CHAPTER III

PROFILE OF THE STUDY AREA AND SELECTED SPICES

The present chapter gives the information about the profile of the study districts and profile of the selected spices. The first part of the chapter provides the details about the selected study districts - Coimbatore, Niligiris and Dindigul districts. The profile of the selected spices - Ginger, pepper, cardamom, chillies, garlic and turmeric are presented in the second part of the chapter.

3.1. SELECTED DISTRICT PROFILE

3.1.1. DINDIGUL DISTRICT

Location

Dindigul District is one of the 29 Districts of the Tamil Nadu and it is carved out of the composite Madurai District on 15.09.1985. It is located 100 kilometers from the rock city-Trichy and is south-west part of Tamil Nadu. Dindigul is the head quarters of the district. It lies on the banks of Kudavanar river.

Dindigul, which is under the way of the famous Muslim Monarch, Tippusulthan, has a heartyh past. The historical rock fort of this District is constructed by the famous Naik king Muthukrishnappa Naicker. It is located between 10’ 05” North 10’ 9” latitude and 77’30” and 77’ 20” East latitude. This District is bound by Erode,
Salem, Karur and Trichy Districts on the North, by Sivagana and Tanjore Districts on the East, by Madurai District on the South and by Theni, Coimbatore Districts and Kerala state on the West\(^1\).

**Population Distribution**

According to 2001 census, the total population of the District is 19,23,014, which covers the male population of 9,68,137 and female population of 9,54,877. In this district, the number of persons belong to schedule castes are around 3,76,170 which consists of male and female as 1,89,066 and 1,87,104 respectively. The total number of persons belong to schedule tribes are 6484 which covers the male and female of 3320 and 3164 respectively. The number of literates are 11,81,746 including the male and female literates of 6,81,698 and 5,00,048 respectively.

**Physical Geography**

The District has extensively hills and rocky areas with undulating plains. Palani hills forming Northern part of the western ghats ranging in height from 1000 to 2700 meters. The upper plains with an average height of 2500 mts comprise valleys and contain several peaks like Perumal Hill, the Vandarvey Hills etc. They consist largely of plateaus made up of rolling down covered with coarse grasses and isolated shoals in the valleys. The lower plains consist of

\(^1\) District Statistical Department, Dindigul District, 2009.
confused jungle of peaks from 1000 to 1700 mts height, separated from one another by steep and beautiful wooded valleys. The hills are Thandigudi, Virupatchi Hills etc. On the eastern side, Sirumalai, Alagar Malai and the Natham and Ayyalur hills are found. A large number of isolated peaks namely Karumalai, a sacred hill, tapering kodarangimalai, great rock of Dindigul, Rengamalwai etc., also found.

Climate and Temperature

The climate in Dindigul District is hot tropical. The maximum temperature is 38°C, and the minimum temperature is 28°C. During the months of November, December and January, the lowest temperature is recorded. From the end of February, the temperature starts rising. Heart becomes intense in April and May and shoots further up unless interfered by rains.

The high rate of evapo transpiration indicates that this will affect the soil moisture and high transpiration from crop plants, thereby, affecting the crop growth in years of low rainfall. Hence, precipitation below evapo transpiration is a direct indication of dry conditions in the area. The climatic condition revealed that the ideal season for irrigated crops lasts between May and September. The remaining months may be put under dry land management.
**Administrative Set-up**

For the administrative convenience, Dindigul district is divided into four revenue divisions namely, Dindigul, Palani, Kodaikanal, and Oddanchatram. This district comprises of seven taluks. They are Dindigul, Natham, Nilakottai, Palani, Vedasanthur, Kodaikanal and Oddanchatram. There are 3 municipalities in the district. They are Dindigul, Palani and Kodaikanal. The 14 Blocks of the Dindigul District are: Athoor, Batlagundu, Dindigul, Gujiliamparai, Kodaikanal, Natham, Nilakottai, Oddanchatram, Palani, Reddiarchatram, Shanarpatti, Thoppampatti, Vadamadurai and Vedasanthur Block. Dindigul District also comprises of 39 revenue firakes 357 revenue villages and 304 village panchayats. There are 24 town panchayats. The entire district consists of seven legislative assembly constituencies and two parliament constituencies.

