Gingelly plants produce flowers from May to August and sometimes throughout the year. Fruit is a capsule. It is ready to be harvested when the bottom capsules are turning into yellow. Plants are cut near ground level, bound and stocked in the field to ripen. When the harvest is dried, heaps of plants are beaten with a stifle. It yields upto 1,000 – 1,200 kg/ha. Seeds should be stored in airtight containers for prolonged storage and the moisture content must be reduced to less than 13% to prevent the growth of mould.

There are four types of varieties cultivated in Sri Lanka recommended by the Department of Agriculture as follows:

Table 13.1: Recommended Varieties of Gingelly by the Department of Agriculture

Variety	MI-1	MI-3	Uma	Malee
Colour of seed	Black	White	White	Light brown
Yield	0.9T/ha	1T/ha	1.5T/ha	1.8T/ha

Source: Department of Agriculture

The recommended varieties are MI-1, MI-3, Uma and Malee. MI-1 and MI-3 varieties produce white colour seeds. Only Malee variety is tolerant to stem and root rot disease.

13.2 Production

13.2.1 Major Producing Districts and Main Contributing Areas within Districts

Based on a five-year average (2001 – 2005) the production as revealed in table 13.2, Anuradhapura (28%), Moneragala (17%), Hambantota (14%), Mahaweli-H area (8%), and Badulla (7%) can be identified as the major producing areas which account for 74% of the total production. During the period of 1996 – 2000, the average production in Anuradhapura area was 39% and it declined to 28% during the last five years. All the other districts

(Kurunegala, Trincomalee, Killinochchi, Mullaitivu and Ampara) contributed 26% of the total production and it was the same during the period from 1996 – 2000 (Annex 13.2).

Table 13.2: Production of Gingelly by Major Producing Districts

M.Tons

District	2001	2002	2003	2004	2005	Average (01-05)	Percentage
Anuradhapura	1,126	822	1,150	1,257	2,477	1,366	28.1
Moneragala	655	871	1,043	764	887	844	17.4
Hambantota	404	530	936	804	651	665	13.7
Mahaweli-H	281	280	788	130	396	375	7.7
Badulla	343	292	273	347	401	331	6.8
Others	1,396	1,275	1,295	1,046	1,349	1,272	26.2

Source: Department. of Census and Statistics
Data Bank of HARTI

During the period 2001 – 2005, about 56% of the production was recorded in *Yala* season.

Table 13.3: Extent of Gingelly by Major Growing Districts

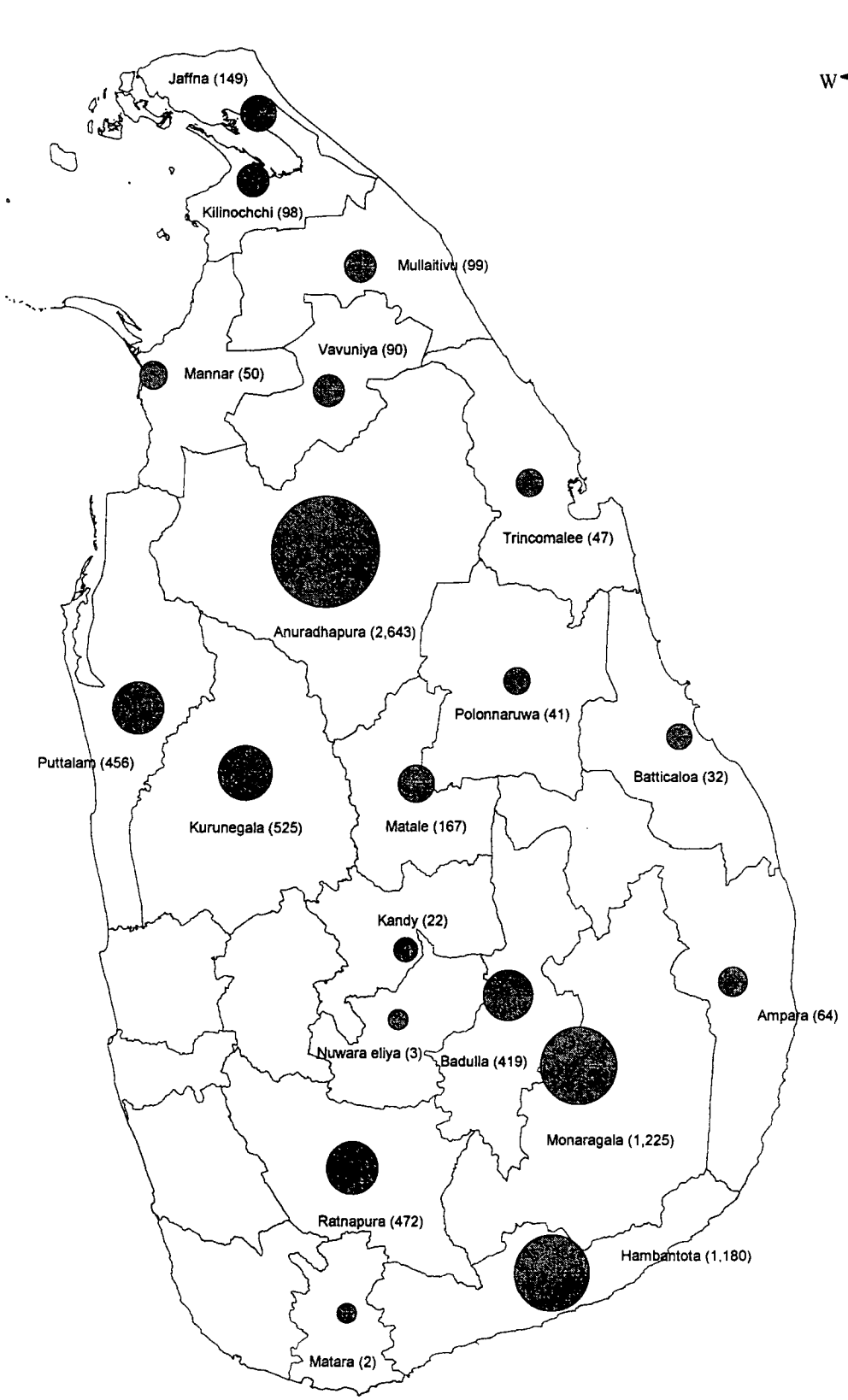
Hectares

District	2001	2002	2003	2004	2005	Average (01-05)	Percentage
Anuradhapura	2036	1449	2080	1816	3451	2166	27.9
Moneragala	918	1290	1444	1182	1293	1225	15.8
Hambantota	713	884	1738	1498	1069	1180	15.2
kurunegala	373	429	435	459	930	525	6.8
Mahaweli- H	299	298	831	232	721	476	6.1
Ratnapura	408	488	678	380	404	472	6.1
Puttalam	473	432	455	376	542	456	5.9
Others	1619	1312	1142	1040	1239	1270	16.3

Source: Department of Census and Statistics
Data Bank of HARTI

Map 13.1: Average Extent of Gingelly Cultivated during 2001 - 2005 by Districts

(Figures given in parenthesis are in hectares)



13.2.2 The Extent of Cultivation

With regard to the five-year average (2001 – 2005), the cultivated extent also spread out as follows; Anuradhapura (28%), Moneragala (16%), Hambantota (15%), Kurunegala (7%), Mahaweli-H area (6%), Ratnapura (6%) and Puttalam (6%).

During the period of 2001 – 2005, about 54% of the extent was cultivated in *yala.*

In Anuradhapura district, Mahavilachchiya (28%), Nochchiyagama (24%) and Madyam Nuwaragampalatha (17%) were the main contributing D.S. Divisions in the year 2005. In Moneragala district, Thanamanwila (50%) and Wellawaya (23%) were the main producing areas within the district based on 2005 *yala* season. In Hambantota district, Sooriyawewa (25%), Hambantota (25%) and Lunugamwehera (23%) were predominant (Annex 13.3).

13.2.3 Agricultural Inputs, Cost of Production, Returns and Income

According to table 13.4, the main component of the cost of production is labour. It was recorded as 98% of the total cost in 2004 *yala*. The Cost of production was Rs. 9,891/- per acre in 2004 *yala* season. During the period from 2002 – 2004, the cost of production increased by 18%. Compared with that of the other subsidiary food crops, the input requirement is low for gingelly.

Table 13.4: Cost of Cultivation per Acre of Gingelly by Inputs in Anuradhapura under Rainfed Conditions during *Yala* Seasons

Rs/Acre

Input	2002	2003	2004
Labour	8077.00	8558.00	9564.00
Seed	305.00	334.00	327.00
Total Cost-Including Imputed Cost	8382.00	8892.00	9891.00
Total Cost-Excluding Imputed Cost	724.00	1710.00	1688.00

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

Table 13.5 shows the net return per acre of gingelly recorded in Anuradhapura district. There was a profit of Rs. 4,547 per acre in 2004 *yala* season. However, it was significfantly low in 2002 and 2003 *yala* seasons and again increased in 2004.

