

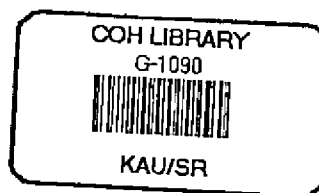
National Agricultural Research Project

STATUS REPORT

OF THE
CENTRAL ZONE

G 1090

Vol. II & III



KERALA AGRICULTURAL UNIVERSITY

VELLANIKKARA, THRISSUR - 680 654

English

NARP

STATUS REPORT

Central Zone

Vol. II & III

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Compiled and Edited by

Prof. N. Rajappan Nair

Dr. K. P. Rajaram

Dr. K. Anilkumar

Published by

Dr. A. G. G. Manon

Director of Extension

Kerala Agricultural University

Mannuthy 680 651, Thrissur, Kerala

Cover design

V. Chandranandan

Printed at

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Mannuthy

FOREWORD

The National Agricultural Research Project was launched in the early 1980's to strengthen the research capabilities of the State Agricultural Universities. The development of regional research stations in the different agroclimatic zones in terms of research manpower and infrastructure facilities was the essential feature of the NARP. The eligibility of the Kerala Agricultural University to the project was approved by the ICAR in May, 1980. The project has completed its first phase in all the five agroclimatic zones of the state. The second phase of the project was launched in March, 1989.

The essential pre-requisite for stating the NARP is the preparation of the Status Report. It is a basic document embodying all the valuable information on the agricultural sector of the state in general and the specific agroclimatic zones in particular. The first status report of the State was published in May, 1984 in 5 volumes, each volume pertaining to one agroclimatic zone. Since then, several changes have taken place both in area and production of crops and new field problems have cropped in necessitating the revision of the Status Report.

The present revised Status Report is published in 3 volumes for each of the five agroclimatic zones in Kerala State. The volume-I gives a comprehensive account of the general agricultural characteristics of the State and the concerned zone, in addition to the research, extension linkages and research priorities and strategies of the zone. The volume II embodies the conclusions drawn from the field surveys on adoption patterns and production constraints of improved agricultural technologies. The data referred to in the narrative part of the Status Report viz, vol. I, are presented in vol. III.

A number of State Departments and organisations have collaborated with the Kerala Agricultural University in the revision of the Status Report. The Zonal Associate Directors and their team of scientists have spent considerable time and energy in collecting the details and pruning in the information to the present form. I congratulate them for their sincere and devoted efforts.

This status report is perhaps the first of its kind bringing together a wealth of information on Kerala Agriculture. I trust that this will be of immense use to all those who are concerned with agriculture and planning, especially as we are in the midst of formulating the VIIIth Five Year Plan as the perspectives for 2000 A. D.

E. G. SILAS
Vice-Chancellor
Kerala Agricultural University

PREFACE

The first Status Reports of all the Five Agro-climatic Zones of Kerala were prepared in the year 1984. The Kerala Agricultural University has successfully implemented the Phase-I of the NARP. The NARP Phase-II was sanctioned by the Indian Council of Agricultural Research in the year 1988 and the sub-projects started functioning with effect from 20-4-1988.

The necessity for the revision of the Status Report prepared earlier was emphasised by the ICAR and the World Bank, incorporating further details. The revision of the Status Reports of the five regions was therefore taken up and the present publication incorporates the details collected as per the guidelines of ICAR/World Bank. The revised Status Report consists of three volumes. The volume I contains details on the general agricultural characteristics of the State, the Zones, Agro-ecological situations, research and extension linkages and research priorities and strategies. The Volume II is mainly concerned with the adoption pattern and production constraints of different crops, while statistical data are presented in the volume III. Considerable efforts have been made by several scientists of KAU to collect data available on the agricultural scenario of the State from all available sources and to present in an informative manner.

It is hoped that this publication will be of considerable use to the scientists working in the five agro-climatic zones of the KAU as well as in evolving strategies for agricultural research and development in the State of Kerala.

The Associate Directors of Research of the five regions and their teams of scientists and other staff deserve appreciation for the painstaking efforts, they have made to bring out this compilation. The encouragement given by Dr. E. G. Silas, Vice-Chancellor, KAU and the guidance given by Dr. A. R. Sheshadri, Consultant, World Bank in the preparation of the Status Report, is gratefully acknowledged.

Our sincere thanks are due to Dr. A.G.G. Menon, Director of Extension, Shri. K. Rajappan, Press Manager and all the members of the staff on the KAU Press for their co-operation in arranging the printing of the publication in record time. Kerala Agricultural University,

Vellanikkara,
13-07-1989

(Sd/-)
M. ARAVINDAKSHAN
Director of Research.

CONTENTS

VOLUME II

Rice	Adoption pattern	—	150
	Production constraints	—	163
Coconut	Adoption pattern	—	165
	Production constraints	—	176
Tapioca	Adoption pattern	—	177
	Production constraints	—	181
Groundnut	Adoption pattern	—	182
	Production constraints	—	184
Pepper	Adoption pattern	—	185
	Production constraints	—	190
Cotton	Adoption pattern	—	191
	Production constraints	—	193
Banana	Adoption pattern	—	194
	Production constraints	—	199
Sugarcane	Adoption pattern	—	200
	Production constraints	—	203

VOLUME III

Annexure

1	District-wise distribution of Administrative/Development division of Kerala	—	205
2	River water resources of Kerala	—	206
3	Characteristics of the surface soil of the important soil types of Kerala	—	208
4	Fertilizer recommendation based on soil test values followed in Kerala	—	209
5	Fertilizer consumption in Kerala	—	210
6	Soil testing laboratories other than those under the State Department of Agriculture	—	210
7	Fertilizer consumption in Kerala predicted upto 2000 AD	—	211
8	Station-wise climatological data	—	211
9	Monthly values of climatological data from 1973	—	215
10	District-wise distribution of area under forests in Kerala	—	216
11	Division-wise area of reserve forests and vested forests in Kerala	—	217
12	Ongoing major and medium irrigation projects in Kerala	—	218
13	Cost escalation of major and medium irrigation projects in Kerala	—	219
14	Physical and financial achievements under minor irrigation—Kerala	—	220
15	Number of minor irrigation works proposed and completed	—	221
16	District-wise distribution of area, population, growth rate and density of population and sex ratio 1971—'81	—	222
17	Population of Scheduled castes and Scheduled tribes in Kerala	—	223
18	Percentage of main workers in Agriculture, Household industry and other workers to total workers in Kerala	—	224
19	District-wise distribution of fishermen population in Kerala	—	225
20	Literacy in Kerala, 1971—1981	—	226
21	Infant mortality rates 1981—All India & States	—	227
22	Expectation of life at birth for All India and Major States based on the Sample Registration Survey	—	227
23	Educational status in Kerala	—	228
24	Student statistics of Kerala Agrl. University	—	229
25	State income of Kerala	—	230
26	Comparative study of the distribution of number, average size of the operational holding and the area operated by major size classes in Kerala and India	—	231

27	Average farm prices of some important commodities in Kerala	—	232
28	Area, production and productivity of important crops in Kerala	—	233
29	English, Malayalam and Botanical names of crops of Kerala	—	236
30	Sowing, harvesting, and peak marketing seasons of principal crops in Kerala state	—	237
31	Number and per cent of livestock and poultry in the districts	—	239
32	District-wise livestock and poultry population in Kerala	—	240
33	Distribution of different categories of livestock in different census years and their percentage variations	—	241
34	Statement showing the density of cattle, buffaloes and livestock population in the different districts of Kerala	—	242
35	Number and density of ovines in different districts	—	242
36	District-wise density of poultry	—	243
37	Percentage distribution of cattle according to age groups under different census periods	—	244
38	Comparative distribution of male and female cattle	—	245
39	Percentage distribution of male and female cattle	—	246
40	Classification of male and female buffaloes	—	247
41	Age distribution of goats in the state	—	247
42	Distribution of poultry	—	248
43	Number and percentage distribution of poultry	—	249
44	Distribution of Fowls	—	250
45	Milk production in Kerala	—	251
46	Per capita availability of milk and egg in Kerala	—	252
47	Production and per capita availability of major livestock production	—	253
48	Monthly transport of eggs to Kerala from neighbouring States	—	254
49	Meat production in Kerala	—	255
50	Month-wise movement of cattle and buffaloes from and to Kerala	—	256
51	District-wise number of Artificial Insemination done, calvings recorded and castrations performed	—	257
52	Distribution of percentage variations of pigs in different districts	—	258
53	VII Plan proposal for the major fisheries scheme	—	259
54	Delineation of Central Zone	—	260
55	Ernakulam District—Taluk, Developmental Blocks and Panchayats	—	260
56	Trichur District—Taluk, Developmental Blocks and Panchayats	—	261
57	Palghat District—Taluk Developmental Blocks and Panchyats	—	262

58 a)	Average monthly rainfall of the Central Zone	—	263
58 b)	District-wise monthly rainfall 1985	—	263
59 a)	Temperature of the hottest and coldest months and temperature range of three centres of the Zone	—	264
59 b)	Mean daily relative humidity recorded in two centres of the Central zone	—	264
59 c)	Monthly and annual wind speed recorded at two centres of the Central Zone	—	264
59 d)	Sunshine hours recorded at Pattambi of the Central Zone	—	265
59 e)	Water balance elements of three centres of the Central Zone	—	265
60	District-wise land use pattern of the Central Zone	—	266
61 a)	Area under irrigation—Source wise	—	267
61 b)	Area under irrigation—Crop-wise	—	267
62	Major and medium irrigation projects in the Central Zone	—	268
63	Bharathapuzha river basin tributaries, streams and irrigation projects	—	269
64	Percentage distribution of area under paddy irrigated/unirrigated	—	270
65	Land holding pattern of the Central Zone and percentage of literacy	—	271
66	Sowing, harvesting and peak marketing seasons of principal crops in the Central Zone	—	272
67 a)	Area under important crops in the Central Zone	—	274
67 b)	Area under other important crops in the Central Zone	—	275
68 a)	Production of important crops in the Central Zone	—	276
68 b)	Production of other important crops in the Central Zone	—	277
69	Area, production and productivity of rice—Taluk wise	—	278
70	Percentage distribution of area under paddy (HYV & Local)	—	284
71	Agricultural implements and machinery	—	285
72	Distribution of plough in the Central Zone	—	288
73	Distribution of diesel and electric pumpsets in the central zone	—	288
74	Density of Cattle, Buffaloes and Livestock population of the Central Zone	—	289
75	Number and percentage distribution of different categories of cattle under Desi and Improved types in Central Zone	—	289
76	Distribution and percentage variation of goats in the Central Zone	—	290
77	Density of poultry in the Central Zone	—	291
78	Number and percentage variation of Desi and Improved Cattle of 1977 and 1982 census periods	—	291
79	Primary Agricultural Credit Societies engaged in marketing of agricultural produce	—	292
80	Primary Marketing Societies of the Central Zone	—	293

Introduction

The Central Zone comprises of the three central districts of Ernakulam, Thrissur and Palakkad of the Kerala State excluding the *Pokkali* tracts, *Kole* land and *Attapadi* area with their special soil and physiographic conditions. The diversity in the agroecological conditions experienced in the zone is reflected in the wide range of crops cultivated here. Water loving rice and drought tolerant cashew are seen side by side due to the peculiar agro ecological situations prevailing in this zone. Cultivation under such situations will be under several constraints and the adoption of agricultural technologies will be partial or incomplete. Rice is the major crop covering nearly half of the total cropped area of the zone contributing 49.2 per cent of the paddy area and 51.5 per cent production of the State. The changing socio-economic characteristics of the zone and the wage hike in the agricultural sector have direct impact on the cropping pattern of the zone and for the large scale adoption of improved technologies that have been developed in the recent past. The Chapter makes a review of different recommended technologies for rice, coconut, tapioca, groundnut, pepper, cotton, banana and sugarcane and the reasons for the partial or non-adoption of the recommended practices. The details were collected from the officers of the Department of Agriculture and by interviewing experienced farmers in the Central zone. The results of the study have been summarised briefly in the following pages.

Rice

Major crop of the zone and is grown mainly in low land conditions in kharif (43.5%) rabi (46.5%) and summer seasons in the following situation and systems

No.	Cropping systems involving rice	Area (ha)	%	No.	Agro-ecological situations	Area	%
1	Rice-rice-fallow	2 43 815	81.20	1	CA-LE-HRF	3,942	1.31
2	Rice-rice-rice	29,090	9.69	3	ME-HRF	1,19,305	39.75
3	Rice-tapioca/yam	8,200	2.73	4	HE-HRF	82,903	27.61
4	Rice-rice--vegetables	4,070	1.36	5	HE-MRF	59 092	19.68
5	Rice-pulses/vegetables	3,282	1.09	6	HE-LRF	17,070	5.69
6	Rice-banana	3,050	1.02	7	BE-BS-LRF	17,882	5.96
7	Rice-rice-pulses/vegetables/ green manure	2,800	0.93			3,00,194	
8	Rice-banana-rice	2,042	0.68				
9	Rice-rice-pulses	1,800	0.63				
10	Rice-ragi/jowar	800	0.27				
11	Rice-rice-groundnut	400	0.13				
12	Rice-cotton	400	0.13				
13	Rice-vegetable/pulses/sesamum	300	0.10				
14	Rice-water fallow	100	0.03				
15	Rice-groundnut	45	0.01				
Total		3,00,194		Total	:	3,00,194	

Situations 2 and 8 have been deleted as these come under the purview of special region.

Season-wise distribution.

Season

Kharif	1,30,685	43.53
Rabi	1,38,233	46.05
Summer	31,276	10.42

Adoption Pattern

1 Rice:

Rice occupies an area of 3.58 lakh hectares in the Central zone and nearly 51.5% of the State's rice production comes from this area. Rice is grown as a transplanted or direct sown crop in three seasons i. e., Virippu, Mundakan and Punja depending upon the availability of water and other local conditions. In this zone, rice is cultivated in modan lands (rainfed upland), palliyal land (terraced uplands) and wet lands. The cropping systems involving rice prevalent in the zone are Rice-Rice-Fallow, Rice-Rice-Green manure, Rice-Rice-Pulses/Sesamum/Groundnut, Rice-Rice-Vegetables, Rice-Rice-Rice, Rice-Banana, Rice-Sesamum/Groundnut, Rice-Ragi/Jowar/Groundnut.

Recommendation 1	Adoption pattern 2	Rationale 3
I. Varieties		
1 Coastal area-low elevation-high rainfall		
a) <i>Kharif</i>		
Medium duration : Aswathy, IR-8, Sabari, Jaya, Bharathi, Mashuri, PTB-23. Short duration : Rohini, Triveni, Annapoorna, Jyothi, Swarna-prabha.	8% of the area is under High yielding varieties and in other areas tall varieties including PTB-23 is cultivated.	Impeded drainage and flooding during the early stages is the reason for the lesser area under high yielding varieties.
b) <i>Rabi</i>		
Medium duration : IR-8, Sabari, Jaya, Bharathi, Mashuri, PTB-20 and PTB-12.	14% of the area is under high yielding varieties. In the rest of the areas, tall varieties including PTB-20 is grown.	This area is mostly rainfed. Excess water at planting and shortage at maturity stages are experienced. Tall varieties thrive better under these conditions.

1	2	3
2. Coastal area-low elevation-Saline hydromorphic soil-high rainfall.	As this area, mainly Kole and Pokkali, comes under the purview of special region of Kerala with problematic soil conditions, the details will be dealt with the status report of the special region.	
3. Medium elevation-low lands-high rainfall.		
a) <i>Kharif</i>		
i) Uplands (Modan lands) purely rainfed (PTB-28, PTB-29, PTB-30, Suvarnamodan Annapoorna, Triveni, Swarnaprabha and Rohini are recommended for areas where rainfall is well distributed.	Adoption of tall and ^{semi} tall varieties like PTB-28 and Suvarnamodan is 90%.	The dwarf high yielding varieties do not perform well under the heavy weed growth and erratic rainfall conditions.
ii) Palliyal lands-single crop terraced uplands.		
Medium duration : Aswathy, Jaya, Bharathi, IR-8 and Mashuri. Short duration : Rohini, Triveni, Annapoorna, Jyothi and Swarnaprabha.	25-30% of the area is under the recommended high yielding varieties. In the rest of the areas local varieties are grown.	These areas are rainfed and the uncertainty of rainfall is the reason for the less area under high yielding varieties.
iii) Double crop wet lands-semi dry cultivation.		
Medium duration : IR-8, Jaya, Bharathi and Mashuri. Short duration : Rohini, Triveni, Annapoorna, Jyothi, and Swarnaprabha.	35% of the area is under the recommended varieties.	Improper land preparations under the conditions of delayed monsoon, financial problems and non availability of quality seed are the reasons for non-adoption.

Recommendation	Adoption pattern	Rationale
iv) Double crop wet lands- Transplanted crop. Medium duration : Jaya, IR-8, Mashuri, Sabari and Aswathy. Short duration : Annapoorna, Rohini, Triveni and Jyothi.	25% of the area is under the re- commended varieties.	The monsoon being erratic, drought is experienced in the nursery and planting cannot be done in time. Local preference for a particular grain qua- lity is another reason.
b) <i>Rabi</i> i) Double crop wet lands Medium duration : Jaya, IR-8, Aswathy, Sabari, Bharathi, IR-20 and Mashuri. Short duration : Annapoorna, Triveni, Jyothi and Swarnaprabha.	30% of the area is under the re- commended varieties.	Grain quality, local preferences higher market price for grain, higher straw yield and better quality of straw are the reasons for growing local varieties in rest of the area. Incidence of pests and diseases for high yielding varieties is yet another reason for non- adoption. Generally the yields of dwarf varieties are less due to the influence of climatic factors.
4. High elevation-low lands-high rainfall varieties as shown in item 3	In kharif season, the varieties are grown in 25% of the area and in Rabi, these varieties occupy 15% of the area.	As in item 3.
Koottumundakan systems (mixing kharif and rabi crop seed in 70:30 ratio) is practised in certain area.	No specific recommendations are given for this system.	
5. High elevation-low lands- Medium rainfall		

1	2	3
<p>a) <i>Kharif</i> Mashuri, Jaya, IR-8, Sabari, Bharathi and Aswathy.</p>	<p>60% of the area is occupied by the recommended varieties.</p>	<p>Quality and higher market prices for the local varieties and local preference for particular varieties are the reasons for non adoption in rest of the area. Non availability of quality seed is another problem.</p>
<p>b) <i>Rabi</i> Jaya, IR-8, Mashuri, Sabari and Bharathy.</p>	<p>In 30% of the area, the recommended varieties are grown.</p>	<p>Incidence of pests and diseases, preference for quality of grain, shortage of water for irrigation in last phase and preferences for higher straw yields are the reasons for non adoption in rest of the area.</p>
<p>6. High elevation with low rainfall</p>		
<p>a) <i>Kharif</i> Medium duration : Mashuri, Aswathy, IR-8, Jaya and Bharathi. Short duration : Rohini, Swarnaprabha, Triveni, Annapoorna and Jyothi.</p>	<p>About 30% of the area is cultivated by the recommended rice varieties.</p>	<p>Shortage of water is the main reason for non adoption of high yielding varieties. Better market price for paddy of local varieties is another reason for the preference for local varieties.</p>
<p>b) <i>Rabi</i> Medium duration : Mashuri, Jaya, IR-8, Aswathy, Bharathi and IR-20. Short duration : Annapoorna, Jyothi and Triveni.</p>	<p>The recommended varieties are grown in 20% of the area during the Rabi season</p>	<p>Incidence of pests and diseases especially during the 2nd crop seasons is the factor limiting the area under high yielding varieties.</p>
<p>7. Medium elevation-low lands with black soil-low rainfall.</p>		

Recommendation	Adoption pattern	Rationale
a) <i>Kharif</i> Mashuri, IR-8 and Jaya b) <i>Rabi</i> IR-20, H4, Mashuri, Jaya, Bharathi and IR-8.	The area under the high yielding varieties is 60 and 30% for kharif and rabi season respectively in areas excluding the poonthalpadams.	Shortage of water is the main reason for non adoption of high yielding varieties. Better market price for paddy of local varieties is another reason. Incidence of pests and diseases especially during the 2nd crop season is the factor limiting the area under high yielding varieties.
8. High ranges-low rainfall	This area comes under the purview of the high ranges region and the details are dealt with in the status report for that region.	
II. Seed rate Transplanting—60-85 kg/ha to plant one hectare Broadcasting—80-100 kg/ha Dibbling —80-90 kg/ha	For transplanted crop full adoption is about 35% and excess adoption by rest of farmers. For broadcast crop, full adoption is 10% and excess adoption 90%.	Cultivators generally follow excess seed rate. They are having a tendency to follow the practice of their predecessors. They are also having a feeling that recommendations given are not enough to give a better crop stand. Another reason for excess seed rate is to ensure maximum plant density in order to cover risk due to lack of moisture and drought conditions.
III. Seed treatment		
a) <i>Wet treatment</i> Soak seeds for 3 minutes in a solution of 0.1% methoxyethyl mercuric chloride formulation containing 3% mercury or in a solution of 0.05% with a formulation of 6% mercury. Drain water after 30 minutes and soak for 12 hours in plain water to induce germination.	Nil	Lack of awareness of the recommendation, lack of conviction of benefits and due to the complexity of technology to be adopted.

1	2	3
<p>b) <i>Dry treatment</i> Treat seeds with formulation of organomercuric fungicides containing 1% active ingredient @ 125 g. or captan @ 80 g/100 kg of seed.</p>	<p>Nil</p>	
<p>IV. Nursery technique Two types of nursery are recommended i.e., dry nursery and wet nursery depending on the availability of water. <i>Wet Nursery:</i> Plough the field two or three times and form raised beds 5 to 10 cm., 1 to 1½ m. wide and of convenient length with drainage channel in between the beds. Apply compost or cattle manure at the rate of 1 kg/m² of nursery bed.</p>	<p>Under dry nursery 40% of farmers adopt the technology and under wet nursery the adoption rate is only 35%. The adoption is only partial in the case of remaining farmers.</p>	<p>The reasons for non adoption of the recommended technology are the high cost of labourers and non availability of labourers. Non availability of cattle manure is the reason for non adoption in the use of organic manure.</p>
<p>V. Preparation of main field Plough the field thoroughly incorporating the weeds and straw in the field. Ensure a smooth and levelled field for planting.</p>	<p>About 46% of the farmers adopt this technology</p>	<p>Non availability of bullock and tractor at the proper time and high cost are the reasons for the non adoption of this technology to fullest extent.</p>
<p>VI. Age of seedlings for transplanting Pull out seedlings when they attain 4-5 leaf stage. The age of seedling for short duration variety is 18 days; for medium duration variety 20-25 days and long duration varieties 30 days.</p>	<p>The extent of adoption is comparatively more for short and medium duration varieties to the extent of 75 and 60% respectively. For long duration varieties adoption is only 30%.</p>	<p>The constraint noticed are lack of sufficient labour and machinery for land preparation and vagaries of weather.</p>

Recommendation	Adoption pattern	Rationale																		
VII. Transplanting Transplant at 2-3 seedlings per hill at a depth of 3 to 4cm. Leave a wider row of 30 cm. after every 3m. to facilitate spraying and cultural operations.	Recommendation on number of seedlings per hill and depth of planting are followed by 40-45% of the farmers. Spray alleys are followed by 5-10% of the farmers only.	This was not followed by majority of farmers because they cultivate local varieties, seedlings of which are tall and hence to be planted deep with more number of seedlings per hill. In the case of alley plantings, the recommendation is not followed as more labourers are required for this purpose and loss of space. Lack of conviction is another factor for non adoption.																		
VIII. Spacing <table border="1" data-bbox="268 536 681 901"> <thead> <tr> <th><i>Season</i></th> <th><i>Variety</i></th> <th><i>Spacing</i></th> </tr> </thead> <tbody> <tr> <td rowspan="2">First crop</td> <td>Medium duration</td> <td>20 x 15cm</td> </tr> <tr> <td>Short duration</td> <td>15 x 10cm</td> </tr> <tr> <td rowspan="2">Second crop</td> <td>Medium duration</td> <td>20 x 10cm</td> </tr> <tr> <td>Short duration</td> <td>15 x 10cm</td> </tr> <tr> <td rowspan="2">Third crop</td> <td>Medium duration</td> <td>20 x 10cm</td> </tr> <tr> <td>Short duration</td> <td>15 x 10cm</td> </tr> </tbody> </table>	<i>Season</i>	<i>Variety</i>	<i>Spacing</i>	First crop	Medium duration	20 x 15cm	Short duration	15 x 10cm	Second crop	Medium duration	20 x 10cm	Short duration	15 x 10cm	Third crop	Medium duration	20 x 10cm	Short duration	15 x 10cm	With short duration varieties adoption is nearly 40% and with medium duration varieties the adoption is 30-35%.	Main reason for non adoption of this technology is the high cost of labour and inability of labourers to follow the recommendation due to lack of training.
<i>Season</i>	<i>Variety</i>	<i>Spacing</i>																		
First crop	Medium duration	20 x 15cm																		
	Short duration	15 x 10cm																		
Second crop	Medium duration	20 x 10cm																		
	Short duration	15 x 10cm																		
Third crop	Medium duration	20 x 10cm																		
	Short duration	15 x 10cm																		
IX Application of manures and fertilizers a. Application of Farm Yard Manure: Apply organic manure in the form of farm yard manure, compost or green leaf @ 5t/ha and incorporated into the soil 15 days before planting.	Organic manures are applied by 20-30% of farmers but its quantity is lower than the recommended dose.	Non availability of organic manures in time and its high cost are the major reasons for the non adoption of this technology. Regarding time of application, the non adoption is mainly because of the lack of sufficient time for land preparation. Non availability of tractors/pairs at the time of requirement is another reason.																		

b) Application of fertilizers:

The fertilizer dose under different situations are given below;

Kind of land	Variety	N	P ₂ O ₅	K ₂ O
(kg/ha)				
Uplands	PTB 28,	40	20	20
(modan)	29, 30			
-do-	High yield	60	30	30
	ing short			
	duration			
	varieties			
Wot lands	H ₄	70	45	45
-do-	Mashuri	50	25	25

The above rates are applied at different stages as per the varieties and soil conditions.

X. Application of lime

For direct seeded crop during the first crop season, apply lime @ 600 kg/ha in two split doses, the first dose @ 350 kg/ha as basal dressing at the time of first ploughing and second dose 250 kg/ha as top dressing about 1 month after sowing or transplanting.