**Agriculture and Land use**

The total geographical area of the District is 508016 ha. Net cultivable area is 274707 ha. Out of the net area sown as low as 9 percent is sown more than once. A sizeable portion is covered by thorny bushes, barren rocks and boulders quite unfit for cultivation. Dry farming is predominant in the District and the important wetland track is located in the Shanmuganathi and Kodaganar basin.
Paddy is the principal crop (37 per cent) followed by oil seeds (23 per cent) and fruits and vegetables (24 per cent). Cholam is the major irrigated crop (30 per cent) followed by oil seeds (18 per cent) and paddy (11 per cent). Sirumalai and Virupatchi hills are known for a special variety of plantains. Fruits like orange, lime, mango and grapes of special interest in Dindigul, Nilakottai and Palani taluks. Colecrops and fruits growth chiefly in Kodaikanal lower plain yield coffee and cardamom. About 900 ha are put under kuruvai system of cultivation and the crops raised are potato, cabbage, tenai, samai, brinjal, cotton and ragi in the forest reserves.

Irrigation

This district is devoid of any major resources for irrigation except a few dams, which depend entirely on monsoon rains for water storage. The area is cultivated with irrigation wells and a few rain fed tanks. There are 41 government canals, 2230 tanks and 86925 dug wells, 2972 tube wells in the District. About 29 percent of the net area is irrigated. Wells form the chief source of irrigation followed by tanks. There are 79275 wells to provide irrigation to 68236 ha. Palar-Porandalar, kodaganar and manjalar schemes are important irrigation schemes. Canals irrigate 12310 ha and 2230 Tanks irrigation covers 16607 ha.
In Dindigul District, there is no perennial rivers and there are some rivers like Shanmuga Nadhi, Santhana Varthini, Thalaikuthu falls and Gudaganaru. The river system is complicated to some extent due to several hills and valleys and is seasonal dependent on rainfall.

Forest

In Dindigul District, the estimated forest area is about 138923 hectares and most of the areas are covered with black babool trees. Hence, there is no scarcity of firewood for cooking purposes. In Tamil Nadu, Dindigul is one the main drought-hit areas. Forest falls naturally under 3 categories as the mixed deciduous, the ever green and the green and the grassland. The natural vegetation is rich and varied. About 700 species accounting for 50-80 per cent of the flora of whole Indian peninsula have been identified in plains, besides a large number of species peculiar to themselves.

Infrastructure

Dindigul and Palani are educational centers with few colleges. The District has two universities viz., Gandhigram Rural University at Gandhigram and Mother Teresa Women University at Kodaikanal. The Nation’s prestigious Highway NH-7, passes through the District besides NH-45, and a network of roads. Dindigul has an important Railway Junction. The nearest aerodrome is located at Madurai, which is 65 Kms away.
Marketing facilities are inadequate. Madurai market committee has gained momentum in this direction. Exports of the District include hides, skins and leather, dyes and tans, cotton and silk fabrics, tea and cardamom etc. There are 78 post and telegraphs, 437 post offices and 3 telegraphic offices in the district. The district has 141 commercial bank branches, 83 rural bank branches, 30 semi-urban and 28 urban bank branches.

**Industries and Trade**

Next to farming, a sizeable population depends on industries. Dindigul is the important industrial center. A number of spinning mills are functioning in Vedasandur and Vadamadurai blocks, besides a few paper mills in Swaminathapuram. Lock industry, tobacco and cigar manufacturing units, metal industry, dyeing iron industry, cotton spinning, weaving and handloom industry are the predominant industries.

### 3.1.2. COIMBATORE DISTRICT

Coimbatore is one of the major industrial cities in South India. It is the second largest city in Tamil Nadu and the administrative headquarters of Coimbatore District. Coimbatore is well known for its textile industries, engineering industries, automobile component manufacturers and its engineering colleges. Coimbatore is located at 11.0’ N 76.97 ’ E. It has an average elevation of 380 metres.(1246 feet).

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2 District Collectorate, Profile of Coimbatore District, Coimbatore, 2009
Coimbatore, known as an industrial hub, is also called the ‘Manchester of South India’. It is also well known for educational institutions, its pleasant weather, friendly culture and exceptional hospitality. There is also a significant minority of people of North and West Indian origin in Coimbatore. People here are highly enterprising and industrious, which is one of the reasons cited for its phenomenal industrial growth. A boost for this industrial growth was provided by Naidus who settled here a few centuries before from Andhra Pradesh. This was followed by Gownders who are basically hardworking entrepreneurs.

The nearest major cities are Chennai, Bangalore, Trichy, Cochin-sea port, Salem which are 500 km, 335km, 232km, 210km and 160km from Coimbatore, respectively. Coimbatore city is well connected by rail, road and air. Coimbatore has a very good health and medical care facility. There are large corporate hospitals where high quality and treatment for complicated illness are provided. The Tamil language spoken itself has a flavor of hospitality, and is referred to as ‘Kongu Tamil’. Other than Tamil, the languages spoken in Coimbatore include Malayalam, Telugu, Kannada and English.
Pollachi, a vibrant and expanding town, 40 km from Coimbatore, was known to the Romans of Caesar’s day for its spices, as is evidenced by numerous Roman coins from that epoch unearthed in Coimbatore district. During Alexander the Great’s stay in India, he ordered diamonds from Coimbatore.

