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**SUBSIDIARY FOOD CROP PRODUCTION  
IN THE DRY ZONE OF SRI LANKA**

By

**Dr. Anoja Wicramasinghe**

Department of Geography  
University of Peradeniya

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Anoja Wickremasinghe  
Senior Lecturer  
(B.A. (Hons.), Cert. in NRRLE., M.Sc., Ph.D., Sheffield, England)  
Department of Geography  
The University of Peradeniya

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## CHAPTER 1

### INTRODUCTION

#### 1.1 Subsidiary Food Crops and the Economy of Sri Lanka

The domestic sector of agriculture plays an important role in the agricultural economy of Sri Lanka, in producing food and generating employment and income for its peasantry. The cultivation of paddy and other subsidiary crops mainly by small scale farmers for domestic consumption is an outstanding feature. The prominence of paddy cultivation across the country is mainly due to its importance in being the staple food of the people. Subsidiary food crops traditionally grown in Sri Lanka include Kurakkan (Coracana), Sesame (Sesamum radiatum), Greengram (Vigna radiatum), Blackgram (Vigna mungo), Maize (Zea mays), Millet, Chilli (Capsicum sp.) and Cassava (Manihot esculenta). Unlike paddy, these are also grown primarily for consumption, but a number of spatial diversities are associated with them regarding their role in domestic agriculture and the livelihood of the people.

As a consequence of recent commercialization of peasant agriculture, some changes have been associated with the cultivation of subsidiary food crops. In the 1960's, in the effort to promote agriculture food production, development of improved, high yielding varieties of subsidiary food crops were emphasized to replace traditional ones. This has led to establishment of subsidiary food crops prominently in domestic agriculture. However, the spatial diversities in the distribution of subsidiary food crops are important to the livelihood of local dwellers.

The majority subsidiary food crop production occurs in the Dry Zone. Agrarian changes, which took place in the 1960's replaced the traditionally grown Chena crops in the drylands. Crops like Kurakkan, sesame, maize, millet and root crops typical of slash and burn agriculture and household consumption were virtually replaced by market oriented cash crops. This landmark, particularly in Dry Zone areas, typifies the changing attitudes towards subsidiary food crop production. The production of "cash crops" and the farmers' desire to produce marketable, high income generating varieties led to changes in overall farming objectives. Producing crops in large quantities for cash means creating employment for paid labour to augment the family workforce. Newly adopted crops like Cowpea, Soyabean, Potato, Onions, Chilli, Greengram etc., have become the source of income for a large number of farm families. This applies particularly to the Dry Zone where such crops fit areas previously under slash and burn cultivation.

Although the contribution of subsidiary food crops production to the economy of this country is considerable, the inadequacy of reliable data often prevents realistic evaluation. This is due to inadequate record keeping by small scale farm operators who are the main producers of subsidiary food crops. The lack of a system to compile production data is another factor. Nevertheless, there is evidence that subsidiary food crops in the context of national economy, have significantly increased production and income for peasantry, particularly in the Dry Zone.

Farmers' response to the government's policy on the food drive has resulted in increasing the area cultivated to SFCs since the mid 1960's. As shown in Table 1, for most crops, the cultivated area has increased substantially. Although some fluctuation occurred, the extent of SFCs increased from 252,200 hectares (ha) in 1977 to 266,200 ha in 1984. Fluctuations noted were due to variations in local situations, including weather. However, during the five year period between 1972 and 1977 SFC hectareage increased by almost 57 percent or about 145,000 ha.

Some changes in the area cultivated for individual crops were also noted. Prior to 1977, the area under each crop type had increased tremendously. For example, Cowpea covered about 500 ha in 1972 and increased to 30,200 ha in 1977. The major crop types achieved a two-fold increase or more during the period.

In terms of area extent, the most important crops in 1977 were Manioc, Chillies, Maize, Cowpea and Kurakkan, each of which was extended over 25,000 ha of cultivated land in Sri Lanka. However, during the period between 1977 and 1984, the area under Manioc, Chillies, Kurakkan and Sesame decreased, whereas with other crops an increase is noted (Table 1). This was associated with a change in their priority related to relative yields and market prices. In the year 1984, the most important crops were Maize, Manioc, Blackgram, Cowpea, Chillies and Greengram.

**Table 1. Area cultivated ('000) to SFCs, 1977 - 1984**

Crop	1977	1978	1979	1980	1981	1982	1983	1984
Manioc	54.5	39.9	33.5	27.0	37.1	52.9	37.5	38.3
Maize	36.7	28.6	23.6	23.2	28.1	44.9	47.2	45.4
Chilli	44.1	33.8	220.1	25.5	24.1	28.4	32.0	30.8
Red onion	8.2	6.3	5.9	7.4	8.2	8.2	11.4	8.3
Groundnut	6.5	8.3	5.0	11.1	12.0	14.1	13.6	7.6
Greengram	12.3	12.1	12.1	14.2	18.2	21.2	28.5	29.6
Sorghum	1.4	0.2	0.2	-	0.1	-	-	-
Soybean	1.0	1.9	1.2	1.1	2.2	16.4	14.6	11.8
Potato	3.2	2.6	4.2	5.2	4.6	5.7	6.6	7.9
B. onion	0.2	0.2	0.1	-	0.1	0.2	0.2	-
Kurakkan	25.6	17.6	10.8	8.0	13.1	16.0	19.8	16.9
Sesame	13.5	16.9	16.7	31.5	25.1	32.7	35.1	4.9
Meneri	1.1	0.5	0.1	1.3	0.9	1.8	0.9	-
Cowpea	30.2	27.6	30.3	25.5	38.1	35.7	45.8	31.3
Blackgram	13.9	14.0	8.7	8.4	10.0	10.0	17.5	33.4

Source: Economic and Social Statistics, Central Bank of Sri Lanka, 1986

As noted in the data given in Table 2, in terms of production, Manioc consistently remained the most important crop. Others in order of importance were Potatoes, Maize, Chillies, Cowpea and Greengram. According to the information provided by Hafi and Erickson (1989), subsidiary food crops have contributed Rs.3.73 million to Sri Lanka's Gross Domestic Product (GDP) in 1986, employed 47.3 million person days and involved 983,000 farm families.

The spatial differences of subsidiary food crops are important. The priority order of crop allocation differs by area, and the pattern of land and the number of farm families involved in creating employment and generating income. Therefore, to evaluate the subsidiary food crops contribution, baseline studies are necessary in areas of high production. Hence, this study in the Kelegama Village Cascade is an attempt to examine the subsidiary food crops production system of a traditional village community.

## 1.2 The objectives

The production of subsidiary food crops for cash income is widespread among village communities, particularly in the absence of modern irrigation schemes or tank based systems. Another factor is the shortage of suitable land for paddy cultivation.