With short duration varieties, for basal application, the extent of full adoption is 10%, partial adoption 73% and excess adoption 17%. With medium duration varieties full adoption is only 8%, partial adoption 78% and excess adoption 14%. In the tillering stage the extent of full adoption is 10% with short duration varieties and 6% with medium duration varieties. The extent of partial adoption is 70% in all the cases. The extent of excess adoption is very low in all the cases. In the panicle initiation stage also the same trend follows.

The percentage of adoption is negligible.

The main reason for non-adoption of the technology is the financial constraints of the farmer. The other reasons for low adoption are unfavourable conditions such as flooding, excess weed growth etc. The reason for excess adoption is due to the belief of the farmer that higher doses of fertilizers give higher response.

For the first crop, non adoption is due to financial constraints, lack of conviction of benefits and high cost and non availability of liming material.

Recommendation	Adoption pattern	Rationale
<p>XI. Water management Maintain water level at about 1.5cm. during transplanting, thereafter increase it gradually to about 5 cm. until maximum tillering stage. Drain water 30 days before harvest.</p>	<p>The technology is followed by about 18% of the farmers.</p>	<p>The most important constraint for the first crop is the lack of control of water due to heavy rainfall and the constraint for the second crop is non availability of water and practical difficulty in maintaining the proper depth of water.</p>
<p>XII. Weed control Keep the field free of weeds upto 45 days either by hand weeding and inter-culture or by using herbicides as follows; Benthocarb E. C. @ 2kg ai/ha or Pendimethalin G @ 1.5 kg ai/ha may be applied on the 6th day after transplanting. Apply propanil @ 1.75 kg ai/ha in 3% solution of fresh urea (100-124 litres of solution per ha) as spray 12-14 days after transplanting or seeding. Alternately Butachlor (G) 1 kg ai/ha 6 days after transplanting or sowing is recommended. In dry sown crop, pre emergent spray of Nitrofen @ 1.5 kg ai/ha in 300 litres of water on the same day of seeding</p>	<p>Majority of farmers follow hand weeding. Weed control using chemicals is adopted by only 5-8% of farmers.</p>	<p>The main reason for not using chemical is due to the difficulty in adoption of specifications such as time of applications, dosage, water management etc. Other reasons are the lack of conviction of benefits, and non availability of weedicides in time.</p>

is recommended. Wherever broad leaved weeds are predominant, apply sodium salt of 2,4-D at 1 kg/ha in 400 litres of water 25 days after transplanting. Wherever the field is level and the water management could be effectively done, 2,4-D sodium salt @ 1 kg/ha may be mixed with 10 kg urea/ha and applied on 20th day after sowing/transplanting. This saves spraying charges.

Posts

a) Rice stem borer

1. Collection and destruction of masses from the nursery plants and adopting a prophylactic nursery protection.
2. Cultivating tolerant varieties like IR-20 in endemic areas.
3. Apply any one of the following insecticides first 15-20 days after planting and then at boot leaf stage keeping minimum water level. Fenthion (1000ml/ha), Quinalphos (750 ml/ha), Fenitrothion (50 E.C.) 1000ml/ha Phosphamidon (25 E. C.) 250 ml/ha

About 75% of the farmers adopt this recommendation

Many of the farmers do not adopt the practice during nursery period since they take up the control measure only after the occurrence of visual damage. Non availability of sprayers at the peak season is the main draw-back for the other farmers.

Recommendation	Adoption pattern	Rationale
b) Gall midge	Adoption of recommended planting	Reasons as above.
1. Avoid late planting in the first crop season	time always depend on the receipt of monsoon.	
2. Apply granules e. g. Phorate (10 G @ 1.5 kg ai/ha), Carbofuran (3 G (0.5 kg ai/ha)	Adoption of chemical application in nursery is less practised, but in the main field the adoption is about 75%.	"
3 Seedling dip in 0.2% solution of Chlorpyrifos for 12 hours.	Seedling dip is not adopted	Seedling dip during transplanting involves more labour, time gap and space for treatment.
c) <i>Leaf roller</i>		
Apply the following chemicals Quinalphos (750 ml/ha), Monocrotophos (40 EC 600 ml/ha).	Adoption is 90% regarding to control of leaf roller.	Non availability of the sprayer is the constraint for the rest of the farmers.
d) <i>Rice bug</i>		
1 Adopt clean cultivation	Overlapping cultivation is still followed by the farmers.	Since farmers grow varieties of different duration in the same ela,
2 Avoid overlapping cultivation in an 'ela'.		avoidance of over lapping cultivation and synchronized flowering is not possible.
3 Apply Carbaryl (50 WP, 2 kg/ha) Formothion (25 EC 1000 ml/ha), BHC 10% 25 kg/ha. Applying the chemicals before 9 AM or after 3 PM to avoid interference to fertilization of paddy. For other minor pests any of the above mentioned spray is recommended.	75% of the farmers adopt chemical control in case of severe incidence	

Diseases

a) *Rice blast*

1. Avoiding cultivation of highly susceptible varieties in endemic areas.
2. Apply the following fungicides both in the nursery and in the main field whenever disease symptoms are noticed.
Hinosan 500 ml/ha.
Bavistin 500 g/ha.
3. Judicious application of Nitrogenous fertilizer to avoid disease development

Adoption is about 50%, rest follow only partial adoption. Adoption in the nursery is not practised.

Nonrealization of the magnitude of damage by the disease is one of the reasons for the non adoption of chemical spray in the nursery as well as in the main field. Non availability of sprayers in time is another reason.

Unawareness of farmers about the harmful effect of high dose of nitrogen in the disease development.

b) *Sheath blight*

1. Avoid closer planting than the recommended spacing
2. Avoid application of nitrogen at a high dose.
3. Add more Potassium (50% more) in the endemic areas while top dressing is done.

Adoption is 60-65%

Rest of the farmers grow local varieties for which the sprayings are not warranted.

Recommendation	Adoption pattern	Rationale
4. Spray the following chemicals: Bavistin 500 g/ha., Foltaf 1500 g/ha, Hinosan 500 ml/ha.		
5. Rotational spraying of chemicals if more than one spraying is necessary.		
<i>c) Sheath rot</i>		
1. Avoid the application of excess nitrogen as in the case of sheath blight.	Adoption is 40-50%	As the disease is seen after flower emergence, farmers are hesitant to spray the chemicals.
2. Spray the following chemicals at the time of panicle emergence. Hinosan 500 ml/ha, Bavistin 500 g/ha.		This recommendation is applicable only in endemic areas.

Production Constraints

Rice

Production constraints	Technology available, but to be adopted (extension gap)	Technology not available or needs modification (research gap)
1	2	3
1. Non availability of quality seed	Farmers have to be trained to produce quality seed and seed plot technique has to be popularised	—
2. Farmers using excess seed for dry as well as wet sowings	Farmers are to be convinced about the wastage of this practice	—
3. Lack of high yielding varieties suitable for dry sowing and second crop seasons, and also varieties suitable for drought and flood prone areas	—	Varieties suitable for these situations have to be identified
4. Non adoption of technology for basal application of recommended dose of fertilizers for dry sown crop	This has to be popularised	—
5. Weed control under dry sown condition	Technology available has to be popularised	—
6. Low plant population due to wider spacing especially during second crop season, and the late planting of overaged seedlings.	Recommended spacing to achieve the required plant population and technology for planting of overaged seedlings have to be popularised	—
7. Inadequacy in the availability of organic manures	Production and use of compost, raising of green manure etc. have to be popularised.	—

1	2	3
8. Imbalanced and untimely use of fertilizer nutrients leading to lodging and susceptibility to pests and diseases	Farmers have to be educated about the ill effects of this practice	Technology for top dressing of fertilizers under uncontrollable flooded condition especially during the first crop season has to be developed.
9. Liming is not adopted even in severe cases of soil acidity	—	Research work to find out the usefulness of liming to counteract the ill effects of acidity developing during the second crop season after the cessation of N-E monsoon.
10. Scientific water management practices are not followed in the irrigated conditions	Technology has to be popularised	—
11. Regular occurrence of stem borer, gall midge, leaf roller and rice bug and incidence of blast, sheath blight, brown spot, stack-burn and bacterial leaf blight	Technology with chemical control has to be still popularised	Varieties with multiple resistance have to be evolved.
12. Lack of suitable varieties and technology for Koottumudakan system of rice cultivation and dry farming and ill drained areas	—	Suitable technology has to be identified
13. Scarcity of labour at peak periods of agricultural operation and ever increasing labour wages	—	Suitable technology for labour saving methods and development and testing of simple manual and animal operated implements such as seed drills, transplanters etc., have to be identified.

Coconut

Coconut occupies an area of 1.43 lakh hectares in the Central Region and the manual production comes to about 736 million nuts. Maximum area under coconut (35,000 ha) comes in the third Agro-ecological situation i. e. medium elevation-high rainfall and the percentage to the total area in the region is 44.7. Though the area under the first Agro-ecological situation i. e., coastal area - low elevation-high rainfall is only 14,500 ha, 73% of the area in this situation is covered by the coconut and coconut based cropping systems. In the region coconut is grown either as a pure crop in the uplands and bunds of reclaimed paddy fields or it is raised in the homestead systems of poly culture, with coconut as the pivotal crop.

Recommendation	Adoption pattern	Rationale
1. Selection of varieties		
<i>a) Recommended varieties</i>		
1. West coast tall	Farmers generally cultivate west coast tall variety. Hybrids and other varieties are rarely cultivated.	The main reason for non adoption of hybrids and other recommended varieties is the non availability of these seedlings for planting and these varieties do not exhibit good yield under average management conditions.
2. Laccadive Ordinary		
3. Andaman ordinary		
4. Phillippines		
5. Java		
6. Cochin China		
7. Kappadam		
<i>b) Recommended hybrids</i>		
1. West coast tall x Chowghat dwarf orange		
2. West coast tall x Ganga-bondam		
3. Laccadive Ordinary x Ganga-bondam		
4. Andaman Ordinary x Gangabondam		
5. Chowghat dwarf orange x West coast tall		

Recommendation	Adoption pattern	Rationale
<p>6. Chowghat dwarf green x West coast tall</p> <p>Hybrid seedlings are recommended for ideal situation and where good management practices are adopted.</p>		
<p>2. <i>Selection of mother palms.</i> Select the mother palms having the following characteristics:</p> <ul style="list-style-type: none"> a) Regular bearing habits and yielding not less than 80 nuts per annum. b) Age 20 years or more. c) Thirty to forty fully opened leaves with strong petiole and wide leaf base firmly attached to the stem bearing at least 12 bunches of nuts per year. d) Bearing nuts with medium size with oblong shape. e) Husked nuts should not weigh 600 g. f) Mean copra content of 150g/nut or more. 	<p>Majority of the farmers are procuring seedlings from other sources such as public and private agencies, but a better percentage of farmers who produce their own seedlings select mother palms from their holdings.</p>	<p>Lack of availability of suitable mother palms in their possession and the lack of awareness of the recommendations are the main reasons for not following this recommendation.</p>

3. Collection and storage of seed nuts

Collect the mature nuts (above 11 months old) from December to May. Nuts showing improper development or other undesirable characteristics should be discarded. Store seednuts in shade for a minimum period of 60 days prior to sowing in nursery.

The farmers who raise their own seedlings follow the technology fully.

4. Raising of nursery

Prepare beds of 1.5 m width and of convenient length with 75 cm space between beds. Plant the seed nuts at a spacing of 30 cm (between rows) x 30 cm (between nuts) at 4 to 5 rows per bed. Plant the nuts in trenches 25 to 30 cm deep and covered with soil so that the top portion of the husk alone is visible. The nursery may be irrigated once in 2 days during summer months by pot watering or other methods. The nursery beds should be kept free of weeds. Spraying periodically with 1% Bordeaux mixture or any other copper fungicides to prevent fungal infection is recommended.

Same as in the case of previous technology.

5. Selection of seedlings

Select only good quality seedlings 9-12 months old with the following characteristics.

Scarcity of seedlings is the main constraint for adoption of this technology.

Recommendation	Adoption pattern	Rationale
<p>a) Early germination, rapid growth and seedling vigour</p> <p>b) Having 6-8 leaves for 10-12 months old seedlings and the minimum of 4 leaves for nine months old seedlings.</p> <p>c) Ten to twelve cm girth at collar.</p> <p>d) Early splitting of leaves.</p>	<p>Majority of farmers do not follow rigorous selection of seedling. They select almost all except a few mal-formed ones.</p>	
<p>6. Preparation of land for planting</p> <p>On slopes and areas of undulating terrain prepare the land by contour terracing or bunding. In low lying areas and in fields, mounds have to be formed to a height of about 1m. above the water level. In reclaimed kayal areas, planting has to be done in field bunds. The size of pits for planting will depend upon soil type and water table. In loamy soils of low water table, a pit size of 1M³ is recommended. In laterite soils with underlying rocks, larger pits of 1.2M³ have to be taken. In sandy soils the pits may be of size 0.75M³. The pits should be filled with top soil to a height of 60 cm below the ground level. In low lying lands, take shallow pits and as the plant grows, raise the ground level by adding silt and sand so as to cover the entire boll of the palm. The same procedure is advocated when the planting is done on mounds and bunds.</p>	<p>The adoption percentage is high to an extent of 60%.</p>	<p>The technology is not followed in the case of contour bunding and terracing as well as in the case of planting in low lying areas because of the high cost of labour and lack of sufficient finance for the farmer.</p>

7. Spacing

The following spacings are recommended under different planting systems in sandy and laterite soils.

The adoption percentage is low to an extent of only 33%. Majority of farmers follow irregular planting without adequate spacing.

The lack of conviction of benefits, the tendency of farmers to accommodate more number of seedlings per unit area and lack of awareness of the recommendation are the reasons of low adoption. Another reason is that the coconut forms only a part of the homestead population of different trees.

<i>Planting system</i>	<i>Spacing</i>
Triangular system	7.6 m
Square	7.6 to 9 m
Single hedge	5 m in rows
	9 m between
	rows
Double hedge system	5x5m in rows
	9 m between
	pairs of rows.

In the hedge system of planting, the rows should be aligned in North-South direction and the seedlings planted as in the triangular system.

8. Irrigation of seedlings

For the first two years from planting irrigate the seedlings @ 45 litres of water per seedling, once in four days during summer months.

Irrigation of seedlings is invariably practised wherever water is available.

Recommendation		Adoption pattern	Rationale
9. Application of manure and fertilizers			
9.1 Manuring of coconut seedlings			
Time after planting	Time of application	Adoption is found to be very negligible. Generally the farmers do not fertilize young seedlings. They are satisfied with the application of small quantity of organic manure preferably wood ash and sometimes a little bit of cowdung.	Lack of conviction of benefit is the main reasons for not following this technology. The cultivators are having a general feeling that the application of organic manure alone is sufficient for young palm.
	April-June (Proportion of the dose of adult palm)		
3 months	1/10		
1 year	1/9		
2 years	2/9		
3 year onwards	3/9		
9.2 Application of organic manure			
Apply organic manure @ 15-25 kg/palm/year during June from the second year of planting.		Full adoption is practically nil. Follow only partial adoption.	Non availability of organic manures and its high cost, may be the main reason.
9.3 Manuring of adult palms			
Nutrient dosages recommended for adult palms are as follows:		Full adoption is very low (10%). Farmers follow only partial adoption. They give about 50-60% of N, 50% of P ₂ O ₅ and 50% of K ₂ O recommended for the palm.	Lack of sufficient capital is the main reason for not following this technology. Other reasons include high cost of fertilizers, lack of irrigation facilities and lack of sufficient labourers at the time of requirement.
a. General recommendation	Nutrient dosages kg/palm/annum		
	N P ₂ O ₅ K ₂ O		
i) Average management	0.34 0.17 0.68		
ii) Good management	0.50 0.32 1.20		

- b) For reclaimed clayey soil 0.25 0.35 0.90
- c) Hybrids and high yielding palms:
 - i) For irrigated areas 1.00 0.5 2.00
 - ii) For rainfed condition 0.5 0.32 1.2

Under rainfed conditions apply fertilizers in two split doses 1/3 at the time of early South-West monsoon showers in April-June and 2/3 in September-October. Under irrigated conditions apply fertilizers in 3 or 4 equal split doses in April-May, August-September, December and February-March.

Apply lime or dolomite during April-May, MgSO₄ during August-September. One kg dolomite or 1 kg lime + 0.5 kg Mg SO₄ is recommended for an adult palm/annum. Apply fertilizers and manures in circular basins with a radius of 1.8 m from the base of the palm and 20 cm deep. The basins may be opened after the onset of South-West Monsoon. Mulching of coconut may be done at the close of the North-East Monsoon.

Recommendation	Adoption pattern	Rationale																				
<p data-bbox="249 225 725 357">10. Irrigation of adult palms Irrigate the palm in summer months in basins around the palms as detailed below:</p> <table border="1" data-bbox="249 371 725 1230"> <thead> <tr> <th data-bbox="249 371 380 485">Type of soil</th> <th data-bbox="380 371 456 485">Sandy</th> <th data-bbox="456 371 533 485">Sandy loam</th> <th data-bbox="533 371 628 485">Loam</th> <th data-bbox="628 371 725 485">Silty clay</th> </tr> </thead> <tbody> <tr> <td data-bbox="249 485 380 585">Available soil moisture in cm/m,</td> <td data-bbox="380 485 456 585">8</td> <td data-bbox="456 485 533 585">12</td> <td data-bbox="533 485 628 585">17</td> <td data-bbox="628 485 725 585">21</td> </tr> <tr> <td data-bbox="249 585 380 985">Quantity of water per irrigation per tree in litres in areas except North-Eastern portion of Trichur and Palghat districts.</td> <td data-bbox="380 585 456 985">600</td> <td data-bbox="456 585 533 985">900</td> <td data-bbox="533 585 628 985">1300</td> <td data-bbox="628 585 725 985">1600</td> </tr> <tr> <td data-bbox="249 985 380 1230">North-Eastern region of Trichur district and Palghat district</td> <td data-bbox="380 985 456 1230">2-3 days</td> <td data-bbox="456 985 533 1230">3-4 days</td> <td data-bbox="533 985 628 1230">5-6 days</td> <td data-bbox="628 985 725 1230">6-7 days</td> </tr> </tbody> </table>	Type of soil	Sandy	Sandy loam	Loam	Silty clay	Available soil moisture in cm/m,	8	12	17	21	Quantity of water per irrigation per tree in litres in areas except North-Eastern portion of Trichur and Palghat districts.	600	900	1300	1600	North-Eastern region of Trichur district and Palghat district	2-3 days	3-4 days	5-6 days	6-7 days	<p data-bbox="725 225 1277 357">Full adoption is practically nil. 20-25% of farmers follow partial adoption.</p>	<p data-bbox="1277 225 1740 357">Lack of irrigation facilities, scarcity of water and financial problems are the main reasons for the non adoption of this technology.</p>
Type of soil	Sandy	Sandy loam	Loam	Silty clay																		
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11. Inter cropping in coconut garden.

The following inter crops are generally recommended in coconut gardens planted at spacing beyond 7.5 m.

- a) Cereals —Rice, maize, etc.
- b) Legumes —Groundnut, horsegram and pulses cowpea.
- c) Tubers —Tapioca, Sweet potato, yams and colocasia.
- d) Spices and condiments —Ginger, turmeric, pepper etc.
- e) Fruit plants —Banana, Pineapple etc.
- f) Beverage crops —Cocoa
- g) Fodder grasses —Napier grass, Guinea grass.

12 Pests

a) *Rhinoceros beetle*

1. Extract beetles by using hooks
2. Filling top three leaf axils around spindle with 1:2 mixture of BHC 10% and sand thrice a year in April, September and December.

Majority of the farmers follow intercropping in coconut gardens during the early and later periods of the crop, though unscientifically.

The adoption with regard to hooking is low (10%)

Adoption of BHC filling is 30%

The tendency of the farmer to grow more crops in an unit area is the main constraint, against this technology.

Searching of the beetle burrow is time consuming and laborious.

Since the farmers feel that the damage is not affecting the yield directly.

Recommendation	Adoption pattern	Rationale
3. Treating manure pits with BHC (50%) WP @ 116 g/cu. m. 4 times every year.	Adoption is less than 10%.	Lack of awareness of the development of larval stage in manure pit. Raking and spraying of manure pit is cumbersome and not convincing.
<i>b) Red palm weevil</i>		
1. Leaf axil filling with BHC 10% with sand (1.2).	30% of the farmers are adopting BHC filling.	Unawareness of the effectiveness against red palm weevil.
2. Injection with Pyrecone-E or Carbaryl 1% solution.	Adoption is 50% with regard to injection of Carbaryl.	Early detection of the damage is difficult, At the later stages, the efficacy of the treatment is doubtful.
3. Implantation of aluminium phosphide tablets @ 1-2/ trees as curative measure	Adoption of implantation of aluminium phosphide is nil	Non availability of the chemical coupled with the special care required in handling the chemical, since toxic fumes are evolved.
Black headed caterpillar		
1. Release of parasites like Braconids, Bethylid and Eulophids.	10% adoption is there	Slow action of parasites, Failure during summer and non availability of parasites
2. Cutting and burning of affected leaves.	50% adoption	Un-awareness of the developmental cycle of the pests and fear of cutting of excess leaves.
3. Spraying the under surface of leaves with chemicals like quinalphos (0.05%) or Malathion (0.05%)	Adoption rate is low (5%)	Spraying is done only in younger palms and it is practically difficult in taller palms.
<i>Diseases</i>		
a) <i>Bud rot</i> , Cutting and removing of affected tissues of the crown and application of Bordeaux paste.	About 70% adoption is seen	Early detection of the disease symptoms is not done and by the time it is noticed the damage become irreparable. Hence the feeling that the treatment may not be useful.

Spraying 1% Bordeaux mixture on spindle leaves and crown of disease affected as well as neighbouring palms.

Adoption is low (10%)

Another reason is lack of routine check up of the central shoots. The treatment since aims at preventing further spread, less importance is attached to such prophylactic spraying.

b. Root wilt

Maintain the vigour of the plant by proper application of manures say 0.34, 0.17 and 0.68 kg N, P₂O₅ and K₂O per palm in the form of urea, rock phosphate and Muriate of Potash.

About 40% of the trees are manured as per the recommended schedule. About 20% is having a partial application of the dose.

Lack of aptitude for manuring and management of coconut gardens.

Application of 20-50 kg of cattle or green manure, 2kg of Dolomite or 1kg of lime and 500g of MgSO₄ per palm.

High adoption, say 80% for green/cattle manure application and low adoption (30%) for dolomite and Mg SO₄.

The high adoption is due to easy availability in the farmstead.

Removing highly diseased trees.

Adoption low (10%)

Non availability and non awareness at field level. Hesitation to remove the trees affected.

If leaf rot symptoms are seen along with root wilt, spraying of leaves with 1% Bordeaux mixture or 0.4% Mancozeb, thrice in a year.

Adoption to a rate of 25%

Attaching less importance to the leaf spot disease.

c) Stem bleeding

Removal of affected tissues by chiselling and swabbing with Bordeaux paste.

About 50% of the farmers adopt.

Lack of early identification of the symptoms and lack of knowledge on the seriousness of fatality of the disease since it is seen only on the stem region.

Production Constraints

Coconut

Production constraints	Technology available, but to be adopted (extension gap)	Technology not available or needs modification (research gap)
1	2	3
1. Non availability of quality seedlings	Production of seedlings has to be intensified	—
2. Closer planting is resorted to in homesteads and mixed cropping systems	Necessity of giving adequate spacing has to be popularised	—
3. Imbalanced and untimely application of fertilizers and difficulty in applying fertilizers due to heavy rain and drought situations	Farmers have to be educated about the balanced application of fertilizers	Suitable technology for application of fertilizers under the special situations has to be evolved.
4. Summer irrigation to coconut	—	New technology for efficient utilisation of limited water has to be evolved and the available technology has to be perfected for easy adoption by farmers
5. Dearth of organic matter	Popularisation of methods for production of organic manures (green manures, compost)	—
6. Frequent occurrence of <i>Nephanthis</i> and red palm weevil	—	Technology for mass rearing of effective parasites have to be developed. Effective method of application of insecticide to target organism has also to be evolved.
7. Increasing incidence of root wilt, Tanjore wilt and stem bleeding of coconut.	The present technology available is living with the disease. This has to be still popularised	Suitable technology for the control of the disease has to be developed.

Tapioca

Tapioca occupies an area of about 28,567 hectares in the Central Region and the Annual production is 5,13,261 tons. Nearly 60 per cent of the tapioca area of this region is in the Agro-ecological situation, High elevation-high rainfall followed by Medium elevation-high rainfall situation. It is grown as a pure crop in the plains and as an intercrop in the uplands. Short duration varieties of 6-7 months duration are grown in the paddy fields after the harvest of first crop rice. The major cropping system involving tapioca are Banana-Tapioca and Tapioca-Banana.

Recommendation	Adoption pattern	Rationale														
<p>1. Varieties</p> <p>The recommended varieties and their duration are given below:</p> <table border="0"> <tr> <td><i>Variety</i></td> <td><i>Duration</i></td> </tr> <tr> <td>H-97</td> <td>10 months</td> </tr> <tr> <td>H-165</td> <td>8 months</td> </tr> <tr> <td>H-226</td> <td>10 months</td> </tr> <tr> <td>M-4</td> <td>10 months</td> </tr> <tr> <td>H-1687 (Sree Visakhom)</td> <td>10 months</td> </tr> <tr> <td>H-2304 (Sree Sahya)</td> <td>10 months</td> </tr> </table>	<i>Variety</i>	<i>Duration</i>	H-97	10 months	H-165	8 months	H-226	10 months	M-4	10 months	H-1687 (Sree Visakhom)	10 months	H-2304 (Sree Sahya)	10 months	<p>The farmers using hybrids are very negligible. Adoption is 100% with M_4 and local varieties.</p>	<p>Poor cooking quality of hybrids and susceptibility to cassava mosaic disease are pointed out as the main reasons for non adoption of hybrids.</p>
<i>Variety</i>	<i>Duration</i>															
H-97	10 months															
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H-2304 (Sree Sahya)	10 months															
<p>2. Preparation of land</p> <p>Before planting, plough the field 2-3 times or dig to a depth of 25-30 cm depending upon soil type to establish a deep porous field for planting setts.</p>	<p>Forty percentage of farmers follow this technology fully and the rest follow partially.</p>	<p>The farmers' preference to a particular practice of preparation of land and their tendency to follow the practices of their predecessors are the main reasons noted against this technology.</p>														

Recommendation	Adoption pattern	Rationale
<p>3. Selection and preparation of planting material Mature healthy stems free from diseases or pests should be selected and 30 cm from the upper immature ends should be discarded. Stems should be cut into cuttings of 15-20 cm length. Harvested stems are to be preserved vertically in shaded and well aerated places. Spraying Methyl parathion 0.05% or Dimethoate 0.05% on the stem will control scale insects.</p>	<p>Majority of the farmers adopt this technology.</p>	
<p>4. Method of planting Pits, flat, ridge or mound method of planting may be adopted depending on the soil type and topography. The land may be prepared to meet the planting method. Cuttings should be planted vertically after smoothing the lower cut end at a depth not exceeding 4-6 cm. Square method of planting may be adopted at a spacing of 90 x 90 cm @ 1 cutting per pit. It is preferable to adopt 75 x 75 cm spacing for non branching type like M₄.</p>	<p>The adoption is only to an extent of 30% in the case of spacing. Majority follow other recommendations.</p>	<p>Lack of conviction of the benefits and preference of the farmer to follow the the prevailing local practice are the constraints.</p>

5. Application of manures and fertilizers

i) Application of organic manure

Apply cattle manure or compost at the rate of 12.5 t/ha during the preparation of the land or while filling up the pits.