During the British Raj Coimbatore was the capital of the district of Coimbatore in Madras. British India situated on the River Noyel. In Independent India Coimbatore District comprises the major town of Tirupur, Mettupalayam, Pollachi, Udumalpet and Palladam. It is number one revenue district in the state of Tamil Nadu with revenues crossing more than Rs.6000 crores annually.

**Demography**

As of 2001 India census, Coimbatore had a population of 923,085 males constitute 52 per cent of the population and females 48 per cent. Coimbatore has an average literacy rate of 78 per cent higher than the national average of 59.5 per cent. Male literacy is 81 per cent and, female literacy is 74 per cent. In Coimbatore, 11 per cent of the population is under 6 years of age.

The area and population of Coimbatore district. The total population was 42,71,856. Of this total population, the male population was 21,76,031 and the female population was 20,95,825.
The density and the literacy rate of Coimbatore district was 572 and 29,45,278 respectively. In Coimbatore district 19,69,332 workers were working in various fields. Out of 19,69,332, the male workers were 13,80,139 and the female workers were 5,89,193.

Regarding the block wise/Municipality wise distribution, Udumalpet block was acquired 900.13 square kilometer of area. It was the highest area acquired in Coimbatore district. Udumalpet municipality occupies 7.20 square kilometer. It was the lowest area in square kilometer. Coimbotore Corporation took first place in population and it was 9,30,882. Out of 9,30,882 population, 4,77,937 were male and 4,52,945 were female. Because of many textile industries are placed in this Corporation, the employment opportunities are high compared with the other. The literates of Coimbatore Corporation was also high. Tirupur secured the second place in Coimbatore district population and it was 6,01,323, and the literates were 4,27,743.

As per the village panchayat details, the total number village panchayat in Coimbatore district was 389, and the total population was 16,33,877. Out of 16,33,977, male was 8,29,519, and the female population was 8,04,358. Total SC population in Coimbatore district was 3,27,235. Out of 3,27,235 SC population, 1,64,525 are male and 1,62,710 are female. ST population was 16,805. Out of 16,805 ST
population, 8494 are male and 8311 are female. Out of 1,81,606 population in Tirupur, 9,4,168 are male and 87,438 are female. The highest total SC population was 27,128 in Avanashi consists of 13,709 male and 13,419 female. The highest total ST population was 7406 (Karamadai) consists of 3756 male and 3650 female.

Industry

Sir Robert stanes, P.S.G. Sons Charities, G.D. Naidu, G. Kuppuswamy Naidu, G.K. Devarajulu and K. Govindarwamy Naidu, N. Mahalingam, S. Palaniswami Naidu are some of the leaders responsible for the industrial revolution in Coimbatore. Coimbatore is a leading producer of textile yam and machinery. Coimbatore is also the motorsports capital of India.

Coimbatore is a busy city with a good business infrastructure. Major industries of Coimbatore include Textile, Textile machinery, wet grinders, Auto ancillary, Auto mobile R and D motor pumps, denim, knitwear, Jewellery, Hospitals, Poultry, Motor sports, Engineering and allied industries, BPO and IT, Agriculture, Apparel, Hosiery.

Tirupur in Coimbatore district is famous for its hosiery products. Tirupur has gained universal recognition as the leading source of hosiery. Knitted garments, casual wear and sports wear.
Tirupur is an important trade center of India and is a major source of foreign exchange because of its exports. The city accounts for major portion of India’s cotton knit wear export, worth an estimated INR 5,000 crore. Tirupur is a traditional center for cotton ginning.

3.1.3. PROFILE OF NILGIRIS DISTRICT

Location

Nilgiris means "Blue Mountains". The entire area of the Blue Mountains constitutes the present district of Nilgiris. The height of the hills in the Blue Mountain range varies between 2280 and 2290 metres, the highest peak being Doddabetta at a height of 2623 metres. Nilgiris district lies between 11° and 11° 55' of north latitude and 76° 13' and 77° 2' of east longitude, with Kerala on the west, the Karnataka State on the north and Coimbatore district on the east and south. The district derives its charm from its natural setting. High above the sea level, situated at the junction of the two ghat ranges of the Sayadri Hills, Nilgiris district provides a fascinating view. The steep hills and fantastically narrow valleys with numerous rivers and rivulets running in all directions with a few fine waterfalls here and there provide beautiful scenery. The temperate and most equable climate further heightens the attractiveness of the place. Total area of the district is 2366.89 Sq.km. Headquarters of this district is
Udhagamandalam. The general geographical information of the district is simple and hill area. Moyar River is flowing the boundary of the district and it will be dry during the summer season.