Table 13.5: Net Return per Acre of Gingelly in Anuradhapura under Rainfed Conditions during *yala* Seasons

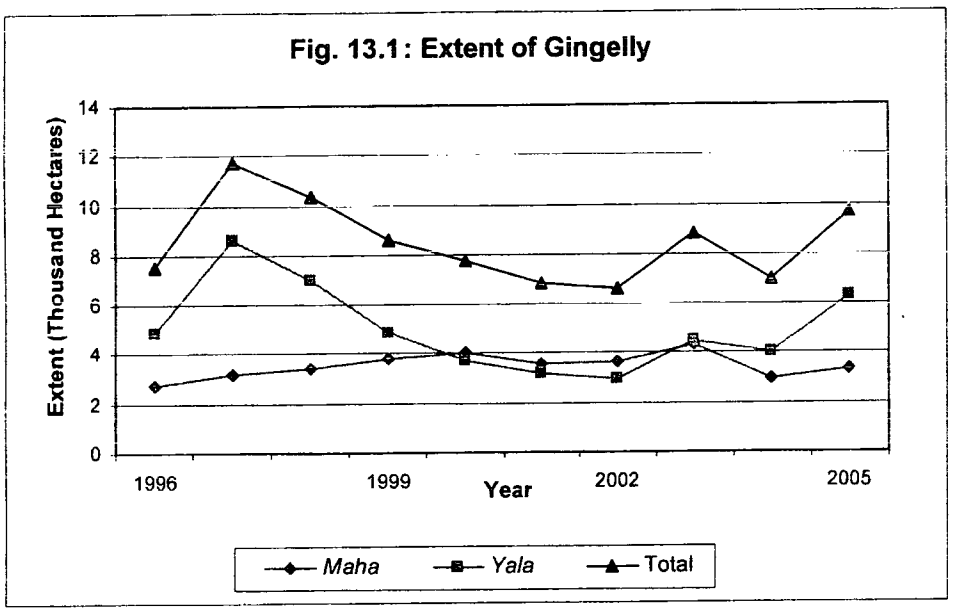
Rs/Acre

Season	Net Return per Acre	
	Including Imputed Cost	Excluding Imputed Cost
2002	1809.00	9468.00
2003	1395.00	8577.00
2004	4547.00	12750.00

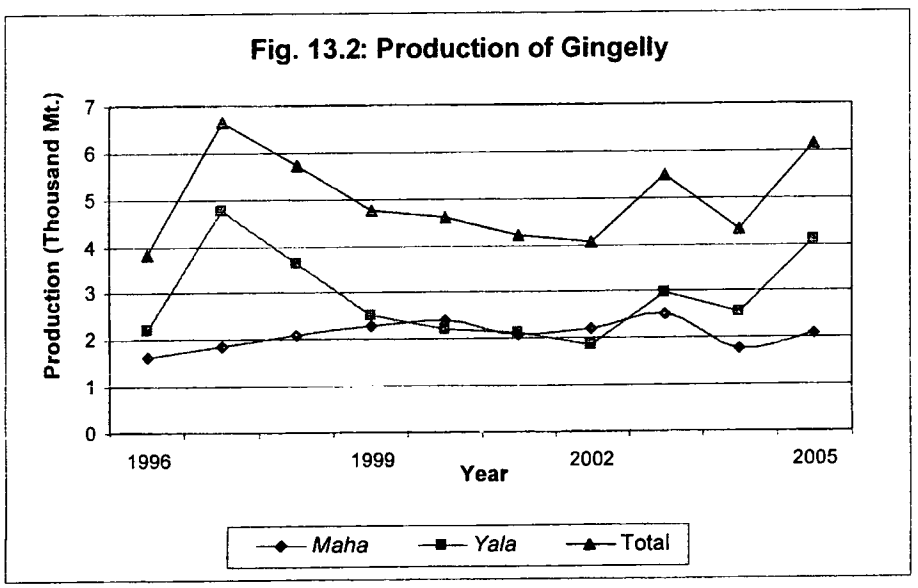
Source: Cost of Cultivation of Agricultural Crops, Various Issues Department of Agriculture

13.2.4 Trends in Production and Average Yield

According to the figure 13.1, during the period from 1997 to 2002, the extent of cultivation has decreased gradually. However, 2003 and 2005 mark increases.



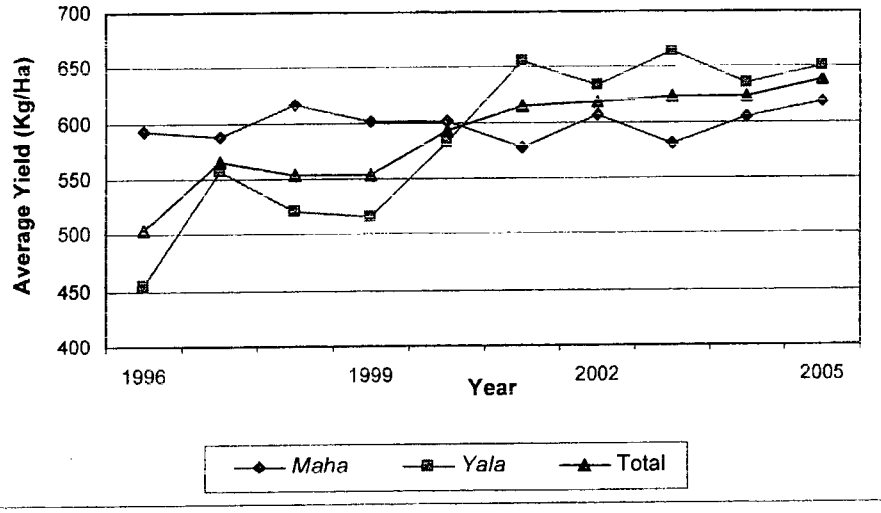
As shown in the figure 13.2, during the period from 1999 to 2002, *maha* and *yala* productions were more or less similar. During the other periods, *yala* production was higher than that of *maha*. The production has also fluctuated just like the extent of cultivation. During the period from 1996 to 2005, the highest production was recorded in 1997.



During the same period (1996 – 2005) the average yield has increased annually as shown in the figure 13.3. However, it has increased slightly recording 504 kg/ha in 1996 and 639 kg/ha

in 2005. Though, the extent of cultivation and production were low in *maha* season, the average yield was high in *maha* season during the period 1996 to 2000. From 2001 to 2005, the average yield was higher in *yala* season.

Fig. 13.3: Average Yield of Gingelly

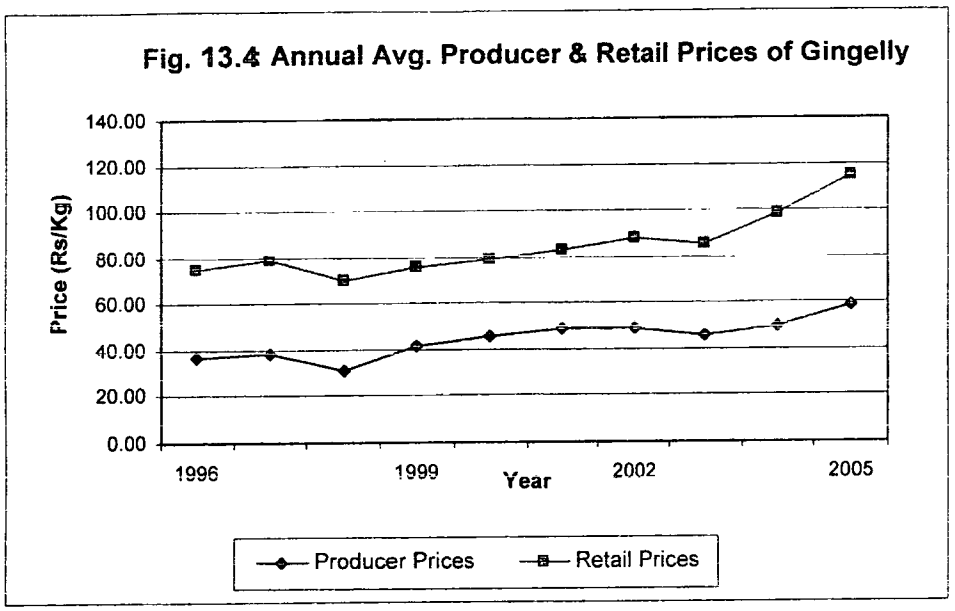


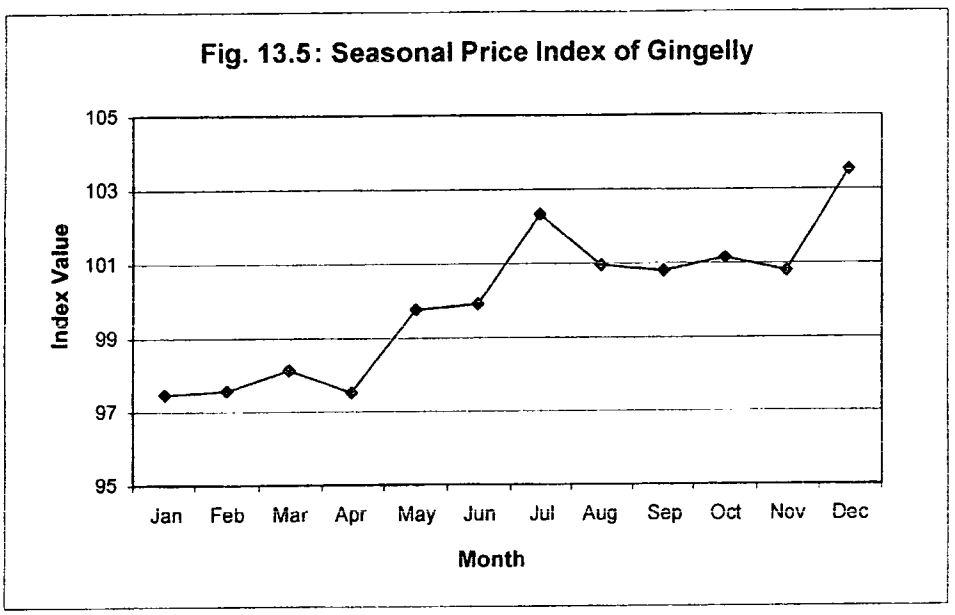
13.3 Domestic Marketing

13.3.1 Price Determination and Price Behaviour

Average producer prices have increased from Rs.45.33/kg in 2000 to Rs.58.24/kg in 2005 (Annex 13.4).

During the period from 2000 to 2005, the average retail prices of gingelly had increased annually. The monthly average retail prices ranged between Rs.105.30/kg to Rs.121.66/kg during 2005 (Annex 13.5).

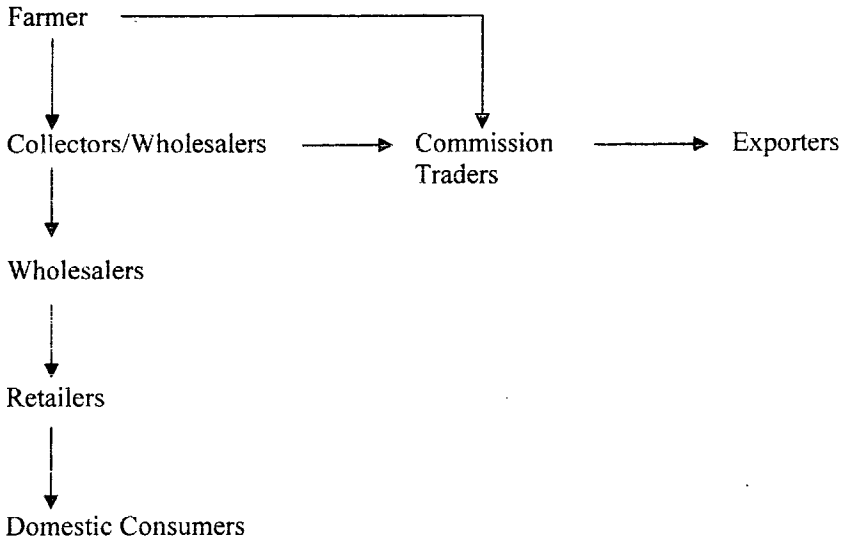




According to the seasonal price index shown in figure 13.5, the highest prices were recorded in July and December and during August to November. Lowest prices were observed from January to April.