Adoption is very low (less than 5%). Majority show partial adoption.

Non availability and high cost of organic manure are the major reason for non adoption.

ii) Application of inorganic fertilizers

The nutrient dose recommended for different varieties are as follows:

Variety	Nutrient dose (kg/ha)		
	N	P ₂ O ₅	K ₂ O
H-97, H-226	75	75	75
H-165, H-1687 & H-2304	100	100	100
M ₁ and local	50	50	50

Full adoption is nil. Partial adoption is 20%, majority of farmers are not in the habit of giving fertilizers to tapioca.

High cost of fertilizers, low market price for the produce and financial constraints are the main reasons for low adoption.

N and K may be applied in 3 split doses i. e., 1/3 basal, 1/3, 2 months after planting add 1/3, 3 months after planting. For August - September planting, apply 1/2 N, full P and 1/2 K as basal with the first digging and weeding. Remaining 1/2 N and 1/2 K should be applied 45 days after planting at the time of inter-cultivation.

Recommendation	Adoption pattern	Rationale
<p>6. Aftercultivation</p> <p>The field should be kept free for weeds and soil should be maintained loose by 2-3 shallow diggings or hoeing upto 90 days after planting followed by light earthing up.</p>	<p>The adoption is fairly high to the extent of 70%.</p>	<p>High cost of labour is the only constraint.</p>
<p>7. Intercropping in tapioca</p> <p>Groundnut can be grown as an intercrop during the early stages of tapioca crop. Bunch varieties like TMV-2, TMV-7, TG-3, TG-14 and Spanish improved are preferred for intercropping in tapioca. In study areas intercropping with groundnut, blackgram, greengram is recommended giving a spacing of 20 cm on both sides of the ridges.</p>	<p>Adoption is practically nil.</p>	<p>Lack of conviction of the benefits and practical difficulty are the reasons for non adoption of the technology.</p>
<p>8. Plant protection</p> <p>Insects like scale insects and termites and diseases like cassava mosaic, leaf spot and bacterial leaf blight are to be controlled by adopting appropriate plant protection measures.</p>	<p>Farmers generally do not undertake plant protection measures for tapioca. The minor pests and diseases noticed in the crop are not viewed seriously. Seldom these occurs to affect economic return seriously.</p>	<p>Lack of conviction of the benefits and practical difficulty are the reasons for non adoption of the technology.</p>

Production Constraints

Tapioca

Production constraints	Technology available but to be adopted (extension gap)	Technology not available or needs modification (research gap)
1. High yielding, short duration varieties (about 6 months) with good cooking quality and agronomic management for these varieties	—	Technology has to be developed

Groundnut

Groundnut is cultivated in an area of 11 744 ha and the annual production is 11,697 tons. Nearly 99 per cent of the area under groundnut of the state is in Palghat district of the Central Region. About 73 per cent of the area is in the Medium elevation-low rainfall-Agro-ecological situation of the central region. In a major portion of the region, groundnut is grown as a pure crop i. e., groundnut-groundnut-groundnut (three crops in a year) or groundnut-groundnut. The other cropping systems involving groundnut are groundnut-Millet, Rice-Rice-Groundnut and Rice-Groundnut.

Recommendation	Adoption pattern	Rationale
1. Varieties		
TMV-1 Spreading-140 days	The recommended varieties are grown (100% adoption)	—
TMV-2 Bunch 110 days		
TMV-7 Bunch 110 days		
TG-3 -do- 100-110 days		
TG-14 -do- 105-115 days		
2. Seed rate (Kernel kg/ha)		
TMV-1 Pure crop 75 kg Mixed crop 60 kg	Adoption is full	—
TMV-2 Pure crop 100 kg		
TMV-7		
Application of manures		
Cattle manure or compost @ 2 t/ha as basal incorporating at the last ploughing.	Full adoption is only by 60% of cultivators.	Non availability of organic manures is the main constraint.
Application of fertilizers		
(N, P ₂ O ₅ and K ₂ O/ha) For rainfed crop 10:10:45 Irrigated crop 10:35:45	Only partial adoption that too 40%	Lack of conviction of the benefit, high cost, and a belief that application of inorganic fertilizers under rainfed condition will adversely affect the performance of the crop.

Irrigation

Once in seven days

50% adoption that too in critical stages. 50% of the farmers irrigate once in a fortnight.

Non availability of water is the main lacuna

Intercultural operation

First weeding and hoeing 10-15 days after germination. At the time of flowering second hoeing and earthing up with an application of gypsum @ 80 kg/ha

Adoption is 100%

—

Plant protection:

Pests

Application of BHC 10% or Carbaryl 10% @ 20 kg/ha against leaf eating caterpillars and leaf miners.

Adoption is full

—

Diseases

Spraying 1% Bordeaux mixture or Bavistin (1 g/litre) at 40-50 days after sowing against Tikka leaf spot.

25% of the farmers adopt the recommendation.

Late stage occurrence of the disease lack of conviction of the benefit of the recommendation and high cost of the chemical are the constraints.

Production Constraints

Groundnut

Production constraints	Technology available but to be adopted (extension gap)	Technology available or needs modification (research gap)
1. Varieties with high yield short duration, drought resistance and tolerance to tikka disease	—	Suitable varieties have to be evolved/ identified
2. Fertilizer requirement for popular groundnut varieties grown in uplands	—	Technology has to be developed
3. Control of leaf miners and Tikka leaf spot disease	Farmers have to be educated about the timely and proper plant protection measures	—
4. New water management techniques for effective use of available soil moisture	—	Technology has to be developed

Pepper

Pepper is grown in the Central Region in 11,637 ha. and the production is 1,487 tons per annum. Nearly 82 percent of the pepper area is spread in two Agro-ecological situations of the region i. e., High elevation—high rainfall (52%) and Medium elevation—high rainfall situation. Most often, pepper is grown as an inter crop in coconut garden with a mixture of other crops.

Recommendation	Adoption pattern	Rationale
1. Varieties Panniyoor-1, Karimunda, Kottanadan, Kuthiravally, Arakulam-Munda, Balankotta, Kalluvally are recommended. Panniyoor-1 should be grown in comparatively open areas.	Majority of farmers cultivate the above varieties. Among them Karimunda is the prominent variety.	
2. Selection of mother plants Select mother plants which give regularly high yields and possess other desirable attributes. Selected mother plants should be in the age group of 5 to 12 years.	Those who are having good mother plants follow the recommendation invariably.	
3. Raising rooted cuttings Select runner shoots produced at the base of mother plants. Keep the runner shoots coiled on wooden pegs fixed at the base of the vines. Separate the runner shoots from the vines in February-March. The middle 1/3 portion of the runner shoots are preferred for planting. The shoots are cut into pieces of	Nearly one fifth of the pepper growers follow the recommendation. Rest of the farmers adopt direct planting of cuttings in the main field.	Practical difficulty of the farmer is the main reason. Large scale production of rooted cuttings are not required due to homestead plantings.

Recommendation	Adoption pattern	Rationale
<p>2-3 nodes each. Dipping of lower cut end of the cuttings in 1000 ppm solution of 3 Indol Butyric Acid for 45 seconds is recommended for better root initiation. Plant the cuttings in nursery bed or preferably in polythene bags or baskets filled with potting mixture. Cuttings should be planted at least one node deep in the soil. The cuttings after planting should be kept under good shade. Light and frequent watering is recommended.</p>		
<p>4. Planting of standards Plant standards in April-May with the onset of pre monsoon showers. Murukku (<i>Erythrina indica</i>), Kilingil (<i>Garuga pinnata</i>), Alianthus sp., Subabul etc. are recommended for growing pepper. Seedlings of Subabul and silver oak are to be planted, 2-3 years before planting of pepper. The spacing recommended is 3 x 3m. on plain lands and 2 m. between plants in rows across the slope and 4 m. between plants in rows in sloping lands.</p>	<p>This method is practised only in areas where a pure crop of pepper is planted.</p>	<p>The usual practice of the farmer is to use the available trees as standards of pepper in a homestead.</p>

5. Planting of pepper

Prepare pits on the northern sides of standards. 50 cm, away from it. The pit size should be 50 x 50 x 50 cm. With the onset of south west monsoon, plant 2 to 3 rooted cuttings in the pits at a distance of about 30 cm. away from the standards. The growing portions of the cuttings are to be trailed and tied to the standards. Provide shade to the plants if the land is exposed. When pepper is grown on coconut or arecanut trees, the pepper cuttings are to be planted 1 to 5 m. away from the trunk of the tree.

The methods are practised by majority of farmers to a certain extent.

Non availability of rooted cuttings is the major reason for the low adoption.

6. Management after planting

Carry out digging around the standards and vines at a radius of about 1m. from the base or the entire plantation twice during the year, first at the onset of south-west monsoon and second towards the end of north-east monsoon. In the early stages, tie the vines to the standards.

The recommendation is only partially adopted

Financial constraints and high cost of labour are the main reasons for not following the technology in full.

Recommendation	Adoption pattern	Rationale
<p>7. Inter cropping inter cropping of pepper gardens with ginger, turmeric, colocasia and elephant foot yam is recommended.</p>	<p>Wherever pure pepper plantation is there, inter cropping is practised.</p>	<p>--</p>
<p>8. Pruning of standards Prune and train the standards in March-April every year to remove excessive over growth and to give them a proper shape. The effective height of the standards is to be limited to about 6 m. A second pruning of the standard may be done in July-August if there is excessive shade.</p>	<p>This practice is invariably adopted in pure plantations. In homesteads this is not usually adopted.</p>	<p>The pruning of the trees of homesteads for this purpose is not practicable.</p>
<p>9. Manures and Manuring Manuring of pepper vine is to be done in basins taken around the plants 10 to 15 cm. deep and of 50-75 cm. radius. Apply cattle manure, compost or green leaves at the rate of 10 kg per annum at the onset of south-west monsoon and cover lightly with soil. Recommended nutrient dosage per standard of pepper of three years and above is as follows: N—100 g/vine/year P₂O₅—40 g/vine/year K₂O—140 g/vine/year</p>	<p>In pure plantation it is partially adopted, but in homestead and other areas it is not adopted.</p>	<p>Financial constraints and non-availability of organic manures are the main reasons for non-adoption.</p>

10. Method of fertilizer application

The fertilizers are to be given in two split doses, first in May-June with the receipt of a few soaking rains and second in August-September. The fertilizers are to be applied in a semi-circular land 30-60 cm. away from the vine depending upon the canopy of the plant.

The fertilizers are applied as a single dose only either during May-June or August-September.

Non-availability of labour and lack of conviction are the main reasons for partial adoption.

11. Plant protection

Pests like Pollu beetles, leaf thrips, root grubs, soft scale and nematodes and diseases like quick wilt, slowwilt and fungal pollu should be controlled by adequate plant protection measures.

For the control of Pollu beetle, fungal pollu and quick wilt, plant protection measures are being adopted by more than 50% of farmers. Other pests and diseases are not very serious.

Financial constraints together with the lack of proper knowledge about pests and diseases are the main reasons for the partial adoption.

Production Constraints

Pepper

Production constraints	Technology available but to be adopted (extension gap)	Technology not available or needs modification (research gap)
1 Rotted pepper cuttings	Farmers have to be educated about the production of rooted cuttings.	—
2 Control of quickwilt and slow wilt.	Existing methods have to be popularised.	—

Cotton

Cotton occupies an area of 6326 ha in the state the production is 10010 bales of 170 kg per annum. The entire area of cotton cultivation of the state is in the Palghat district of the Central Region. Comparison of the area under different agro-ecological situations of the region reveals that nearly 78 per cent of the cotton area is located in the medium elevation—low rainfall situation - and the main cropping system involving cotton in the region is pulses-cotton.

Recommendation		Adoption pattern	Rationale
1. Varieties			
MCU—5	Spinning potential 60 S	Season Rainfed crop sown in July— August.	Adoption is 100%
LRA—5166	40 S	Rainfed and irrigated.	—
2. Seed rate			
10-14 kg delineated seed/ha Seed treatment with Thiram, PCMB, or Carboxym @ 4 g/kg of seed before sowing.		Adoption is full No Adoption	Lack of conviction of the benefit is the constraint.
3. Preparation of land, sowing			
Ploughing 3-4 times, forming ridges and furrows 75 cm. apart. Dibble seeds on the sides of furrows at a distance of 22.5cm. @ 2-3 seeds/hill,		Full adoption	—
4. Application of organic manures			
12.5 t FYM or compost/ha as basal dose for rainfed crop, 25 t FYM/compost for irrigated crop.		Partial adoption to a tune of 80%.	Return is not in commensuration with the cost of manure applied, besides non availability and high cost are the constraints. In cotton area, Penning system is followed, where further manure application is not required.

Recommendation	Adoption pattern	Rationale
<i>Fertilizers</i>		
Application of N, P ₂ O ₅ and K ₂ O @ 35 kg each/ha as basal. Top dressing with 35 kg N/ha 45 days after sowing.	Partial adoption in rainfed crop. In areas where assured rain is expected 20% of the farmers adopt this recommendation.	High cost of fertilizers, lack of awareness of the recommendation are the reasons.
5. After cultivations		
Thinning when the plants are 6-8" tall to retain 2 seedlings per hill. Timely weeding and hoeing.	Adoption is 100%	—
6. Irrigation		
Once in a fortnight. During flowering copious irrigation for inducing good setting and high fibre maturity.	Fairly high adoption (60%)	Lack of irrigation facility and non availability of water are the constraints.
7. Plant protection		
<i>Pests:</i> Against sucking pests like jassids, aphids and thrips, spraying Metasystox, or Rogor @ 2ml/lit. on the occurrence of the pest.	Adoption is 100%	—
For boll worm, spray Nuva-cron 1.5 ml lit. Zolone 3 ml/lit.	Adoption is 100%	—
<i>Diseases:</i> For the control of leaf spot disease, spray Mancozeb at 2 g/litre.	Adoption is 80% where the occurrence of the disease is severe.	Financial constraint and lack of awareness of the gravity of the problems are the constraints reported.

Production Constraints

Cotton

Production constraints	Technology available but to be adopted (extension gap)	Technology not available or needs modification (research gap)
1. Lack of high yielding varieties suitable for the area	—	Suitable technology to be developed.
2. Seed treatment with chemical	Farmers have to be educated	—
3. Dearth of organic matter	Popularise methods for production of compost	—
4. Balanced use of fertilizers	Farmers have to be educated	—
5. Water scarcity	—	Suitable agro techniques for the efficient utilisation of soil moisture and applied water to be developed.

Banana

Banana is grown in an area of about 5,500 ha in the Central Region and the annual production is 0.57 lakh tons which is about the 30 per cent of the state's production. Nearly 60 per cent of the region's banana area is in the Agro-ecological situation, High elevation-high rainfall, followed by the Medium elevation-high rainfall (30%). Nendran is the ruling variety grown because of its higher market price and local demand, and it is mainly grown in the reclaimed paddy fields and in paddy fields after the harvest of first crop rice. Rice-banana or Tapioca-banana are the major cropping systems involving banana.

Recommendation	Adoption pattern	Rationale
1. Varieties		
a) Nendran group: Nendran, Nendran and Zansibar.	67% grow Nendran group and 37% table varieties. Adoption under culinary variety is nil.	Cultivators preference to grow a particular variety considering the market preference is the reason for choosing a particular variety.
b) Table varieties: Monmarie, Robusta, Dwarf Cavendish, Chenkadali, Poovan, Palayamkodan, Njalipoovan, GrosMichel and Karpooravally.		
c) Culinary variety: Monthan, Bathesa, Kanchekola and Nendrapadathi.		
2. Preparation of land		
Prepare the field by ploughing or digging and take pits for planting. Size of pits depends upon soil types, water table and variety. In general pit size of 50 x 50 x 50 cm is recommended. In low lying areas mounds may be formed for planting.	Majority of farmers adopt the recommendation (85%). Adoption is fairly high to an extent of 78%.	

3. Selection of suckers

Select 3 to 4 months old disease free sword suckers from healthy clumps. In the case of Nendran variety, cut back pseudostem to length of 15 to 25 cm from corm and remove old roots. The rhizomes are to be smeared with cowdung solution and ash and dried in the sun for about 3 to 4 days and stored in shade upto 45 days before planting.

For Nendran group adoption rate is almost full. For rest of the varieties, the adoption rate is about 35%.

The rest of farmers collect suckers from other available sources hence the selection is not possible. They collect the suckers from the available sources.

4. Spacing

Spacing may be provided as indicated below:

Variety	Spacing
Poovan	2.13 x 2.13 m
Chenkadali	2.13 x 2.13 m
Palaymkodan	2.13 x 2.13 m
Monthan	2.13 x 2.13 m
Nendran	2 x 2 m
Grosmichel	2.4 x 2.4 m
Robusta, Monsmarie, Dwarf Cavendish	2.4 x 1.8 m

In the case of pure crop majority (80%) of farmers follow the recommended spacing. When banana is grown as an intercrop in homestead system, this practice is rarely followed.

The usual practice of the cultivator is to follow closer spacing in order to accommodate more number of plants per unit area in a homestead system.

5. Application of manures and fertilizers

i) Organic manure

Apply compost, cattle manure or green leaves @ 10 kg per plant at the time of planting.

Full adoption by 20% and adoption by rest is only partial.

Non availability of organic manure and its high cost are the main reasons for low adoption.

Recommendation	Adoption pattern	Rationale																
<p><i>ii) Fertilizers</i></p> <p>Apply fertilizers at the following dose (g/plant/annum):</p> <table border="1" data-bbox="295 349 714 742"> <thead> <tr> <th></th> <th>N</th> <th>P₂O₅</th> <th>K₂O</th> </tr> </thead> <tbody> <tr> <td>Nendran (irrigated)</td> <td>190</td> <td>115</td> <td>300</td> </tr> <tr> <td>Palayamkondan (rainfed)</td> <td>100</td> <td>200</td> <td>400</td> </tr> <tr> <td>Other varieties depending upon soil fertility level</td> <td>160-200</td> <td>160-200</td> <td>320-400</td> </tr> </tbody> </table>		N	P ₂ O ₅	K ₂ O	Nendran (irrigated)	190	115	300	Palayamkondan (rainfed)	100	200	400	Other varieties depending upon soil fertility level	160-200	160-200	320-400	<p>Adoption is partial.</p>	<p>Financial problems of the farmer and ignorance about the need for application of full dose of fertilizers are the main reasons for not following the technology.</p>
	N	P ₂ O ₅	K ₂ O															
Nendran (irrigated)	190	115	300															
Palayamkondan (rainfed)	100	200	400															
Other varieties depending upon soil fertility level	160-200	160-200	320-400															
<p><i>iii) Irrigation</i></p> <p>a) During summer months irrigate once in 3 days</p> <p>b) Ensure good drainage and prevent water logging.</p> <p>Nendran (October planting) grown under deep water table condition (below 2 m from ground level) need 10 mm (40 litres per plant) irrigation once in two days during summer season to ensure higher bunch yield and better water use efficiency.</p>	<p>Majority of farmers who cultivate Nendran varieties irrigate the crop as required. Farmers who cultivate other varieties seldom give irrigation.</p>	<p>Lack of irrigation facilities is the main reason for not irrigating the crop in other situations.</p>																

6. After cultivation

Control weeds by spraying with a combination of weedicides (Diuron 2 to 3 kg/ha and paraquat @ 0.30 kg ai/ha). If hand weeding is resorted to give 4 to 5 surface digging depending upon weed growth. Avoid deep digging. Do not disturb soil once the plant start producing bunches. Remove side suckers produced till the emergence of flowers. Retain 1 to 2 suckers produced after the bunch formation.

Pests

i) *Rhizome weevil*

Dipping suckers in 0.2% BHC solution or applying Aldrin 5% DP @ 50 g/pit.

In the cast of hand weeding full adoption is 58% and others follow partial adoption. Herbicides are seldom used.

For hand weeding high cost of labour and for chemical method lack of conviction of the recommendation, non availability and high cost of weedicides are the main reasons for not following the technology.

Dipping in BHC solution. Adoption is 80%.

Treatment depends upon the endemic nature of the pest.

ii) *Nematode*

Application of carbofuran @ 30g per plant at 75 DAP and 105 DAP

Adoption is partial.

Chemical application at the time of planting is done only in endemic areas and the severity due to nematode infestation is less felt due to the lack of external symptoms.

Recommendation	Adoption pattern	Rationale
Diseases		
a) <i>Bunchy top</i>		
Eradication of disease affected plants. Control vector (Aphid) by using granular insecticide like phorate 10 G @ 25 g at planting and 12.5 g subsequently at 75 DAP and 165 DAP.	About 80 per cent adoption. The adoption rate is about 75 per cent.	Non adoption (20%) is due to the late recognition of the symptom.
b) <i>Sigatoka disease (leaf spot)</i>		
Spraying (1% Bordeaux mixture or Captafol 0.3% or Calyxin (80 EC) @ 6 ml /10 litre of water on leaves.	About 80 per cent of the farmers adopt the practice.	—
Cutting and pruning the affected leaves.	50 to 60 per cent adoption.	Unawareness of the spread of diseases.

Banana

Production constraints	Technology available but to be adopted (extension gap)	Technology available or needs modification (research gap)
1 Non availability of varieties suitable for rainfed conditions	—	Suitable varieties have to be evolved
2 Adoption of closer planting especially in homesteads and mixed cropping systems	Proper spacing has to be popularised	—
3 Imbalanced and untimely use of fertilizers	Proper education is required	—
4 Failure to do desukering in time	—do—	
5 Timely propping is not done.	—	Cheap materials for propping or methods have to be evolved
6 Incidence of rhizome weevil attack and sigatoka disease is severe	Available technology has to be adopted	—
7 Spread of Kokkan disease	—	Suitable technology for the control has to be developed.
8 Lack of suitable technology for rainfed banana and relay cropping banana in paddy fields	—	Technology has to be developed.

Sugarcane

Nearly 98 percent of the area under sugarcane of the Central Region is located in the Palghat district and 85 per cent of the region's sugar cane area is in the seventh Agro-ecological situation i.e., Medium elevation-low rainfall. The normal planting season is October-December and the prominent varieties are Co-419, Co-449 and COC-67-1. Mostly sugarcane is grown as a pure crop for a period of three years and it is grown as an irrigated crop depending upon the availability of water.

Recommendation	Adoption pattern	Rationale
1 Varieties		
Co-6304 Suitable for flood Co-419 prone situation Co-449 Co-62175 For drought prone Co-62174 situation COC-67-1	Adoption is full	—
2 Preparation of land		
Plough the land thrice, and prepare furrows 75 cm apart and 25 cm deep.	Full adoption	—
3 Selection of setts and seed rate		
Use disease free setts, taken from top 1/3rd portion of the cane, with two buds. 40,000—50,000 setts/ha	All the farmers follow the recommendation	—
4 Seed treatment		
Dip the setts in solution prepared by dissolving @ 1g Bavistin in one litre water.	Adoption is full in disease prone areas	—

5. **Planting**

Plant the setts end-to-end in furrows with eye buds facing side ways and covering with soil

Adoption is full

—

6. **Manures**

Apply organic manure @ 10 t/ha and lime @ 500 kg/ha.

45% of the farmers adopt the technology partially

Non availability and high cost are the main reasons for non adoption by the rest of the farmers

Fertilizers

Apply N, P₂O₅ and K₂O 225, 62.5 62.5 kg/ha

For all varieties except COC-67-1 For COC-67-1 apply N, P₂O₅ and K₂O @ 70:25:45 kg/ha in split doses

Adoption is only partial (45%)

Financial problem is the main constraint in adopting this technology

Ratoon crop

For ratoon crop apply organic manure @ 4 t/ha, 25 days after cutting. Apply 56 kg N, 30 kg P₂O₅ and 15 kg K₂O/ha as first top dressing. Give a second top dressing on 75th day.

Adoption is only 50%

-do-

7. **Irrigation**

Irrigate the crop 8-10 times depending upon the availability of the rain. Care must be taken to avoid excess moisture and water stagnation during germination stage.

Adoption is full. (In some areas 25-30 irrigations per crop are given depending upon the availability of water).

—

Recommendation	Adoption pattern	Rationale
8. Plant protection		
For the pests like white-grubs, and termites, use pest free setts for planting. Adhere clean cultivation. Apply Aldrin, Heptachlor or Chlordane (20 kg/ha) in the furrows.		
For the control of early shoot borers, spray Ekalux 25 EC @ 2 ml/lit. of water.	Adoption is 100%	—
9. Harvesting		
Harvest the crop when fully mature.	Adoption is full	—

Production Constraints

Sugarcane

Production constraints	Technology available but to be adopted (extension gap)	Technology not available or needs modification (research gap)
1. Water scarcity	—	Present technology needs modification

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Vol. III

ANNEXURES

Annexure 1

District-wise distribution of Administrative/Development Divisions of Kerala

Item	Unit	Reference year	Thiruvandrum	Quilon	Pathanamthitta	Alleppey	Kottayam	Idukki	Ernakulam	Trichur	Paighat	Malappuram	Kozhikode	Wynad	Cannanore	Kasaragode	State
Taluks	Nos.	1985	4	5	5	6	5	4	7	5	5	4	3	3	3	2	61
Blocks	Nos.	1985	12	12	10	12	11	8	15	17	12	14	12	3	9	4	151
Municipalities/ Corporations/ Townships	Nos.	1985	5	2	2	5	4	2	8	7	3	4	2	—	3	2	49
Census towns	Nos.	1985	6	5	2	6	4	2	16	25	4	4	6	—	25	2	107
Panchayaths	Nos.	1985	84	76	56	66	73	51	86	98	91	95	77	25	85	37	1000

(Source : Progress of Kerala in three Decades 1956-1985—Department of Economics & Statistics, Thiruvandrum)

Note : One Panchayat viz. Kuttappuzha in Pathanamthitta district was merged with the nearby Thiruvalla Municipality in 1987.