**Administrative Set Up**

The Nilgiris district comprises 4 taluks, 4 blocks and 54 villages. As regards the hierarchy of administrative arrangement, there are 2 municipalities, 13 town panchayats and 25 village panchayats in the district. The Community development blocks in the district are Gudalur, Udhagamandalam, Kotagiri and Coonoor.

**Meteorological Information**

The monthly average rainfall in the district has been 94.20 mm. The months of June, July, September, October and November receive a rainfall that is more than the annual average rainfall. The district has highest average number of rainy days with 7.3 days per month, Mean maximum average temperature of 20.70 C, mean minimum average temperature of 9.60 C and mean relative humidity maximum of 76.9 and minimum of 75.8.

**Population**

The population of Nilgiris district has grown from 4,09,308 in 1961 to 7,10,214 in 1991. The growth rate indicates that there has been a significant increase during the 1981-91 decade with the average
growth rate being 1.27 % per annum during this decade. According to the 1991 census of Uthagamandalam taluk is the most thickly populated and Kothagiri taluk is the least populated in the district. Birth rate, death rate and infant mortality rate have been reduced from 39.17 in 1961 to 23.1 in 1991, 17.15 in 1961 to 9.01 in 1991 and 95.20 in 1961 to 50.0 in 1991 respectively.

**Literacy Level**

The literacy level of Nilgiris district according to figures available for the year 1996 is 65% with male literacy level being more than the female literacy level. It is also observed while the male literacy level has grown steadily from 67.74% in 1981 to 74.11% in 1996, there has also been a significant increase of female literacy level from 44.79% in 1981 to 55.78% in 1996.

**Education**

In the urban areas of Nilgiris district, this ratio of schools per 1000 population is 00.71 for Higher Secondary Schools, 1.53 for Secondary Schools, 2.66 for Middle Schools and 6.40 for Primary Schools. With there are 14 towns having Secondary Schools. Middle School facilities are available in 15 towns. There are 15 towns having Primary Schools of Nilgiris district. More than one third of them have higher proportion of Primary Schools per 10000 population than that
of district average of 3.48. The educational institutions in the district include the Pasteur Institute of India, Defence Services Staff College, Wellington, and a Govt. Arts College, Udagamandalam.

Agriculture and Horticulture

The cropping pattern is adjusted to the two rainy seasons occurring in the district. The main season is during the Southwest Monsoon from June to September. The rainfall during this season is heavy on the western parts of the district and in Gudalur taluk. The Northwest Monsoon is active during the period October to November and is strong in parts, east of the Doddabetta range. The plantation crop of tea and coffee covers the bulk of the cultivable area. Among the annually cultivated crops, potato ranks first. Paddy is grown mostly in the swampy low lands, which are depressions between the numerous little hills in Gudalur taluk, and also in a stretch of about 130 hectares in Thengumarada. The total extent covered by potato is 7888 hectares, while that of paddy is 3815 hectares only. Ragi and samai are grown in dry lands adjacent to paddy fields in Gudalur taluk and in some places on Ootacamund and Coonoor taluks. Samba, wheat and barley are grown in small extents in Coonoor and Ootacamund taluks. The area covered by all these cereals is 3817 hectares, while those of the pulses is 3821 hectares. Fruits trees and vegetables of the
cold climate are grown in Kotagiri area of Coonoor taluk and also in some parts of Ootacamund taluk to the extent of 117 hectares, including root crops. There are Five State Seed Farms in this district for the multiplication and distribution of potato seeds. There is an agricultural research station in Nanjanad where research on potato is conducted. The experimental planting of cinchona started at Doddabetta in 1860 was gradually developed into Government Cinchona Plantation and the cultivation of the crop has been extended in and around Naduvattam. A quinine factory was started at Naduvattam in Nilgiris district in 1871, which manufactures quinine and other derivatives from the bark obtained from the cinchona trees.

**Land Utilization**

The area under cultivation with medicinal and essential oil-bearing crops is about 329 hectares in the district. Besides cinchona, eucalyptus globules, geranium and eucalyptus citirodora are important crops raised. There are no major sources of irrigation in this district. Except for a small area of about 240 hectares in Thengumarada, at the foot of the ghats the district depends on rain for cultivation.