13.3.2 Marketing Channels

Anuradhapura and Moneragala are the major producing areas of gingelly and the farmers have to transport them to Colombo and Dambulla markets for sale to the local collectors or the wholesalers. The exporters also either buy directly from the farmers or the commission traders.



13.3.3 Marketing Cost

Marketing cost is the price difference from the producer to the consumer. It includes the cost of marketing such as transport, handling, loading, unloading and profit margins. For gingelly, it is calculated as Rs.33.70/kg (Oil Crop Research and Development Institute).

13.4 External Trade

13.4.1 Major Imports/Exports by Countries of Origin/Destination

Seeds have been exported mainly to Taiwan. In 2004 and 2005, the exports were significant. Sesame seeds were largely imported from India.

13.4.2 Trends in Imports/Exports in Quantity

According to the table 13.6, the exports of gingelly seeds registered an upward trend in 2004 and 2005. According to the Sri Lanka Customs, 1,248 mt of gingelly and 36 mt of gingelly oil were exported while the quantity imported in 2005 was 27 mt of gingelly and 2,380 mt of gingelly oil. Gingelly oil is imported more than gingelly seeds. During the period from 2000 to 2005, the total quantity and value of imports (gingelly seeds) have declined. However, the imports of gingelly oil have increased from 2003 to 2005 and it was significant in 2005. The CIF price of gingelly was Rs.47.48/kg in 2005.

Table 13.6: Total Quantity and Value of Exports/Imports of Gingelly

Quantity of Imports and Exports	Product	2000	2001	2002	2003	2004	2005
Total Quantity of Exports (mt)	Gingelly	82	0	2	736	2624	1248
	Gingelly oil	54	47	42	52	48	36
Total Value (Rs. 000')	Gingelly	5,786	131	321	42,931	162,001	72,073
	Gingelly oil	10,000	10,426	8,614	11,701	12,963	11,101
Total Quantity of Imports (mt)	Gingelly	1,031	845	303	39	22	27
	Gingelly oil	209	174	119	160	353	2380
Total Value (Rs. 000')	Gingelly	27,604	28,050	11,137	1,331	718	1,282
	Gingelly oil	17,464	15,732	11,657	17,273	35,627	293,397

Source: External Trade Statistics, Various Issues, Sri Lanka Customs

From 1997 to 2002, the exports have decreased due to the drop in production of gingelly and it has increased from 2003 to 2005 with the increased extent of cultivation and production in the country.

13.5 Consumption

Gingelly was the main oil crop when the population concentrated in the dry zone of Sri Lanka. Later when the people shifted to the wet zone, coconut replaced gingelly. Still gingelly oil has a big demand among the Tamil community of the country. Seeds are used for confectionery purposes, while the oil is used as edible oil. Demand is high for white gingelly.

The per capita consumption of gingelly declined over the years in the 1973-1986/87 period. According to the table 13.7, it increased from 1.32 g in 1996/97 to 4.14 g in 2003/04. The per capita consumption in the urban sector was 5.06 g which is slightly higher than the national average in 2003/04. The per capita consumption of gingelly oil was 9.24 ml in 2003/04.

The estimated domestic consumption of gingelly was 80 mt and the consumption of gingelly oil was 181,732 litres in 2005.

Table 13.7: Per Capita Consumption of Gingelly per Annum by Sectors

Grams

Year	Urban	Rural	Estate	All Sectors
1973	33.60	43.68	23.52	43.68
1986/87	9.60	3.60	-	4.80
1996/97	0.96	1.44	-	1.32
2003/04	5.06	4.26	-	4.14

Source: Consumer Finance and Socio Economic Survey, Various Issues, Central Bank of Sri Lanka

13.6 Forcasting Future Trends

The estimated domestic requirement of gingelly is 85 mt and the requirement of gingelly oil was 19,2901 litres in 2010. It is expected to increase the extent of cultivation up to 15,822 ha by 2010 with an average yield of 1.2 mt. Also, it is expected to introduce new technology for gingelly producers to make sand free seeds and to reduce the bitterness. Further, varietal research is undertaken at present to produce a new variety, which is white in colour and disease resistant. At present there are white seed varieties. But, they are susceptible to stem and root rot disease. However, Malee variety is tolerant to that disease and produces light brown seeds. Therefore, the aim is to breed a variety by crossing MI-3 and Malee varieties.

13.7 Conclusions and Policy Recommendation

Anuradhapura was the major producing district according to the five-year average production (2001-2005) which contributed 28% of the average national production. It was low compared to the average production from 1996-2000. From 1997 to 2002, there was a decreasing trend in both production and extent of cultivation. From 2000-2005, the highest extent of cultivation and production was recorded in 2005. During the period from 1996-2005, the average yield has increased annually.

According to the monthly average retail prices recorded from 2001 to 2005, the highest retail prices were observed in July and December.

From 1997-2002, the exports have declined and again increased from 2003 to 2005. Import of gingelly seeds mainly from India was significant in 2004 and 2005. Import of gingelly oil had a significant rise in 2006.

Domestic consumption of gingelly was 79 mt and gingelly oil was 179,829 litres in 2004.

Before 2003, the gingelly oil production in Sri Lanka was around 730 mt per year. In 2003 and 2004, it was only 70 mt per year. As the domestic consumption is increasing annually, it is important to expand gingelly oil production in Sri Lanka. There is a good demand in Japan, U.S.A., Korea, Egypt, and Israel for gingelly. Hence, it is important to promote export to those countries. Also, it is important to introduce technology to the farmers to produce sand free seeds and to reduce the bitterness. As the consumer preference and export potential are high for white seeds, more such varieties need to be bred.

Annex 13.1: Extent of Gingelly by Major Growing Districts

Hectares

District	Season	Average (96-00)	2001	2002	2003	2004	2005	Average (01-05)	Percentage
Anuradhapura	*Maha*	318	365	329	429	169	383	335	
	Yala	3,769	1,671	1,120	1,651	1,647	3,068	1,831	
	Total	4,087	2,036	1,449	2,080	1,816	3,451	2,166	27.9
Moneragala	*Maha*	787	692	1,082	761	602	692	766	
	Yala	378	226	208	683	580	601	460	
	Total	1,166	918	1,290	1,444	1,182	1,293	1,225	16.0
Hambantota	*Maha*	928	690	826	1,648	1,074	962	1,040	
	Yala	181	23	58	90	424	107	140	
	Total	1,109	713	884	1,738	1,498	1,069	1,180	15.2
Kurunegala	*Maha*	54	57	108	115	193	224	139	
	Yala	478	316	321	320	266	706	386	
	Total	532	373	429	435	459	930	525	6.8
Mahaweli - H	*Maha*	3	11	11	1	14	6	9	
	Yala	118	288	287	830	218	715	468	
	Total	122	299	298	831	232	721	476	6.1
Ratnapura	*Maha*	135	227	304	439	145	142	251	
	Yala	136	181	184	239	235	262	220	
	Total	271	408	488	678	380	404	472	6.1
Puttalam	*Maha*	213	338	280	318	241	375	310	
	Yala	165	135	152	137	135	167	145	
	Total	378	473	432	455	376	542	456	5.9
Others*	*Maha*	973	1,229	710	605	527	583	731	
	Yala	576	390	602	537	513	656	540	
	Total	1,543	1,619	1,312	1,142	1,040	1,239	1,270	16.4
Sri Lanka	*Maha*	3,413	3,609	3,650	4,317	2,965	3,367	3,582	
	%	37.0	52.8	55.5	49.0	42.5	34.9	46.1	
	Maha	5,802	3,230	2,932	4,487	4,018	6,282	4,190	
	%	63.0	47.2	44.5	51.0	57.5	65.1	53.9	
	Total	9,214	6,839	6,582	8,804	6,983	9,649	7,771	
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Total of Badulla, Matale, Jaffna, Mulativu, Kilinochchi, Vavuniya, Ampara, Mannar, Trincomalee Polonnaruwa, Baticoloa, and Kandy districts

Source : Department of Census and Statistics
Data Bank of HARTI

Annex 13.2: Production of Gingelly by Major Producing Districts

M.Tons

District	Season	Average (96-00)	2001	2002	2003	2004	2005	Average (01-05)	Percentage
Anuradhapura	*Maha*	183	213	203	281	126	190	203	
	Yala	1,820	913	619	869	1,131	2,287	1,164	
	Total	2,003	1,126	822	1,150	1,257	2,477	1,366	28.2
Moneragala	*Maha*	554	482	720	539	461	504	541	
	Yala	249	173	151	504	303	383	303	
	Total	803	655	871	1,043	764	887	844	17.4
Hambantota	*Maha*	560	393	497	886	620	598	599	
	Yala	113	11	33	50	184	53	66	
	Total	673	404	530	936	804	651	665	13.7
Mahaweli - H	*Maha*	3	8	8	1	10	3	6	
	Yala	108	273	272	787	120	393	369	
	Total	112	281	280	788	130	396	375	7.7
Badulla	*Maha*	166	189	0	0	0	0	189	
	Yala	110	154	292	273	347	401	293	
	Total	209	343	292	273	347	401	331	6.8
Others*	*Maha*	1,011	801	787	801	578	784	750	
	Yala	662	595	488	494	468	565	522	
	Total	1,310	1,396	1,275	1,295	1,046	1,349	1,272	26.2
Sri Lanka	*Maha*	2,048	2,086	2,215	2,509	1,795	2,079	2,137	
	%	40.1	49.6	54.4	45.7	41.3	33.7	44.0	
	Maha	3,061	2,119	1,855	2,977	2,553	4,082	2,717	
	%	59.9	50.4	45.6	54.3	58.7	66.3	56.0	
	Total	5,110	4,205	4,070	5,486	4,348	6,161	4,854	
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Total of Kurunegala, Ratnapura, Puttalam, Matale, Jaffna, Vavuniya, Trincomalee Killinochchi, Mullaitivu and Ampara districts

Source: Department of Census and Statistics
Data Bank of HARTI

Annex 13.3: Major Growing D.S. Divisions of Gingelly within Major Growing Districts

District	D.S. Division	Percentage
Anuradhapura	Mahavilachchiya	28.0
	Nochchiyagama	24.1
	Madyama Nuwaragampalatha	16.9
Moneragala	Thanamanwila	49.7
	Wellawaya	22.9
Hambantota	Sooriyawewa	25.2
	Hambantota	24.9
	Lunugamwehera	23.1

* % is based on district, extent cultivated during the year 2005.