The development potential of subsidiary food crops is great in remote areas where the community is deprived of services and socio-economic benefits. Improvement in living conditions of such communities to be successful, should be based on a community oriented development strategy. The present study attempted to cover the important aspects to be considered in promoting subsidiary food crop production and directing relevant extension services as follows:

Table 2. SFC production ('000 mt), 1977 - 1984

Crop	1977	1978	1979	1980	1981	1982	1983	1984
Manioc	544.9	499.5	365.0	334.5	422.7	637.7	737.6	476.7
Maize	41.9	35.3	26.1	31.4	35.3	44.6	51.0	39.1
Chilli	31.3	28.3	21.9	25.5	21.4	26.8	29.4	26.8
R. onion	66.3	72.3	62.7	79.1	92.2	92.7	134.8	37.6
Groundnut	5.7	7.5	5.4	14.0	14.5	13.8	17.3	6.5
Greengram	7.8	8.4	9.7	12.9	18.9	17.7	15.1	17.5
Sorghum	2.0	0.6	0.2	-	0.1	-	-	-
Soybean	1.1	2.9	1.3	1.1	2.4	11.1	10.6	7.9
Potato	33.4	29.9	52.6	75.9	63.4	65.2	82.5	98.4
B. onion	1.7	3.6	1.0	0.4	0.9	1.8	2.4	-
Kurakkan	23.3	14.7	10.8	6.6	11.7	13.3	11.7	7.1
Sesame	7.4	9.7	17.2	23.5	13.9	23.2	9.2	2.5
Meneri	1.1	0.5	0.1	0.8	0.8	1.3	1.1	-
Cowpea	21.3	22.6	18.8	23.5	39.3	35.6	26.1	22.4
Blackgram	11.7	8.7	6.0	5.5	7.3	8.9	12.8	5.4

Source: Economic and Social Statistics, Central Bank of Sri Lanka, 1986

- i The historical evolution of the community and the social structure;
- ii The physiographic condition and the distribution of subsidiary food crops;
- iii The demographic features, and the socio-economic condition of the community;
- iv The marketing system and the socio-economic factors influencing marketing and domestic consumption;
- v The linkage between agrarian services and the community;
- vi Farmer's access to credit;
- vii Problems associated with subsidiary food crop production and possible solution;
- viii Prospects of promoting subsidiary food crops in the community and recommendations for extending SFC production.

### 1.3 The investigation Methodology

The present study was based on field investigations over a period of about seven months. The following methodology was followed:

- i Preparatory work inclusive of the activities, selection and training of field investigators, an orientation, visit, and interpretation of aerial photographs;
- ii Conducting interviews and holding village meetings with 6 groups of villagers. These helped minimize memory lapses of individuals and learn the common perceptions and pursuits of the community;
- iii Questionnaire survey - This included preparation, testing and conduct of the survey. Background information of the 219 families in the Kelegama area was rated equal to information on socio-economic aspects and data on crop production systems. Primary survey data was upgraded by incorporating data on household contribution to production and marketing activities;
- iv Participatory observations - Field investigators stationed in the village facilitated close monitoring of production activities and household labour allocation by the crop type and the seasonal differences;
- v Data tabulation - Information gathered on demographic factors, socio-economic and crop production factors were summarized and analyzed by category for 219 families following a pre-determined format;
- vi Preparation and submission of the report.

## CHAPTER 2

### GENERAL CHARACTERISTICS OF THE STUDY AREA

#### 2.1 The location and Physiographic Condition

A community largely dependent on subsidiary food crops was selected to study the factors associated with production. The Kelegama village cascade, a typical OFC production area, was selected, since all rainfed areas are cultivated with subsidiary food crops and complemented previous experience of the researcher in the northwestern Dry Zone.

Kelegama village cascade is located within the administrative district of Kurunegala, in close proximity to the newly commissioned Inginimitiya Reservoir. Situated about 12 Kilometres from Anamaduwa, it is the main service and market centre for the area. However, the nearest transport service is about six Kilometres distant. The area is typical of the conditions prevalent in the Dry Zone northwest areas (Figure 1).

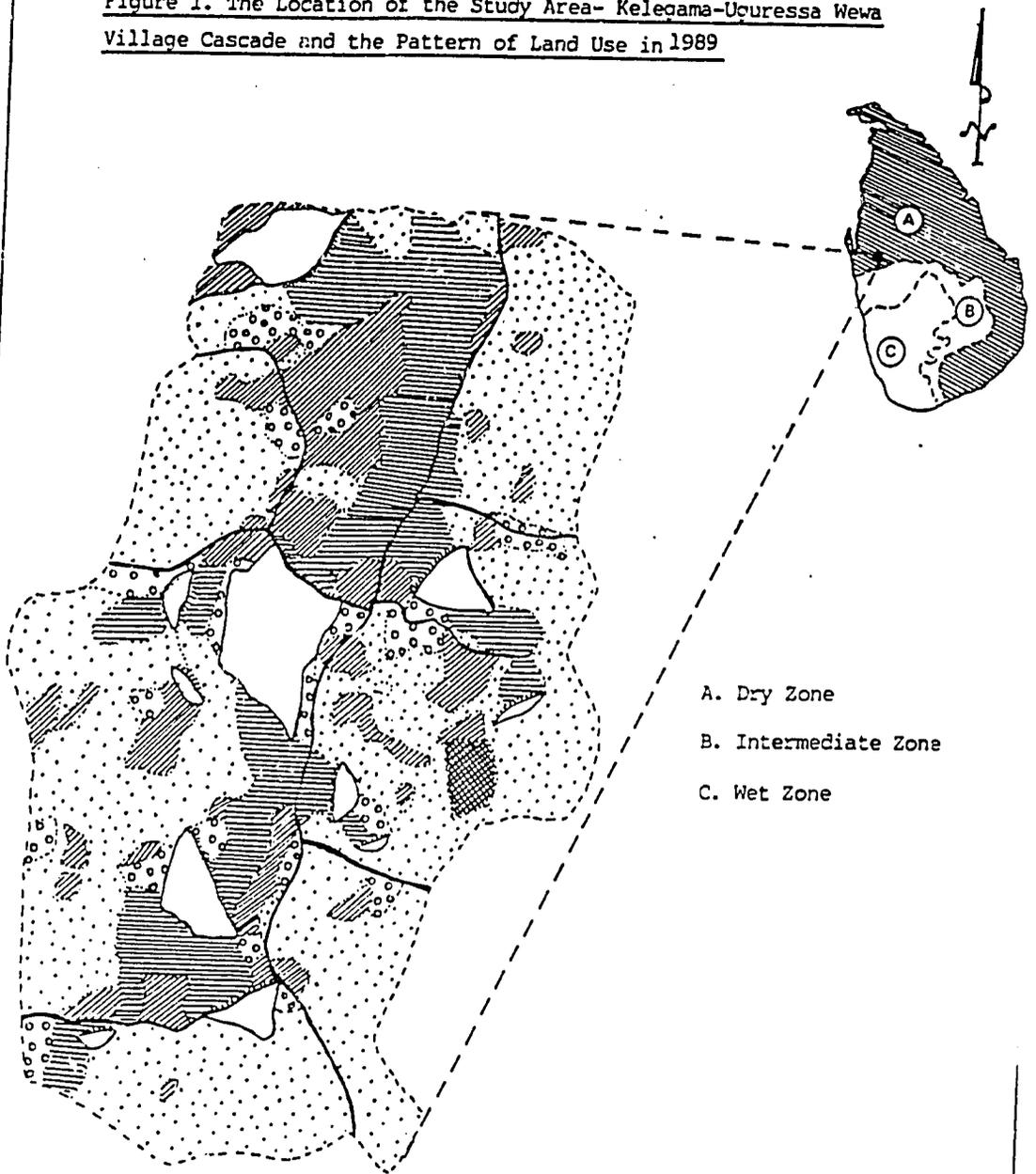
The cascade is like an amphitheatre, characterized by a chain of tanks linked with stretches of paddy and bordered by a slight elevation. Physiographically of low relief with a range of 20 to 50 metres, perennial drainage does not exist. Among the nine storage tanks located in the area, the central Kelegama tank and Uguressa-wewa in the north are the major ones. The area consists of traditionally old villages: Ihala-Kelegama, Achari-Kelegama, Digannewa, Uguressewa and Hene-Kelegama are names which reflect their location in relation to tanks or specific community characteristics.

#### 2.2 Climatic Factors

An important feature of the area is the seasonality of rainfall typified by one prominent growing season followed by a long dry spell. As shown in Figure two, nearly two-thirds of the rainfall occurs during the northwest monsoon, mostly between September and February. Comparatively low rainfall occurs during the southwest monsoon in the period between April and August, which can also be dry.