The total geographical area of the district is 2366.89 Sq.km. in 1995-96. Cropped area accounts for about 22.74% of the total area. Forestlands cover about 60.57% of the total land. A significant portion
(12.50%) of the land falls under the category of ‘non available for cultivation’ and ‘fallow lands’. About 4.19% fall under the category of other uncultivated land. The land utilisation pattern in Nilgiris district.

Crops

Cereals, Pulses and Oil seeds are observed to be the three important crops produced in the district. The productivity pattern over the past 7 years indicates that the productivity of cereals, pulses and oil seeds had been declining as the productivity has significantly gone down. Another significant features are the reduction in the area under production for cereals, pulses and oil seeds. The details on the productivity performance of the district in relation to cereals, pulses and oil seeds for the past 7 years.

The production of vegetable crops is 192620 tonnes and a plantation crop is 590 tonnes. The area covered under the vegetable crops is 7665 ha and plantation crops are 3299 Ha. and tea & Coffee is 56243 Ha. during the years 1995-96. The details pertaining the crops.

Soil Types

The soil of the district falls under three major types - (1) clay, (2) clayey loam and (3) loam with laterite sub-soil. The depth of the
soil usually varies from one to three feet and that of the sub-soil from 10 to 14 feet. The sub-soil is invariably porous.

The report of the All India Soil and Land Use survey carried out by the Central Soil Conservation Board includes the Nilgiris District in the Red and Laterite soil region II and classifies the soil of the plateau as Ootacamund soil series. In the Nilgiris District the soil is mainly derived from igneous and metamorphic rocks. The soils vary in depth from a few inches to several feet.

**Forest Resources**

Nature has bestowed Nilgiris with magnificent forests with varied and colourful plants and animal life. Incidentally the forests are also the repositories of tribal culture. Ootacamund enjoys a salubrious climate. Forest wealth is one of factors, adding to the natural beauty and economic importance of this district. Nilgiris district has an enormous forest area of considerable value spread over 404.33 Sq.Km. constituting as much as 59.34 per cent of the district area.

The man made forest plantations have been restricted to the existing forest areas in Nilgiris district. About 1805.02 hectares of man made forest area are available in the district and the man made
plantations are eucalyptus, wattle, teak, softwood, sandal, neem, tamarind and others.

**Trade, Commerce and Export**

The chief articles of trade in the district are tea, coffee, potatoes, vegetables, fruits, timber, eucalyptus oil, wattle bark, garlic and pepper. Coffee is sent to Mettupalayam and Coimbatore for processing, before they are sold to the Coffee Board. The products grown in the district are marketed both at Ootacamund and Mettupalayam, which is the receiving centre at the foot of the hills. Vegetables and fruits grown here are also marketed likewise.

The chief articles required for that the local people here, viz., rice, other foodgrains, clothing and consumer goods are brought from the plains.

**3.2. PROFILE OF THE SELECTED SPICES**

The present study had selected six spices on marketing after trade liberalization. They are pepper, chillies, turmeric, garlic, cardamom, ginger. A brief profile of the selected spices are given below:
3.2.1. BLACK PEPPER

Black pepper is the dried, mature but unripe berry (fruit) of Piper nigrum, a branching vine or climbing, perennial shrub. Black pepper is the most important spice of India and world due to its day-to-day use. It is therefore rightly considered as the 'king of spices'. Trading in Pepper futures was first introduced by NMCE in April 2003.

Black pepper comes from the berries of the pepper plant. Black pepper, green pepper and white peppercorns are actually the same fruit (Piper nigrum); the difference in their color is a reflection of varying stages of development and processing methods.

Black peppercorns are made by picking the pepper berries when they are half ripe and just about to turn red. They are then left to dry which causes them to shrivel and become dark in color. Alternatively, green peppercorns are picked while still unripe and green in color,
while white peppercorns are picked when very ripe and subsequently soaked in brine to remove their dark outer shell leaving just the white pepper seed.

Black pepper is the most pungent and flavorful of all types of peppers and it is available as whole or cracked peppercorns or ground into powder.

Native to India, pepper has played a very important role throughout history and has been a prized spice since ancient times. Since ancient Greece, pepper has held such high prestige that it was not only used as a seasoning but as a currency and a sacred offering. Pepper was used to both honor the gods and to pay taxes and ransoms. During the fall of ancient Rome, the invading barbarians were even honored by being given black pepper. Additionally, in the Middle Ages the wealth of a man was oftentimes measured by his stockpile of pepper.