Source: Department of Census and Statistics
Data Bank of HARTI

Annex 13.4: Monthly Average Producer Prices of Gingelly in Sri Lanka

Rs/Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	29.55	39.99	27.76	34.52	42.37	54.58	52.08	41.67	40.95	48.06
February	36.72	38.91	29.27	31.46	44.39	54.60	49.58	38.55	44.46	53.77
March	44.71	42.09	25.13	36.94	44.01	54.50	53.94	37.80	44.87	60.15
April	38.50	42.84	24.92	42.88	44.86	51.25	50.01	42.07	48.85	61.09
May	27.31	34.20	32.40	39.40	47.94	48.75	52.08	47.95	50.31	62.14
June	29.88	30.87	31.12	39.47	43.36	43.93	47.62	47.16	51.28	59.02
July	37.72	33.53	28.52	41.39	42.41	46.69	41.68	42.85	52.70	59.39
August	34.63	35.67	33.19	43.19	45.40	46.38	44.15	46.41	54.62	60.71
September	38.98	35.90	33.50	43.79	44.71	46.44	46.20	48.91	55.21	58.52
October	41.83	37.73	32.00	45.93	46.11	47.39	50.28	50.74	54.61	58.17
November	38.69	39.53	36.61	46.79	47.56	48.31	49.24	51.53	52.08	56.33
December	39.35	39.46	Nil	47.02	47.71	51.78	51.20	50.42	50.04	60.00
Annual Average	36.66	37.89	31.22	41.31	45.33	48.81	49.03	45.75	49.98	58.24

Source: Department of Census and Statistics
Data Bank of HARTI

Annex 13.5: Monthly Average Retail Prices of Gingelly in Sri Lanka

Rs/Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	68.84	78.31	65.20	63.89	80.84	79.63	92.14	89.85	90.66	106.09
February	71.52	78.56	63.91	65.70	77.87	80.89	85.90	91.98	94.80	105.30
March	70.66	76.49	71.35	72.79	78.20	80.09	88.76	87.41	94.24	110.87
April	68.32	83.57	74.11	80.28	82.74	81.07	85.64	86.21	94.20	111.42
May	71.97	83.53	72.78	83.81	82.63	83.13	83.55	84.75	96.18	121.66
June	76.20	81.87	73.17	79.34	77.44	83.96	83.64	85.19	99.53	117.68
July	78.06	79.72	72.61	76.90	74.60	83.85	90.71	84.61	101.40	120.77
August	78.69	79.95	73.71	75.08	76.47	83.92	90.60	81.23	100.14	118.96
September	76.72	79.97	63.35	75.93	78.48	84.36	88.87	80.73	101.26	118.79
October	77.83	77.39	64.73	77.27	77.78	85.42	88.85	80.96	102.34	118.25
November	76.03	75.33	62.49	77.56	79.98	85.12	89.74	82.94	106.17	110.18
December	76.82	71.63	62.71	78.69	78.00	84.95	90.58	88.06	105.57	117.77
Annual Average	74.99	79.22	69.61	76.07	78.73	83.03	88.14	85.20	98.89	114.68

Source: Department of Census and Statistics
Data Bank of HARTI

Annex 13.6: Seasonal Price Index Values of Gingelly

Month	2001	2002	2003	2004	2005	Average	Index
January	79.63	92.14	89.85	90.66	106.09	91.67	97.46
February	80.89	85.90	91.98	94.80	105.30	91.77	97.57
March	80.09	88.76	87.41	94.24	110.87	92.27	98.10
April	81.07	85.64	86.21	94.20	111.42	91.71	97.50
May	83.13	83.55	84.75	96.18	121.66	93.85	99.78
June	83.96	83.64	85.19	99.53	117.68	94.00	99.94
July	83.85	90.71	84.61	101.40	120.77	96.27	102.35
August	83.92	90.60	81.23	100.14	118.96	94.97	100.97
September	84.36	88.87	80.73	101.26	118.79	94.80	100.79
October	85.42	88.85	80.96	102.34	118.25	95.16	101.18
November	85.12	89.74	82.94	106.17	110.18	94.83	100.82
December	84.95	90.58	88.06	105.57	117.77	97.39	103.54
Average	83.03	88.25	85.33	98.87	114.81	94.06	100.00

Source: Department of Census and Statistics
Data Bank of HARTI

14. GROUND NUT

14.1. Introduction

Ground nut (*Arachis hypogea*) belongs to the family *Fabaceae*. It is also known as peanut. It is an important legume and also an oil seed crop. Ground nut is an annual herb, which flowers during July and August. It is native to tropical America and now widely distributed and cultivated in tropical and sub tropical regions of America, Africa and Asia including India and Sri Lanka. Ground nut is a crop which is cultivated in highlands under rain-fed condition in *maha* season and in paddy lands under irrigation during *yala* season in the dry and the intermediate zones. In *maha* season, planting is done in late September and for the *yala* season, in March/April. About 70% of the production comes in *maha*. Though ground nut is an oil crop, in Sri Lanka, it is demanded as snacks and a confectionary item. Yields vary according to the duration of the life cycle, the climate and the crop density from 500-1500 kg seeds per hectare.

With respect to plant characteristics, ground nut plants have a well developed top root and produce root nodules. Leaves are compound with leaflets and produce pale yellow to orange red flowers which are self pollinated. After pollination, the plant produces pod containing 1 to 4 seeds.

Ground nut plants prefer a loose friable soil. Well drained sandy loams are the best. This type of soils is present extensively in the Northern, North-Central and Eastern Provinces of Sri Lanka. Average temperature should be 22^0-27^0C. Rainfall of 750-1,250 mm is required for optimal growth. A dry period is required for the ripening of the underground fruits. All types of ground nuts are day length neutral. As it belongs to the family *Fabaceae* it can fix atmospheric nitrogen. Therefore, it is widely used in crop rotation and mixed cropping.

Table 14.1: Recommended Varieties of Ground nut by the Department of Agriculture

Varieties	Tissa	Walawe	Indi	Tikiri
Year of release	1993	1993	1994	2004
Growth habit	Erect	No-erect	Semi-erect	Semi-erect
Crop duration	3 months	4 ½ months	3 ½ months	3 ½ months
Avg. yield (kg/ha)	2,500-2,700	2,800-3,500	3,864	2,500-3,000

Source: Department of Agriculture

The recommended varieties are Tissa, Walawe, Indi and Tikiri. Only Walawe type has a non-erect type growth, while all the other varieties have erect growth habit.

14.2. Production

14.2.1 Major Producing Districts and Main Contributing Areas within Districts

Ground nuts are mainly grown in the Northern, North-Central and Eastern Provinces. Major producing districts are Moneragala, Puttalam, Ratnapura, Hambantota, Ampara, Polonnaruwa and Kurunegala. As shown by the five-year average (2001-2005) of production, the above districts contributed 75% of the total production.

Moneragala	-	36%
Puttalam	-	8%
Ratnapura	-	8%
Hambantota	-	7%
Ampara	-	5%
Polonnaruwa	-	5%
Kurunegala	-	5%

All the other producing districts (Badulla, Matale, Jaffna, Mullaitivu, Kilinochchi, Batticaloa, Anuradhapura and Kandy) contributed 25% of the total production.

14.2.2 The Extent and Number of Farmers According to Cultivation Seasons

According to the five-year average (2001-2005) as shown in the table 14.2, 75% of the total extent cultivated is covered by Moneragala (23%), Mullaitivu (15%), Ampara (9%), Kurunegala (8%), Puttalam (8%), Ratnapura (7%) and Hambantota (6%).