Annexure 2

River water resources of Kerala

Sl. No.	Name of the River	Name of River basin	Length of the river (kms)	Catchment area in sq. km.			Annual yield (Million Cubic Ms.)			Annual utilisable (Million Cubic Ms.)		
				Total	In Kerala	Outside Kerala	Total	In Kerala	Outside Kerala	Total	In Kerala	Outside Kerala
1	2	3	4	5	6	7	8	9	10	11	12	13
1	Manjeswar	Manjeswar	16	340	166	174	698	309	389	379	106	273
2	Uppala	Uppala										
3	Shiriya	Shiriya	67	587	290	297	1337	620	717	973	358	615
4	Mogral	Chandragiri	34	1538	702	886	3964	1718	2246	3129	1218	1911
5	Chandragiri	-do-	105									
6	Chittari	Chittari	25	145	145	—	254	254	—	100	100	—
7	Nileswar	Nilaswar	46	751	619	132	1710	1356	354	1238	937	301
8	Kariankode	Kariankode	64									
9	Kavvayi	Kavvayi	31	495	495	—	1143	1143	—	603	603	—
10	Peruvamba	Peruvamba	51									
11	Ramapuram	Ramapuram	19									
12	Kuppam	Kuppam	82	538	469	70	1516	1236	280	1024	786	238
13	Valapattanam	Valapattanam	110	1867	1321	546	4092	2784	1308	2938	1823	1115
14	Anjarakandy	Anjarakandy	48	412	412	—	986	986	—	503	503	—
15	Telicherry	Telichery	28	132	132	—	251	251	—	122	122	—
16	Mahe	Mahe	54	394	394	—	803	803	—	445	445	—
17	Kuttiady	Kuttiady	74	583	583	—	1625	1626	—	1015	1015	—
18	Karapuzha		40	4765	4377	388	7775	7135	640	3160	2616	544
19	Kallai	Chaliyar	22									
20	Chaliyar		169									
21	Kadalundi		130									

1	2	3	4	5	6	7	8	9	10	11	12	13
22	Tirur	Tirur	48	117	117	—	165	165	—	60	60	—
23	Bharathapuzha	Bharathapuzha	209	6186	4400	1786	7478	6540	938	4146	3349	797
24	Kōcheri	Kōcheri	51	635	635	—	1024	1924	—	345	345	—
25	Puzhakkal											
26	Karuvannur	Karuvannur	48	1054	1054	—	1887	1887	—	963	963	—
27	Chalakudy	Chalakudy	130	1704	1404	300	3121	2541	580	2033	1539	494
28	Periyar	Periyar	244	5398	5284	114	11607	11341	266	8230	8004	226
29	Muvattupuzha	Muvattupuzha	121	2004	2004	—	3814	3814	—	1812	1812	—
30	Meenachil	Meenachil	78	1272	1272	—	2349	2349	—	1110	1110	—
31	Manimala	Manimala	90	847	847	—	1829	1829	—	1108	1108	—
32	Pamba	Pamba	176	2235	2235	—	4641	4641	—	3164	3164	—
33	Achancoil	Achancoil	129	1184	1484	—	2287	2287	—	1249	1249	—
34	Pallikkal	Kallada	42	1919	1919	—	2770	2770	—	1368	1368	—
35	Kallada											
36	Ithikkara	Ithikkara	56	642	642	—	761	761	—	429	429	—
37	Vamanapuram	Vamanapuram	88	867	867	—	1324	1324	—	889	889	—
38	Ayroor											
39	Mamom											
40	Karamana	Karamana	68	703	703	—	836	836	—	462	462	—
41	Neyyar	Neyyar	56	497	497	—	433	433	—	229	229	—
Total				40112	35469	4643	71981	64263	7718	43226	36712	6514
<i>East flowing</i>												
1	Kabbini	Kabbini		1920	1920	—	4333	4333	—	4333	4333	—
2	Bhavani	Bhavani		562	562	—	1019	1019	—	1019	1019	—
3	Pambar	Pambar		384	384	—	708	708	—	708	708	—
Total				2866	2866	—	6060	6060	—	6060	6060	—
Grand Total				42978	38335	4643	78041	70323	7718	49286	42772	6514

Source : Water Resources of Kerala, P. W. D., Government of Kerala, June, 1974.

(Land Resources and Land Use in Kerala—State Land Use Board, Trivandrum, December, 1980).

Annexure 3

Characteristics of the surface soil of the important soil types of Kerala

Characteristics	Red loam (Thiruvallam)	Laterite (Koduvally)	Coastal alluvium (Azhoor)	Riverine alluvium (Parappur)	Onattukara alluvium (Krisnapuram)	Brown hydro-morphic (Naduvattom)	Saline hydro-morphic (Elamkunnapuzha)	Kuttanad alluvium			Black soil (Kozhijampara)	Forest loam (Manikulam)
								Kayal (Vechoor)	Karappadam (Champakulam)	Kari soil (Ambalappuzha)		
pH	5.10	6.20	6.60	5.80	6.20	5.70	6.90	5.40	5.30	3.00	8.00	5.8
Gravel %	5.07	73.92	—	—	—	—	—	—	—	—	2.13	5.80
Coarse sand %	40.70	37.12	70.00	24.25	60.00	13.00	13.60	0.20	18.30	1.40	5.10	33.60
Fine sand %	25.30	11.32	12.00	32.00	23.10	13.20	16.30	50.20	24.50	5.58	14.50	7.10
Silt %	18.00	18.32	3.50	26.10	5.00	25.00	20.20	19.20	16.60	26.50	16.40	36.00
Clay %	12.40	30.45	11.00	16.03	10.00	50.50	45.50	28.10	31.00	52.40	61.70	21.50
Total N%	0.04	0.08	0.01	0.07	0.07	0.09	0.13	0.15	0.41	0.45	0.03	0.15
Organic Carbon %	0.49	0.66	1.14	0.64	1.00	1.17	2.26	0.75	6.50	8.06	0.48	2.10
Total CaO %	0.02	0.17	0.02	0.01	0.04	0.02	0.24	0.31	0.12	0.34	1.10	0.04
Total P ₂ O ₅ %	0.07	0.08	0.05	0.05	0.05	0.03	0.06	0.05	0.04	0.12	0.02	0.03
Total K ₂ O %	0.03	0.19	0.04	0.03	0.11	0.05	0.23	0.02	0.32	0.31	0.23	0.24
P ₂ O ₅ %	11.00	20.00	—	9.25	14.43	9.59	29.30	35.35	32.50	—	12.50	9.20
Fe ₂ O ₃	5.56	11.84	—	3.72	4.46	3.60	3.40	3.21	6.75	—	2.15	3.64
CEC, me/100 g	4.00	5.60	3.00	3.26	2.22	8.20	20.20	16.10	13.80	24.32	31.20	10.00
TEMC me/100 g	2.10	3.00	1.60	1.82	—	4.72	11.85	8.55	6.50	10.60	18.10	5.55
Base saturation	52.50	53.53	53.33	55.82	—	67.56	58.66	52.13	47.10	43.58	58.01	50.91
WHC %	—	—	—	33.50	—	—	39.68	40.00	38.80	45.60	51.80	35.00
EC mmhos/cm	—	—	—	—	—	—	3.00	0.50	0.20	1.50	0.37	—

Source: Soils of Kerala; Soil Survey Branch, Department of Agriculture, Kerala (1978).

Annexure 4

Fertilizer recommendation based on soil test values followed in Kerala

Soil fertility Class No.	% organic C		Recommendation of N, as % to general re-commendation	Available P (kg/ha)	Exchangeable K (kg/ha)	Recommendation of P & K, as % to general recommendation
	Sandy	Clayey loamy				
0	0.09–0.10	0.99–0.16	128	0.0– 3.0	0 – 35	128
1	0.11–0.20	0.17–0.33	117	3.1– 6.5	36– 75	117
2	0.21–0.30	0.34–0.50	106	6.6–10.0	76–115	106
3	0.31–0.45	0.51–0.75	97	10.1–13.5	116–155	94
4	0.46–0.60	0.76–1.00	91	13.6–17.0	156–195	83
5	0.61–0.75	1.01–1.25	84	17.1–20.5	196–235	71
6	0.76–0.90	1.26–1.50	78	20.6–24.0	236–275	60
7	0.91–1.10	1.51–1.83	71	24.1–27.5	276–315	48
8	1.11–1.30	1.84–2.16	63	27.6–31.0	316–355	37
9	1.31–1.50	2.17–2.50	54	31.1–34.5	356–395	25

Source: Department of Agriculture, Kerala.

Annexure 5

Fertilizer consumption in Kerala (tonnes)

Year	N	P ₂ O ₅	K ₂ O	Total
1960-61	5314	4703	2032	12049
1961-62	6264	8461	2248	16973
1962-63	8296	9033	7948	25277
1963-64	10148	9452	8853	28952
1964-65	12746	11210	10252	34908
1965-66	15251	12773	11305	30329
1966-67	21106	13373	11030	45419
1967-68	24000	15689	11853	54542
1968-69	28574	20442	21514	70330
1969-70	30120	20347	21543	72010
1970-71	26335	14183	16139	56655
1971-72	31257	15670	18044	64671
1972-73	31484	22314	20470	74268
1973-74	31691	22609	24524	78846
1974-75	32143	17187	18032	67362
1975-76	31654	14374	16643	62671
1976-77	33533	15796	20157	69404
1977-78	36995	19167	26394	81556
1978-79	45689	23382	30766	99837
1979-80	46341	25402	33872	105615
1980-81	41697	23402	32431	97530
1981-82	40612	23214	30935	94761
1982-83	45233	26555	38065	109753
1983-84	62480	31178	35819	129477
1984-85	57657	32642	37346	127645
1985-86	59263	34412	47652	141330

Source: Fertiliser Association of India

Annexure 6

Soil testing laboratories other than those under the State Department of Agriculture

Location	Organization	Capacity samples/annum
Kanjirappally	Kerala State Rubber Marketing Federation	1,200
Mèppadi	UPASI Tea Advisory Service	2,000
Munnar	-do-	3,000
Myladumpara	Indian Cardamom Research Institute	3,500
Puthupally	Rubber Research Institute of India, Kottayam	2,000
-do- (Mobile)	-do-	3,000
Udyogamandal	FACT	30 000
-do- (Mobile)	-do-	10,000
Vandiperiyer	UPASI Tea Research Sub Station	2,000

Source : Fertilizer Association of India

Annexure 7

Fertilizer consumption in Kerala predicted upto 2000 AD based on linear regression models fitted to actual fertilizer consumption (in tonnes) for the period 1960-61 to 1985-86

Year	N	P ₂ O ₅	K ₂ O	Total
1986-87	64434	31931	47727	144092
1987-88	67612	33140	50247	150999
1988-89	70867	34370	52832	158069
1989-90	74198	35623	55481	165302
1990-91	77605	36898	58195	172698
1991-92	81089	38196	60974	180259
1992-93	84649	39516	63818	187983
1993-94	88286	40859	66726	195871
1994-95	92000	42224	69699	203923
1995-96	95790	43612	72737	212139
1996-97	99656	45022	75840	220518
1997-98	103599	46554	79008	229061
1998-99	107618	47909	82240	237767
1999-2000	111714	49386	85538	246638
2000-2001	115887	50886	88900	255673

Source : Dr. A. I. Jose, Strategy for meeting fertilizer use target in Kerala by 2000 AD—Conference on *Fertilizer Technology*, ICAR, New Delhi.

Annexure 8

Station-wise climatological data. Calicut: Lat. 11°1.5' Long. 75° 47, E, MSL 5m.
(Based on observations 1931-1960)

Station	Daily Max. °C	Daily Min. °C	RH%		Rainfall	
			8.30 AM	17.30 PM	Monthly total mm	No. of Rainy days
Calicut						
J	31.7	22.0	74	64	5.9	0.4
F	31.9	23.1	76	66	11.1	0.3
M	32.6	24.7	74	69	21.0	0.7
A	32.9	25.8	75	71	111.1	5.2
M	32.5	25.6	81	76	322.5	10.9
J	29.5	23.8	90	85	870.9	24.5
J	28.2	23.3	92	89	860.0	26.5
A	28.7	23.6	92	86	404.9	20.0
S	29.5	23.7	88	82	215.0	12.3
O	30.4	23.8	85	78	290.4	11.5
N	31.1	23.4	80	72	140.0	7.1
D	31.6	22.2	75	64	29.9	1.4
Annual						
Mean/Total	30.9	23.7	82	75	3282.7	120.8

(Annexure 8 contd.)

Station: Palghat, Lat. 10° 46' N, Long. 76° 39' E, Ht MSL 7m

Station	Mean		RH%		Rainfall	
	Daily Max. °C	Daily Min. °C	8.30 AM	17.30 PM	Monthly total (mm)	No. of rainy days
J	33.5	22.3	67	41	3.8	0.3
F	35.7	23.0	64	33	5.5	0.6
M	37.4	24.5	67	38	17.2	1.5
A	36.0	25.3	77	59	106.7	5.6
M	33.4	24.8	81	69	192.3	9.4
J	29.3	23.3	89	82	414.1	20.7
J	28.1	22.6	92	85	546.2	21.0
A	28.8	23.1	91	81	274.1	18.4
S	30.3	23.1	87	73	125.5	10.4
O	30.7	23.4	85	77	242.8	12.7
N	31.8	23.0	77	68	112.0	6.3
D	32.1	22.2	69	50	18.4	1.0
Annual Mean/Total	32.3	23.4	79	63	2058.6	107.9

Source: India Meteorology Department, Trivandrum

Station: Trivandrum, Lat. 08° 29' Long. 76° 57' E, Ht. above MSL 64 m
(Based on observations for 1931-1960)

J	31.3	22.3	77	63	20.1	1.6
F	31.7	22.9	79	63	20.3	1.5
M	32.5	24.2	80	66	43.5	3.0
A	32.4	25.1	81	73	122.1	7.1
M	31.6	25.0	84	77	248.6	10.8
J	29.4	23.6	90	82	331.2	18.8
J	29.1	23.2	89	81	215.4	15.6
A	29.4	23.3	88	79	164.0	11.9
S	29.9	23.3	86	77	122.9	8.9
O	29.9	23.4	87	80	271.2	11.5
N	31.0	23.1	87	78	206.9	10.6
D	39.0	22.5	80	69	73.1	4.2
Annual Mean/Total	37.0	23.5	84	74	1839.3	105.2

(Annexure 8 contd)

Station: Cochin, Lat. 09° 58', Long. 76° 14' Ht. above MSL 3 m

Station Cochin	Daily Max. °C	Daily Min. °C	RH%		Rainfall	
			8.30 AM	17.30 PM	Monthly total (mm)	No. of rainy days
J	30.6	23.2	68	64	9.6	0.6
F	30.7	24.3	72	68	34.2	1.6
M	31.3	25.8	74	70	50.0	2.6
A	31.4	26.0	75	74	139.5	7.5
M	39.0	25.7	81	78	364.3	12.8
J	29.0	24.1	88	84	755.9	25.0
J	28.1	23.7	89	87	571.9	23.0
A	28.1	24.0	88	83	385.7	19.3
S	28.3	24.2	84	84	234.8	14.1
O	29.2	24.2	83	80	332.7	14.3
N	29.8	24.1	78	74	183.7	8.9
D	30.3	23.5	71	66	36.8	2.1
Annual Mean/ Total	29.8	24.4	79	76	3099.1	132.7

Source: India Meteorology Department, Trivandrum.

Station: Alleppey, Lat. 09° 33'N, Long. 76°25', MSL 4 m (1951 to 1960)

J	31.9	22.6	74	68	18.3	1.8
F	31.9	23.6	76	70	27.4	1.8
M	32.6	24.9	76	71	74.1	3.9
A	32.7	25.5	78	73	158.4	9.9
M	31.6	25.3	83	78	456.8	15.3
J	29.5	23.9	90	85	781.0	23.4
J	28.8	23.3	91	85	521.3	21.7
A	28.8	23.5	91	85	313.3	17.5
S	29.4	23.7	86	82	271.6	15.0
O	29.7	23.8	85	81	395.6	15.8
N	30.3	23.7	81	76	209.5	19.2
D	31.4	22.8	75	68	36.3	2.4
Annual Mean/ Total	30.7	23.9	82	77	3263.6	138.7

(Annexure 8 contd.)

Station: Alleppey—1984 Ref:—Monthly values of Climatological data from 1973.

	Max. °C	Min. °C	R. H.	Rainfall	No. of rainy days
J	32.5	23.5	83	38.1	3
F	33.4	24.3	82	116.7	5
M	32.9	24.5	81	64.5	6
A	33.3	25.3	83	394.6	10
M	33.5	26.6	83	41.1	5
J	29.9	23.3	92	683.4	28
J	29.3	23.2	92	408.8	19
A	29.1	23.2	90	202.0	18
S	30.1	23.6	88	187.2	11
O	30.3	23.5	86	141.0	9
N	32.0	24.0	86	105.4	9
D	32.2	22.9	80	30.8	2

Source: India Meteorology Department, Trivandrum

Station: Calicut—1984

J	31.7	23.5	81	4.4	1
F	32.4	24.7	79	26.2	1
M	32.5	25.3	80	30.4	1
A	32.4	25.5	81	388.2	8
M	32.2	26.6	79	42.8	6
J	28.6	23.4	92	861.4	28
J	28.1	23.4	92	675.5	23
A	28.5	23.4	92	422.4	10
S	29.3	23.6	89	87.1	12
O	29.8	23.2	86	366.0	11
N	31.9	23.9	80	131.1	3
D	33.3	22.1	78	12.7	1

Station: Trivandrum—1984

J	31.8	22.9	81	65.1	6
F	31.4	23.2	85	128.2	7
M	31.7	23.6	86	151.0	10
A	31.8	24.4	86	297.0	10
M	32.6	25.3	84	153.7	6
J	29.7	23.3	91	205.5	17
J	29.1	32.9	89	126.0	12
A	30.8	23.4	83	21.1	2
S	31.0	23.2	83	40.2	5
O	29.8	22.8	83	205.1	9
N	30.8	23.3	86	71.8	8
D	31.8	22.1	72	2.7	—

Source: India Meteorology Department, Trivandrum

Annexure 9

Station: Trivandrum 1984 (Monthly values of climatological data from 1973)

Trivandrum	Max °C	Min °C	R. H. %	Rainfall m m	No. of rainy days
J	31.6	22.6	80	91.7	3
F	32.2	23.3	81	40.2	3
M	33.4	24.9	77	13.6	2
A	33.5	25.4	78	87.4	4
M	32.2	24.4	83	223.3	13
J	28.7	22.8	93	424.3	27
J	29.8	22.9	88	82.5	12
A	30.1	23.3	86	61.8	7
S	30.9	23.6	84	96.7	3
O	30.4	23.6	87	162.7	9
N	30.1	22.7	83	170.4	7
D	31.7	22.9	76	39.5	5

Station : Cochin 1984

J	32.0	23.7	81	156.5	5
F	32.4	24.0	81	170.1	5
M	32.3	25.0	82	59.0	4
A	32.7	25.6	80	113.1	9
M	32.9	24.8	84	136.6	8
J	29.6	23.5	96	785.0	28
J	29.0	23.1	94	601.4	22
A	29.8	23.6	92	243.7	17
S	29.8	24.2	85	131.1	7
O	29.6	23.3	86	308.2	5
N	31.8	24.3	83	116.1	6
D	31.5	22.4	75	15.5	1

Station : Calicut 1983

J	31.7	23.5	81	4.4	1
F	32.4	24.7	79	26.2	1
M	32.5	25.3	86	30.4	1
A	32.4	25.5	81	388.2	8
M	32.2	26.6	79	42.8	6
J	28.6	23.4	92	861.4	28
J	28.1	23.4	92	675.5	23
A	28.5	23.4	92	422.4	20
S	29.3	23.6	89	87.1	12
O	29.8	23.2	86	366.0	11
N	31.9	23.9	80	131.1	3
D	33.3	22.1	78	12.7	1

(Annexure 9 contd.)

Station : Trivandrum.1984

Station Calicut	Max °C	Min °C	R. H. %	Rainfall m m	No. of rainy days
J	31.8	22.9	81	65.1	6
F	31.4	23.2	85	128.2	7
M	31.7	23.6	86	151.0	10
A	31.8	24.4	86	297.0	10
M	32.6	25.3	84	153.7	6
J	29.7	23.3	91	205.5	17
J	29.1	32.9	89	126.0	12
A	30.8	23.4	83	21.1	2
S	31.0	23.2	83	40.2	5
O	29.8	22.8	83	205.1	9
N	30.8	23.3	86	71.8	8
D	31.8	22.1	72	2.7	—

Source : India Meteorology Department, Trivandrum

Annexure 10

District-wise distribution of area under forests (hectares) in Kerala.

District	Area			% to the total forests	% to the area of the Districts
	1978--79	1979--80	1980--81		
Trivandrum	49861	49861	49861	4.60	22.78
Quilon	236048	236048	236048	21.83	49.76
Alleppey	518	518	518	0.04	0.28
Kottayam	8141	8141	8141	0.75	3.70
Idukki	260993	260993	260993	24.13	50.67
Ernakulam	8123	8123	8123	0.75	3.45
Trichur	103619	103619	103619	9.59	34.61
Palghat	136257	136257	136257	12.60	31.04
Malappuram	103417	103417	103417	9.57	34.61
Kozhikode	90876	90876	90876	8.41	24.48
Cannanore	83656	83656	83656	7.73	14.73
State	1081509	1081509	1081509	100.00	27.83

Source: Season and Crop report of Kerala 1979-1980 & 1980-81 p-7, Department of Economics & Statistics, Trivandrum.

Annexure 11

Division-wise area of reserve forests and vested forests in Kerala (1985)

Division	Area (ha)
A Reserve Forests	
1 Trivandrum	57058
2 Thenmala	56762
3 Punalur	28005
4 Konni	33166
5 Ranni	105746
6 Kottayam	73074
7 Malayattur	64509
8 Munnar	89660
9 Chalakudy	35471
10 Trichur	33102
11 Wild Life Division (Thekkady)	77700
12 Nenmara	48407
13 Nilambur	32459
14 Palghat	37317
15 Kozhikode	42062
16 Wynad	45782
17 Special Division (Kozhikode)	359
18 Kothamangalam	31686
19 Vazhachal	41178
Sub Total (A)	933503
B Vested Forests	
1 Palghat	79392
2 Nilambur	42903
3 Kozhikode	42020
4 Tellicherry	17591
5 Tiru-Cochin	6740
Sub Total (B)	188652
Grand Total (A+B)	1122155

Source: Economic Review 1985, State Planning Board, Trivandrum.

Annexure 13

Cost escalation of Major and Medium irrigation Projects in Kerala (Rs. in lakhs)

Name of the Scheme	Year of starting	Original Estimate	Latest Estimate	Expenditure upto 3/85 (anticipated)	Expected year of completion	Increase in the original cost (%)
Major Schemes						
Pamba	1961	383	5200	4874	3/86	1358
Periyar Valley	1956	348	5700	4643	3/86	1638
Chitturpuzha	1963	105	1786	1396	3/86	1701
Kuttiadi	1962	496	4860	4607	3/86	980
Kanhirapuzha	1961	365	4200	3679	1986	1151
Kallada	1961	1328	20000	13216	1987	1506
Pazhassi	1961	1320	5400	4780	1986	409
Chimoni	1976	2900	2343	956	1988	81
Idamalayar	1977	1439	6147	1546	1992	427
Muvattupuzha	1975	1100	4808	1935	1990	436
Kakkadavu	1979	1330	2600	152	1992	195
Beyyporepuzha	1979	344	1061	34	1995	308
Kuriarkutty-Karappara	1979	1600	4881	112	1995	305
Medium Schemes						
Attappady	1975	476	2077	523	1990	436
Karapuzha	1975	389	1200	642	1989	308
Vamanapuram	1979	780	3640	69	1993	467
Meenachil	1979	810	4810	30	1993	594
Banasurasagar	1980	1100	1137	112	1990	103

(Source: Economic Review, 1985—Government of Kerala)

Annexure 14

Physical and Financial achievements under Minor Irrigation--Kerala

Item	1983-84			1984-85	
	Actual Expenditure (Rs. lakhs)	Achievements (Area in ha)		Actual Expenditure (Rs. lakhs)	Achievements (Area in ha) (net)
1	2	3 (Net)	4 (Gross)	5	6
Minor Irrigation Class I	224.17	2225	3338	244.99	2080
Minor Irrigation Class II (PWD)	81.28	1137	1137	108.95	2139
Minor Irrigation Class II with peoples participation					
Lift Irrigation	161.88	1894	2841	169.04	1580
I. P. D. Yelah Scheme	73.65	917	917	45.37	1070
Repairs to M. I. Structures	21.24	—	—	72.55	294
Others	23.61	705	705	29.00	—
Total	585.83	6878	8938	669.90	7163

Annexure 15

Number of Minor Irrigation Works proposed and completed during 1984—85

Items	No. of works proposed	No. of works completed
Minor Irrigation Class I	227	39
Minor Irrigation Class II PWD	380	126
Minor Irrigation Class II (with peoples participation)	—	—
Lift Irrigation	143	28
Repairs to Minor Irrigation Structures	104	23
I.P.D. Yelah Scheme	239	57

Source: Economic Review 1985, State Planning Board, Trivandrum

Annexure 16

District-wise distribution of area, population, growth rate and density of population and sex ratio-1971 & 1981

District/ State	Area Sq. Km.	1981 population			Density of popu- lation per sq. km (1971)	Density of popu- lation per sq. km (1981)	Decadal growth rate (1971- 1981)	Sex ratio	
		Persons	Males	Females				Female/ 1000 male 1971	1981
Trivandrum	2192.0	2596112	1279150	1316962	1003	1184	18.08	1008	1030
Quilon	4620.0	2813650	1388678	1424972	522	609	16.61	—	1926
Alleppey	1883.0	2350145	1146407	1203738	1128	1248	10.56	—	1050
Kottayam	2204.0	1697442	848462	848980	701	770	10.29	991	1001
Idukki	5061.0	971636	494999	476637	150	192	26.91	937	963
Ernakulam	2408.0	2535294	1269174	1266120	910	1053	17.18	988	998
Trichur	3032.0	2439543	1161675	1277868	702	8805	14.60	1081	1100
Palghat	4480.0	2044399	994196	1050203	383	456	21.30	1056	1056
Malappuram	3548.0	2402701	1170778	1231923	510	677	29.43	—	1052
Kozhikode	2345.0	2245265	1111409	1133856	569	957	23.25	—	1020
Wynad	2132.0	554026	284261	269765	—	260	33.87	—	949
Cannanore	4958.0	2803467	1378578	1424889	415	565	25.39	—	1034
State	38863.0	25453680	12527767	12925913	549	655	19.24	1016	1032

Source: 1. Census of India 1971 3. Statistics for planning 1983, Directorate of Economics and Statistics, Kerala
 2. Census of India 1981 4. Season and Crop report of Kerala, March 85.