The reason that pepper was so cherished is that it served important culinary purposes. Not only could its pungency spice up otherwise bland foods, but it could disguise a food's lack of freshness, the latter being an especially important quality in the times before efficient means of preservation.
Pepper became an important spice that catalyzed much of the spice trade. This not only led to exploration of many undiscovered lands, but also to the development of major merchant cities in Europe and the Middle East.

Today, the major commercial producers of pepper are India and Indonesia.

**Indian Names of Pepper**

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There are different varieties of Black pepper and their names are originated from the localities where they grown or from ports through which they are being exported, e.g. Malabar, Alleppey (Kerala), Lampang, Saigon and Singapore. Majority of the cultivated varieties are monoecious i.e. male and female flowers found in the same spike. Peppers differ slightly in their physical and chemical characteristics; colour, size, shape, flavour and bite.

Black pepper is more aromatic than the other varieties of pepper. It is native to Malabar and has been grown here for more than 2000 years. The best Black Pepper is considered to be Telicherry and Lampong. The most popular varieties from India are Malabar Garbled and Tellichery Black. Tellichery and Alleppey peppers are large, attractive, dark reddish-brown to black, very aromatic and are among the best. Same in case of the Malabar Garbled (MGI), which alone accounts for nearly 90% of the total exports from India.
3.2.2. CARDAMOM (SMALL)

Cardamom is the Queen of Spices. It is one of the most exotic and highly prized spices; Indian cardamom has a history as old as human civilization. Southern India and Sri Lanka are regarded as origin of this spice. Till recently India was the main Producer and exporter of this commodity, but of late Guatemala has emerged as a keen competitor to Indian cardamom in the international spice market. Indian cardamom is slightly smaller, but more aromatic. As a whole, cardamom is cultivated commercially in India, Sri Lanka, Guatemala and Tanzania.

Cardamom is often named as the third most expensive spice in the world (after saffron and vanilla), and the high price reflects the high reputation of this most pleasantly scented spice.
Cardamom is grown commercially in plantations under the shade of tall forest trees. It is a very labor-intensive crop to produce. The fruits are picked individually by hand before they are fully ripe, over a period of several months.

Cardamom is the second most important spice of India and is known as the “Queen of spices”.... India is the major cardamom producing country in the world. The various genetic varieties of cardamom grown in India are characterized by taste and flavour profiles that are distinctly different and uniquely Indian.

The spice value of cardamom depends on the volatile oils (2-10 percent) present in the seeds. The active principle constituents of the oil are the terpenes - cineol, tripenoil, turpinene, limonene, sabinine and terpinyl acetate.

Cardamom is one of the oldest spices in the world, and the most popular spice in ancient Rome was probably cardamom. By the first country AD, Rome was importing substantial quantity of cardamom from India. India and Arabic writers of very early times knew and noted cardamom. The first written mention is in the famous ebers papyrus, discovered in Egypt and dating back to 1550 BC, which lists

3 www.mnce.com
4 www.cardamenindia.com
about 800 medical drugs and their uses. The Indian writer Sususta (around the 18th century) mentioned cardamom under the sanskrit name export Eta. Cardamom is mentioned in the list of spices liable to duty at Alexandrea in 176-180 AD.

The Varieties and Grades of Cardamom are:

1. **Bold**: It is popular export grade; 90% and above capsules will be having 6.5 mm and above diameter, matured and Greenish color. Lt. Wt. will be 415 gms.

2. **Super Bold**: It is a very special variety. All capsules will be matured greenish and having above 8 mm diameter size. Lt. Wt. will be more than 450 gm.

3. **Extra Bold**: Best in the Export market. All capsules will be matured, greenish and having 7 mm and above diameter. Lt. Wt. will be 435 gm.

4. **Bulk**: This is the grade of cardamom produced as it is. This grade will contain all size, matured and immature capsules, black, yellow and splited cardamom. This is to be graded.
5. Small: Small size cardamom having size between 5.5 mm and 6.5
111liL Cleaned and removed dust, \textit{husk and} black capsules. Lt. Wt. will
be around 385gms.

6. \textbf{Open} / Splits: More than 60% capsules will be in open condition
and the color may be partly greenish / pale yellow. All capsules will
be matured and the size are 6.5mm and above.

7. \textbf{Seeds}: Black / Brown colour seeds are the original content in every
cardamom capsule. The husks were fully removed. Lt. Wt may be
around 550 gm to 600 gm.

8. \textbf{Fruit} : Fruits are generally over matured capsules with slight
yellowish in color and Lt. Wt. over 425 gm.