The rhythm of the rainfall pattern influences the agricultural activities of the area. Farmers cultivate two crops, the most prominent being the "Maha Crop" during the northeast rains and a second, less reliable, "Yala Crop" dependent upon the southwest monsoons. Hence, the distribution of rainfall is the dominant factor determining production, as well as the availability of food, employment and income (Wickremasinghe, 1989).

Figure 1. The Location of the Study Area- Kelegama-Uçuressa Wewa Village Cascade and the Pattern of Land Use in 1989



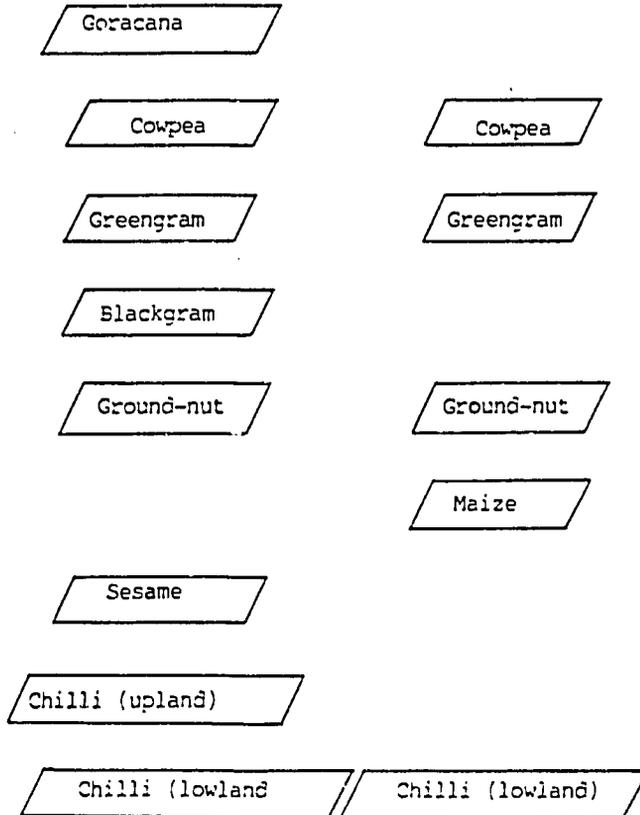
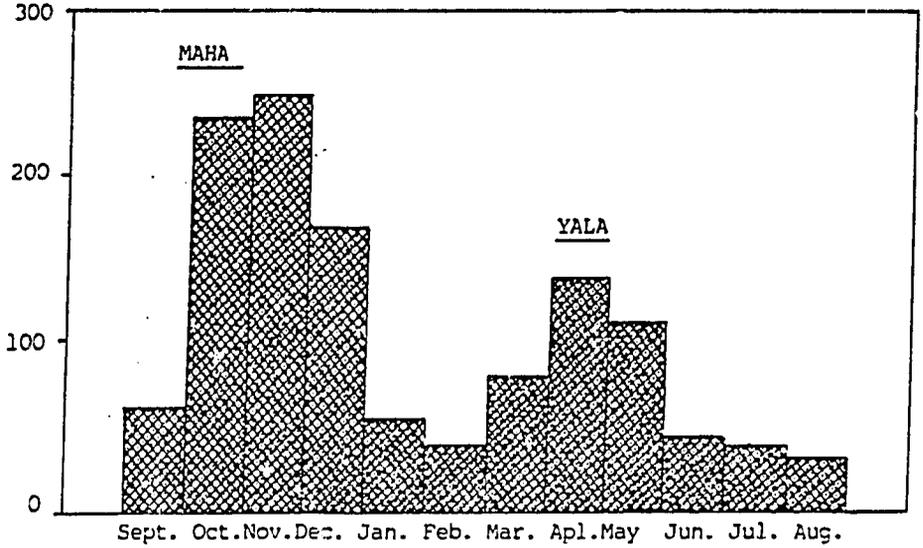
- A. Dry Zone
- B. Intermediate Zone
- C. Wet Zone

-  Forest
-  Rice
-  Upland - 'Chanas'
-  Homegarden
-  Shrub

-  Tank
  -  Road
- 65 0 65 130m  
Scale

Figure 2. The Pattern of Rainfall Distribution and Cultivation of SFCs

Rainfall (MM)



### **2.3 The Social Structure of the Community**

The basic social unit of the community structure is the family, traditionally a patriarchal organization. The community within the Kelegama cascade includes 219 families in 173 dwellings including 127 dwellings with separate families and 46 dwellings shared by two families each. Hence, 21 married members which could be considered family units also live with parents or in-laws without having a separate identity. The family represents a strong social unit in which members share the work, the household and the facilities.

"Caste" is the most prominent feature noted within this community. Blacksmith, Washerman, Tom Tom beater are the three low caste groups living in the village, traditionally bound to serve the village temple. These families continue their traditional caste activities for their livelihood.

With the establishment of a new administrative system, the village leadership lies in the position of a Gramasevaka Niladari. Yet, within the community, the "Village beadle" is accepted as the decision maker regarding crop production and provision of water for cultivation etc. His control over collective work continues to be an advantage in organizing the dwellers.

### **2.4 The Demographic Features of the Community**

The total population living in the area is 956 with an average of 4.37 persons per family ranging in the size from two to eight members. About 361 people are dependants, 310 are children below 13 years and 51 persons above the age of 60 (Table 3). The largest number of people were found in the households with extended families, and the lowest with the newly established households. Therefore, the features associated with crop production, labour enrolment, distribution of farm products and their contribution to the market are likely determined by the individual family structure.

Table 3. Population Structure in the Village of Kelegama Cascade

Village	Total Number of Household	Population			Age structure (years)			
		Male	Female	Total	below 13yrs	14-30	30-60	abv.60
Ihala-Kelegama	102	206	225	431	127	161	116	27
Achari-Kelegama	27	67	66	133	45	47	36	05
Diganneva/Haliyava	42	109	87	196	64	64	56	12
Ujuressewa	28	51	58	109	42	31	33	03
Heno-Kelegama	20	48	39	87	32	27	24	04
<b>TOTAL</b>	<b>219</b>	<b>481</b>	<b>475</b>	<b>956</b>	<b>310</b>	<b>330</b>	<b>265</b>	<b>51</b>

source; Field Informations.

## 2.5 The Land Use

The major types of land use in the area are dryland farming, paddy and homesteads. In addition, scattered shrub lands and forests can also be found. In terms of area, dryland farming in uplands is the most predominant land use, covering about 720 hectares (Table 4). As shown in Figure 1 and the survey data, paddy cultivation is confined to lowlands. The distribution of irrigation tanks and topography influences crop distribution. In most cases, the settlements are located in close proximity to paddy cultivation. Forests are limited to one pocket, with scattered parcels of shrubs indicating the expansion of settlements into forest lands of the upper periphery of the cascade, since about 1956 (Wickremasinghe 1987).

Although tank irrigation is an important feature in the area, cultivation is not completely dependent on it. The Use of irrigation water is often limited to some specific situation such as drought during a critical stage of the crop. In this situation, dry land farming development in uplands is important for its peasantry, because almost every household in the cascade grow at least a few crops for home use. Dryland farming is even more important for the near landless, mainly because many of the poorest sectors of the community are not cultivators, but work for the larger land holders and benefit from a marketable excess.

## 2.6 The Nature of Operational Holdings and types of Land Ownership

Although the pattern of land use gives some guidance in determining the role of dryland farming in the traditional village cascades, a complex exists due to differences in the extent of land holdings and the nature of ownership. Holding size seems to be important in influencing the nature of crop production and the quantity of products marketed. The owners of larger holdings are large contributors to the market, whereas small holders are often short of product even for home consumption. However, to some extent, home consumption of farm products, particularly the SFCs, is influenced by food habit. The size of land holdings in the survey area varies between 0.1 and 4 ha (Table 5).