Table 14.2: Extent of Ground Nut by Major Growing Districts

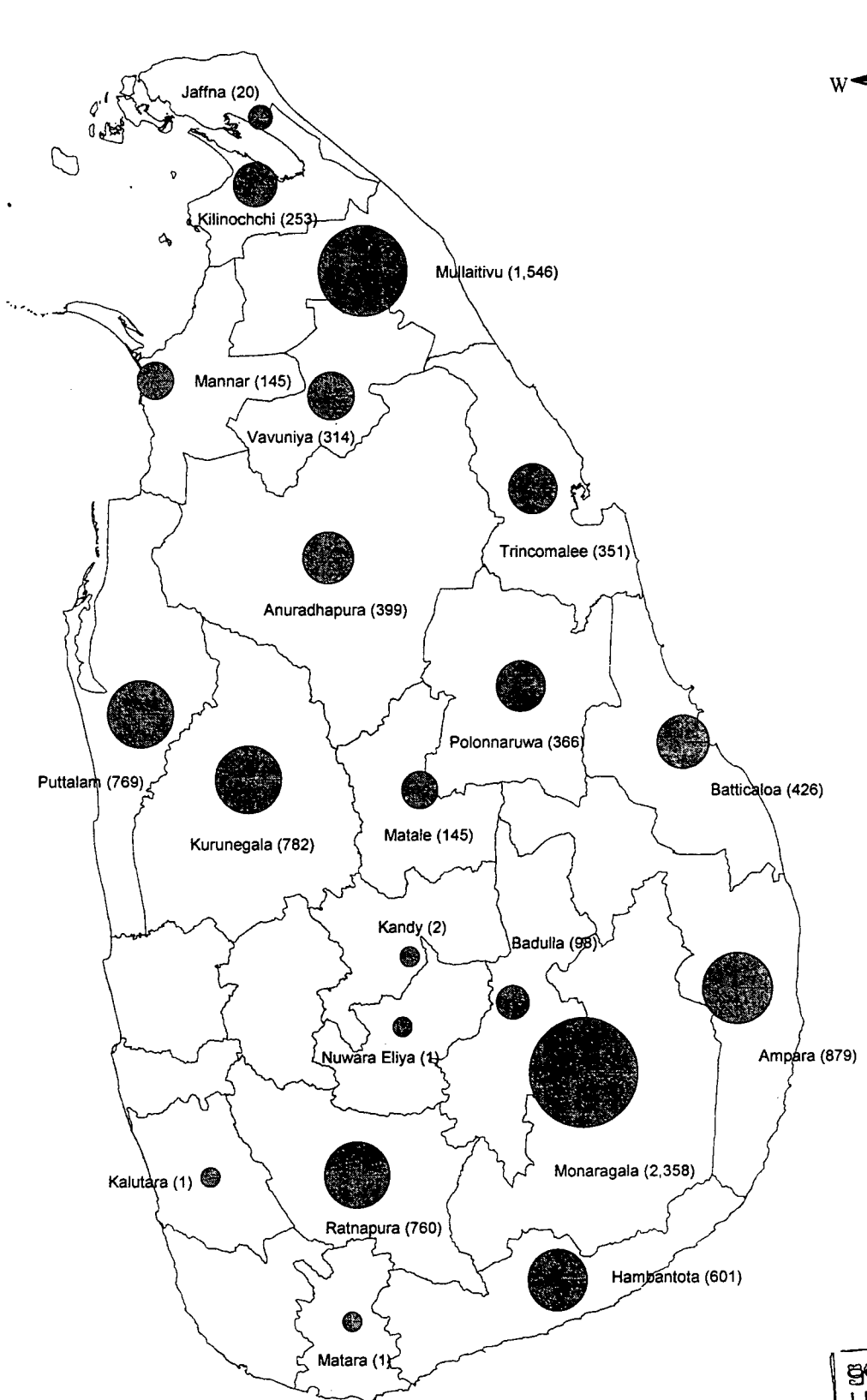
Hectares

District	2001	2002	2003	2004	2005	Average (01-05)	Percentage
Moneragala	2,311	1,984	2,532	2,381	2,581	2,358	23.1
Mullaitivu	1,091	1,091	1,761	1,720	2,067	1,546	15.1
Ampara	782	792	1,057	1,158	607	879	8.6
Kurunegala	734	730	726	770	950	782	7.6
Puttalam	941	822	804	530	750	769	7.5
Ratnapura	818	689	984	620	687	760	7.4
Hambantota	496	568	875	595	473	601	5.9
Others	2,509	2,439	2,643	2,206	2,803	2,520	24.7

Source: Department of Census and Statistics
Data Bank of HARTI

Map 14.1: Average Extent of Ground Nut Cultivated during 2001 - 2005 by Districts

(Figures given in parenthesis are in hectares)



Ground nuts are mainly cultivated in *maha* season. During the five-year period of 2001-2005, 76% was cultivated in *maha* and 79% of the production was also recorded in *maha* season (Annexes 14.1 and 14.2).

In Moneragala district, Wellawaya (32%), Buttala (16%), Moneragala (14%) and Siyambalanduwa (13%) were the main contributing Divisional Secretary divisions within the district during the last 2005 *yala* season (Annex 14.3).

14.2.3 Use of Agricultural Inputs, Cost of Production, Returns and Income

According to the Department of Agriculture, the main component of the cost of production is labour as described in the table 14.3. It was recorded as 76% of the total cost in 2003/04 *maha* season. The cost of seeds accounted for 14%. The cost of production increased by 29% from Rs.10,781 per acre in 1996/97 *maha* season to Rs.13,903 per acre in 1999/2000 *maha* season. Further, it has increased by 44% from Rs.12,102 per acre in 2000/01 *maha* to Rs.17,404/- per acre in 2003/04 *maha* season (Annex 14.3). According to the table, the cost of production has increased annually.

Table 14.3: Cost of Cultivation per Acre of Ground Nut by Inputs in Moneragala under Rainfed Conditions

Rs/Acre

Input	2000/01 *Maha*	2001/02 *Maha*	2002 *Yala*	2002/03 *Maha*	2003/04 *Maha*
Labour	8,844.00	10,025.00	10,243.00	12,847.00	13,147.00
Seed	1,724.00	2,392.00	3,213.00	2,230.00	2,405.00
Draught power, Machinery and Equipment	1,534.00	1,931.00	1,913.00	2,054.00	1,851.00
Total Cost-Including Imputed Cost	12,102.00	14,348.00	15,368.00	17,132.00	17,404.00
Total Cost-Excluding Imputed Cost	5,048.00	5,616.00	6,151.00	4,424.00	7,301.00

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

Table 14.4 describes the net return per acre of ground nut recorded in Moneragala district. There was a profit of Rs. 1,261 per acre for 2004 *maha* season. It was Rs. 6,104 per acre in 2000 *maha* season. Therefore, from 2000 to 2004 period there was a gradual decline in net return of ground nut under rain-fed condition. However, the net return per acre has increased from Rs. 1,200 per acre in 1994/95 *maha* to Rs.6,697 per acre in 1999 *maha* season (Annex 14.2). The net return is higher when the imputed cost is excluded.

Table 14.4: Net Return per Acre of Ground Nut in Moneragala under Rainfed Conditions during *Maha* Seasons

Rs/Acre

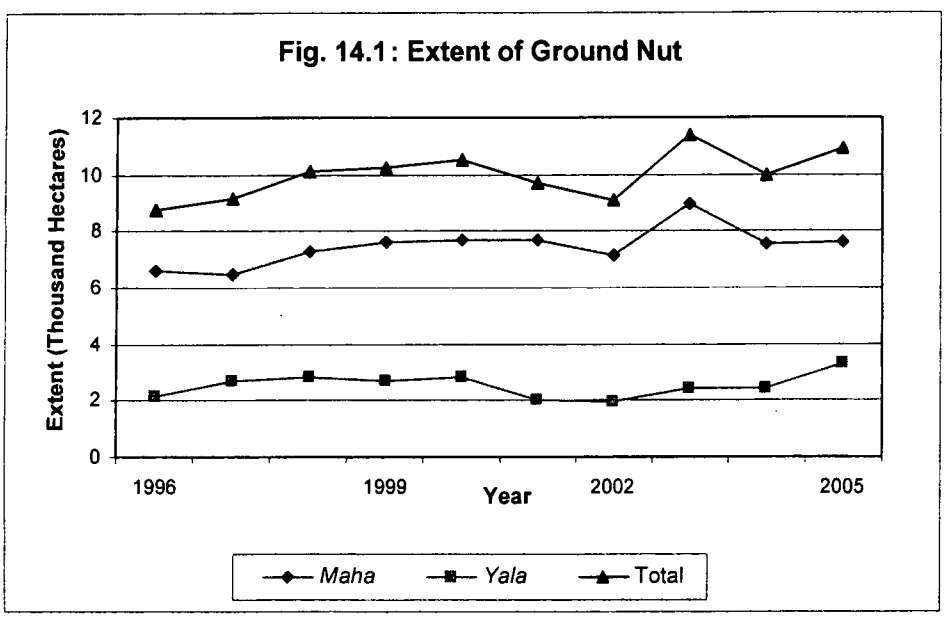
Season	Net Return per Acre	
	Including Imputed Cost	Excluding Imputed Cost
2000	6,104.00	13,998.00
2001	1,174.00	8,229.00
2002	3,674.00	12,406.00
2003	1,151.00	13,858.00
2004	1,261.00	113,646.00

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

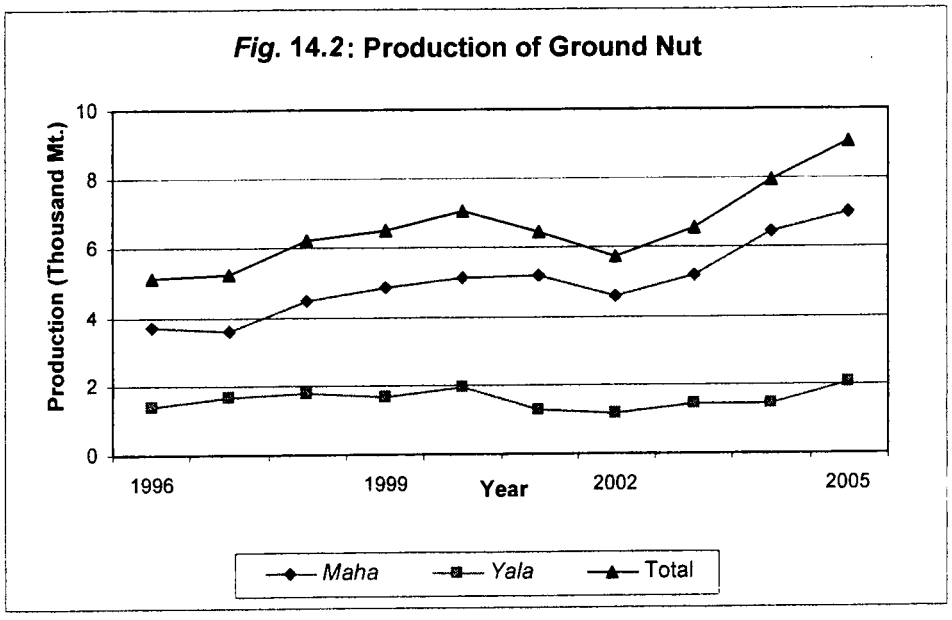
14.2.4 Trends in Production and Average Yield

As shown in the figure 14.1, during the period from 1996 to 2005, the extent cultivated gradually increased up to 2,000 hectares . Then, it decreased in 2001 and 2002. Thereafter, it has shown an increasing trend. The highest extent of cultivation was recorded in 2003 as 11,383 hectares (Annex 14.1).