The term cardamom has been applied to the aromatic capsules
of plants, most of them from India, belonging to the family of Maton
Zingiberaceae.\textsuperscript{5} The generic name \textit{Elettaria} originated from the
Malayalam world Elathari meaning literally the seeds of Elam. The
specific name is the Latin word \textit{Amomum}\textsuperscript{6} Cardamom, otherwise
known as Malabar Cardamom or true cardamoms or small cardamom
was second to pepper in importance during the Renaissance period.
The official Latin name for true cardamom is \textit{Elettaria cardamom}.\textsuperscript{7}

\textsuperscript{5} \url{www.cardamompicture monograph.htm}
\textsuperscript{6} \url{www.epicentre.com}
\textsuperscript{7} \url{www.ebookmail.com}
Cardamom comes from the seeds of ginger like plant. The small, brown black sticky seeds are contained in the ped in three double rows with about six seeds in each row. The pods are 5.20 mm $\frac{3}{4}$ long, the larger variety known as black cardamom being brown and the smaller being green white bleached pods are also available. The pods are roughly triangular in cross section and oval or oblate. Their dried surface is rough furrowed, the large blocks having deep wrinkles. The texture of the pod is that of tough peper pods are available whole or split and the seeds are sold loose or ground it is better to buy the whole pods as ground cardamom quickly loses flavour.\(^8\)

Cardamom has certain characteristics. It is colourless to pale yellow liquid with the sweet - spicy, warming fragrance and area weedy-balsamic undertone. It blends well with rose, olibanum, orange, bergamot, cinnamon, cloves, caraway, ylang labdanum, cedarwood, organge blossom and oriental bases in general.\(^9\)

\(^8\) www.cardamomindia.com
\(^9\) www.cardamomgen.com
3.2.3. TURMERIC

Turmeric botanically called Curcuma longa (LINN.) belongs to family Zingiberaceae. Turmeric also called as “Indian saffron”. Turmeric is an important spice among the rice-eating peoples of India, South East Asia and Indonesia and is indispensable in the preparation of curry powder\(^\text{10}\).

Turmeric belongs to the ginger family and there are about 70 species of turmeric of which 30 species occur in India. Turmeric stands third among the spices exported from India. The importance of turmeric in medicine took area new turn when it was discovered that the turmeric is very rich in particular type of phenolic compounds called curcuminoids. The three main curcuminoids isolated from turmeric are curcumin, demethoxy curcumin and bisdemethoxy curcumin, of which curcumin is the major curcuminoid.

\(^{10}\)www.MNCE.com
The phenolic compound (curcumin) is known to possess antioxidant properties. Thus it significantly inhibit the generation of reactive oxygen species (Ros) and acts as area scavenger of oxygen free radicals.

Studies carried out in National Institute of Nutrition (NIN) suggest that turmeric has anticarcinogenic and antimutagenic effects. Curcumin has an impact on all stages of carcinogenesis. Curcumin has also been demonstrated to have antitimour effect in animals treated with potent carcinogens.

Turmeric is well known for its antibacterial activity. The active principle of turmeric, curcumin has an inhibitory action principle of turmeric, curcumin has an inhibitory action on the micro-organisms and arrests the growth of fungi.

Turmeric and curcumin have been reported to reduce the levels of cholesterol in experimental animals given high cholesterol containing diet. It is also useful in treating gall stones in traditional medicine.

Turmeric helps in detoxifying harmful drugs of chemicals that are converted to toxic metabolites. Export it also increases the mucin content of gastric juice and reduce irritation in stomach. It is used to relieve sore throat, cough, cold and against flatulence.
Recently, curcumin was shown to be effective against the Alzheimer’s disease in animal models. Area studies carried out in NIN also demonstrate that feeding of curcumin and turmeric could delay the progression of diabetic cataract in rats.

Thus, turmeric or curcumin, the active principle has area wide range of beneficial properties that include antioxidant, anticarcinogenic, antimutagence, anti-inflammatory, antiviral, hypolipidemic, antidiabetic/hypoglycemic, antibacterial and ant infectious activities.

Modem science has also acknowledged the following functional benefits of turmeric.

1. Effective treatment for inflammatory bowel disease.
2. Relief for rheumatoid arthritis.
3. Prevention of cancer
4. Inhibition of cancer cell growth and metastases
5. Risk reduction for childhood leukemia
6. Improved liver function
7. Cardiovascular protection
8. Protection against Alzheimer’s Disease.

Turmeric is the dried rhizome of area herbaceous plant. It is the most popular spice as area beauty aid. The spice is sometimes called ‘Indian Saffron’

Indian turmeric has been known to the world since ancient times. Its antiseptic and preservative properties make Indian turmeric an ideal choice as area food flavour, an effective ingredient in medicines and cosmetics. It is an antidote against poison.