Of a total of 213 production units, those 0.4 to 1.6 ha account for about 63 percent of the total. Nearly 38 percent of this area varies between 0.8 and 1.6 hectares, a situation favourable for farmers to sell in the market.

Two types of land ownership are noted in the area e.g. complete ownership and encroachments. One of the features associated with land ownership is the growing

of several subsidiary food crops in encroached, state owned property. Another feature noted in the area is the confinement of almost all paddy on owned land.

**Table 4. Land Use Type in the Keleqama Cascade**

Land Use Type	Area in Hectares
Paddy Cultivation	80
Dwellings and Homegardens	116
Areas under SFCs	720
Forests	12
Shrubs	14
Water Bodies and Others	60
TOTAL	1002

(Based on Field Information & Aerial-Photo Interpretation)

**Table 5. Size Class Distribution of Operational Holding**

Size Category (hectares)	Number of Holdings
.1 - .4	30
.41 - .8	54
.81 - 1.6	80
1.61 - 2.4	24
2.41 - 3.2	15
above 3.21	10

Source: Field Information

The settlements, exclusive of about 10 percent of the dwellings and their home gardens are owned by the dwellers. After cultivating a particular plot of land over decades, ownership becomes clear and established. For example, paddy lowlands have been owned by the farmers for three to four decades. Yet, much of the uplands, which were encroached long ago are still state owned. This limits the capacity of the grower to obtain credit or subsidies for investing in crop production.

All land is cultivated regardless of its status. Even scattered shrubland claimed by the State, is cultivated from time to time. A notable feature within this village cascade is the cultivation of SFCs predominantly on State land by the encroachers who inherit the settlement. They have no doubt about their ownership of the land which they have cropped over the years.

## 2.7 The Major Source of Employment

Agriculture is the mainstay of the economy of this community where crops are produced for cash income as well as for subsistence. Almost all 219 households in the Kelegama cascade are engaged in agriculture and is often the sole source of income. In only a few cases, households derive income from non-agricultural employment. (Table 6).

The primary income of all except nine families is agriculture, who depend upon carpentry and trade for employment. Animal husbandry, which includes rearing water-buffalo, dairy animals and goat for meat production is mainly part of the production system of about 83 households. As noted in the survey, 199 families are largely dependent on crop production, mainly upland cultivation of subsidiary crops. Income generated through casual work is important only for about 30 families which form small holdings for growing crops. In this situation, production of subsidiary food crops is a source of employment, income and the means for survival.

**Table 6. The Major Sources of Income/Employment of the Community**

Sector/Source.	No. of households engaged
Agriculture	25
Agriculture and Animal Husbandry	83
Agricultural and State Sectoral Employment	11
Agriculture and Other	34
Agriculture and Trade	07
Non-Agricultural	09

Source: Field Information

## CHAPTER 3

### CULTIVATION PRACTICES AND PRODUCTION OF SUBSIDIARY FOOD CROPS IN THE KELEGAMA CASCADE

#### 3.1 The Crop types

A large variety of crops form the category of subsidiary food crops, but the selection and extent cultivated varies with the household. At present, small-scale producers grow traditional varieties which have been cultivated for centuries, along with improved, high yielding varieties. These include kurakkan, sesame, greengram, millet, blackgram, maize, manioc, groundnut, cowpea and chilli.

As a consequence of the recent commercialization of the peasantry or sector of domestic subsistence, traditional crops have been gradually replaced by fast growing, high yielding varieties. Crops grown in the area were ranked on the basis of the number of farmers involved and the area cultivated with each crop (Table 7).

Farmers of the area argue almost unanimously on crop priority of the community.

Table 7. Subsidiary Food Crops During Maha, 1989

Crop Type	% Area	% Farmers
Maize	Intercropped with others	87
Cowpea	35	62
Mungbean	31	58
Sesame	11	41
Blackgram	10	40
Manioc	Intercropped with others	31
Coracana	06	24
Groundnut	04	22
Chilli	03	24

Source: Field Information

For example, the most popular crops, cowpea, mungbean, sesame and blackgram covered almost 87 percent of the cultivated area during the Maha Season, 1989. As pointed out by the farmers, the same crop mix was followed almost every year since about 1978 due to the marketability of the produce and the level of cash income produced. The less popular crop varieties grown on smaller parcels are mostly for household consumption or casual sale. Marketable and cash generating crops are given priority in the production schedule.

### 3.2 Changes in Agricultural Land Use Practices

Since advanced crop varieties were introduced in these areas, a number of changes have taken place. As noted by the author in a previous study (Wickremasinghe, 1977), introduction of new crops resulted in vast highland areas planted with subsidiary food crops. Another feature associated with this expansion is the decrease in traditional cultivation practices. As pointed out by farmers, the traditional shifting cultivation had disappeared by 1960 due to scarcity of land, even though the land was owned by the State. These two features resulted in significant changes in farming practice.

Improved varieties introduced to the upland cultivation system required chemical fertilizer and insecticides. Until then farmers had no experience in applying chemical inputs for highland crops. Traditionally grown kurakkan, sesame, manioc, blackgram and greengram were not the advanced varieties cultivated after 1970, but were planted in small plots from home grown seeds.

On the other hand, as the farming objectives changed from that of home use to fulfil market demand, a change from inter-cropping to monoculture took place. In the place of random broadcast of seed, a more systematic system of sowing in lines of equidistant spacing was introduced. As a consequence, labour required to handle production activities from land preparation to harvesting almost doubled. Hence, the need for hired labour (in addition to unpaid family labour) increased the production costs about 20 percent, and increased the farmers' dependency on credit and other services.

The introduction of advanced varieties of subsidiary food crops decreased the practice of mixed broadcasting. As described by farmers, the mixture of seeds of greengram, mustard, kurakkan and blackgram sown together had enabled farmers to harvest a range of produce needed for the household. The present cash based monoculture system means selling excess production to purchase produce needed for domestic consumption.

The rising cost of production and the adoption of technologies leading to high yields and over exploitation of resources are the result of the change from subsistence production to market orientation.

This has also led to profit making tactics by village or outside traders with small-scale local producers, particularly during harvesting. Changed food habits also occurred due to diminishing traditional crop varieties like kurakkan and millet and the dependency of the community on purchased food commodities. The production of manioc, sweet-potatoes and millet is extremely low and obtaining seeds or sprigs for propagation has become difficult.

The use of paid labour in place of unpaid labour or reciprocal exchange of labour (which was common in the past) has direct social implications. Individual farm production and individual capacity of the farmers is well established in the place of collective community pursuits. Family members in poorest sectors of the community, particularly the near landless or small holders are hired as casual workers. This socio-economic transition has strengthened the position of mass producers and weakened the granary of the poorest. However, since SFC production has been established as the mainstay of the economy, ensuring its future is of immense importance to the community.

### 3.3 Cultivation Practices

Within the context of agricultural crop production, the cropping pattern and cultivation practices followed for production of individual varieties are important. Subsidiary food crops grown on the upland system of dryland cropping are susceptible to the vagaries of climate because they are produced without irrigation. Rainfall, i.e. its availability, amount, duration and time of occurrence are the parameters which determine planting time and the number of crops per annum. The overriding effect of the rainfall distribution on cropping pattern is a well marked feature.

Crop production is confined to the two rainy seasons, namely "Yala" and "Maha". The Maha crop is usually more reliable than the Yala crop since about 60-75 percent of annual rainfall occurs in Maha. As a consequence SFCs in Yala may be reduced by almost 40 percent, because farmers are reluctant to take the risk of possible crop loss in the event of extremely low rainfall.