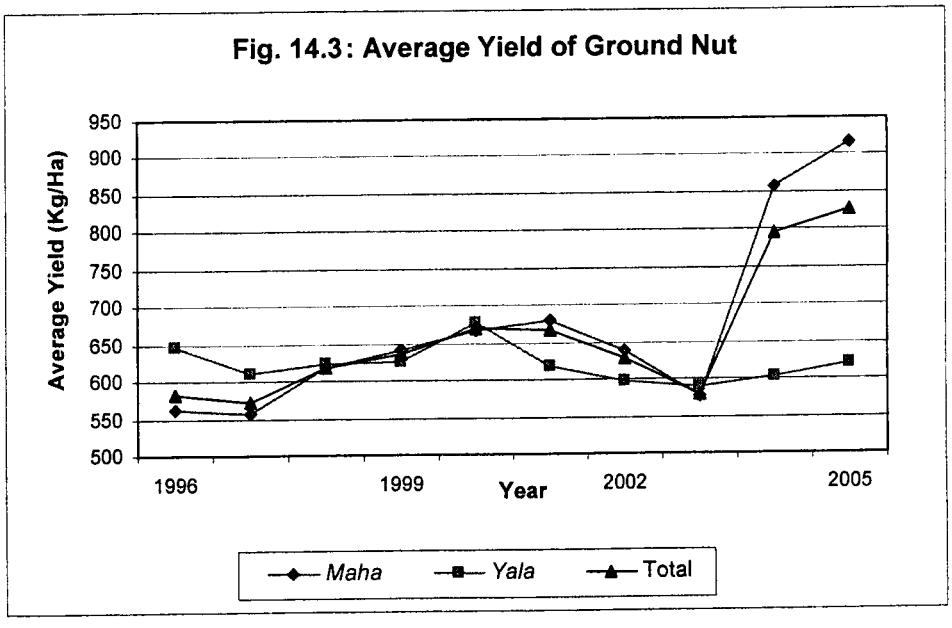
Fig. 14.1 : Extent of Ground Nut



At the same time, according to the figure 14.2, the production increased annually during the period from 1996 to 2000. A sharp decline in production was recorded in 2002. Thereafter, the production has increased again with the highest production recorded as 9,034 mt in 2005 (Annex 14.2).



According to the average yield of ground nut recorded over the last ten year period as presented in the figure 14.3, the average yield has increased annually up to 2000 and it has declined from 2000 to 2003 period. Thereafter it has shown an increasing trend. The highest yield recorded was 827 kg/ha in 2005 and the lowest was 579 kg/ha in 2003. Though, the extent of cultivation was highest in 2003, the production was comparatively low. Hence, the lowest average yield was recorded in 2003 during the last 10 year period.



14.3. Domestic Marketing

14.3.1 Price Determination and Price Behaviour

According to the Department of Census and Statistics, the average producer price was Rs.29.84/kg in 1996 and it has increased to Rs.40.65/kg in 2005 (Annex 14.6). It has remained unchanged during a three year period from 1998 - 2000. Within the year, the producer price was highest in October during 2001-2005.

Average retail prices have increased annually over the last ten years as shown in the figure 14.4. The monthly average retail prices ranged between Rs.65.83/kg to Rs.92.27/kg during 2005 (Annex 14.7).

Fig. 14.4: Annual Avg. Producer & Retail Prices of Ground Nut

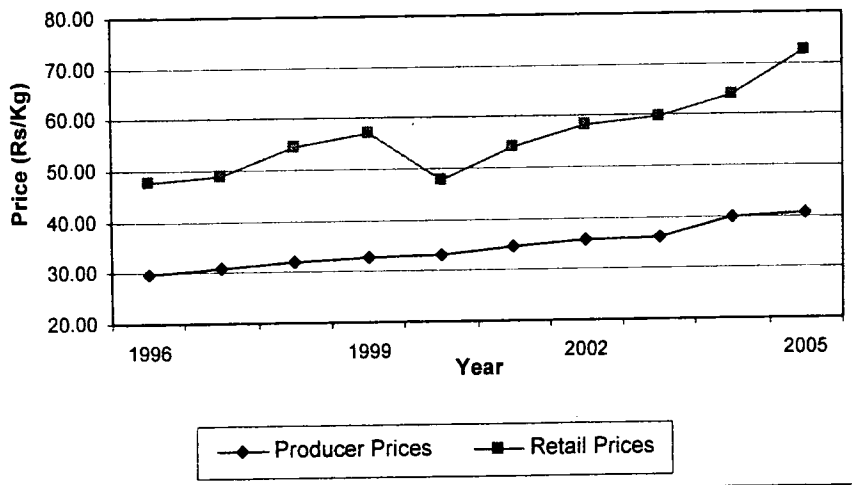
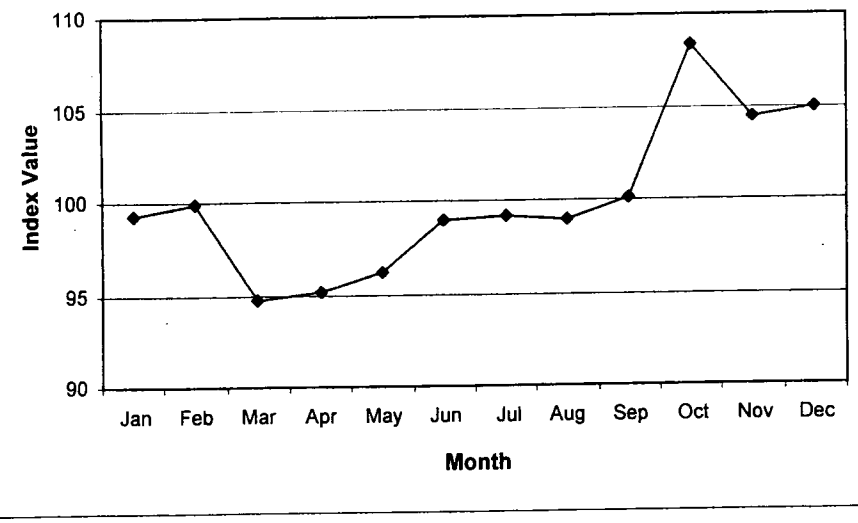


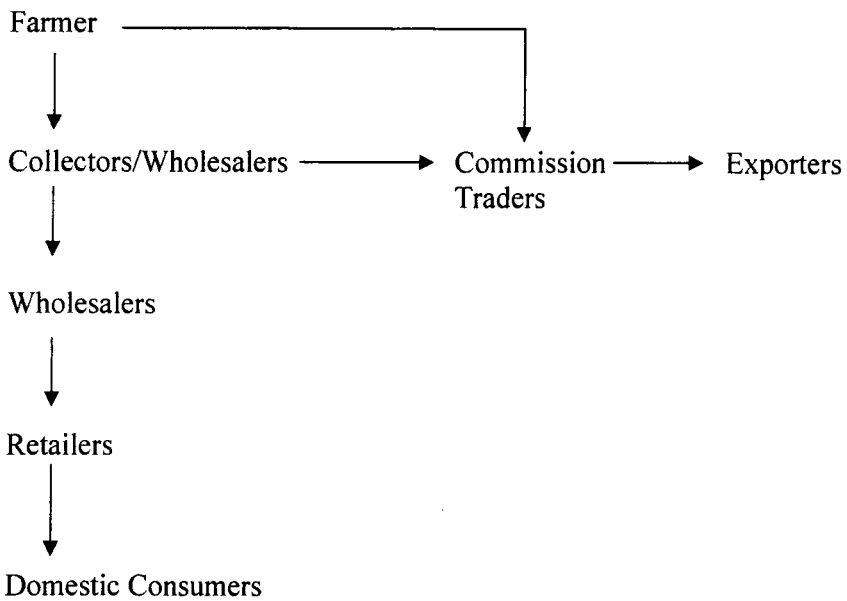
Fig. 14.5: Seasonal Price Index of Ground Nut



According to the seasonal price index shown in the figure 14.5, the highest price was recorded in October and also relatively higher prices were recorded during November and December. Lowest prices were recorded from March to May. Ground nut is a *maha* crop.

14.3.2 Marketing Channels

The predominant marketing channel for ground nut is as follow:



Moneragala is the major producing area of ground nut and the produce is supplied to Colombo and Dambulla markets and to the processors.

14.3.3 Marketing Cost

Marketing cost is the price difference from the producer to the consumer. It includes the cost of marketing such as transport, handling, loading, unloading and profit margins. For ground nut, it is calculated as Rs.14.15/kg (Oil Crop Research and Development Institute).

14.4. External Trade

14.4.1 Major Imports/Exports by Countries of Origin/Destination

Ground nut had been imported mainly from India. However, the exports were limited, mainly to imported 'Jumbo peanut' type from India, which was used for sweet products preparation. Imports from other countries were not much significant (Annex 14.9).

14.4.2 Trends in Imports in Quantity

The quantity of imports has increased annually during the period from 2000 to 2002 as shown in the table 14.5. There was a sharp drop in imports of ground nuts in 2003 and it has shown an increasing trend from 2003 upto now. The value of import has increased from Rs.32 million in 1996 to Rs.210 million in 2001, but it has declined to Rs.101 million in 2005. Further, the CIF price has increased during 1996-2002 and it was low in the years 2003, 2004

and 2005 due to the decrease in the imported quantities. The CIF price was Rs.21.61/kg in 2005 (Annex 14.9).

Table 14.5: Total Quantity and Value of Imports of Ground Nut (2000-2005)

Imports of Ground Nut	2000	2001	2002	2003	2004	2005
Total Imports (MT)	4,399	4,892	5,493	2,680	4,199	4,692
Value of Imports (Rs. 000')	172,958	210,160	233,317	79,556	93,962	101,396
CIF Price (Rs/kg)	39.32	42.96	42.48	29.68	22.38	21.61

Source: External Trade Statistics, Sri Lanka Customs

14.5 Consumption

Nut is the edible part. In Sri Lanka, it is mostly consumed as fried, or roasted nuts. Ground nut oil is good for cooking, which contain unsaturated fatty acids. Ground nut oil contains 30%-35% linoleic acid which can be used to produce margarine and butter. Peanut butter is popular as it is cholesterol free. In the world, ground nut oil is the second most important oil crop. About 2/3 of world ground nut crop is for oil production.

The per capita annual consumption of ground nut has increased over the years between 1986/87 to 2003/04. According to the table 14.6, it has increased from 5.28 g in 1996/97 to 47.13 g in 2003/04. The per capita consumption in the urban sector was 87.83 g which is higher than the national average. Domestic consumption of ground nut was 19,668 mt in 2005.