Annexure 17

Population of Scheduled Castes and Scheduled Tribes in Kerala

District	1951		1961		1971		1981	
	Scheduled Caste	Scheduled Tribe	Scheduled Caste	Scheduled Tribe	Scheduled Caste	Scheduled Tribe	Scheduled Caste	Scheduled Tribe
Trivandrum	102550	6261	161982	9784	213741	11059	284279	14145
Quilon	183003	2614	227265	3799	280532	3737	283136	3079
Pathanamthitta	—	—	—	—	—	—	147419	4990
Alleppey	136206	459	166521	584	200770	435	152465	2646
Kottayam	125348	6765	73195	10769	94528	11059	119377	15227
Idukki	—	—	91843	19886	97819	23181	133177	38712
Ernakulam	130007	4707	143463	766	182775	580	216470	3551
Trichur	172795	2100	174893	6271	216237	9383	302085	3227
Palghat	190582	3073	176199	19423	210765	25594	376424	28794
Malappuram	—	—	111409	6768	140826	8882	208018	7655
Kozhikode	154096	30016	64527	63859	76338	84982	161715	3888
Wynad	—	—	—	—	—	—	21130	95557
Cannanore	60401	17932	43520	70905	57737	90464	78283	15439
Kasaragod	—	—	—	—	—	—	65461	24565
State	1254988	73927	1434817	212762	1772168	269356	2549409	261475

Source: Progress of Kerala in three decades 1956-1985
Department of Economics & Statistics, Trivandrum.

Annexure 18

Percentage of main workers in Agriculture, Household industry and Other Workers to total workers in Kerala during 1971 and 1981

District/ State	Cultivators		Agricultural labourers		Household Industry		Other workers	
	1971	1981*	1971	1981*	1971	1981*	1971	1981*
Kerala	17.80	13.18	30.69	28.19	4.28	4.09	47.23	54.54
Cannanore	17.65	83.10	33.71	27.38	4.09	2.76	44.55	56.76
Wynad	25.24	21.25	37.06	39.41	1.15	1.06	36.55	38.28
Kozhikode	12.39	5.58	23.86	14.33	3.80	2.89	59.95	77.20
Malappuram	18.84	13.19	39.13	37.15	3.08	3.06	38.95	46.60
Palaghat	15.74	14.53	48.42	44.94	4.27	3.86	31.57	36.67
Trichur	13.64	9.43	32.84	25.55	5.87	5.73	47.65	59.29
Ernakulam	12.84	10.48	21.93	18.22	4.16	3.85	61.07	67.45
Idukki	25.56	22.59	22.46	25.62	0.92	0.96	51.05	50.83
Kottayam	24.65	17.87	28.09	25.05	3.16	4.00	44.10	53.08
Alleppey	16.01	11.00	30.66	26.46	6.96	8.80	46.37	53.74
Quilon	26.89	20.16	20.81	25.41	3.78	3.80	48.52	50.63
Trivandrum	14.05	8.85	29.85	33.30	5.30	4.64	50.80	53.21

*Provisional

Source: 1. Census Report 1981.

2. Statistics for planning 1983, Directorate of Economics and Statistics, Kerala.

Annexure 19

District wise distribution of fishermen population in Kerala (1984-85)

District	Marine				Inland				Grand Total
	Male	Female	Children	Total	Male	Female	Children	Total	
1	2	3	4	5	6	7	8	9	10
1 Trivandrum	42372	40982	58643	141997	316	322	407	1045	143042
2 Quilon	25327	23341	31040	79708	9363	8601	11639	29603	109311
3 Alleppey	29359	28710	36920	94989	17746	16824	19172	53742	148731
4 Pathanamthitta	—	—	—	—	239	227	259	725	725
5 Kottayam	—	—	—	—	7127	6806	7560	21493	21493
6 Idukki	—	—	—	—	—	—	—	—	—
7 Ernakulam	19849	19414	22421	61684	19139	18371	18367	55877	117561
8 Trichur	18149	18497	22639	59285	5694	5490	5960	17144	76429
9 Palghat	—	—	—	—	107	124	319	459	459
10 Malappuram	19900	20399	23907	64206	1171	1158	1347	3676	67882
11 Wynad	—	—	—	—	259	247	319	825	825
12 Calicut	26289	25496	32425	84210	3245	3095	4023	10363	94573
13 Cannanore	14259	13880	16586	44725	294	258	214	766	45491
14 Kasargode	11754	11442	13675	36871	243	213	175	632	37503
State	207258	202161	258256	667675	64943	61732	69675	196350	864025

Source: Economic Review 1985, State Planning Board, Trivandrum.

Annexure 20

Literacy in Kerala 1971 & 1981

District	Number of literates (1981)			General literacy rate (1971)(%)			General literacy rate (1981) (%)		
	Persons	Male	Female	Persons	Male	Female	Persons	Male	Female
Trivandrum	1830234	963063	867170	70.50	75.29	65.85	62.54	68.64	56.48
Quilon	2085085	1084558	1000527	74.11	78.10	70.21	64.97	70.10	59.84
Alleppey	1845435	941412	904023	78.52	82.12	75.10	70.44	75.22	65.79
Kottayam	1386065	712393	673672	81.66	83.96	79.35	72.18	76.18	69.55
Idukki	655268	357128	298140	67.44	72.15	62.55	56.42	62.21	50.25
Ernakulam	1947615	1024833	922782	76.82	80.75	72.88	65.37	70.52	60.16
Trichur	1795178	898045	897133	73.59	77.31	70.71	61.61	66.35	57.23
Palghat	1185731	644362	541369	58.00	64.81	51.55	46.69	54.58	39.22
Malappuram	1453607	771859	681748	60.50	65.93	55.34	47.90	55.32	40.78
Kozhikode	1574461	850875	723586	70.12	76.56	63.83	58.77	57.65	49.94
Wynad	323190	184221	138969	58.33	64.81	51.51	47.33	54.95	39.07
Cannanore	1842864	995343	847521	65.74	72.20	59.48	55.27	63.67	47.06
State	17924732	9428092	8496540	70.42	75.26	65.73	60.42	66.62	54.31

Source: 1 1981 Census Report

2 Statistics for planning 1983, Directorate of Economics and Statistics, Trivandrum.

Annexure 21

Infant Mortality Rates, 1981-All India and States

State/India	Total	Rural	Urban
1 Andhra Pradesh	86	93	52
2 Assam	106	107	76
3 Bihar	118	124	60
4 Gujarat	116	123	89
5 Haryana	101	108	52
6 Himachal Pradesh	71	72	65
7 Jammu & Kashmir	72	76	41
8 Karnataka	69	77	45
9 Kerala	37	40	24
10 Madhya Pradesh	142	152	80
11 Maharashtra	79	90	49
12 Orissa	135	140	68
13 Punjab	81	88	51
14 Rajasthan	108	118	53
15 Tamil Nadu	91	104	55
16 Uttar Pradesh	150	157	97
17 West Bengal	91	98	44
India	110	119	62

Annexure 22

Expectation of Life at Birth for All India and Major States Based on the Sample Registration Survey Data—1970-75

India/State	Total	Male	Female
India	49.7	50.5	49.0
1 Andhra Pradesh	48.8	48.4	49.3
2 Assam	45.5	46.2	44.8
3 Gujarat	48.8	48.8	48.8
4 Haryana	57.5	59.0	55.6
5 Himachal Pradesh	52.6	54.8	50.9
6 Jammu & Kashmir	56.1	56.9	55.2
7 Karnataka	55.2	55.4	55.1
8 Kerala	62.0	60.8	63.3
9 Madhya Pradesh	47.2	47.6	46.3
10 Maharashtra	53.8	53.3	54.5
11 Orissa	45.7	46.0	45.3
12 Punjab	57.9	59.0	56.8
13 Rajasthan	48.4	49.2	47.5
14 Tamil Nadu	49.6	49.0	49.5
15 Uttar Pradesh	43.0	45.4	40.5

Source: Economic Review 1985, State Planning Board, Trivandrum

Annexure 23

Educational status in Kerala

Item	Unit	1956-57	1961-62	1971-72	1981-82	1992-83	1983-84	1984-85
1	2	3	4	5	6	7	8	9
Lower primary schools	(Nos.)	7882	6928	6895	6807	6788	6842	6849
Upper primary schools	Do	1665	1925	2551	2766	2772	2823	2857
High schools	Do	763	989	1393	2087	2243	2338	2404
Students at primary stage	('000 Nos.)	1791	2145	2898	2586	2549	2501	2517
Students at Upper primary stage	Do	803	886	1331	1747	1782	1805	1787
Students at High school stage	Do	267	428	750	1317	1315	1342	1368
Teachers in schools	(Nos.)	81006	114979	146972	178435	181524	183638	NA
Arts and Science Colleges	Do	28	47	117	172	172	172	172
Students in Arts and Science Colleges	Do	25254	41739	116330	269207	287304	292409	297745
Engineering Colleges	Do	1	6	6	6	6	6	6
Polytechnics	Do	4	13	18	19	20	23	25
No. of I. T. C./I. T. Is.	Do	NA	12	36	222	223	239	259
Medical Colleges	Do	1	3	4	4	5	5	5

Source: Progress of Kerala in three decades 1955-1985—Department of Economics & Statistics, Trivandrum

Annexure 24

Student Statistics for 1983—84 and 1984—85 of the Kerala Agricultural University

Course of study	1983—84			1984—85		
	Admission	On rolls	Success-ful completion	Admission	On rolls	Success-ful completion
1	2	3	4	5	6	7
Degree programmes						
B. Sc. (Ag)	143	516	110	160	565	126
B. Sc. (Hort)	—	33	37	—	—	28
B. V. Sc. & A. H.	69	419	49	114	419	56
B. F. Sc.	29	106	nil	32	140	18
B. Sc. (C&B)	32	109	nil	27	129	—
Total	273	1183	196	335	1253	228
Diploma Courses						
D. A. Sc.	17	161	43	60	126	41
D. A. R. E.	17	63	24	19	50	28
Total	34	224	67	79	176	69
Post-Graduate						
Degree programme						
M. Sc. (Ag)	62	122	39	88	154	74
M. Sc. (Ag. Stat)	4	16	5	4	16	5
M. Sc. (Ag. Engg.)	5	5	—	5	8	4
M. Sc. (Hort)	10	20	11	7	10	4
M. V. Sc.	14	26	17	13	27	3
Ph. D. (Ag)	8	22	4	17	28	8
Ph. D. (Hort)	—	2	—	2	4	3
Ph. D. (Vety)	4	8	1	3	9	1
Total	107	221	77	139	256	102
P. G. Diplomas						
Natural Rubber Production	—	—	5	1	1	—
Food and Nutrition	3	3	—	4	4	3
Vety. & A. Sc.	—	22	21	—	—	—
Total	3	25	26	5	5	3
Grand Total	417	1653	366	558	1619	402

Source:- Kerala Agricultural University Economic Review, 1985; State Planning Board; Govt. of Kerala

Annexure 25

State Income of Kerala (Rupees in crores)

Item	1956—57		1961—62		1971—72		1981—82 (R)		1982—83 (R)		1983—84 (P)		1984—85 (Q)	
	A	B	A	B	A	C	A	C	A	C	A	C	A	C
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Net State Domestic Product	350	209	467	438	1276	1323	3705	1618	4422	1656	5203	1654	5965	1751
Sectoral distribution														
a. Primary sector	180	21	251	234	585	647	1413	629	1719	637	2105	594	2396	642
Percent	51.43	10.05	53.75	53.42	45.85	48.91	38.14	38.88	38.87	38.47	40.46	35.91	40.17	36.66
b. Secondary-sector	61	63	75	71	234	226	836	326	958	317	1056	316	1168	319
Per cent	17.43	30.14	16.06	16.21	18.34	17.08	22.56	20.15	21.67	19.14	20.29	19.11	19.58	18.22
c. Tertiary sector	109	125	141	133	457	450	1456	663	1745	702	2042	744	2401	790
Per cent	31.14	59.81	30.19	30.37	34.81	34.01	39.30	40.97	39.46	42.39	39.25	44.98	40.25	45.12
Per capita Income (Rs)	228	263	273	256	592	613	1441	629	1689	633	1951	620	2196	645

A = At current prices

R = Revised

B = At 1960-61 prices

P = Provisional

C = At 1970-71 prices

Q = Quick estimate

Source : Progress of Kerala in three decades-1956-1985
Department of Economics & Statistics, Trivandrum.

Annexure 26

Comparative study of the distribution of number, average size of the operational holding and the area operated by major size classes in Kerala and India during 1980—81

Class and size of holdings	No. of operational holdings (nos. in '00)		Average size of operational holdings (area in ha)		Area operated (in '000 ha)	
	Kerala	India	Kerala	India	Kerala	India
Marginal (below 1 ha)	37280	505252	0.20	0.39	750	19800
Small (between 1 & 2 ha)	2898	160779	1.37	1.42	398	22962
Semi medium (between 2 & 4 ha)	1236	125071	2.68	2.76	331	34560
Medium (between 4 & 10 ha)	358	80884	5.45	5.98	195	48334
Large (10 ha and above)	37	21544	35.14	17.27	130	37133
Total/average	41809	893530	0.43	1.82	1805	162792

Source: State Planning Board, Kerala, Trivandrum
Farm guides 1985 & 1986

Annexure 27

Average farm prices of some important commodities in Kerala (Rupees)

Name of crop	Unit	1956—57	1961—62	1971—72	1981—82	1982—83	1983—84	1984—85
1	2	3	4	5	6	7	8	9
Paddy	Quintal	36.95	43.72	99.62	178.78	208.16	251.62	200.76
Pepper (Black)	do	178.22	348.38	616.25	1211.96	1196.64	1725.33	2920.98
Ginger (Dry)	do	117.26	119.30	554.00	867.00	1633.00	2740.68	2238.77
Coconut (with husk)	1000 Nos.	157.47	213.99	571.30	1140.00	1443.00	2427.00	2616.00
Arecanut	do	20.18	29.74	37.30	80.40	80.90	100.00	124.70
Banana (Nondran)	100 Nos.	6.05	8.53	15.69	42.05	46.16	57.06	56.15
Tapioca	Quintal	9.75	10.18	20.59	48.95	61.91	70.02	56.95
Cashewnut (raw)	do	57.20	63.65	139.93	655.53	474.79	869.89	843.84

Source: Progress of Kerala in three decades, 1956—1985, Department of Economics & Statistics, Trivandrum.

Annexure 28

Area, production and productivity of important crops in Kerala
(1975-76 to 1984-85)

Crops	Years										
	75-76	76-77	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86*
1	2	3	4	5	6	7	8	9	10	11	12
<i>Rice</i>											
Area (000 ha)	876	854	840	799	793	802	807	778	740	730	678
Production (000 tonnes)	1339	1254	1295	1273	1300	1272	1339	1306	1208	1256	1173
Productivity (kg/ha)	1520	1468	1541	1592	1638	1587	1660	1678	1632	1719	1729
<i>Coconut</i>											
Area (000 ha)	693	695	673	661	663	661	667	674	682	687	687
Production (million nuts)	3439	3348	3053	3211	3032	3296	3006	3184	2602	3453	3149
Productivity (nuts/ha)	4963	4817	4533	4860	4576	4617	4509	4721	3813	5023	4584
<i>Tapioca</i>											
Area (000 ha)	327	323	290	273	244	245	248	228	233	217	215
Production (000 tonnes)	5390	5126	4189	4044	4089	4061	3745	3849	3933	3694	3463
Productivity (kg/ha)	16481	18855	14457	14787	16774	16575	15097	16911	16751	17047	16106
<i>Pepper</i>											
Area (000 ha)	108	109	102	107	106	108	108	107	106	106	106
Production (000 tonnes)	25	25	20	27	29	29	29	25	25	17	29
Productivity (kg/ha)	227	225	199	247	273	263	254	233	236	161	274

	1	2	3	4	5	6	7	8	9	10	11	12
<i>Rubber</i>												
Area (000 ha)		207	210	212	214	214	238	238	256	271	312	320
Production (000 tonnes)		129	133	136	124	124	140	139	153	162	189	185
Productivity (kg/ha)		623	664	640	577	577	590	587	596	598	605	578
<i>Areca nut</i>												
Area (000 ha)		77	68	62	62	61	61	61	61	60	57	57
Production (million nuts)		13387	11303	10548	10919	10829	10805	10702	NA	NA	9269	5033
Productivity (nuts/ha)		174719	165354	168968	175217	177939	176431	174723	NA	NA	162614	88298
<i>Cashew</i>												
Area (000 ha)		103	113	127	137	140	141	140	141	142	137	137
Production (000 tonnes)		122	87	85	84	83	82	79	76	77	72	73
Productivity (kg/ha)		1122	770	667	617	592	579	564	534	543	527	533
<i>Coffee</i>												
Area (000 ha)		NA	41	53	53	58	58	58	58	62	64	NA
Production (000 tonnes)		18	15	28	28	30	24	34	22	9	NA	24
Productivity (kg/ha)		NA	371	525	525	521	406	580	374	151	NA	NA
<i>Tea</i>												
Area (000 ha)		NA	36	36	36	36	36	36	35	35	35	NA
Production (000 tonnes)		46	42	52	47	52	51	46	46	44	56	53
Productivity (kg/ha)		NA	1151	1439	1312	1451	1402	1275	1290	1262	1608	NA

* Figures for 1985-86 are provisional

Source: Directorate of Economics and Statistics, Government of Kerala, Trivandrum

Annexure 29

English, Malayalam and Botanical names of crops of Kerala

English name	Malayalam name	Botanical name
1	2	3
<i>Cereals</i>		
Paddy	Nellu	<i>Oryza sativa</i>
Ragi	Koovaraku	<i>Eleusine coracana</i>
Jowar	Cholam	<i>Sorghum vulgare</i>
Bajra	Kambu	<i>Pennisetum typhoides</i>
Kodamillet	Varagu	<i>Paspalum scrobiculatum</i>
Chama	Chama	<i>Panicum miliare</i>
Wheat	Gothampu	<i>Triticum vulgare</i>
Barley	Barley	<i>Hordeum vulgare</i>
Maize	Makke Cholam	<i>Zea mays</i>
<i>Pulses</i>		
Blackgram	Uzhunnu	<i>Phaseolus mungo</i>
Greengram	Cherupayar	<i>Phaseolus aureus</i>
Horsegram	Muthira	<i>Dolichos biflorus</i>
Redgram	Thuvara	<i>Cajanus cajan</i>
Cowpea	Perumpayar	<i>Vigna sinensis</i>
<i>Sugar</i>		
Sugarcane	Karimbu	<i>Sacharum officinarum</i>
Palmyrah	Karimpana	<i>Borassus flabellifera</i>
<i>Condiments and Spices</i>		
Chilly	Mulagu	<i>Capsicum annum</i>
Turmeric	Manjal	<i>Curcuma longa</i>
Cardamom	Elam	<i>Elettaria cardamom</i>
Coriander	Kothamalli	<i>Coriandrum sativum</i>
Mustard	Kadugu	<i>Brassica spp</i>
Pepper	Kurumulagu	<i>Piper nigrum</i>
Cumin	Jeerakam	<i>Cuminum cyminum</i>
Garlic	Veluthully	<i>Allium sativum</i>
Long pepper	Thippili	<i>Piper longum</i>
Ginger	Inchi	<i>Zingiber officinale</i>
Nutmeg	Jathi	<i>Myristica fragrans</i>
Cinnamon	Karukappata	<i>Cinnamomum zeylanica</i>
Clove	Grampu	<i>Eugenia caryophyllata</i>
Cinchona	Cinchona	<i>Cinchona officinalis</i>
Arecanut	Adacka	<i>Areca catechu</i>

Fruits

Banana	Vazha	<i>Musa paradisiace</i>
Plantain	Vazha	<i>Mussepietium</i>
Bread fruit	Seemaplavu	<i>Artocarpus incisa</i>
Bullocks heart	Malammumthiri	<i>Anona reticulata</i>
Cashew	Kasumavu	<i>Anacardium occidentale</i>
Grape vine	Munthiri	<i>Vitis vinifere</i>
Custare apple	Seetha Pazham	<i>Anona squamosa</i>
Guava	Pera	<i>Psidium guajava</i>
Jujube	Elantha	<i>Aizarphus jujuba</i>
Jack fruit	Plavu	<i>Artocarpus integrifolia</i>
Lemon	Naranga	<i>Citrus lemon</i>
Lime	Naranga	<i>Citrus aurantifolia</i>
Mango	Mavu	<i>Mangifer indica</i>
Pappaya	Pappaka	<i>Carica pappaya</i>
Pineapple	Kaithachakka	<i>Ananas sativa</i>
Pomegranate	Mathalam	<i>Punica cranatum</i>
Sapota	Sapota	<i>Achras acharas sapota</i>
Pomella	Bamplimas	<i>Citrus mahima</i>
Orange	Orange	<i>Citrus reticulata</i>
Mangosteen	Mangosteen	<i>Garcinia mangosteens</i>

Vegetables

Tapioca	Maracheeni	<i>Manihot utilissima</i>
Elephantear	Chembu	<i>Celocasi antiquorum</i>
Elephant foot	Chona	<i>Amorphophallus</i>
Potato	Urulakizhangu	<i>Solanum tuberosum</i>
Sweet potato	Choenikizhangu	<i>Impomoea batatas</i>
Radish	Mullangi	<i>Raphanus sativus</i>
Yam	Kachil	<i>Dioscorea spp</i>
Turnip	Seema Mullangi	<i>Brassica campestris</i>
Carrot	Carrot	<i>Daucus carota</i>
Bed pumpkin	Vellarimathan	<i>Cucurbita maxima</i>
Brinjal	Vazhuthana	<i>Solanum melongena</i>
Tomato	Thakkali	<i>Lydcoperseum esculentum</i>
Amaranthus	Cheera	<i>Amaranthus spp</i>
Lady's finger	Venda	<i>Abelmoschus esculentus</i>
Bitter gourd	Pavakka	<i>Momordica charantia</i>
Bottle gourd	Churakka	<i>Lagenaria siceraria</i>
Snake gourd	Padavalanga	<i>Trichosanthes angunia</i>
Ridge gourd	Peechanga	<i>Luffa acutangulata</i>

Source : Season and Crop Report of Kerala 1979—80 & 1980—81, Department of Economics & Statistics, March, 1985.

Annexure 30

Sowing, harvesting and peak marketing seasons of principal crops in Kerala state

Name of crop	Season	Sowing	Period of flowering	Harvesting	Peak marketing
1	2	3	4	5	6
Rice	Autumn	April-July	July-October	August-October	September-November
	Winter	August-November	October-January	November-January	December-March
	Summer	October-December	January-March	March-May	March-June
Ragi	I crop	April-July	August	September-November	September-November
	II crop	September-October	October-November	December-January	December-January
	III crop	May-June	September-October	October-November	October-November
Small millets	Autumn	December	January-February	February	—
	Summer	April-July	July-November	September-November	December-January
	Winter	January-February	March	April	April
Red gram	Autumn	May-August	June-September	August-October	August-October
	Winter	August-November	September-November	October-January	December-January
	Summer	February-March	May	May	June
Horse gram	Autumn	February-April	March-April	April-June	May-June
	Winter	September-November	October-November	November-January	November-February
	Summer	December-February	January-April	April	April
Green gram	Autumn	June-August	August-September	August-September	September-December
	Winter	October	November	November-December	November-December
	Summer	January	February-April	March-April	March-April
Black gram	Winter	March-June	July-August	June-September	September-October
	Summer	September-October	October-November	November-December	December-January
Other pulses	Autumn	April-July	July-August	July-October	July-November
	Winter	September-December	October-December	November-February	December-March
	Summer	December-March	January-April	February-June	April
Sugarcane	Autumn	October-February	—	October-December	November-December
	Winter	November-March	—	December-February	January-February
	Summer	June-October	September-October	October-January	January

	1	2	3	4	5	6
Ginger	Autumn	March-July		—	November-February	December-February
	Winter	March-June		—	December-February	December-March
Pepper	Winter	June-August	July-October		November-February	February-March
	Summer	July	July-September		January-April	March-May
Cotton	Winter	June-October	November-December		December-March	February-March
Sesamum	Autumn	April-August	July-September		August-October	July-October
	Winter	August-October	October-December		December-April	December-February
	Summer	December-February	February-April		March-May	March-May
Sweet Potato	Autumn	April-July		—	September-November	November-February
	Winter	October-November		—	January-February	February-March
	Summer	December-March		—	March-June	April-June
Turmeric	—	April-July		—	November-February	November-March
Lemongrass	—	May-June		—	July-November	July-November
					January-February	January-February
					April-May	April-May
Tapioca	Autumn	July-October		—	July-August	July-September
	Winter	March-May		—	November-March	December-February
	Summer	June-October		—	March-July	March-July
		October-November		—	April-May	—
Mango	—			December	April-May	April-May
Tender Arecanut	—			June	September	September
Tubers	Autumn	February-March		—	July-September	August-September
	Winter	March-April		—	November-January	December-January
Banana	Autumn	August-September	April-May		July-January	July-August
	Winter	December-January	August-October		November-January	December-January
Tobacco	Winter	November-December		—	March-April	May-June

Source: Season and Crop Report of Kerala 1979-80 & 1980-81
Department of Economics & Statistics, March, 1985

Annexure 31

Number and per cent of livestock and poultry in the districts according to 1977 and 1988 censuses
(includes all types)

District	Livestock				Poultry			
	1977		1982		1977		1982	
	No. (lakh)	Percent to total	No. (lakh)	Percent to total	No. (lakh)	Percent to total	No. (lakh)	Percent to total
Trivandrum	3.85	7.23	4.24	7.51	11.22	8.38	14.31	9.49
Quilon	6.62	12.44	6.81	12.07	13.99	10.45	15.12	10.02
Alleppey	4.86	9.13	4.69	8.03	17.06	12.74	15.88	10.53
Kottayam	5.22	0.81	4.92	8.72	11.84	8.84	12.07	8.00
Idukki	3.13	5.89	3.15	5.58	6.23	4.65	5.64	3.74
Ernakulam	5.05	9.50	5.28	9.35	15.51	11.58	16.24	10.77
Trichur	4.42	8.32	4.77	8.45	12.78	9.54	15.33	10.77
Palghat	5.28	9.94	5.73	10.16	10.04	7.50	12.97	8.60
Malappuram	4.19	7.87	4.83	8.56	12.62	10.17	16.74	11.09
Kozhikode	4.42	8.30	3.75	6.65	10.18	7.60	10.51	6.97
Wynad	—	—	1.99	3.53	—	—	3.64	2.42
Cannanore	6.15	11.57	6.28	11.12	11.40	8.51	12.37	8.20
Kerala	53.19	100.00	56.44	100.00	133.89	100.00	150.83	100.00

Source: Report on the 13th quinquennial livestock census—1982.