As shown in Figure 2, the peak season in the pattern of rainfall distribution coincides with the peak season in SFC production. This results in the clustering of agricultural activities, employment and income into the

cropping seasons. Slack seasons are most difficult times for families with very small or no land holdings.

Almost all uplands are cultivated during the Maha season, but the area cultivated during the Yala varies from one year to another. The reason for this is the un-reliability and inadequacy of rainfall in most years and also the possibility of unexpected droughts. In addition, following Maha harvest in late February, farmers have a very short period to prepare for the Yala crop. However, many of the households with small plots of land cultivate kurakkan, coracana, sesame and mungbean for household use.

In terms of agricultural input, fertilizer is used on market oriented new varieties of cowpea and mungbean. According to the farmers, varieties like MI-1, Arlington and M:35 yield better with fertilizer application.

The use of agro-chemicals is also crop specific. Crops grown without agro-chemicals are sesame, kurakkan and groundnut. However, nearly all farmers use insecticides on cowpea, mungbean and blackgram. Fungicides and herbicides were used by only 20 percent of the farmers and they are the category who represent medium to large holdings.

The introduction of improved varieties have lead to increased labour requirements and changes in farming practices. Although labour requirements vary with the type of crop grown, activities dealing with subsidiary food crop production is done by manual labour, unlike paddy cultivation, where the use of draught animals is important. Variation of the use of labour in subsidiary food crop production is due to differences in the operational practices required for each crop. For example, among SFCs, kurakkan, sesame, maize and groundnut are low labour intensive crops, since only a single harvest is required. Crops like cowpea, mungbean and blackgram require sequential and selected harvesting which often continues over a period of two months. Moreover, crops not requiring agro-chemicals are broadcast, thus requiring less labour. However, these crops contribute little to the market.

### 3.4 The System of Provision of Labour

Family labour is very important in the production of subsidiary food crops, particularly in the case of small-scale production. Although not a traditional practice, the use of hired labour is common particularly on large operational holdings. Both hired and farm labour are employed in sowing and harvesting. Tasks which are less urgent such as cleaning of land, and separating grain from the chaff are very often chores for family labour.

In the Kelegama Cascade, the nature of labour in subsidiary food crop production can be divided into three broad categories.

- i Family labour/unpaid;
- ii Hired labour;
- iii Reciprocal exchange

The survey showed that almost 73 percent of the activities dealing with subsidiary food crop production was done by family labour and 18 percent by hired workers. Hired labour was employed by only 17 percent of the producers, which were large land holders. Only 9 percent of the labour involved the system of reciprocal exchange. Paid labour is used by large land holders and by households of which members are in permanent employment.

As revealed at village discussions and the available data, the traditional practice of the reciprocal labour exchange is being replaced gradually by a system of paid labour, due to the establishment of a market oriented production system. The adverse socio-economic implications to the family is the change from collective goals to individual goals. In addition, hired employees are usually temporary, as it is difficult to work continuously in agriculture. In such situations, land holders with outside employment must use hired labour to attend to agricultural tasks. However, the cash based production system of this community tends to emphasize class differences.

### 3.5 Pattern of Labour Used in Production Activity

In examining labour utilization in the process of SFC production, two factors are to be considered. First is the total labour requirement for various crops and the second is the gender of labour related to crop types. In order to examine these factors, the process of crop production is divided into activity components:

- i Land clearance - this includes slashing and burning shrubs;
- ii Sowing;
- iii Preparation of seed beds;
- iv Planting of seeds;
- v Weed control;
- vi Application of insecticides;
- vii Harvesting;
- viii Separating chaff from grain.

The type of crop greatly influences labour requirements. For example, direct seeded crops reduce labour requirements by about 30 percent. Another 10 percent reduction is noted if fertilizer is not required. On the other hand, labour use is intensive in crops which require a number of weedings, insecticide and fertilizer applications. Although a common series of activities are associated with crop production, variation occurs depending on required cultivation practices. Labour intensive crops are cowpea, greengram and blackgram, due to the practice of planting in rows. Although traditionally kurakkan and sesame were broadcast seeded, lately, about 15 percent of the farmers changed to seeding in holes, especially when several crops are mixed together. However, kurakkan, maize and groundnut are not labour intensive.

In the process of SFC production, three types of labour were engaged. Male labour is used during crop establishment (exclusive of seeding in holes) females do the harvesting and threshing and insecticides are applied by male labour (Figure 3). In general, males and females share the work equally, with children contributing about 10 percent (Table 8). Analysis of the data, excluding male dominated insecticide application, indicates the prominence of female labour in subsidiary food crop production. Almost 49 percent of production work is performed by women, while the share of male and children labour is 41 and 10 percent, respectively. In the case of land clearing, broadcast sowing, row preparation for seeding and weeding, male workers predominate, while females predominate in hole seeding, harvesting and threshing.

There is also a gender difference in labour related to individual crops. In producing cowpea, blackgram, sesame and chilli the majority share of work is performed by males. In the case of kurakkan, groundnut and maize females do most of the work.

However, it is important to note that in compiling labour information, it was extremely difficult to accurately record the work done by female members, particularly housewives involved in their domestic chores. No such difficulty was encountered with male labour, except in fertilizer application as a separate activity because in most cases it was done either at preparation of seeding holes or prior to seeding.