Table 14.6: Per Capita Consumption of Ground Nut per Annum by Sectors

Grams

Year	Urban	Rural	Estate	All Sectors
1986/87	13.2	9.60	8.40	9.60
1996/97	4.20	5.64	2.40	5.28
2003/04	87.83	43.76	-	47.13

Source: Consumer Finance and Socio Economic Survey, Various Issues, Central Bank of Sri Lanka

14.6 Forecasting Future Trends

The estimated domestic requirement is 20,877 mt by 2010. Therefore, the targeted extent of cultivation by 2010 is 18,000 ha with an average yield of 1.6 mt/ha. The consumer preference is high for red colour testa and the aim is to produce a drought tolerant variety with red colour testa.

14.7 Conclutions and Policy Recommendations

Moneragala was the major producing district according to five-year average production (2001-2005) which contributed 36% of the national production. From 1996 to 2000, the extent cultivated and production has increased gradually. There was a decline in cultivated extent and production in 2001 and 2002. Thereafter, it has shown an increasing trend.

The net return per acre increased from 1994 to 1999 and then declined from 2000 to 2004.

According to the monthly average retail prices recorded from 2001 to 2005, the highest retail price was recorded in October. Prices were low from March to May.

Groundnut has been mainly imported from India during last 10 years. But, the exports were limited.

Domestic consumption of ground nut has increased annually. In 2005, it was 19,668 mt/year. However, the total availability was 13,233 mt/year. In order to fill this gap, it is important to expand and promote the cultivation. In Sri Lanka, there is lot of imported 'jumbo' types of ground nuts at the market. By promoting cultivation of local varieties such as 'Walawa' type, the imports can be reduced. In the world, there is a good demand for ground nut oil. Therefore, it is important to consider the production of ground nut oil in Sri Lanka.

Annex 14.1: Extent of Ground Nut by Major Growing Districts

(Hectares)

District	Season	Average (96-00)	2001	2002	2003	2004	2005	Average (01-05)	Percentage
Moneragala	*Maha*	1,889	2,153	1,855	2,133	2,021	2,248	2,082	
	Yala	337	158	129	399	360	333	276	
	Total	2,226	2,311	1,984	2,532	2,381	2,581	2,358	23.1
Mullaitivu	*Maha*	873	971	971	1,457	1,315	1,338	1,210	
	Yala	126	120	120	304	405	729	336	
	Total	999	1,091	1,091	1,761	1,720	2,067	1,546	15.1
Ampara	*Maha*	390	734	737	1,028	1,134	560	839	
	Yala	49	48	55	29	24	47	41	
	Total	438	782	792	1,057	1,158	607	879	8.6
Kurunegala	*Maha*	549	395	395	395	294	310	358	
	Yala	452	339	335	331	476	640	424	
	Total	1,001	734	730	726	770	950	782	7.7
Puttalam	*Maha*	612	658	503	524	369	462	503	
	Yala	397	283	319	280	161	288	266	
	Total	1,009	941	822	804	530	750	769	7.5
Ratnapura	*Maha*	507	566	499	684	373	400	504	
	Yala	299	252	190	300	247	287	255	
	Total	806	818	689	984	620	687	760	7.4
Hambantota	*Maha*	745	459	506	796	427	405	519	
	Yala	215	37	62	79	168	68	83	
	Total	960	496	568	875	595	473	601	5.9
Others*	*Maha*	1,566	1,719	1,689	1,965	1,624	1,906	1,781	
	Yala	772	790	750	678	582	897	739	
	Total	2,336	2,509	2,439	2,643	2,206	2,803	2,520	24.7
Sri Lanka	*Maha*	7,131	7,655	7,155	8,983	7,557	7,629	7,796	
	%	72.9	79.1	78.5	78.9	75.7	69.9	76.3	
	Maha	2,646	2,027	1,960	2,400	2,423	3,289	2,420	
	%	27.1	20.9	21.5	21.1	24.3	30.1	23.7	
	Total	9,777	9,682	9,115	11,383	9,980	10,918	10,216	
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Total of Badulla, Matale, Jaffna, Mullaitivu, Kilinochchi, Vavuniya, Ampara, Mannar, Trincomalee, Polonnaruwa, Batticaloa, Anuradhapura, and Kandy districts

Source : Department of Census and Statistics
Data Bank of HARTI

Annex 14.2: Production of Ground Nut by Major Producing Districts

(M.Tons)

District	Season	Average (96-00)	2001	2002	2003	2004	2005	Average (01-05)	Percentage
Moneragala	*Maha*	1,686	2,408	2,059	2,284	2,229	2,590	2,314	
	Yala	311	132	107	309	360	332	248	
	Total	1,996	2,540	2,166	2,593	2,589	2,922	2,562	35.8
Mullaitivu	*Maha*	295	312	167	168	781	929	471	
	Yala	200	139	157	138	81	143	132	
	Total	494	451	324	306	862	1,072	603	8.4
Ampara	*Maha*	345	368	296	411	322	376	355	
	Yala	244	229	173	284	247	288	244	
	Total	589	597	469	695	569	664	599	8.4
Kurunegala	*Maha*	394	221	249	373	693	612	430	
	Yala	106	15	28	31	84	60	44	
	Total	499	236	277	404	777	672	473	6.6
Puttalam	*Maha*	185	330	331	419	480	266	365	
	Yala	25	27	34	14	12	19	21	
	Total	210	357	365	433	492	285	386	5.4
Ratnapura	*Maha*	227	211	239	250	201	291	238	
	Yala	234	161	149	177	79	130	139	
	Total	461	372	388	427	280	421	378	5.3
Hambantota	*Maha*	210	171	174	177	128	135	157	
	Yala	205	135	132	133	238	431	214	
	Total	415	306	306	310	366	566	371	5.2
Others*	*Maha*	1,022	1,186	1,049	1,091	1,639	1,796	1,352	
	Yala	361	416	393	328	362	636	427	
	Total	1,383	1,602	1,442	1,419	2,001	2,432	1,779	24.9
Sri Lanka	*Maha*	4,363	5,207	4,564	5,173	6,473	6,995	5,682	
	%	72.1	80.6	79.6	78.5	81.6	77.4	79.5	
	Maha	1,685	1,254	1,173	1,414	1,463	2,039	1,469	
	%	27.9	19.4	20.4	21.5	18.4	22.6	20.5	
	Total	6,048	6,461	5,737	6,587	7,936	9,034	7,151	
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*Total of Badulla, Matale, Jaffna, Mullaitivu, Kilinochchi, Vavuniya, Ampara, Mannar, Trincomale, Batticaloa, Anuradhapura, and Kandy districts

Source : Department of Census and Statistics
Data Bank of HARTI

Annex 14.3: Major Growing DS Divisions of Groud nut within Major Growing Districts

District	D.S. Division	Percentage*
Moneragala	Wellavaya	32.1
	Buttala	16.1
	Moneragala	13.8
	Siyambalanduwa	13.4
Mullaitivu	Maritime Pattu	34.5
	Puttukadiarippu	31.9
	Oddusudan	19.5
Kurunegala	Giribawa	13
	Mahawa	11.9
	Ambanpola	10.5
	Kotavehera	7.9
	Nikaveratiya	5.7

* % is based on district, extent cultivated during the year 2005.

Source: Department of Census and Statistics
Data Bank of HARTI

Annex 14.4: Cost of Cultivation per Acre of Ground nut by Inputs in Moneragala under Rainfed Conditions

Rs/Acre

Input	1996/97	1998/99	1999/00	2000/01	2001/02	2002	2002/03	2003/04
	Maha	*Maha*	*Maha*	*Maha*	*Maha*	*Yala*	*Maha*	*Maha*
Labour	8,981	9,943	10,432	8,844	10,025	10,243	12,847	13,147
Seed	1,800	1,802	2,130	1,724	2,392	3,213	2,230	2,405
Draught Power, Machinery and Equipment		856	1,340	1,534	1,931	1,913	2,054	1,851
Total Cost – Including Imputed Cost	10,781	12,601	13,903	12,102	14,348	15,368	17,132	17,404
Total Cost - Excluding Imputed Cost	1,909	3,517	6,009	5,048	5,616	6,151	4,424	7,301

Source: Cost of Cultivation of Agricultural Crops , Various Issues
Department of Agriculture

Annex 14.5: Net Return per Acre of Ground nut in Moneragala under Rainfed Conditions

Year	Season	Net Return per Acre		Year	Season	Net Return per Acre	
		Including Imputed Cost	Excluding Imputed Cost			Including Imputed Cost	Excluding Imputed Cost
1995	*Maha*	1,200.00	6,794.00	2002	*Maha*	3,674.00	12,406.00
1997	*Maha*	3,219.00	12,091.00	2002	*Yala*	350.00	9,567.00
1999	*Maha*	6,697.00	15,781.00	2003	*Maha*	1,151.00	13,858.00
2000	*Maha*	6,104.00	13,998.00	2004	*Maha*	1,261.00	11,364.00
2001	*Maha*	1,174.00	8,229.00				

Source: Cost of Cultivation of Agricultural Crops, Various Issues, Department of Agriculture

Annex 14.6: Monthly Average Producer Prices of Ground Nut in Sri Lanka

Rs/Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	26.53	26.34	26.41	25.55	31.75	33.06	36.51	31.67	36.08	39.26
February	25.15	27.76	27.91	24.35	26.76	30.07	34.38	32.48	36.79	40.64
March	27.62	28.85	28.66	30.48	27.10	30.22	35.08	35.73	38.72	39.50
April	24.80	31.53	28.49	34.17	28.84	30.89	36.37	35.19	39.74	40.55
May	28.35	31.06	28.96	34.56	29.41	34.62	35.71	36.27	40.59	42.09
June	30.35	32.36	29.21	33.34	28.84	35.68	35.53	35.08	40.31	39.08
July	30.81	31.39	32.92	34.15	29.41	35.35	37.07	38.45	40.49	40.77
August	31.87	31.95	33.21	35.14	32.70	35.52	36.59	38.71	42.19	41.81
September	32.72	30.35	33.92	35.64	35.11	36.03	32.23	37.15	41.93	40.18
October	31.41	31.86	34.67	34.51	35.34	38.09	32.43	38.66	43.57	43.30
November	31.97	30.57	36.88	35.02	38.13	33.67	38.24	37.31	41.27	43.85
December	33.50	32.23	38.78	34.62	38.51	39.66	36.44	36.34	36.69	39.84
Annual Average	29.84	30.69	32.13	32.69	32.96	34.59	35.80	36.25	39.91	40.65