Annexure 32

District-wise livestock and poultry population in Kerala—1982 (lakh)

District	Cattle	Buffaloes	Goats	Pigs	Fowls	Ducks
Trivandrum	1.98	0.31	1.80	0.09	14.14	0.14
Quilon	4.19	0.24	2.36	0.01	14.79	0.31
Alleppey	3.19	0.10	1.38	0.006	13.78	2.06
Idukki	1.66	0.14	0.99	0.34	5.54	0.08
Kottayam	2.83	0.08	1.59	0.41	11.35	0.68
Ernakulam	3.04	0.27	1.80	0.15	14.90	1.26
Trichur	2.34	0.54	1.86	0.02	14.94	0.37
Palghat	2.74	1.02	1.95	0.01	12.86	0.10
Malappuram	1.93	0.65	2.25	0.002	16.57	0.13
Wynad	1.09	0.29	0.57	0.04	3.61	0.03
Kozhikode	2.12	0.07	1.54	0.01	10.42	0.07
Cannanore	3.85	0.37	1.88	0.18	12.29	0.07
Kerala	30.96	4.08	20.84	1.27	145.19	5.30

Source: Report on the 13th quinquennial livestock census—1982

Annexure 33

Distribution of different categories of livestock in different census years and their percentage variations

Classification					Percentage variation over the previous census			
	1966	1972	1977	1982	1966	1972	1977	1982
1	2	3	4	5	6	7	8	9
Cattle	2856727 (61.55)	2856320 (57.86)	3006059 (56.52)	3096775 (54.86)	+ 3.76	- 0.01	+ 5.240	+ 3.017
Buffalo	471235 (10.15)	471747 (9.56)	454400 (8.54)	408584 (7.24)	- 2.80	+ 0.11	- 3.678	- 10.084
Sheep	11519 (0.25)	10321 (0.21)	2546 (0.05)	7059 (0.13)	-52.43	+10.40	-75.332	+177.258
Goats	1189218 (25.62)	1467657 (29.73)	1683297 (31.64)	2003795 (35.50)	- 9.38	+23.41	+14.692	+ 19.039
Other Livestock	112676 (2.43)	130424 (2.64)	172731 (3.25)	128867 (2.27)	-	+15.75	+32.440	- 25 680
Total Livestock	4641375 (100.00)	4936469 (100.00)	5319033 (100.00)	5644580 (100.00)	- 1.20	+ 6.36	+ 7.749	+ 6.120

(Figures in brackets indicate the percentage distribution of different species under total Livestock in each census years)

Source: Report on 13th quinquennial livestock census—1982.

Annexure 34

Statement showing the density of Cattle, Buffaloes and Livestock population in the different Districts of Kerala according to 1982 Census.

State/District	Cattle		Buffaloes		Livestock	
	Population	Density per km ²	Population	Density per km ²	Population	Density per km ²
Kerala	3096775	80	408584	11	5644580	145
Trivandrum	197501	90	31438	14	424233	194
Quilon	419294	91	24081	5	681495	148
Alleppey	319225	170	9683	5	468605	249
Kottayam	283353	129	7931	4	492451	223
Idukki	166028	33	14193	3	314601	62
Ernakulam	304367	126	27272	11	527664	219
Trichur	233655	77	54331	18	477035	157
Palghat	273813	61	102354	23	573247	128
Malappuram	193364	54	64428	18	483243	136
Calicut	212568	91	7200	3	375180	160
Wynad	108964	51	28642	13	192121	93
Cannanore	8846	78	37031	7	627515	127

Source: Report on the 13th quinquennial livestock census—1982.

Annexure 35

Number and density of Ovines in different districts—1977 and 1982 Census years

State/District	Sheep		Goat		Ovine Density per Sq. K. M.			
	1977	1982	1977	1982	1977	1982	1977	1982
Kerala	2546	7059	1683297	2003795	1685843	2010854	43	52
Trivandrum	—	72	156493	185825	156495	186545	76	81
Quilon	91	1306	208150	285735	208241	237041	45	53
Alleppey	—	664	116355	138408	116355	139072	62	74
Kottayam	23	479	162760	159346	162783	159825	74	73
Idukki	138	762	89093	99141	89251	99903	18	20
Ernakulam	—	253	156280	183354	156280	180607	66	75
Trichur	—	482	162763	186370	162763	186852	54	62
Palghat	2237	1290	138672	194665	140909	195955	32	44
Malappuram	4	623	169658	224613	169662	225236	47	63
Kozhikode	39	77	151760	154030	151799	154107	41	66
Wynad	—	131	—	56982	—	57113	—	27
Cannanore	14	272	171313	188326	171327	188698	30	38

Source: Report on the 13th quinquennial census 1982

Annexure 36

District-wise density of Poultry—1982

State/District	Area in km ²	No. of Poultry	Density Sq. k. m.	No. of fowls	Density Sq. k. m.	No. of Ducks	Density Sq. k. m.
1	2	3	4	5	6	7	8
Kerala	38863	15083410	388	14519039	374	530354	14
Trivandrum	2192	1431488	653	1414548	645	13697	6
Quilon	4620	1511521	327	1479058	320	30701	7
Alleppey	1883	1587940	843	1378143	732	206001	109
Kottayam	2204	1207218	548	1134613	515	67803	31
Idukki	5061	564355	112	554221	110	8336	2
Ernakulam	2408	1624152	674	1489939	619	126003	52
Trichur	3032	1533438	506	1494043	493	37030	12
Palghat	4480	1297144	290	1285688	287	10035	2
Malappuram	3548	1673560	472	1657291	467	13643	4
Kozhikode	2345	1050749	448	1041574	444	7497	3
Wynad	2132	364427	171	360887	169	2611	1
Cannanore	4958	1237425	250	1229034	248	6997	1

Source: Report on the 13th quinquennial census—1982.

Annexure 37

Percentage distribution of Cattle according to age groups under different census periods

Item	Number				Percentage			
	1966	1972	1977	1982	1966	1972	1977	1982
1	2	3	4	5	6	7	8	9
Total cattle	2856727	2856320	3006059	3096775	100.00	100.00 (-0.01)	100.00 (5.24)	100.00 (+3.017)
Males over 3 years	519523	391594	371114	265973	18.19	13.71 (-24.62)	12.35 (-5.23)	8.59 (28.33)
Females over 3 years	1219242	1300171	1370980	1512615	42.68	45.54 (+6.64)	45.61 (+5.45)	48.84 (+10.33)
Males 3 years & Under	393534	389084	381532	392902	13.77	13.62 (-1.13)	12.69 (-1.94)	12.69 (+2.98)
Females 3 years & Under	724428	755470	882433	925285	25.36	27.13 (+7.05)	29.35 (+13.79)	29.88 (+4.86)

Figures in brackets indicate percentage variation over the previous census.

Source: Report on the 13th quinquennial livestock census—1982.

Annexure 38

Comparative distribution of Male and Female Cattle (Desi and Improved) in 1977 and 1982

Classification	1977			1982		
	Desi	Imp.	Total	Desi	Imp.	Total
1	2	3	4	5	6	7
Total Cattle (A+B)	1651173	1354886	3006059	1643320	1453455	3096775
A. Males total (I+II)	536015	216631	752646	441610	217265	658875
I. Total males above 3 years (i+ii)	349915	21199	371114	245685	20288	265973
i. Males over 3 years castrated	325988	8028	344016	222527	10521	233048
ii. Do. (a) Uncastrated for breeding only	2263	1199	3462	4743	5956	10699
Do. (b) do. for breeding and work	9196	727	9923	18415	3811	22226
Do. Others	12468	1245	13713	—	—	—
II. Youngstock 3 years and under	186100	195432	381532	195925	196977	392902
B. Female Total (I+II)	1115158	1138255	2253413	1201710	1236190	2437900
I. Total adult females (i+ii+iii+iv)	684959	686021	1370980	785707	726908	1512615
i. Cows in milk	334289	370751	705040	392791	471481	864272
ii. Cows dry	290126	296348	585474	350315	211161	561476
iii. Cows not calved even once	55773	19021	74794	40701	42782	83433
iv. Cows not used for breeding	4771	901	5672	1900	1484	3384
II. Youngstock 3 years and under	430199	452234	882433	416003	509282	925285

Station: Report on the 13th quinquennial livestock census 1982.

Annexure 39

Percentage distribution of Male and Female Cattle (Desi and Improved in 1977 and 1982)

Classification	Percentage Distribution					
	1977			1982		
	Desi	Imp.	Total	Desi	Imp.	Total
1	2	3	4	5	6	7
Total Cattle (A+B)	100.00	100.00	100.00	100.00	100.00	100.00
A. Males total (I+II)	32.46	15.99	25.04	26.87	14.95	21.28
I. Total males above 3 years (i+ii)	21.19	1.56	12.35	14.95	1.40	8.59
i. Males over 3 years castrated	19.74	13.31	11.44	13.54	7.24	7.53
ii. Do. (a) Uncastrated for breeding only	0.14	0.09	0.12	0.29	0.40	0.34
Do. (b) do. for breeding and work	0.55	0.05	0.33	1.12	0.26	0.72
Do. others	0.76	0.09	0.46	—	—	—
II. Youngstock 3 years and under	11.27	14.43	12.69	11.92	13.55	12.69
B. Female Total (I+II)	67.53	84.01	74.96	73.12	85.05	78.72
I. Total adult females (i+ii+iii+iv)	41.48	50.63	45.61	47.81	50.01	18.84
i. Cows in milk	20.24	27.36	23.45	23.90	32.44	27.91
ii. Cows Dry	17.57	21.80	19.48	21.32	14.53	18.13
iii. Cows not calved even once	3.38	1.40	2.49	2.48	2.04	2.69
iv. Cows not-used for breeding	0.29	0.07	0.19	0.11	0.10	0.11
II. Young stock 3 years and under	26.05	33.38	29.35	25.31	35.04	29.88

Source: Report on the 13th quinquennial livestock census - 1982

Annexure 40

Classification of Male and Female Buffaloes in 1977 and 1982

Classification	Number	
	1977	1982
1	2	3
Total Buffaloes (A+B)	454400	408584
A. Male total (I+II)	253816	219944
I. Total Male over 3 years (1+2+3+4)	218774	182801
1 Male Buffaloes over 3 years castrated	203463	166088
2 Male Buffaloes over 3 years uncastrated for breeding	1777	3282
3 Male Buffaloes over 3 years for breeding and work	4272	13431
4 Male Buffaloes over 3 years for work only	9262	—
II. Young stock 3 years and under	35042	34143
B. Female total (I+II)	200584	191640
Total adult female over 3 years (1+2+3+4)	157592	138791
1 Female over 3 years in milk	86698	82730
2 Female over 3 years dry	55646	48878
3 Female over 3 years not calved even once	9013	5710
4 Female over 3 years not used for breeding	6235	1473
Female young stock 3 years and under	42992	52849

Source: Report on the 13th quinquennial livestock census—1982.

Annexure 41

Age-distribution of Goats in the state in 1977 and 1982

Item	1977		1982		Variation over the previous census
	Number	Percentage	Number	Percentage	
1	2	3	4	5	6
Total Goats	1683297	100.00	2003795	100.00	+19.04
Male Goats 1 year & above	89818	5.34	127420	6.36	+41.86
Female Goats 1 year & above	866877	51.50	1038018	51.80	+19.74
Goats under 1 year					
1 Male	258803	15.37	286074	14.28	+10.54
2 Female	467799	27.79	552283	27.56	+18.06

Source: Report on the 13th quinquennial livestock census—1982.

Annexure 42

Distribution of Poultry in the Census years 1972, 1977 and 1982

Classification	1972		1977		1982		Percentage of increase over the previous census	
	Number	Percentage	Number	Percentage	Number	Percentage	1977	1982
1	2	3	4	5	6	7	8	9
Total poultry	12207454	100.00	13388850	100.00	15083410	100.00	+ 9.68	+ 12.66
Hens	6154815	50.42	7071510	52.82	8761947	58.09	+ 14.89	+ 23.90
Cocks	1588471	13.01	1922612	14.35	2174698	14.42	+ 21.04	+ 13.11
Chicken	4101262	33.60	3952064	29.59	3582394	23.75	- 3.39	- 9.58
Total ducks	361941	2.96	429569	3.21	530354	3.51	+ 18.68	+ 23.46
Others	965	0.01	3095	0.09	34017	0.23	+220.73	+899.10

Source: Report on the 13th quinquennial livestock census—1982

Annexure 43

Number and percentage distribution of Poultry—(Fowls and Ducks) in the districts—1982

State/ Districts	Poultry		Fowls		Ducks		Others	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
1	2	3	4	5	6	7	8	9
Kerala	15083410	100.00	14519039	100.00	530354	100.00	34017	100.00
Trivandrum	1431488	9.49	1414548	9.74	13697	2.58	3243	9.53
Quilon	1511521	10.02	1479058	10.92	30701	5.79	1762	5.18
Alleppey	1587940	10.53	1378143	9.49	206001	38.85	3796	11.96
Kottayam	1207218	8.00	1134613	7.81	67803	12.79	4802	14.12
Idukki	564355	3.74	554221	3.82	8336	1.57	1798	5.29
Ernakulam	1624152	10.77	1489939	10.26	126003	23.76	8210	24.13
Trichur	1533438	10.17	1494043	10.29	37030	6.98	2365	6.95
Palghat	1297144	8.60	1285688	8.86	10035	1.89	1421	4.18
Malappuram	1673560	11.09	1657291	11.41	3641	2.57	2626	7.72
Kozhikode	1050749	6.97	1041574	7.17	7497	1.41	1678	4.93
Wynad	364427	2.42	360887	2.49	2611	0.49	922	2.71
Cannanore	1237425	8.20	1229034	8.47	6997	1.32	1394	4.10

Source : Report on the 13th quinquennial livestock census --1982.

Annexure 44

Distribution of fowls- (Desi and improved) in different districts--1982

State/ District	Cocks		Hens		Chicks		Total Fowls	
	Desi	Improved	Desi	Improved	Desi	Improved	Desi	Improved
1	2	3	4	5	6	7	8	9
Kerala	1010921	1163777	3994409	4767538	1559977	2022417	6565307 (100.00)	7953732 (100.00)
Trivandrum	95869	130371	403014	551314	85330	148850	584213 (8.90)	830335 (10.44)
Quilon	93581	106673	501070	584948	87555	105231	682206 (10.39)	796852 (10.02)
Alleppay	66812	82857	490227	587941	56478	93828	613517 (9.34)	764626 (9.61)
Kottayam	59793	76071	355352	451488	66802	125107	481947 (7.34)	652666 (8.21)
Idukki	44788	54093	151761	182845	51437	69292	247986 (3.18)	306235 (3.85)
Ernakulam	110238	101058	421914	502006	142556	212167	674708 (10.28)	815231 (10.25)
Trichur	986000	116451	370562	420776	211418	276236	680580 (10.37)	813463 (10.23)
Palghat	110955	120470	270100	293958	233660	256345	614915 (9.37)	670773 (8.43)
Malappuram	131204	142990	379580	403512	287090	312915	797874 (12.15)	859417 (10.81)
Kozhikode	73999	90704	259281	304321	140200	173069	473480 (7.21)	568094 (7.14)
Wynad	32130	36076	89236	100298	46734	56413	168100 (2.56)	192787 (2.42)
Cannanore	92952	105958	302312	384131	050517	193164	545781 (8.31)	683253 (8.59)

Source: Report on the 13th quinquennial livestock census--1982.

Annexure 45

Milk production in Kerala

Year	Average milk production per day per animal in milk (kg)				Total milk production in lakh tonnes			
	Cow (Cross bred)	Cow (Non- descript)	Buffalo	Goat	Cow milk	Buffalo milk	Goat milk	Total milk Production
1	2	3	4	5	6	7	8	9
1977-78	3.162	1.618	2.770	0.395	6.240	0.870	0.670	7.780
1978-79	3.272	1.625	2.787	0.401	6.670	0.890	0.680	8.240
1979-80	3.448	1.625	2.812	0.411	6.993	0.925	0.717	8.635
1980-81	3.582	1.587	2.977	0.407	7.384	0.963	0.732	9.079
1981-82	3.822	1.627	3.152	0.400	8.046	1.028	0.744	9.818
1982-83	3.760	1.647	3.226	0.428	8.959	0.968	0.857	10.784

Source: Integrated Sample Survey
Bulletin of Animal Husbandry Statistics, 1984.

Annexure 46

Per capita availability of milk and egg in Kerala

Name of product	Year	Total quantity produced	Per capita availability
1	2	3	4
Milk	1964-65	2-210 lakh tonnes	30 grammes per day
	1978-79	8,240 ..	90 ..
	1981-82	9,818 ..	104 ..
	1982-83	10,784 ..	112 ..
	1983-84*	11,500 ..	117 ..
Egg	1964-65	282 millions	15 eggs per year
	1978-79	948 ..	36 ..
	1981-82	1018 ..	39 ..
	1982-83	1172 ..	44 ..
	1983-84*	1262 ..	47 ..

Source: Sample Survey results

* Provisional

All India per capita availability (1983-84)

Milk - 142 gm. per day

Egg - 14 Eggs per year

Annexure 47

Production and per capita availability of Major Livestock Products

Name of Product	Unit	INDIA				KERALA				
		Year				Year				
		1980-81	1981-82	1982-83	1983-84	Unit	1980-81	1981-82	1982-83	1983-84
Milk	Million tonnes	31.5	33.3	34.7	36.3	Lakh tonnes	9.079	9.818	10.784	11.500*
Egg	Million Nos.	10105*	10755*	11400*	12200*	Million Nos.	962	1018	1172	1260*

* Provisional
 1983-84 Department of Agriculture & Co-operation, Govt. of India
 Bulletin of Animal Husbandry Statistics, 1984

Annexure 48

Monthly transport of eggs to Kerala from the neighbouring States by road 1984

Month	By road		By rail	Grand total
	Fowl Egg (In lakhs)	Duck Egg (In lakhs)	Fowl + Duck (In lakhs)	
January 1984	121.89	20.69		
February 1984	120.27	21.93		
March 1984	135.31	26.42		
April 1984	161.91	27.75		
May 1984	127.13	14.80		
June 1984	110.65	16.81		
July 1984	116.37	12.11		
August 1984	115.88	16.63		
September 1984	133.11	22.79		
October 1984	112.62	16.15		
November 1984	116.55	22.40		
December 1984	124.15	22.59		
Total	1495.84	241.15	95.82	1832.81

Source: Data collected from egg merchants in the Districts of the State
Bulletin of Animal Husbandry Statistics 1984

Annexure 49

Meat Production in Kerala (1984)

Species of animals slaughtered	Average live body weight of slaughtered animals (kg)	Average dressed meat yield per animal slaughtered	No. of animals slaughtered		Total quantity of dressed meat obtained	
			1983	1984	1983 (M. T.)	1984 (M. T.)
1	2	3	4	5	6	7
Cattle (Young)	75	38.159	6844	12329	261.160	470.462
Cattle (Adult)	130	54.725	181513	219170	9932.391	11994.571
Buffalo (Young)	72	33.675	3013	3129	101.448	105.366
Buffalo (Adult)	147	58.900	77320	94798	4554.148	5583.602
Sheep & Goat	13	7.083	445986	495069	3157.581	3506.574
Pig	61	39.000	16552	21655	645.528	844.545
Total			731228	846159	18652.256	22505.123

Annexure 50

Month-wise movement of cattle and buffaloes from and to Kerala during 1983—84

Month	Incoming Animals			Outgoing Animal		
	Cattle	Buffalo	Total	Cattle	Buffalo	Total
1	2	3	4	5	6	7
April 1983	45049	20029	65078	72	22	94
May 1983	45001	20131	65132	41	109	150
June 1983	43872	21433	65305	3	102	105
July 1983	41992	19419	61411	2	—	2
August 1983	35508	17166	52674	9	8	17
September 1983	39983	20274	60257	5	—	5
October 1983	37455	15420	52875	392	668	1060
November 1983	35625	15374	50999	405	553	958
December 1983	38075	16256	54331	245	628	373
January 1984	39013	15843	54856	6	112	118
February 1984	36289	15625	51914	6	6	12
March 1984	41443	19501	60954	16	45	61
Total	479305	216481	695786	1202	2253	3455

Source: Bulletin of Animal Husbandry Statistics, 1984

Annexure 51

District wise number of Artificial Insemination done, calvings recorded and castrations performed under various schemes, Project/Institutions of the Department during 1984-85

District	Artificial Inseminations done	Calving recorded			Castrations done
		Male	Female	Total	
1	2	3	4	5	6
Trivandrum	115207	12622	11921	24543	2401
Quilon	99108	10430	11146	21576	1760
Pathenamthitta	28999	3617	3383	7000	913
Alleppey	83294	10655	10683	21338	1548
Kottayam	99139	12921	11887	24808	2602
Idukki	21830	1442	1807	3249	1108
Ernakulam	57930	6736	6465	13201	2357
Trichur	89777	5773	5958	11731	5292
Palghat	51642	3476	3408	6884	11943
Malappuram	13564	1101	1063	2164	2773
Calicut	25499	2733	2629	5362	1245
Wynad	9218	647	582	1199	1086
Cannanore	45789	4117	3935	8052	2088
Total	740996	76270	74837	151107	37116

Source: Bulletin of Animal Husbandry Statistics, 1984

Annexure 52

Distribution and percentage variations of pigs in different districts according to previous census years

State/ District	1977		1972		1982		Percentage variation of pigs over the previous census	
	Number	Percentage	Number	Percentage	Number	Percentage	1977	1982
Kerala	129087	100.00	172375	100.00	127247	100.00	+ 33.5	-- 26.2
Trivandrum	14001	10.85	11644	6.76	8724	6.86	16.8	-- 25.1
Quilon	964	0.75	2528	1.46	1026	0.80	+ 58.5	-- 59.4
Alleppey	148	0.11	509	0.30	584	0.47	+244.0	+ 14.7
Kottayam	43348	35.58	55727	32.33	41239	32.41	+ 28.6	-- 25.0
Idukki	25666	19.88	39643	23.00	34201	26.88	+ 54.5	-- 13.7
Ernakulam	32246	24.98	22720	13.18	15335	12.05	-- 29.5	-- 32.5
Trichur	2141	1.66	1985	1.15	2118	1.66	-- 7.3	+ 6.7
Palghat	430	0.33	1378	0.80	982	0.77	--220.5	-- 28.7
Malappuram	86	0.07	77	0.04	183	0.14	-- 10.5	+137.7
Kozhikode	3772	2.92	9053	5.25	1279	1.00	+140.0	-- 85.9
Wynad	—	—	—	—	4348	3.42	—	—
Cannanore	6285	4.87	27116	15.73	17228	13.54	+331.4	-- 36.5

Source: Bulletin of Animal Husbandry Statistics, 1984.

Annexure 53

VII plan proposal for the major fisheries schemes

Schemes	Outlay (Rs. in lakhs)
Fish Farms and Hatcheries	480
Inland Fisheries	192
Fishing Harbours and Landing Facilities	1328
Offshore and Deep Sea Fisheries	200
Processing, preservation and Marketing	710
Mechanisation and Improvement of Fishing Crafts	605
Research	75
Education and Training	250
Social Amenities to Fishermen	980
Fishermens' Welfare Fund	400
Share Capital Contribution to the KSCFED and District Societies	300
Dispensaries	50
Kerala Fisheries and Inland Fisheries Development Corporations	100
Enforcement of Kerala Marine Fisheries Regulation Act	150
Strengthening of Statistical unit	20
Strengthening of Fisheries project Cell	20
Others	640
Total Fisheries	6500

Delineation of Central Zone

District	Taluk	Muni- cipa- lities/ Corpo- ration	Deve- lop- mental block	Cen- sus town	Pan- cha- yat	Area in sq. km.	Popu- lation	Den- sity
Palghat	5	3	12	4	91	4480	2044399	456
Trichur	5	7	17	25	98	3032	2439543	805
Ernakulam	7	8	15	16	86	2408	2535294	1053
	17	18	44	45	274	9831	7012152	

Annexure 55

Ernakulam District (Taluk, Developmental Blocks and Panchayats)

Taluk	Developmental Blocks	Panchayats
Alwaye	Angamaly	Ayyampuzha, Kalady, Kanjoor, Karukutty, Malayattur, Neeleswaram, Manjapra, Mookannor, Sreemoolanagaram, Thuravoor.
"	Parakkadavu (West)	Nedumbassery, Parakkadavu, Chengamanad.
Parur	Parakkadavu (East)	Kunnakkara, Puthenvelikara
	Alengad	Alengad, Eloor, Kodungallur, Karumallur
	Vazhakkulam (East)	Choorikkara, Edathala, Keezhmad
Kunnathunadu	Vazhakkulam (West)	Kizhakkambalam, Vazhakkulam, Vengola
"	Koovapady	Asamannoor, Koovapady, Mudakuzha, Rayamangalam, Vengoor, Perumbavoor(M)
"	Vadavukode	Aikkarand, Kunnathunad, Mazhuvanoor, Poothrikka, Thiruvaniyoor, Vadavucode, Puthencruz
Kothamangalam	Kothamangalam	Kavalangad, Keerampara, Koottappady, Nellikuzhi, Paingottoor, Pallarimangalam, Pindimana, Pothamkad, Varapetty
Muvattupuzha	Muvattupuzha (Portion)	Arakuzha, Avoly, Ayavana, Marady, Payipra Valakam, Kallookadu (Portion), Manjalloor(Portion)
	Pampakuda	Elanji, Koothattukulam, Maneed, Palakuzha, Piravam, Ramamangalam, Thirumarady
	Mulamthuruthy	Amballur, Chottanikkara, Edakkattuval, Mulamthuruthy, Thiruvemkulam, Udayamperur

Out of 15 Developmental Blocks, the above mentioned 10 Blocks come under the Central Zone jurisdiction. The rest five viz., *Parur*, *Vypeen*, *Vyttila*, *Edappally* and *Palluruthy* constitute 'Pokkali' and 'Kuttanad' cultivations and hence they will be described in Special Zone for Problem Areas.