Figure 3. Type of Labour Used in Production Activity

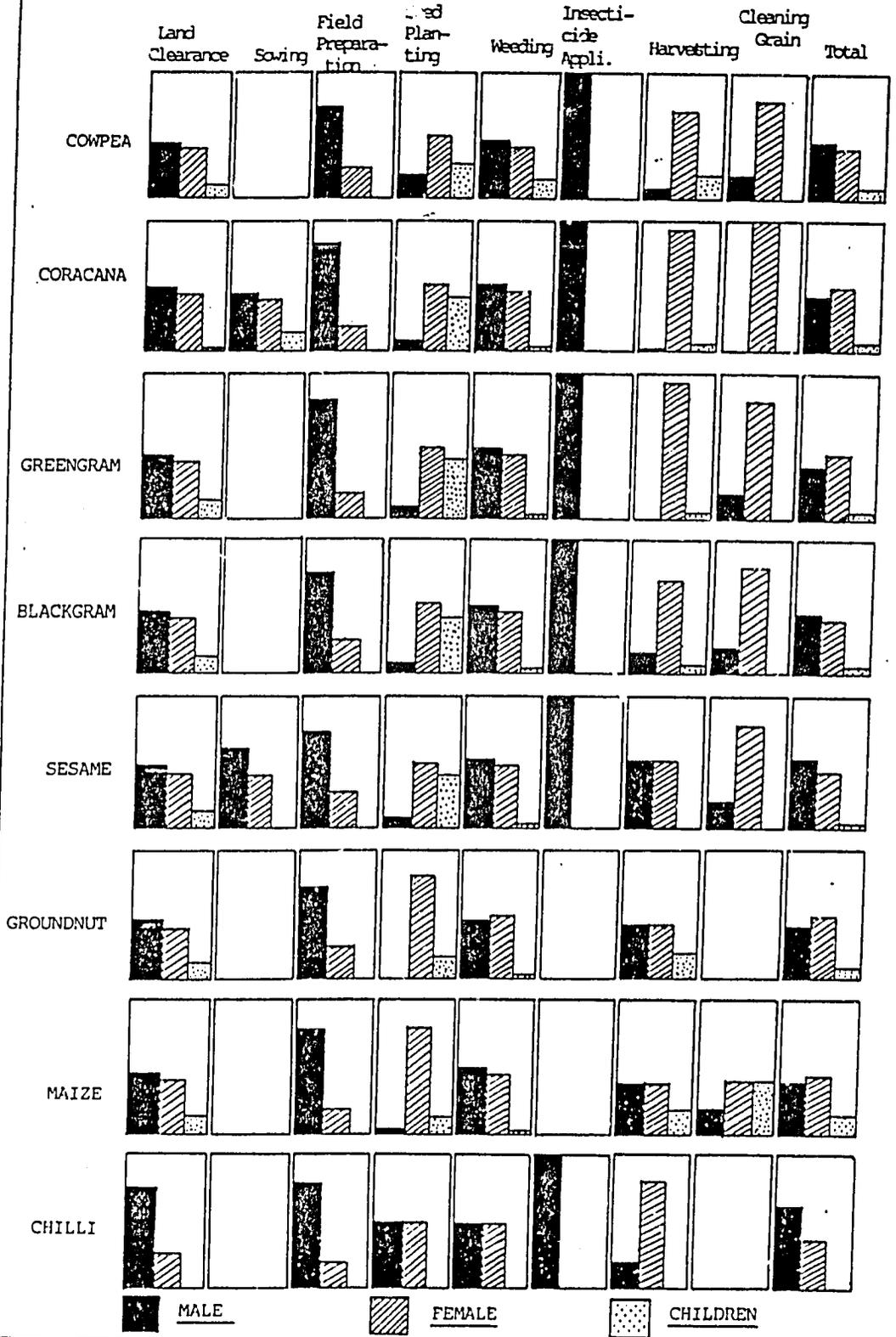


Table 8. Type of labor used in crop production (percent).

Crop		Land clearance	Sowing	Preparation of seed planting curvatures	Planting	Weeding	Application of insecticides	Harvesting	Threshing	Total
Cowpea	M	45		75	20	45	100	10	20	45
	F	42		25	50	40	0	70	80	43
	C	13		0	30	15	0	20	0	12
Coracana	M	50	45	80	10	50	100	1	0	42
	F	45	40	20	50	45	0	91	100	49
	C	5	15	0	40	5	0	8	0	9
Greengra	M	45		80	10	50	100	0	20	43
	F	40		20	50	45	0	91	80	46
	C	15		0	40	5	0	9	0	11
Blackgram	M	45		75	10	50	100	20	20	46
	F	40		25	50	45	0	70	80	44
	C	15		0	40	5	0	10	0	10
Sesame	M	45	60	75	10	50	100	50	20	51
	F	40	40	25	50	45	0	50	80	41
	C	15	0	0	40	5	0	0	0	8
Groundnut	M	45		75	20	45		40		41
	F	40		25	80	50		40		47
	C	15		0	0	5		20		12
Maize	M	45		80	5	50		40	20	40
	F	40		20	80	45		40	40	44
	C	15		0	15	5		20	40	16
Chilli	M	7		80	50	50	100	20		62
	F	25		20	50	50	0	80		38
	C	0		0	0	0	0	0		0
TOTAL	M	49		78	17	49	100	23	17	46
	F	39		22	57	46	0	65	77	44
	C	12		0	26	5	0	12	6	10

M=male; F=female; C=children

Source: Field data

### 3.6 The Cost of Production

The cost of cultivation varies according to the technology used. The planting method is important in determining the cost of cultivation. Exclusive of chillies, which is established by transplanting seedlings, other crops were established from seed through dibbling or seeding in lines or by broadcasting. Except sesame and kurakkan which are established through broadcasting, all others were either dibbled, or seeded in lines.

The cost of crop establishment accounts for 72 to 94 percent of total costs. The cost of fertilizer was not averaged because there was great variation in fertilizer use among farmers and 42 percent of the farmers did not apply chemical fertilizer.

The cost of fertilizer varied between Rs.30/= and Rs.200/= per acre, the lowest for kurakkan and the highest for chilli. However, the total cost of production per 0.4 ha exclusive of the fertilizer varied between Rs.1,325/= (kurakkan) and Rs.2,229/= (chilli) (Table 9). In calculating the cost of production, the family labour was included. Records were maintained on the number of man/days needed to produce each crop.

As a further step, the data collected on the cost of fertilizer was added by incorporating the information given by 42 percent of the Farmers. With the inclusion of fertilizer, the average cost of production per 0.4 ha of land was increased to the following:

<u>Crop</u>	<u>Cost Rs./ha</u>
Cowpea	2000.00
Greengram	1850.00
Blackgram	1520.00
Coracana	1355.00
Chilli	2490.00

Fertilizer was not used on sesame or groundnut.

Table 9. The Cost of Production by Crop and Activity - 1989  
(cost in Rupees per 0.4 hectares of Land)

Activity	Cowpea	Greengram	Sesame	Blackgram	Groundnut	Coracana	Chilli
Land preparation	400	400	400	400	400	400	400
Seeding	220	220	200	220	220	200	400
Weeding	420	420	400	420	420	420	200
Harvesting	360	360	300	200	320	200	440
TOTAL	1400	1400	1300	1240	1360	1220	1440
Seeds	240	150	20	150	300	25	0
Insecticides	330	240	80	80	0	80	350
TOTAL COST exclusive of fertilizer	1970	1790	1400	1470	1660	1325	1790

Source: Field data

The cost of cultivation ranked in order of highest to lowest as follows: chilli, cowpea, greengram, groundnut, blackgram, sesame and kurakkan. The cost of seed varied between Rs.20/= and Rs.300/= per 0.4 ha, the lowest for sesame, and the highest for groundnut. Seed of sesame and kurakkan was produced locally. High insecticide cost was associated with the improved varieties.

As a further step, the average income received by the farmers per unit of products was calculated (Table 10). To a great extent, the crops which involved high production costs also gave high incomes. For example, chilli and greengram provided higher income than 5 other crops recorded. The cost of production, the prices received by the farmers and the income received for a unit of production vary not only among crops but also from one season to another.

A common feature noted across the area is the association of the lowest cost of production with the small operational holdings. Here, labour input is often under-estimated because family members work only a few hours per day. In the case of large holdings, farmers employ labour to complete the work within a short period.

### 3.7 The Pattern of Consumption and Marketing

Although many of the subsidiary food crops produced on small-scale family farms are not fully cash oriented, almost 78 percent of the farmers sell produce (Table 11). However, sales less than 0.2 ha and from operational holdings are limited to 10 - 20 percent of the total production and that is often for cash to overcome hardship. Nearly 86 percent of the produce sold during the Maha 1989 season was produced on holdings of 0.4 ha and above.

The proportion of produce consumed domestically and sold at the market varies among households and crops. In terms of production, crops sold for market varies between 5 percent and 92 percent (Table 11).

Kurakkan is used purely for household consumption and is a traditional substitute for rice. A considerable percentage of maize is also used in the household, but it is not stored like kurakkan for off seasons. Much of the consumption is during harvest and immediately after. On the other hand, about 87 - 88 percent of the production of cowpea, sesame and groundnut is sold at the market. However, the features associated with these two aspects, i.e. consumption and marketing, is dominated by large producers.

Table 10. The Average Income Received by a Farmer Per Unit of Production  
(unit of production = 0.40 hectare)

	Cowpea	Greengram	Sesame	Blackgram	Groundnut	Coracana	Chilli
Average production (in kg)	450	240	240	300	400	300	150
Cost of production (Rs/kg)	4.40	7.45	5.80	4.90	4.15	3.80	15.30
Average price (Rs/kg) February 1991	15.00	20.00	14.00	15.00	10.00	9.00	65.00
Income (Rs/kg)	10.60	12.55	8.20	10.10	5.85	5.20	49.70

0.40 hectares is the average production unit

Source: Field data

Naturally on the smaller production units, a larger proportion of total production is consumed at home. Bigger production units of 0.4 ha in extent market a larger proportion of total production. Hence, cash income through subsidiary food crops is higher to farmers with comparatively large land holdings. Although small-scale producers sell less product, this is compensated somewhat by earnings as farm labourers.