Source : Department of Census and Statistics
Data Bank of HARTI

Annex 14.7: Monthly Average Retail Prices of Ground Nut in Sri Lanka

Rs/Kg

Month	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	45.12	49.55	47.29	60.97	51.45	57.52	55.81	62.50	61.72	68.28
February	44.91	49.71	52.73	60.22	47.10	56.82	58.63	62.83	63.12	66.59
March	45.36	48.49	53.13	64.44	48.70	46.63	56.68	60.03	62.72	65.83
April	45.18	49.70	56.02	56.42	47.00	47.93	55.89	60.37	61.00	67.93
May	47.05	50.59	55.61	55.40	45.53	48.41	54.58	59.79	61.38	72.13
June	47.33	50.97	56.02	55.38	45.22	53.93	58.80	58.14	62.70	71.54
July	45.56	47.57	59.11	54.99	46.07	54.01	56.15	59.26	63.42	72.76
August	48.34	47.94	50.94	54.81	46.68	54.06	56.58	58.21	63.45	72.69
September	48.63	48.69	53.57	55.68	47.65	54.49	60.63	58.48	64.67	70.15
October	48.50	48.79	56.52	57.93	47.69	57.90	58.62	58.61	66.40	92.27
November	50.18	45.18	55.05	56.61	47.03	57.91	61.25	59.48	68.02	75.03
December	51.54	46.16	56.84	56.31	54.17	55.90	63.49	60.76	67.78	75.45
Annual Average	47.62	48.84	54.64	57.15	47.93	54.16	58.15	59.82	63.87	72.64

Source : Department of Census and Statistics
Data Bank of HARTI

Annex 14.8: Seasonal Price Index Values of Ground Nut

Month	2001	2002	2003	2004	2005	Average	Index
January	57.52	55.81	62.50	61.72	68.28	61.17	99.24
February	56.82	58.63	62.83	63.12	66.59	61.60	99.94
March	46.63	56.68	60.03	62.72	65.83	58.38	94.71
April	47.93	55.89	60.37	61.00	67.93	58.62	95.11
May	48.41	54.58	59.79	61.38	72.13	59.26	96.14
June	53.93	58.80	58.18	62.70	71.54	61.03	99.02
July	54.01	56.15	59.26	63.42	72.76	61.12	99.16
August	54.06	56.58	58.21	63.45	72.69	61.00	98.97
September	54.49	60.63	58.48	64.67	70.15	61.68	100.08
October	57.90	58.62	58.61	66.40	92.27	66.76	108.31
November	57.91	61.25	59.48	68.02	75.03	64.34	104.38
December	55.90	63.49	60.76	67.78	75.45	64.68	104.93
Average	53.79	58.09	59.88	63.87	72.55	61.64	100.00

Source: Data Bank of HARTI

Annex 14.9: Imports of Ground Nut by Country of Origin

Country	1996		1997		1998		1999		2000	
	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)
India	1,198	31,725	1,756	52,835	2,335	79,509	4,312	156,074	4,398	172,925
Australia					15	1,204	17	1,606		
Indonesia							19	721		
Other									1	33
Total	1,198	31,725	1,756	52,835	2,350	80,713	4,348	158,401	4,399	172,958

Country	2001		2002		2003		2004		2005	
	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)	Qty (Mt)	Value (Rs'000)
India	4,892	210,160	4,761	206,841	2,547	74,620	4,159	93,116	4,671	100,954
Indonesia					57	2,128				
Singapore							40	829		
China			20	959	*	30				
Kenya			76	2,742						
Tanzania			200	7,226						
UAE			208	7,261						
Vietnam			228	8,288	76	2,778				
Other							*	17	21	442
Total	4,892	210,160	5,493	233,317	2,680	79,556	4,199	93,962	4,692	101,396

* - Less than 0.5 Metric Tons

Source : External Trade Statistics, Various Issues, Sri Lanka Customs

Summary of the Proceedings

Workshop on HARTI Agricultural Commodity Review – 2005

Held on 17th July 2007

Prepared by Dr. G.M.Henegedara and Mrs. G.G.L. Samarasinha

1. Summary of Inaugural Address

By the Hon. Minister of Agriculture, **Mr. Hemakumara Nanayakkara**

The government should take policy decisions on how to improve the productivity and reduce the high input cost involved in non-plantation agriculture. Though the production and the extent cultivated of many subsidiary food crops have declined in the recent past, improving productivity would be the key factor to be considered by us. It is also important to know how the system has got weakened and what are the reasons for weakening extension services? Therefore our main task would be to do more policy oriented research to overcome the problem.

2. Technical Session I – Presentations

Paddy and Kurakkan	–	by Dr. G.M. Henegedara
Maize and Soya bean	–	by Dr. M.S. Senanayake
Green gram, Cowpea and Black gram	–	by Mr. M.M.M. Aheeyar
B.onion, Red onion and Potato	–	by Dr. W.D. Wickramasinghe
Manioc and Sweet potato	–	by Mr. W.H.A. Shantha
Gingelly and Ground nut	–	by Mrs. R.P. Vidanapathirana

Technical Session II – Questions and Discussion

Chaired by Mr. Thusman Gunawardena, Director, Socio-Economic Division, Department of Agriculture, Peradeniya

Mr. Gunawardena appreciated the important work done by the HARTI and requested to improve the report by incorporating comments given by participants. He emphasized the importance of uniformity of the formats of all the papers.

Paddy

A question was raised regarding the predicted paddy yield of 2007. Since we already have 2007 *maha* season data and it is impossible to get the predicted surplus from *yala* season, it was suggested to revise these values.

Kurakkan

Dr. Henegedara responding to a question regarding the substitution effect of wheat flour to kurakkan said that there is no empirical evidence to prove the fact that wheat flour is the best substitute to kurakkan. But, the production has declined remarkably in the recent past due to decrease in extent of *chena* and lower profitability compared to other field crops.

Maize

It was mentioned that when considering the extent of cultivation and production, almost 50% of national demand could be produced in Anuradhapura district alone (2006-2007 data). An issue relating to yield of hybrid seeds arose. In 2003, the seed cost was comparatively lower than 2004: Most probably the seeds are not hybrid but production was higher than 2004.

Responding to this, it was stated that there are other factors such as closer spacing/fertilizer etc. that influence the production, other than the type of seeds. Mr. Thusman mentioned that in the future when India commences implementing their bio fuel concept, they will not provide us maize. However, there would be better prospects for maize production because the world market price is going up daily.

Since the farmers are getting a yield of about 3 t/ac, maize cultivation is profitable if they get a good price.

Soya bean

Cultivation of soya bean is mainly concentrated to Anuradhapura district and the production is mainly used for 'thriposha' production. According to the statistics, soya bean consumption is less than 15%. But, this value is misleading because it excludes consumption of soya meat.

Green Gram, Cowpea and Black Gram

The question in relation to the price determination of imported green gram and black gram arose whether the prices are higher or lower, imported products are superior in quality with less hard seeds. Main reason behind this as revealed is mechanization of the production.

Potato

It was proposed to include statistics of locally produced seed and importation of seeds. Our varieties are considered more potential than imported ones and there is a potential to improve it further.

A suggestion was made to reconsider the necessity of giving subsidies to potato growers when considering the environmental pollution taken place due to potato cultivation.

Since the number of farmers benefiting from potato cultivation was small, it was proposed to move potato growers to other industries such as cut flowers, foliage etc, gradually.

Manioc/Sweet potato

Prof. Gunasena raised a question about the industrial use and market potential of manioc. He was of the opinion that it is useless in promoting these crops otherwise.

It was mentioned that the per capita consumption data was not very accurate. Actual consumption was rather higher than the reported values. Therefore, it was difficult to accept that there was a surplus of production of these two crops.

Gingerly

Gingerly was mainly used for confectionary. A question aroused regarding its suitability for edible purposes since there was no ill effects to human health. However, it was responded that it is better to remain with coconut oil since there are no considerable negative impacts in it and also it was difficult to change the consumption behaviour.

Groundnut

It was mentioned that research is progressing on aiming to reduce the growth period of ground nut to 3½ months. A question arose regarding why extent and production of ground nut is not reducing as other subsidiary crops? It was stated that there was a good price for the production

3. Policy Session

Chaired by Prof. H.P.M. Gunasena, Director, Council for Agricultural Research and Policy (CARP), Colombo

Opening the policy session, Prof. Gunasena said that the time series trend analysis does not show the core issues of decreasing production or the increasing imports. Therefore what is necessary is to conduct comprehensive policy analysis that would help to identify core factors to make appropriate policy recommendations.

Expressing his ideas Mr. Thusman Gunawardena said that though the agricultural policies have changed from time-to-time, the present policy should be focused on the key factors of the "Mahinda Chintana" that are focused on competitiveness, equity and poverty alleviation.

Considering the suggestions and comments of the subject matter specialists and other experts, the following issues were identified and suggestions were made as the key factors to be considered in comprehensive policy analysis.

- Certain crops show decrease in extent of cultivation and production, while the imports were ever increasing. What are the reasons behind this?
- What should be the role of respective institutions to safeguard non-cash crops?
- What are the factors influencing the farmers to remain in non-cash crops?
- How to approach these low price crops to make them viable?
- Can other field crops help farmers in these respective areas to overcome poverty? Are there any options to overcome poverty?
- Has researches identified the areas affected by poverty? Mostly in these areas they are consuming what they are producing. Though there is less commercial value, it is important to promote these crops to safeguard rural people's daily consumption.
- Technology is the limiting factor than marketing problems in these areas. There is a big gap between best farmer's yield and the average yield reflecting technological gap. Transformation of technology is depending on demand. Farmers cannot afford it. As seen there is a need to produce appropriate technology. People tend to go for technology if they can get a good price for their production.
- Since size of land holdings of many farmers is small, it is difficult to overcome poverty even we double the yield. Therefore, a need arises to identify profitable cropping pattern/system etc. and land diversification systems. Since the most important factor is farmer's income, it is essential to identify alternative income avenues.

Concluding the policy session, Prof. Gunasena, emphasized the importance of preparing strong policy measures at least for one crop considering the main issue of decreasing local production and subsequent issues i.e. low farm income and increase in imports.

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