Annexure 56

Trichur District (Taluk, Developmental Blocks and Panchayats)

Taluk	Developmental Blocks	Panchayat
Talapally	1 Pazhayannur	Chelakkara, Vallathole Nagar, Kondazhi, Panjal, Pazhayannur and Thiruvilwamala.
	2 Wadakkanchery	Varavur, Velur, Wadakkanchery, Desamangalam, Erumapetty, Kadangode, Mullurkara, Mundathikode and Thekkumkara.
	3 Chowannur*	Arthat, Choondal, Chowannur, Kadavallur, Kandanissery, Porkulam.
Trichur	4 Puzhakkal*	Kaiparamba, Killannur, Avanur.
	5 Ollukkara	Kolazhi, Madakkathara, Nadathara, Puthoor, Vilvattom, Ollukkara, Panancherry
	6 Cherpu	Kole Areas
	7 Anthicad	
Mukundapuram	8 Kodakara	Alagappanagar, Kodakara, Mettathoor, Nenmenikkara, Puthukad, Thrikkur and Varantharappally
	9 Chalakudy	Kallur, Vadakkummuri, Pariyaram, Vettilappara, Kodassery, Koratty and Melur
	10 Mala	Alur, Annamanada, Kuzhur, Mala
	11 Vellangallur	Kole areas
	12 Irinjalakkuda	
Kodungallur	13 Kodungallur	Edavilanga, Eriyad and Methala
	14 Mathilakam	Edathiruthy, Kaipamangalam, Pappivattom, Perinjanam and Sreenarayanapuram.
Chavakkad	15 Thalikkulam	Engandiyur, Nattika, Thalikkulam, Vadanappilly and Valappad.
	16 Mullassery	Kole Areas
	17 Chavakkad	

* Part of the Block having Kole areas (The number shown in the district maps)

Annexure 57

Palghat District (Taluk, Developmental Blocks, Panchayats)

Taluk	Developmental Blocks	Panchayats
Mannarghat*	1 Mannarghat	Alanellur, Korakurissi, Karimba, Kottapadam, Kumaramputhut, Mannarghat, Pottasseri, Thachanattukara and Thachampara.
Ottappalam	2 Sreekrishnapuram	Cherpulassery, Kandampazhipuram, Karimpuzha, Pookkottukavu, Sreekrishnapuram, Thrikkadeeri and Vellinezhi.
	3 Pattambi	Koppam, Kulukkallur, Muthuthala, Nellya, Ongallur, Pattambi, Parudur, Thiruvegappura, Vallappuzha and Vilayur.
	4 Thrithala	Anakkara, Chalisseri, Kappur, Nagalasseri, Pattithara, Thirumittacode and Thrithala.
	5 Ottappalam	Ambalappara, Anangadi, Chalavara, Lakkidi Perur, Ottappalam and Vaniyamkulam
Palghat	6 Palghat	Akathethara, Kannadi, Keralasseri, Kongad, Malampuzha, Nankara, Mannur, Marutharode, Mundur, Parli, Pirayiri and Puduppariyaram.
	7 a) Kuzhalmannam (East)	Kottayi, Kuthannur, Kuzhalmannam, Mathur, Peringottukurussi and Thenkurussi
	b) Kuzhalmannam (West)	Peruvemba and Pudusseri
	8 a) Kollengode (North)	Elappully, Kodumba and Polpully
	b) Kollengode (South)	Elavancheri, Koduvayur, Kollengode, Muthalamada, Pallassena, Polpully, Pudunagaram and Vadavannur
	9 Chittur	Eruthempathy, Kozhinjampara, Nallepilly, Pattancheri, Perumatty and Vadakkarappathy.
	10 Nemmara	Ayilur, Nelliampthy and Nemmara.
Alathur	11 Alathur	Alathur, Erimayur, Kannanpara, Kavasseri, Kizhakkancheri, Melarkode, Pudukode, Tarur, Vandazhi and Vadakkancheri

* Attappadi Block included in High ranges

Annexure 58

a) Average monthly rainfall of the Central Zone (mm)

Month	Palghat	Trichur	Ernakulam
January	9.8	9.3	16.8
February	9.3	8.8	22.4
March	27.0	28.6	51.6
April	79.6	86.6	129.5
May	158.4	274.3	308.4
June	503.4	803.4	796.1
July	649.9	761.4	785.3
August	363.0	458.6	518.0
September	169.5	250.3	298.9
October	257.2	307.5	359.7
November	140.9	158.3	212.6
December	29.7	30.3	54.2
Total	2397.7	3177.4	3548.5

Annexure 58 b) District-wise average monthly rainfall (mm) 1985

Month	Palghat	Trichur	Ernakulam	Total
January	64.1	79.1	107.0	250.0
February	—	4.0	3.5	7.5
March	—	2.0	16.0	18.0
April	122.0	27.7	6.0	155.7
May	84.8	365.5	213.5	663.8
June	746.3	929.0	1005.2	2680.5
July	441.2	840.9	442.2	1364.3
August	282.5	447.2	321.4	1051.1
September	218.0	107.6	127.2	452.8
October	121.0	252.8	205.1	578.9
November	8.0	79.5	95.1	182.6
December	69.2	173.5	63.3	306.0
Total	2157.1	2948.8	2605.5	7711.4

Source: Directorate of Economics and Statistics, Kerala

Annexure 59

a) Temperature of the hottest and coldest months and annual temperature range of three centres in the zone

Station	Average temperature at hottest month °C	Average temperature of coldest month °C	Annual temperature range*	Period for which computation is based
Pattambi	30.2	25.9	17.3	1973-83
Palghat	30.9	24.4	15.2	1951-80
Cochin	28.9	26.0	8.2	1931-80

* Annual temperature range is the difference of mean of maximum temperature and mean minimum temperature.

Annexure 59 – B. Mean daily relative humidity recorded in two centres of Central Zone.

Station	Period of data computed	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Palghat	1961—80	57	51	55	64	79	82	86	86	81	79	72	64	70
Cochin	1961—80	68	69	71	73	78	85	88	86	83	81	77	70	77

Annexure 59 – C. Monthly and annual wind speed (km/h) recorded at two centres of the Central Zone

Station	Period of data computed	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Palghat	1961—80	11.3	9.3	8.5	9.3	11.8	13.0	13.3	13.6	11.9	8.7	7.6	10.9	10.8
Cochin	1961—80	8.0	9.3	10.6	10.7	10.9	9.1	9.6	9.9	9.1	7.8	6.7	7.1	9.1

Annexure 59—D. Sunshine hours recorded at Pattambi of Central Zone (Data—Mean of values recorded upto 1965)

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean daily duration	9.6	9.6	9.3	8.4	6.1	3.3	2.8	4.3	6.0	6.1	7.9	9.0	6.8
Maximum possible hours	11.6	11.8	12.1	12.4	12.6	12.7	12.7	12.2	12.2	11.9	11.6	11.5	12.1

Annexure 59—E. Water balance elements of three centres of Central Zone

Centre	Rainfall mm	P E mm	A E mm	W S mm	W D mm	Ih (%)	Ia (%)	Ima (%)
Chittur (Palghat dist.)	1607	1750	1136	471	614	26.9	35.1	64.9
Ollukkara. (Trichur dist.)	2836	1722	11340	1496	382	86.9	22.2	77.8
Cochin (Ernakulam dist.)	3116	1710	394	1722	316	100.7	18.5	81.5

P E—Potential evapotranspiration

A E—Actual evapotranspiration

Ima—Index of moisture adequacy

Source: M. Sc. (Ag) Thesis of Sri. Karmachandran—1985

W S—Water surplus

W D—Water deficit

Ih—Humidity index

Ia—Aridity index

Annexure 60

District-wise land use pattern of Central Zone in ha (1984—85)

Particulars of land use	Palghat	Trichur	Ernakulam	Total zone	Total state	% to State total
1 Total geographical area	438980	299390	235319	973689	3885497	29.93
2 Forest	136257	103619	8123	247999	1081509	22.93
3 Land put to non-agricultural use	33081	22074	33544	88699	279703	31.71
4 Barren and uncultivable land	13585	2205	2869	18659	85688	21.78
5 Permanent pastures or grazing land	243	149	166	558	4158	13.42
6 Land under miscellaneous tree crops	7147	1367	1209	9723	51039	19.05
7 Cultivable waste	25287	5190	5401	35878	130098	27.58
8 Fallow other than current fallow	3468	3100	2648	9216	27221	33.86
9 Current fallow	6067	4753	3232	14052	41658	33.73
10 Net area sown	213845	156933	178127	548905	2184423	25.13
11 Area sown more than once	109965	72800	68724	251489	690220	36.44
12 Total cropped area	323810	229733	246851	800394	2874643	27.84

Source: Directorate of Economics and Statistics, Trivandrum

Annexure 61

(a) Central Zone—Area under irrigation—source-wise in ha (1980—81)

District	Government canal	Private canal	Government tanks & wells	Private tanks & wells	Minor and lift irrigation	Other sources	Total
Ernakulam	18039	137	1240	8080	14292	5747	47535
Trichur	20752	504	989	5960	4620	5888	38713
Palghat	45672	315	353	7925	1407	3290	58962
Total	84463.0	956.0	2583.0	21965.0	20319	14925.0	145210.0
% to total area irrigated	58.16	0.66	1.78	15.13	13.99	10.28	

Annexure 61 (b) Central Zone—Area under Irrigation—Cropwise in ha. (1980—81)

Crop	Ernakulam	Trichur	Palghat	Total
Rice	70100	48409	91461	2,09,970
Vegetables	6	330	273	609
Tubers	—	77	—	77
Coconut	6046	29717	1972	38,735
Arecanut	696	6243	774	7,713
Clove, Nutmeg, Cinnamon	437	106	5	548
Other condiments and spices	32	609	166	807
Banana	664	660	582	1,906
Betel leaves	11	45	4	60
Sugarcane	1	5	659	665
Others	2780	1374	1540	5,694
Total	81773	87575	97436	2,66,784

Source: Statistics for Planning—Directorate of Economics and Statistics, Government of Kerala, 1983.

Annexure 62

Major and medium irrigation projects in the Central zone

Sl. No.	Name of project	Name of river tributary	Name of Dam	Districts benefited
1	Malampuzha	Malampuzha tributary of Bharathapuzha	Malampuzha	Palghat and Trichur
2	Pothundy	Ayalurpuzha tributary of Bharathapuzha	Pothundy	Palghat
3	Mangalam	Mangalampuzha tributary of Bharathapuzha	Mangalam	Palghat
4	Gayathri-I	Meenakarapuzha tributary of Bharathapuzha	Meenakara	Palghat
5	Gayathri-II	Chulliyarpuzha tributary of Bharathapuzha	Chulliyar	Palghat
6	Walayar	Walayarpuzha tributary of Bharathapuzha	Walayar	Palghat
7	Kanhirapuzha	Kanhirapuzha tributary of Bharathapuzha	Kanhirapuzha dam	Palghat
8	Chitturpuzha	Chitturpuzha tributary of Bharathapuzha	Mooathara	Palghat
9	Attappady	Siruvani tributary of Bharathapuzha	Chittoor Dam	Palghat
10	Chalakkudy	Chalakkudy river	Thumburankuzhi	Trichur and Ernakulam
11	Peechi	Manali tributary of Karuvannur river	Peechi	Trichur
12	Vazhani	Wadakkancherry tributary of Keechery river	Vazhani	Trichur
13	Cheerakuzhi	Cheerakuzhi tributary of Bharathapuzha	Cheerakuzhi	Trichur
14	Periyar valley	Periyar river	Pianchode	Ernakulam
15	Moovattupuzha	Moovattupuzha river	Melamkaram	Ernakulam and Kottayam
16	Edamalayar	Periyar river	Enakkal	Idukki and Ernakulam
17	Chimoni	Chimoni tributary of Karuvannur river	Chimoni	Trichur

Source: Kerala in Maps, 1978—Bureau of Economics and Statistics, Trivandrum.

Annexure 63

Bharathapuzha river basin tributaries, streams and irrigation projects

River	Tributaries	Streams	Irrigation projects	
Bharathapuzha	Gayathri	Mangalam	Cheerakuzhy	
		Ayalurpuzha	Mangalam	
		Cherukunnupuzha	Pothundy	
		Vandazhipuzha		
		Meenakkara	Meenakara	Gayathri-I
				Gayathri-II
		Palar		Chitturpuzha
		Kannadi (Chitturpuzha) (Amaravathi)	Alyar Upper Karai River	
		Korayar (Kalpathipuzha)	Varattar Walayar	Walayar
			Malampuzha Kunhipuzha	Malampuzha
	Thuthapuzha	Kanjirapuzha Ambankadavuthodu Thuppanadpuzha	Kanjirapuzha	

Annexure 64

Percentage distribution of area under paddy irrigated/unirrigated

District	Season	1981-82			1982-83			1983-84			1984-85		
		Irrigated	Unirrigated	Total	Irrigated	Unirrigated	Total	Irrigated	Unirrigated	Total	Irrigated	Unirrigated	Total
Ernakulam	Virippu	33.20	66.20	100	27.48	72.52	100	36.20	63.80	100	50.52	49.48	100
	Mundakan	72.11	27.89	100	79.25	20.75	100	98.86	26.63	100	94.54	5.46	100
	Summer	99.75	0.25	100	100.0	—	100	98.86	1.14	100	99.54	0.46	100
Trichur	Virippu	3.65	96.35	100	6.01	93.99	100	8.19	91.81	100	3.27	96.73	100
	Mundakan	70.15	29.85	100	62.85	37.15	100	80.98	19.02	100	79.71	20.29	100
	Summer	100	—	100	99.98	0.02	100	99.46	0.54	100	100	—	100
Palghat	Virippu	0.44	99.56	100	14.57	85.43	100	22.07	77.93	100	21.01	78.99	100
	Mundakan	75.83	24.17	100	79.04	20.96	100	85.04	14.96	100	82.70	17.30	100
	Summer	94.85	5.15	100	100	—	100	89.78	10.22	100	98.32	1.68	100
State	Virippu	6.26	93.74	100	9.33	90.62	100	12.69	87.21	100	14.43	85.57	100
	Mundakan	49.63	50.37	100	52.17	47.83	100	58.49	41.51	100	65.10	34.90	100
	Summer	73.97	26.03	100	77.69	22.31	100	63.27	36.73	100	67.46	32.54	100

Annexure 65

Land holding pattern of Central Zone and percentage of literacy (1980-81)

Size of holdings	Palghat		Trichur		Ernakulam		Central zone on total		
	No. of holdings	Area (ha)	No. of holdings	Area (ha)	No. of holdings	Area (ha)	No. of holdings	Area	Percentage (holdings)
Below 1 ha.	100773	225532	264735	325525	285223	325277	650731	3369400	78.78
Between 1 to 2 ha.	66351	30180	21655	22160	28375	25641	116381	289805	14.47
Between 2 to 4 ha.	21384	17100	8702	6185	16353	10362	46439	123622	5.16
Above 4 ha.	803	5909	11880	1076	532	2131	13215	39479	1.59
No. of farming families (approximate)			120965		120716	137450	379131		
Literacy (%)			55.88		72.32	75.71	67.97		
Per capita operational area (ha)			0.158		0.054	0.097	0.114		

Source : 1. State Planning Board—Kerala
2. Census of India 1981—Series 10 Kerala.

Annexure 66

Sowing, harvesting and peak marketing seasons of principal crops in Central Zone

Crops	Season	Sowing	Harvesting	Peak marketing
1	2	3	4	5
1 Rice	Autumn	April-July	July-October	September-October
	Winter	July-October	November-February	December-February
	Summer	October-December January-March	March-April May-June	March-April May-June
2 Ragi	1st crop	April-July	August-November	September-November
	2nd crop	September-October	December-January	December-January
3 Red gram	1st crop	May-June	August-October	September-October
	2nd crop	August-November	November-January	December-January
	3rd crop	February	April	April
4 Horse gram	1st crop	August-October	November-January	December-February
	2nd crop	February-March May-June	April-May August-September	May-June September-October
5 Green gram				
6 Black gram	1st crop	May-June	August-September	October
		October-November	January-February	February
7 Other pulses		May-June	August-September	August-September
8 Cotton		August-September	February-March	February-March

1	2	3	4	5
9 Sugarcane	1st crop 2nd crop	September-November November-January January-April	November-January October-November December-April	January November-December January-April
10 Sesamum	1st crop 2nd crop 3rd crop	July-October December-February January-March	September-February March-May May-July	October-February April-June June-August
11 Turmeric		April-June	December-February	January-February
12 Lemongrass			June-September	September
13 Tapioca	1st crop 2nd crop 3rd crop	August-November March-July November-December July-September	June-September December-January May-July October-December May-July	July-September December-January June-July November-December June-July
14 Sweet potato	1st crop 2nd crop 3rd crop	June-July September-October November-December	September-October December-January February-March	September-October December-January February-March
15 Small millets	Kharif Rabi	May September	August December	August December
16 Ginger		April-May	November-January	December-January
17 Pepper			November-January	December-January

Annexure 67

a) Area under important crops in Central Zone (in ha)

District	1975-76	1980-81	1981-82	1982-83	1983-84	1984-85
1	2	3	4	5	6	7
<i>Rice</i>						
<i>Virippu</i>						
Ernakulam	38096	43174	40102	40053	35736	36690
Trichur	34566	40584	41794	40661	37920	35576
Palghat	100835	89762	90044	89438	87895	86339
State	397232	349243	347077	342669	327783	318611
<i>Mundakan</i>						
Ernakulam	40562	39719	41379	40877	36994	38422
Trichur	59493	49168	51570	49716	48220	49705
Palghat	82211	89550	86816	81044	77692	78006
State	383706	354132	356074	352273	324560	326812
<i>Summer</i>						
Ernakulam	10285	19607	19403	15080	14002	14071
Trichur	14319	20562	22147	17334	17251	17259
Palghat	2136	4322	4018	2676	2447	1967
State	104031	98324	103700	83548	87743	84956
<i>Total</i>						
Ernakulam	88943	102500	100884	96010	86732	89183
Trichur	108378	110314	115511	107711	103391	102540
Palghat	185182	183634	180878	173158	168034	166312
State	884969	801699	806851	778490	740086	730379
<i>Sugarcane</i>						
Ernakulam	28	80	55	41	59	50
Trichur	25	4	8	5	5	5
Palghat	1080	2324	2568	2175	2356	2690
State	7596	8041	8381	7814	8084	7839
<i>Banana</i>						
Ernakulam	1361	1312	1629	2043	1836	2145
Trichur	1384	1549	1432	1228	1403	1577
Palghat	587	1385	1545	1467	1591	1778
State	11155	14318	14068	14126	15185	16123

1	2	3	4	5	6	7
<i>Tapioca</i>						
Ernakulam	17091	12462	12382	10782	11874	10364
Trichur	12178	6191	6157	5493	5797	5588
Palghat	7965	12644	12714	12831	12990	12515
State	328650	244990	248069	227617	233010	216742
<i>Sweet potato</i>						
Ernakulam	53	66	60	54	60	46
Trichur	190	140	135	135	137	148
Palghat	740	1794	2023	1723	1845	1712
State	5882	5054	5316	5006	5085	4635
<i>Coconut</i>						
Ernakulam	50726	60881	62317	62916	62038	55678
Trichur	50699	54030	57312	57312	58929	62438
Palghat	16994	22954	22916	23388	23186	25504
State	692945	651370	666618	674378	682281	687483

b) Area under other important crops in Central Zone (1984-'85)
(In hectares)

Crop	Ernakulam	Trichur	Palghat	Total region	Percentage to the State
Jowar	5	9	1682	1696	93.08
Ragi	2	29	817	848	70.67
Other cereals	136	78	1789	2003	81.42
Pulses	1395	2440	8662	12497	43.54
Sugarcane (Gur)	50	5	2690	2745	35.02
Pepper	6192	3780	1665	11637	11.00
Chillies	—	3	187	190	18.98
Ginger	2282	96	410	2788	19.18
Turmeric	626	149	290	1065	36.02
Betal Nut	5727	6201	2170	14098	24.83
Tamarind	741	1460	2999	5200	46.84
Mango	4595	4550	5752	14897	24.88
Jack	3942	3644	3844	11430	19.68
Banana	2145	1577	1778	5500	34.11
Other Plantain	3333	3273	2404	9010	25.52
Ground Nut	—	—	11744	11744	99.32
Coconut	22954	54030	60881	137865	20.80
Rubber	34319	11019	13013	58351	18.70
Pineapple	589	344	202	1135	23.46

Annexure 68

a) Production of important crops in Central Zone (in tonnes)

District	1975—76	1980—81	1981—82	1982—83	1983—84	1984—85
<i>Rice</i>						
Virippu						
Ernakulam	50340	59764	57138	65388	50995	62011
Trichur	39987	49477	47193	52509	53404	42606
Palghat	205018	190593	203506	209159	175566	196006
State	585068	553748	556918	578828	520458	549027
<i>Mundakan</i>						
Ernakulam	55419	57161	62974	63216	47964	64482
Trichur	77996	62382	74310	68382	71443	73828
Palghat	175741	176176	175043	151679	160779	151524
State	588829	548500	589154	565704	520622	539839
<i>Summer</i>						
Ernakulam	13401	27676	28883	21214	20095	22706
Trichur	21799	35712	33970	28502	30274	30947
Palghat	3460	7013	6840	4373	3020	2940
State	150970	169714	193321	161665	166836	167050
<i>Total</i>						
Ernakulam	119160	144601	148995	149818	119054	149199
Trichur	139782	147571	155473	149393	155121	147381
Palghat	374219	373782	395389	365211	339364	350470
State	1364867	1271962	1339393	1306197	1217916	1255902
<i>Sugarcane</i>						
Ernakulam	112	495	340	236	340	288
Trichur	135	17	33	29	29	29
Palghat	7528	16245	17771	11610	12576	13961
State	41831	48178	49749	43316	44630	42754
<i>Banana</i>						
Ernakulam	9917	15017	18646	22448	23354	26465
Trichur	10083	24536	22683	19062	15657	17599
Palghat	4277	18855	21034	18374	11137	12446
State	81273	176683	182413	164913	177917	189564
<i>Tapioca</i>						
Ernakulam	323702	240267	243059	207554	252323	205207
Trichur	164884	92555	76655	102060	103650	73773
Palghat	112298	177648	191346	185151	183159	234281
State	5390217	4060911	3745142	3848718	3903169	3694270
<i>Coconut (in million nuts)</i>						
Ernakulam	269	327	344	332	264	363
Trichur	299	347	381	355	322	297
Palghat	56	80	77	80	63	76
State	3429	3008	3006	3184	2602	3453

b) Production of other important crops in Central Zone (1984-'85)
(In tonnes)

Crop	Ernakulam	Trichur	Palghat	Total Region	Percentage to state production	Productivity
Jowar	2	3	866	871	94.16	514 kg/ha
Ragi	2	24	671	697	69.70	822 ..
Other cereals	87	50	1286	1423	78.66	710 ..
Pulses	999	1742	6289	9030	44.29	723 ..
Sugarcane (GUR)	288	29	13961	14278	33.39	5202 ..
Pepper	547	677	253	1487	8.57	128 ..
Dry Chillies	—	3	164	167	18.29	879 ..
Dry Ginger	7385	156	986	8527	20.67	3059 ..
Cured Turmeric	1125	233	523	1881	36.27	1766 ..
Betal Nut (No. in million)	1089	1071	372	2532	27.31	180 (nos. in 000) 179600
Tamarind	1005	3038	7821	11864	50.38	2282 kg/ha
Mango	12025	20070	41898	73993	38.27	4967 ..
Jack (Nos. in 000)	16939	13818	14573	45330	19.84	3966 Nos.
Banana	26485	17594	12446	56505	29.80	13274 kg/ha
Other Plantain	16392	7194	11542	35128	24.30	3899 ..
Ground Nut	—	—	11697	11679	99.39	994 ..
Coconut (nos. in million)	363	297	76	736	21.31	5469 Nos.
Rubber	21727	7507	6879	36113	19.11	619 kg/ha
Pineapple	6491	2864	2461	11816	19.74	10411 ..

Annexure 69

Area, Production and Productivity of rice—Taluk wise

a) Area under paddy in ha.