**Table 11. Percent of Harvest Conserved, Retained for Consumption or Marketed**

Crop	Conserved or stored for consumption	Sold/stored to be marketed
Cowpea	13	87
Coracana	95	05
Greengram	24	76
Blackgram	22	78
Sesame	12	88
Groundnut	12	88
Maize	33	67
Chilli	08	92

Source: Field Information

In the pattern of household consumption, crops like greengram, blackgram and cowpea could become staples but, farmers prefer rice daily at all three meals. Rice is often in short supply and families who are unable to produce rice for home consumption sell SFCs and purchase rice. Rice is predominant in the daily diet and production of SFCs is mostly meant for cash.

### 3.8 The Marketing System

The share of subsidiary food crops which goes to the market is handled mostly by outside traders. However, as shown in Figure 4, a number of marketing channels are used by the producers. The amount of product sold locally within the community during harvest is almost nil. All farm families living within the area do not produce all crops, but in most cases, even non-cultivators obtain produce from neighbours for household consumption. During off harvest, the situation is different and farmers who produce for the market tend to sell between harvests. Often local traders purchase during harvest and store produce for a better price later on.

The system of marketing varies among crops and between small and large producers. Exclusive of chillies, the pulses which include blackgram, cowpea and greengram are

and greengram are the major market oriented crops. Another feature associated with marketing is the difference in marketing channels used by small-scale producers and mass producers. Small-scale producers tend to sell their products during harvest. Almost 80 percent of the farm families with holdings less than 0.4 ha sell their products to either a local trader or an outside dealer. About 60 percent of this share goes to the nearby market, while the remainder is stored by the dealers for a better price during the off season. About 16 farm households sell their products in small quantities at the weekly fair located about 8 kilometers away, which enables them to purchase the other commodities needed for the household.

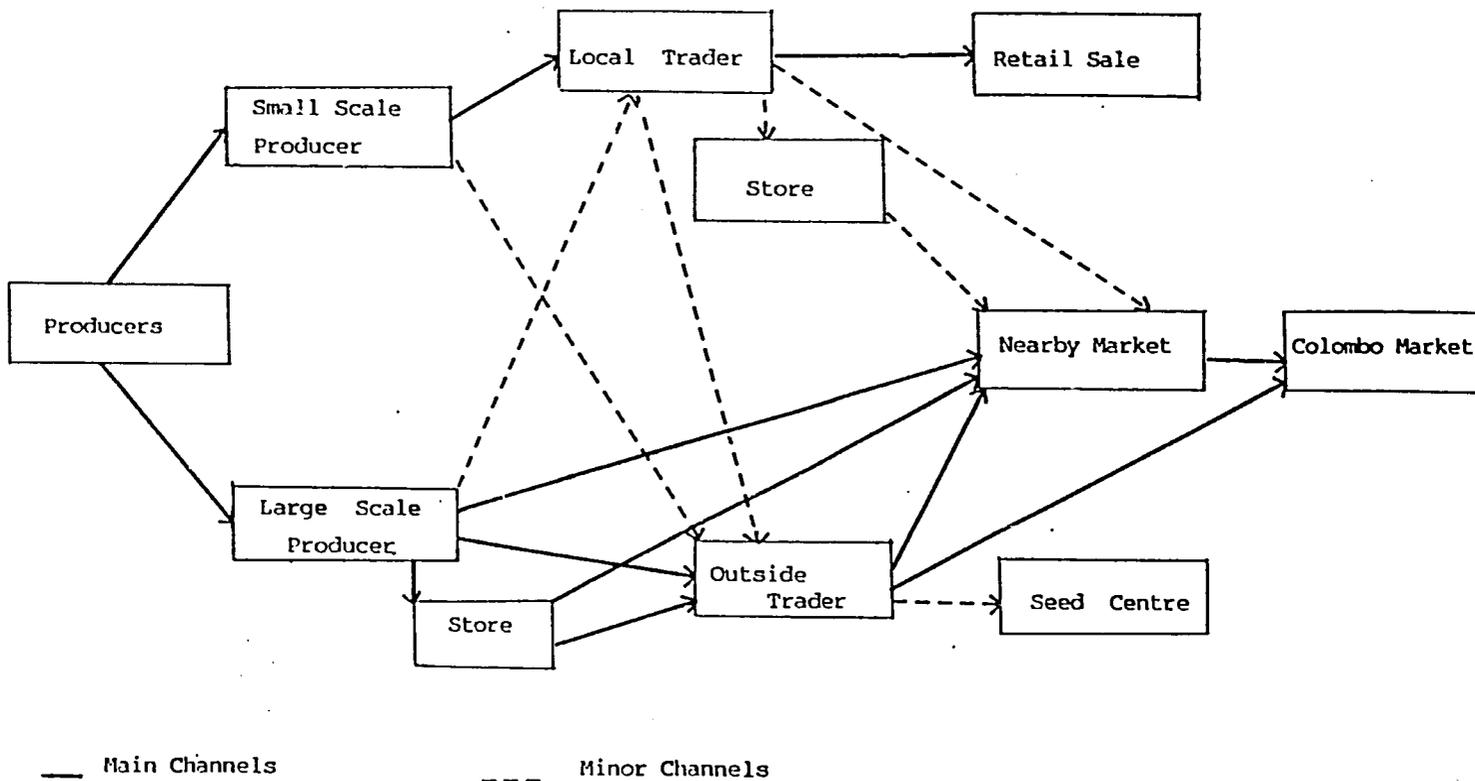
The main marketing channel is through outside dealers, representing about 62 percent of large holder production. About 24 percent is collected by local traders and stored for better prices at off season. Another 14 percent is stored by the producers themselves and sold during the off season either through a local or outside dealer. However, transport to outside dealers is difficult.

Regardless of marketing channels, prices are higher during the off season than at harvest by 30 to 50 percent (Table 12). Yet, many small-scale producers are unable to store their produce due to economic hardships. Thus either local or outside dealers benefit from this situation by storing and selling locally when the market is favourable. Under these circumstances, the wealthier sector (and the more efficient managers) profit more than the poorer sector of the farmer community.

Table 12. Average Prices Received by Farmers for Various Subsidiary Food Crops in 1989 (in Rupees/Kg)

Period	Crop					
	Cowpea	Greengram	Sesame	Blackgram	Chilli	Ground nut
YALA						
During early period of harvest	21.00	22.00	18.00	11.00	--	18.00
During harvest	17.00	20.00	14.00	10.00	60.00	16.00
Off season	23.00	28.00	20.00	15.00	70.00	20.00
MAHA						
During early period of harvest	20.00	26.00	21.00	12.00	60.00	18.00
During harvest	14.00	18.00	16.00	9.00	65.00	14.00
Off season	24.00	28.00	26.00	15.00	75.00	19.00

Figure 4. The Marketing System of the Produce



### **3.9 The Credit and Services Available to Farmers**

Although the whole community is engaged in cultivating subsidiary food crops, a common system of delivery services is not in place.

Information collected on agricultural extension service to farmers clearly indicates a very limited impact on the community. Only 9 families benefitted from extension services and these work outside of the community, having obtained information through secondary sources. The wealthy few, and large scale farm operators with outside contacts also benefitted from extension services. To a degree, this information is shared with many of the socially and economically backward farmers but limited to crops like cowpea, greengram and blackgram.

Credit is one of the services needed in crop production, usually provided by informal sources, particularly village traders or neighbours. About four percent of the farmers obtain credit at the people's Bank and with the establishment of a branch of the Co-operative Thrift and Credit Society, about 28 farmers received loans (ranging from Rs.500/= and Rs.3,000/=) in 1989. About 19 Farmers had taken loans of more than Rs.1,000/=. As noted from the survey, almost 60 percent of the farmers consider short term loans to be essential to raise a crop. Such services should be directly linked with the producers.

The problem of land ownership falls heavily on the encroachers, because they are unable to obtain formal assistance or credit based on land ownership. Although this cannot be solved by the agriculture sector alone, the need for clarifying land ownership cannot be over emphasized.

### **3.10 The Socio-Economic Factors that Influence Subsidiary Food Crop Production**

Among the few outstanding factors influencing SFCs production, the effect of farm size on overall production and profitability is important. The fragmentation of operational holdings which has continued over the last few decades has reduced profitability of individual holders, as the production obtained from small farm holdings is now needed for domestic consumption.

In such situations farmers tend to seek outside work for cash income, and to some extent, have only a limited time to devote to their own farming operations. This, in association with the continuous fragmentation of household operational holdings, in time to come, will prevent crop production for marketable commodities. With the increasing density of population, there is a need for additional employment to alleviate a number of socio-economic problems associated with poverty. It is difficult

to depend just on crop production to meet the food requirements, employment and other necessities. Since expansion of cultivation is not possible, agro-based industries must be introduced to maximize profits from farming and to employ excess labour available, particularly during slack seasons. The system of crop production directly for market should be converted to a providing raw stuffs for agro-based industries. To accomplish this, motivation, incentives and extension services are needed, plus training and education for community members. Should this develop, it will be possible to attract the youth of the community who presently seek outside employment. The promotion of skills through training and education in crop processing and preserving technologies is necessary to diversify agro-based activities in these areas.

There are problems falling heavily on landless and female labour engaged in subsidiary food crop production. As stressed by the author (Wickremasinghe, 1988, 1989), female labour is often heavily exploited within the area by receiving wage levels 20-25 percent less than males. Alleviation of this inequity alone would benefit the poorest sector of the community. The problems associated with the landless engaged in crop production as labour is the irregularity of their employment and income. The promoting of regular work through a system of diversified production seems essential.

As revealed in the field data, the proportion of the produce sold varies among the households. As farm size increased, so did the percentage of production which was marketed (Table 13).

The respondents priority on their requirements was quite variable but high priority needs were identified as improved marketing, credit facilities, extension and technology (Table 14).

**Table 13. The Percentage of Production of SFCs Marketed by Farm Size**

Crop	Farm Size		
	.2 Ha. or less	.21 to .4	.41 ha. and above
Cowpea	20	68	87
Greengram	12	65	85
Sesame	10	72	80
Blackgram	16	73	87
Groundnut	20	78	90
Coracana	15	60	70
Chilli	20	88	95

**Table 14. The Priority for Inputs Listed by Respondents In Growing SFCs**

Requirements	Percentage of the Respondents		
	Priority 1	Priority 2	Priority 3
Better Marketing System	26	19	24
Credit	19	21	19
Extension Services	18	20	23
Training & Education	08	09	08
Storing Facilities	09	07	-
Agro-based Activities	08	05	05
Low Cost Technologies	12	19	21

The experience gathered in this study is common to thousands of rural communities located in the Dry Zone relying on subsidiary food crop production.

## CHAPTER 4

### CONCLUSIONS AND RECOMMENDATIONS

#### 4.1 The Basic Requirements

Facts revealed in this study seem to be important in formulating plans for improved economic status of the peasantry which relies largely on subsidiary food crop production for survival. Effort is needed to diversify production based activities and utilize the labour available within the community.

Although production information is not quantified, it was mentioned by Farmers that dependency of production on agro-chemicals (ever increasing in price) is becoming unbearable. Therefore, technologies should be promoted which will enable the farmers to reduce unit production costs and make subsidiary food crop production sustainable.

Although labour intensive farming practices enable many of the community members to grow crops, its confinement to specific seasons must be changed by reorganizing their farming systems. An example would be the introduction of drought tolerance species or more emphasis on suitable perennial crops.

Farmers recognized that SFC production could be involved with improved inputs. Although there were differences in opinion, high priority needs were listed as improved marketing, credit facilities, extension and technology.

#### 4.2 Marketing Outlets

The marketing system is largely controlled by outside traders. Due to the Farmers' lack of storage traders have provided it and benefitted later by a more favourable market. The role of other outlets, like co-operatives and other government institutions is negligible. The aim of maintaining a large profit margin for farmers cannot be achieved easily due to limited marketing outlets within the area. In addition, the difficulty of transporting the produce to outside outlets is one of the problems which should be solved.

It is extremely important to organize a crop collection center or a system associated with co-operative stores. At least one center for a cluster of villages should be made available for providing fertilizer, agro-chemicals and seed as well as facilities for marketing local produce.

### **4.3 Diversifying Production and Agro-based Industries**

At present, subsidiary food crops are mostly grown in a monoculture system. The weakness of this is the concentration of income to a single or only a few crops and clustering of employment and agricultural activities to one or two periods. As irrigation is not available in the upland, alternative crops must be introduced for production during off seasons. Perennials, like fruit trees could be intercropped with subsidiary food crops in a systematic way without interfering unduly with either production. Employment and income should be created through out the year via agro-based industries. Crops sold directly as raw stuff could be processed by adopting appropriate technologies. In addition, grading and packeting of produce, the use of grain as a base for powered food stuffs and making confectioneries are activities that could be considered.

### **4.4 Storing and Marketing**

As revealed in this study, if farmers are able to store produce during harvest to be marketed off season, profit margins can be increased by about 30 to 40 percent. The main problem lies with farm families which sell produce in small quantities. If the services of co-operatives are expanded to store produce of small-scale producers, farmers' returns could be increased. Then of course, some of the profits of outside dealers could be channelled to farmers. Another alternative would be to develop a new system to cater to the needs of small-scale producers or encourage and motivate Farmers to form their own organization.

### **4.5 Extension Services**

The Extension Services is a major requisite for efficient production and is particularly needed in communities which are socio-economically backward in areas of limited services and market outlets. A common delivery system to facilitate both small and large scale producers is a necessity. The services of an extension officer should be provided at least once every fortnight in this village cluster, similar to neighbouring areas like Thorowa.

### **4.6 Credit**

A system of short term loans is also needed that will bypass credit at high interest rates through informal sources. Non-availability of such facilities within the community necessitated loans from the local traders or the wealthy, with the assurance of repaying at harvest when commodity prices are low. Therefore, a system of credit available during the most needy periods is necessary for the area.

#### 4.7 Training and Education

One of the facts highlighted in this study is the women's contribution to SFC production. Therefore it is important that training programmes be available for both men and women. Training should not be limited to production technologies, but should also deal with nutritional aspects and product conversion like preservation and processing. As traditional food habits are prominent in the village, a small proportion of the produce is consumed at home. Nutritional values of subsidiary food crops are often overlooked. Hence, it is important to introduce link programmes with extension services dealing with subsidiary food crops and identify women and children as priority targets.

Different ways of converting crop waste into consumable energy and using them as raw stuff for industries should be taken into consideration. For example, corn leaves and stalks burnt by the Farmers in clearing the land are used as raw materials for weaving baskets in other countries like Thailand, Philippines and Indonesia. Such technologies could be introduced to groups of women in these areas for development of local industries. Production activities could be diversified to use subsidiary food crops as raw materials.

Marketing outlets, extension services and also training and education were the needs mentioned by a majority of Farmers. If resources are utilized in the most profitable and sustainable manner, socio-economic problems associated with subsidiary food crop production can be solved.

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