District/ Taluk	1975-76	1980-81	1981-82	1982-83	1983-84	1984-85
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ernakulam						
Kothamangalam	8764	8812	9274	8608	7279	7860
Muvattupuzha	12275	13080	12796	12124	11172	11118
Cochin	3134	1615	1671	2533	2329	2160
Kanayannur	13801	9527	3844	8008	7665	7948
Kunnathunad	20890	33181	32462	29953	28661	29814
Alwaye	20422	27148	25822	26412	22708	23157
Parur	9657	9137	10015	8372	6918	7126
Trichur						
Cranganore	2107	2998	3220	3500	2961	2812
Mukundapuram	27501	38285	39978	34031	33313	33136
Trichur	31390	28286	31138	28752	25699	27917
Thalappally	33685	31685	33047	32248	33718	32618
Chowghat	13684	9060	8128	9180	7700	6057
Palghat						
Chittur	42061	39793	41682	39541	41052	39022
Alathur	41090	47552	46471	39931	39130	39902
Palghat	42334	40828	38692	40450	37037	35119
Ottappalam	46159	39234	39137	39371	37391	38209
Mannarghat	13538	16227	14896	13865	13424	14060
<i>Virippu</i>						
Ernakulam						
Kothamangalam	3728	4318	4435	4039	3512	3634
Muvattupuzha	4493	5468	5486	4886	4144	4491
Cochin	3134	1615	1617	2533	2329	2160
Kanayannur	8698	5034	4630	3876	3417	3472
Kunnathunad	7535	12544	10810	11311	10341	11381
Alwaye	6689	10272	9759	9870	8543	8543
Parur	3820	3923	3311	3538	3450	3009
Trichur						
Cranganore	520	811	817	1069	807	702
Mukundapuram	7432	13244	13931	13244	11622	11289
Trichur	7074	8000	7245	6326	5569	6190
Thalappally	16012	14876	16148	16367	16270	15149
Chowghat	3528	3653	3653	3655	3652	2246
Palghat						
Chittur	19432	21381	23086	21029	21031	20923
Alathur	20289	18918	19886	20169	20353	20242

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Palghat	26463	21583	19863	21031	20376	18771
Ottappalam	27641	20401	20561	20561	91569	19837
Mannarghat	7010	7479	6648	6648	6566	6566
<i>Mundakan</i>						
Ernakulam						
Kothamangalam	4712	3706	4086	4263	3244	3725
Muvattupuzha	7381	6379	6103	6343	5772	5493
Cochin	—	—	—	—	—	—
Kanayannur	4736	4045	3773	3970	3702	4042
Kunnathunad	11640	12363	13815	13296	12985	13025
Alwaye	10132	10107	9598	9889	9117	9395
Parur	1961	3116	4006	3116	2174	2742
Trichur						
Cranganore	1549	2119	2286	2354	2093	2058
Mukundapuram	15327	15771	16515	15645	15251	15277
Trichur	17699	12853	15811	13561	12008	14080
Thalappally	16342	14518	14509	14249	15954	15424
Chowghat	8576	3907	2449	3907	2914	2866
Palghat						
Chittur	22364	16736	17130	17641	19158	17509
Alathur	20526	28540	26448	19695	18722	19594
Palghat	15721	18818	18425	19239	16471	16164
Ottappalam	17384	17899	17364	18171	17190	17876
Mannarghat	6216	7557	7149	6298	6151	6863
<i>Summer</i>						
Ernakulam						
Kothamangalam	324	788	753	306	523	501
Muvattupuzha	401	1233	1207	895	1256	1134
Kanayannur	367	445	441	162	546	454
Kunnathunad	1716	8274	7839	5346	5335	5408
Alwaye	3601	6769	6465	6653	5048	5219
Parur	3876	2098	2698	1718	1294	1375
Trichur						
Cranganore	38	68	117	77	61	52
Mukundapuram	4742	9270	9532	5142	6440	6570
Trichur	6617	7433	8082	8865	8122	7647
Thalappally	1342	2291	2390	1632	1494	2045
Chowghat	1580	1500	2026	1618	1134	945
Palghat						
Chittur	265	1676	1466	871	863	590
Alathur	275	94	137	67	55	66
Palghat	150	427	404	180	190	184
Ottappalam	1134	934	912	639	632	496
Mannarghat	312	1191	1099	919	707	631

b) Production of rice in tonnes

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ernakulam						
Kothamangalam	13806	12726	14289	14000	11084	13774
Muvattupuzha	16679	22710	22628	21661	20362	20453
Cochin	3881	1778	2483	4082	2822	2491
Kanayannur	11670	11798	9350	9198	11606	11514
Kunnathunad	29166	45303	49245	44810	33045	49158
Alwaye	27519	37537	35242	45246	33673	39897
Parur	11369	12749	15758	10821	6462	11912
Trichur						
Cranganore	1702	1709	3010	3478	1683	2046
Mukundapuram	31177	52566	45198	45908	49879	49000
Trichur	44634	35828	46760	47411	44547	42821
Chowghat	12822	8910	11944	8941	8914	5298
Palghat						
Chittur	105098	91770	109150	103243	102252	106355
Alathur	94142	98180	117987	102839	95014	99111
Palghat	83543	96895	81333	85415	74536	72269
Ottappalam	71178	54227	56330	53471	50847	53577
Mannarghat	20258	32710	20589	20243	16716	19158
Virippu						
Ernakulam						
Kothamangalam	6133	6292	6724	6955	6042	6879
Muvattupuzha	6382	9836	10160	10459	8162	8538
Cochin	3881	1778	2483	4082	2822	2491
Kanayannur	10538	6162	4725	4056	5018	4550
Kunnathunad	11716	16038	14836	17618	12806	18823
Alwaye	7682	13761	13770	16992	13495	16231
Parur	4008	5897	4439	5528	2650	4499
Trichur						
Cranganore	380	440	443	997	480	165
Mukundapuram	7642	14035	12408	18576	16601	14850
Trichur	8747	8793	9482	9804	8753	7699
Thalappally	20388	21697	21220	20571	23225	18402
Chowghat	2830	4512	3640	2561	4345	1490
Palghat						
Chittur	53927	55094	69350	62851	52338	63900
Alathur	47851	42582	50180	54993	50112	53271
Palghat	53097	53161	45711	54338	39577	42847
Mannarghat	9819	12024	9420	8889	7919	8141
Ottappalam	40334	27732	28845	28088	25570	27847

(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Mundakan</i>						
Ernakulam						
Kothamangalam	7349	5624	6448	6730	4276	6204
Muvattupuzha	9742	11630	10967	9909	9924	10274
Cochin	—	—	—	—	—	—
Kanayannur	5703	4891	3930	5083	5594	6188
Kunnathunad	15471	17317	21896	21308	13813	21314
Alwaye	14372	14423	13123	16452	12801	15754
Parur	2782	3276	6610	3734	1556	4748
Trichur						
Cranganore	1277	1146	2428	2362	1145	1798
Mukundapuram	16887	21935	20175	19490	24111	23542
Trichur	26931	15158	25475	22338	19050	22034
Thalappally	26337	21414	22786	20745	23700	24130
Chowghat	6564	2729	3376	3447	3437	2324
Palghat						
Chittur	50809	33877	36983	38505	48793	41189
Alathur	45676	55484	67482	47776	44844	45738
Palghat	30087	42839	34648	30883	34741	29240
Ottappalam	29159	25119	26391	24310	24449	25210
Mannarghat	10010	18857	9539	10205	7952	10147
<i>Summer</i>						
Ernakulam						
Kothamangalam	324	810	1117	315	766	691
Muvattupuzha	555	1244	1501	1293	2276	1641
Kanayannur	499	745	695	59	994	776
Kunnathunad	1979	11948	12512	5884	6426	9021
Alwaye	5465	9353	8349	11802	7377	7912
Parur	4579	3576	4709	1861	2256	2665
Trichur						
Cranganore	45	123	69	119	58	83
Mukundapuram	6648	16596	12615	7842	9167	10608
Trichur	8956	11877	11803	15269	16744	13088
Thalappally	2722	4547	4555	2339	2273	5684
Chowghat	3428	2569	4928	2933	2032	1484
Palghat						
Chittur	362	2799	2817	1887	1071	1266
Alathur	625	114	325	70	58	102
Palghat	359	895	974	194	218	182
Ottappalam	1685	1376	1094	1023	828	520
Mannarghat	429	1829	1630	1149	845	870

C. Productivity of paddy — Taluk-wise (kg/ha)

District/ Taluk	1975-76	1980-81	1981-82	1982-83	1983-84	1984-85
(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Virippu</i>						
Ernakulam						
Kothamangalam	2504	2218	2308	2621	2619	2881
Muvattupuzha	2162	2738	2819	3258	2998	2894
Cochin	1885	1676	2262	2453	1844	1755
Kanayannur	1844	1863	1553	1593	2235	1995
Kunnathunad	2367	1946	2089	2371	1885	2517
Alwaye	1748	2039	2148	2620	2404	2829
Parur	1597	2288	2041	2248	1169	2276
Trichur						
Cranganore	1113	826	825	1420	905	358
Mukundapuram	1565	1613	1356	2135	2174	2002
Trichur	1882	1673	1992	2359	2392	1893
Thalappally	1938	2220	2000	1913	2173	1849
Chowghat	1221	1880	1517	1066	1811	1010
Palghat						
Chittur	4224	3922	4572	4549	3791	4648
Alathur	3589	3426	3841	4150	3748	4006
Palghat	3054	3749	3503	3933	2956	3474
Ottappalam	2221	2069	2135	2079	1989	2137
Mannarghat	2132	2447	2157	2035	1836	1887
<i>Mundakan</i>						
Ernakulam						
Kothamangalam	2374	2310	2402	2403	2006	2535
Muvattupuzha	2009	2775	2735	2378	2617	2847
Cochin	—	—	—	—	—	—
Kanayannur	1833	1839	1585	1949	2300	2330
Kunnathunad	2023	2132	2413	2439	1619	2491
Alwaye	2159	2172	2081	2532	2137	2552
Parur	2159	1600	2511	1824	2089	2636

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Trichur						
Cranganur	1255	823	1663	1527	833	1330
Mukundapuram	1677	2117	1859	1896	2406	2346
Trichur	2316	1795	4252	2507	2415	2382
Thalappally	2453	2245	2390	2216	2261	2381
Chowghat	1165	1063	2098	1343	1795	1234
Palghat						
Chittur	3438	3081	3286	3322	3877	3581
Alathur	3387	2959	3883	3692	3646	3553
Palghat	2913	3465	2862	2443	3210	2753
Ottappalam	2553	2136	2274	2036	2165	2147
Mannarghat	2451	3798	2031	2466	1968	2250
<i>Summer</i>						
Ernakulam						
Kothamangalam	1523	1565	2258	1567	2229	2099
Muvattupuzha	2108	1536	1892	2199	2758	2203
Cochin	—	—	—	—	—	—
Kanayannur	2070	2548	2397	556	2771	2721
Kunnathunad	1755	2198	2429	1675	1833	2539
Alwaye	2310	2103	1966	2700	2224	2307
Parur	1798	2594	2657	1649	2654	2950
Trichur						
Cranganore	1817	2754	893	2352	1447	2429
Mukundapuram	2134	2725	2014	2321	2167	2458
Trichur	2061	2432	2223	2622	3138	2605
Thalappally	3087	3021	2901	2181	2316	4231
Chowghat	3302	2607	3702	2759	2727	2390
Palghat						
Chittur	2081	2542	2925	3298	1889	3266
Alathur	3461	1852	3611	1593	1605	2352
Palghat	3644	3291	3671	1640	1746	1506
Ottappalam	2261	2243	1826	2556	1994	1596
Mannarghat	2095	2337	2257	1903	1819	2099

Annexure 70

Percentage distribution of area under paddy (HYV & Local)

District	Season	1975-76		1980-81		1981-82		1982-83		1983-84		1984-85	
		HYV	local	HYV	local	HYV	local	HYV	local	HYV	local	HYV	local
Ernakulam	Virippu	44.04	55.96	30.39	69.61	41.67	58.33	39.32	60.68	30.01	69.99	52.44	47.56
	Mundakan	8.14	91.86	10.27	89.73	5.50	94.50	3.98	96.02	3.55	96.45	8.90	91.10
	Summer	30.10	69.90	25.74	74.26	20.08	79.92	9.48	90.52	10.82	89.18	24.85	75.15
Trichur	Virippu	11.36	88.64	18.00	82.00	15.72	84.28	8.45	91.55	18.22	81.78	8.83	91.17
	Mundakan	24.32	75.68	15.82	84.18	19.66	80.44	7.74	92.26	12.73	87.27	14.46	85.54
	Summer	70.27	29.73	84.18	51.82	48.35	51.65	51.87	48.13	45.72	54.28	55.26	64.74
Palghat	Virippu	31.25	68.75	69.28	30.72	64.49	35.51	54.78	45.22	42.59	57.41	34.77	65.23
	Mundakan	11.69	88.31	62.66	37.34	40.15	59.85	31.83	68.12	30.00	70.00	22.93	77.07
	Summer	55.43	44.57	61.46	38.54	32.88	67.12	38.71	61.20	32.65	67.35	26.39	73.61
State	Virippu	24.30	75.20	39.01	60.99	40.03	59.97	33.00	67.00	31.06	68.94	35.28	64.72
	Mundakan	16.20	38.80	26.09	73.91	42.97	57.03	14.72	85.28	19.12	80.88	19.49	80.51
	Summer	66.71	33.29	51.97	48.03	45.50	54.50	37.63	62.37	55.25	44.75	52.32	47.68

Annexure 71

Agricultural Implements and Machinery (1984-85)

State/ District	Hand operated Implements							Animal operated Implements								
	Seed ferti- lizer drill	Seed drill	Chaff cutter	Wheel hoe	Spray- ers	Duster	Wooden plough	Steel plough	Disc harrow	Culti- vator (Tri- hali)	Seed cum fer- tilizer drill	Seed drill	Levell- ing Ka- rahale- veller	Wet land pudd- ler	Olpad Thresher	
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Kerala	15920	1753	4031	5164	35206	9501	228566	33524	13861	761	933	281	3186	100049	8085	1283
Rural	15783	1714	3929	4973	34609	9294	224623	32871	13666	719	985	276	3101	98262	7984	1273
Urban	137	39	102	191	597	207	3943	653	195	42	8	5	85	1787	101	10
Ernakulam	1467	18	91	189	4987	245	29662	3118	937	51	10	5	150	13305	204	45
Rural	1467	18	88	181	4841	230	28703	3033	873	30	9	2	148	12872	203	45
Urban	—	—	3	8	146	15	959	85	64	21	1	3	2	433	1	—
Trichur	138	117	178	192	2297	654	16080	2237	1492	56	70	13	185	6722	930	115
Rural	138	117	178	167	2250	636	15806	2166	1471	52	69	13	135	6668	928	106
Urban	—	—	—	25	47	18	274	71	21	4	1	—	50	54	2	9
Palghat	1442	13	602	177	2654	2230	65279	2871	1778	140	308	104	933	31286	4668	483
Rural	1442	13	598	176	2611	2228	64198	2806	1735	140	308	104	919	30700	4611	483
Urban	—	—	4	1	43	2	1081	65	43	—	—	—	14	586	57	—
Total (Central Zone)	3047	148	871	558	9938	3129	111021	8226	4207	247	388	122	1263	51313	5802	643

Annexure 71 Contd...

State/ District	Plant protection Equipment and Engines, etc.						Tractor, Power and other Implements								
	Animal Cart	Per- sian wheel	Sugar cane crusher	Power operated sprayer/ duster	Diesel Engine pumpset	Electric pumpset	Power tiller (for Agril. purpose)	Tractor (for Agril. purpose)	Mould board plough	Disc harrow	Seed drill	Seed cum fer- tilizer drill	Plan- ter	Level- ler	Potato digger
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Kerala	8245	309	95	2058	24475	74456	3925	1335	1278	84	23	37	188	3582	207
Rural	8064	297	95	1995	23870	70922	3774	1271	1245	70	22	37	177	3499	175
Urban	181	12	—	63	605	3534	151	64	33	14	1	—	1	83	32
Ernakulam	263	26	5	158	1467	18283	940	141	389	21	5	4	10	1019	1
Rural	236	25	5	155	1326	17274	914	120	376	10	5	4	9	981	1
Urban	27	—	—	3	141	1009	23	21	13	11	—	—	1	38	—
Trichur	782	31	3	211	4288	25763	1589	132	75	7	1	—	10	448	2
Rural	761	31	3	206	4173	24411	1544	131	75	6	1	—	10	430	2
Urban	21	—	—	5	115	1352	45	1	—	1	—	—	—	18	5
Palghat	5718	5	9	564	3198	7063	359	593	212	25	4	2	91	735	5
Rural	5614	5	9	561	3060	6897	327	565	203	23	3	2	91	724	5
Urban	104	—	—	3	138	166	32	28	9	2	1	—	—	11	—
Total (Central Zone)	6763	62	17	933	8953	51109	2888	866	676	53	10	6	111	2202	8

Annexure 71 Contd.....

State/ District	Other Power Operated Equipments																	
	Combine Harvester			Thresher		Multi- crop	Maizer sheller	Chaff cutter	Sugar- cane Crusher	Gill net- ters	Mechanised boats (1982)			Non-Mechanised boats (1982)				
	Trailer	Tractor atta- ched	Self pro- pelled	Wheat	Paddy						Trawlers	Liners	Others	Beach scine boats	Plank built boats	Dugs out canoes	Catama- rans	Others
32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	
Kerala	297	60	8	20	330	33	4	17	71	2211	1621	452	877	1284	4381	9916	5709	5329
	291	57	8	19	329	33	4	17	71									
	6	3	—	1	1	—	—	—	—									
Ernakulam	29	13	—	1	24	9	—	—	1	131	145	5	99	51	1051	1671	118	1312
	29	11	—	1	24	9	—	—	1									
	—	2	—	—	—	—	—	—	—									
Trichur	15	2	—	—	179	—	1	1	3	149	41	560	51	42	214	438	94	89
	14	2	—	—	177	—	1	1	3									
	1	—	—	—	—	—	—	—	—									
Palghat	97	12	3	3	3	3	—	4	12	—	—	—	—	—	—	—	—	—
	94	11	3	2	2	3	—	4	12									
	3	1	—	1	1	—	—	—	—									
Total (Central zone)	141	27	3	4	206	12	1	5	16	280	186	565	150	93	1265	2809	212	144 ¹

Source: Directorate of Economics and Statistics.

Annexure 72

Distribution of plough according to 1977 and 1982 census

State/District	Wooden		Iron	
	1977	1982	1977	1982
	1	2	3	4
Kerala	316975 (100.00)	228566 (100.00)	69191 (100.00)	47388 (100.00)
Ernakulam	45357 (14.31)	29662 (12.98)	6701 (9.68)	4055 (8.56)
Trichur	27777 (8.76)	16080 (7.04)	3968 (5.73)	3729 (7.87)
Palghat	71888 (22.68)	65279 (28.56)	16711 (24.15)	4649 (9.81)
Total	145322	111021	27380	12433
(Central zone)	(45.75)	(48.57)	(39.57)	(26.24)

Annexure 73

Distribution of Diesel and Electric Pumpsets in different Districts in different
Census periods

State/ District	1972		1977		1982	
	Oil	Electric	Oil	Electric	Oil	Electric
Kerala	17376 (100.00)	9983 (100.00)	28759 (100.00)	25973 (100.00)	24475 (100.00)	74456 (100.00)
Ernakulam	3209 (18.47)	3039 (30.44)	3976 (13.82)	10882 (41.90)	1467 (5.99)	18283 (24.56)
Trichur	1062 (611)	1849 (18.52)	3755 (12.99)	6971 (26.84)	4288 (17.52)	25763 (34.60)
Palghat	3697 (21.28)	2373 (23.77)	3839 (13.35)	3516 (13.54)	3198 (13.07)	7063 (9.49)
Total	7968	7261	11550	21369	8953	51109
(Central zone)	(45.86)	(72.73)	(40.16)	(82.27)	(36.58)	(68.64)

Annexure 74

Statement showing the density of Cattle, Buffaloes and Livestock population in the different districts of Central zone according to 1982 Census

State/ District	Area in kms.	Cattle		Buffaloes		Livestock	
		Popula- tion	Density per sq.km.	Popula- tion	Density	Popula- tion	Density
Kerala	38863	3096775	80	408384	11	5644580	145
Ernakulam	2408	304367	126	27272	11	527654	219
Trichur	3032	263613	77	54331	18	471735	157
Palghat	4480	273813	61	102354	23	573247	128
Total (Central zone)	9920	811335	82	183957	19	1577936	159

Source: Livestock Census Report—1982
Department of Animal Husbandry—Kerala

Annexure 75

Number and Percentage Distribution of different Categories of Cattle under Desi and Improved types in central zone (1982 Census)

	Ernakulam	Trichur	Palghat	Zone total	State total
1	2	3	4	5	6
<i>Male over 3 years:</i>					
Desi	30531 (96.11)	21837 (93.44)	47506 (94.73)	99874 (94.86)	245685 (92.37)
Improved	1236 (3.89)	21534 (6.56)	2642 (5.27)	5412 (5.14)	20288 (7.63)
<i>Adult females kept for Breeding and Milk:</i>					
<i>In Milk</i>					
Desi	39541 (44.90)	29833 (44.29)	35053 (50.89)	104427 (46.55)	392791 (45.45)
Improved	48535 (55.10)	37526 (55.71)	33825 (49.11)	119886 (53.45)	471481 (54.55)
<i>Dry</i>					
Desi	30302 (62.85)	20052 (59.47)	30702 (71.88)	81056 (65.03)	350315 (62.39)
Improved	17909 (37.15)	13668 (40.53)	12008 (29.12)	43585 (34.97)	211161 (33.61)

	1	2	3	4	5	6
<i>Young stock (Females) under one year:</i>						
Desi		22185 (40.36)	19445 (42.25)	21783 (51.03)	63413 (44.13)	220668 (40.58)
Improved		32787 (59.64)	26577 (57.75)	20906 (48.97)	80270 (55.87)	323080 (59.42)
<i>1—3 years:</i>						
Desi		19532 (54.47)	13441 (47.41)	15560 (60.42)	48533 (53.95)	195335 (51.20)
Improved		16324 (45.53)	14912 (52.59)	10192 (39.58)	41428 (46.05)	186202 (51.20)
<i>Total Cattle</i>						
Desi		165084 (54.24)	121213 (51.88)	177383 (64.78)	463680 (57.12)	1643320 (53.07)
Improved		139283 (45.76)	112442 (48.12)	96430 (35.22)	348155 (42.88)	1453455 (46.93)

Source: Livestock Census Report—1982
Department of Animal Husbandry—Kerala

Annexure 76

Comparative Statement of Distribution and variation of Goats in different districts of the Central Zone

State/District	1977		1982		Percentage variation over the previous census
	Number	Percentage	Number	Percentage	1982
1	2	3	4	5	6
Kerala	1683297	100.00	2003795	100.00	+ 19.04
Ernakulam	156280	9.28	180354	9.00	+ 15.40
Trichur	162763	9.67	186370	9.30	+ 14.50
Palghat	138672	8.24	194665	9.72	+ 40.38
Total for the zone	457715	27.19	561389	27.51	20.47

Source: Livestock census Report—1982 Department of Animal Husbandry, Kerala

Annexure 77

Density of poultry in the various districts of Central zone (1982)

State/ District	Area in sq. km.	No. of poultry	Density/ sq. km	No. of fowls	Density/ sq. km.	No. of Ducks	Density/ sq. km.
1	2	3	4	5	6	7	8
Kerala	38863	15083410	388	14519039	374	530354	14
Ernakulam	2408	1624152	674	1489939	619	126003	52
Trichur	3032	1533438	506	1494043	493	37030	12
Palghat	4480	1297144	290	1285688	287	10035	2
Total (Central zone)	9920	4454734	449	4270570	430.5	173068	17.45

Annexure 78

Number and percentage variation of Desi and Improved Cattle of 1977 and 1982
Census Periods

	Erna- kulam	Trichur	Palghat	Total zone	Total State
<i>1977</i>					
Desi	167173	120879	170017	458069	1651173
Improved	130270	99186	88907	318363	1354886
Total:	297443	220065	258924	776432	3006059
<i>1982</i>					
Desi	165084	121213	177383	463680	1643320
Improved	139283	112442	96430	348155	1453455
Total:	304367	233655	273813	811835	3096775
<i>Percentage variation over the previous census:</i>					
Desi	-1.25	+ 0.28	+4.33	1.22	-0.48
Improved	+6.92	+13.36	+8.46	9.36	+7.28
Total:	+2.33	+ 6.18	+5.75	4.56	+3.01

Source: Livestock Census Report—1982
Department of Animal Husbandry Kerala.

Annexure 79

Primary agricultural credit societies engaged in marketing of agricultural produce 1982-83
(Amount in '000 Rs.)

District	Marketing of Agrl. produce		Supply of Agrl. requisities		No. of societies undertaking processing	Distribution of consumer goods		
	No. of societies	Value of Agrl. produces marketed	No. of societies	Value of agrl. requisities supplied		No. of societies	Value of consumer goods purchased	Value of consumer goods sold
Ernakulam	58	25295	83	24475	...	83	39621	46955
Trichur	32	10227	78	32740	...	103	89143	92792
Palghat	1	883	79	51746	...	75	72665	77481
Total zone:	91	36205	260	108961	...	261	201429	217228
Total state:	389	119332	1152	327226		1210	571730	646382

Storage facilities, management and working results—1982-83

	No. of godowns owned	No. of godowns hired	No. of societies on profit	Profit amount	No. of societies on loss	Loss amount	Cost of Management	No. of societies having paid secretaries
Ernakulam	129	45	119	6553	39	1259	11349	162
Trichur	166	33	88	4139	69	11303	27982	156
Palghat	143	57	49	5995	36	8109	15843	85
Total zone:	438	135	256	16687	144	20671	55174	403
Total state:	1513	660	876	54276	685	69453	211613	1560

Annexure 80

Primary marketing societies of the zone—1982-83

District	No. of societies	Mem-ber-ship	Paid up capital Total Govt. share (000Rs.)		Re-serves	De-posit	Borro-wing	Value of Agrl. produce pur-chased	Value of agrl. produce sold	Value of Agrl. re-quisites pur-chased	
1	2	3	4	5	6	7	8	9	10	11	
Ernakulam	5	6821	1916	1499	1052	262	509	22941	23352	2090	
Trichur	4	2543	1080	785	480	3	1665	4014	27399	68	
Palghat	9	16475	3214	2528	3031	1136	5566	13722	13168	2028	
Total zone;	18	25819	6210	4812	4563	1401	7740	40677	63919	4186	
Total state:	93	162418	32492	23986	21615	9373	43963	261186	298852	43163	
	Value of Agrl. re-quisites sold	Value of fertili-zers sold	Value of consumer goods purchased	Cost of consumer goods sold	Cost of manage-ment	No. of go-downs owned	No. of go-downs hired	No. of socie-ties in profit	Amount	No. of socie-ties in loss	Amount
	12	13	14	15	16	17	18	19	20	21	22
Ernakulam	1650	980	6750	6504	514	5	5	5	217	—	—
Trichur	90	65	—	—	386	11	1	2	67	2	322
Palghat	2105	1080	85319	103022	1178	17	10	1	136	8	2447
Total zone:	3845	2125	92069	109526	2078	33	16	8	420	10	2769
Total state:	46508	24562	206094	251665	11571	152	131	35	2040	63	16824

□