As area beauty aid turmeric paste prevents and cures pigmentation, maintains pH factor and makes skin glowing. Taken internally it purifies the blood. With all its unique properties, Indian turmeric is considered the best in the world. India is today the largest exporter of turmeric to countries like the Middle East, the UK, USA and Japan. Some of the well-accepted varieties are: 'Alleppey Finger', 'Madras Finger', and 'Erode turmeric', Rajapore and Sangli turmeric and ‘Nizamabad Bulb’. India also exports turmeric in powder form and as oleoresins.

The name turmeric is believed to originate with the Latin word ‘terramerrita’ meaning metric of Earth. Among the multifaceted uses of turmeric, its role in medical therapy makes it truly a wonder spice. Turmeric is a food colorant and condiment it’s got an aromatic colour and a fiery taste. Turmeric contains gum, starch, mineral matter, cellulose, oil and curcumin.

12 S.N.Yogish, Anjana.K, Cultivation of Spices crop from India
A number of cultivars are available in the country and are known mostly by the name of locality where they are cultivated. The important varieties used in India are: 'Alleppey Finger' (Kerala) and 'Erode and Salem turmeric* (Tamil Nadu), 'Rajapore' and 'Sangli turmeric' (Maharashtra) and 'Nizamabad Bulb' (Andhra Pradesh). In Tamilnadu, the important varieties cultivated are Erode local, BSR-1, PTS-10, Roma, Suguna, Sudarsana and Salem local. Among these varieties, 70-75% is occupied by the local varieties.

<table>
<thead>
<tr>
<th>Growing Region</th>
<th>Variety</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhra Pradesh</td>
<td>Amruthapani, Armoor, Duggirala, Tekkurnpeta, Nizamabad Bulb</td>
<td>Medium to long (8-9 months) duration crops, fairly resistant to fungal diseases</td>
</tr>
<tr>
<td>Bengal &amp; Assam</td>
<td>Pattani, Deshi</td>
<td>Medium to long (8-9 months) duration crops, fairly resistant to fungal diseases</td>
</tr>
<tr>
<td>Kerala</td>
<td>Moovattupuzha, Allepey, Wynad</td>
<td>High color variety, generally marketed as Allepey type</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>Rajaputi, Sanghli Turmeric</td>
<td>Major regional variety</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>Chinnanadan, Perianadan, Erode, Salem</td>
<td>Generally marketed as Madras type</td>
</tr>
</tbody>
</table>

In domestic & international markets Salem turmeric has established itself as the best quality & it fetches the higher price compared to the price of Erode turmeric. The superior quality of Salem turmeric is due to good soil conditions & less cross contamination.
3.2.4. CHILLIES

India has always been the traditional home of spices and commodities. Among the condiments chilli (red pepper) has become indispensable in every Indian home, for its pungent fruits which are used both green and ripe to impart pungency to the food. Chilli is the most widely used and universal spice of India. India is the only country in world to have different varieties of chilli with rich quality factors. India has immense potential to grow and export different types of Chillies required by various markets around the world. Chilli is an important cash crop in India and about one million farmers are engaged in the production of Chilli in Andhra Pradesh, Karnataka, Tamil Nadu and other states. India is the largest producer of chilli in the world and contributes 25% to total world production. Chilli is the most common spice cultivated in the country.
In India, Chillies are grown in almost all the state through the length and breadth of the country. Andhra Pradesh is the largest producer of Chilli (27%) in India followed by Karnataka (19 %), Maharashtra (12 %), Orissa (9%), Tamil Nadu (8 %) and other states contributing 18 % to the total area under Chilli. More than 90 % produced chillies from India meant for domestic consumption with 5% for exports. Chilli is the major spice contributing 31 % by volume and 17% by value of total spices exported from India.

India earns 270 crores as foreign exchange through export of chillies. Various processed forms of chillies (chilli powder, dried chillies, pickled chillies and chilli oil) are demanded by United States of America, Sri Lanka, USA, Nepal, Mexico and Bangladesh are the major importer of Chillies from India. In India, Chilli is cultivated both under irrigation and dry conditions preferably more in black soils. Unlike peak or low arrivals during harvesting and off-seasons in other commodities, Chilli continues to arrive throughout year into the markets, because as soon as the commodity arrives in the market after harvest it will be purchased by the traders and they keep the stocks in cold storages and release into the market as prices move up. Among the area under spices and condiments in India, 54 per cent covered by southern states.
Ill Tamil Nadu, among the total area under chillies nearly ninety per cent (ie 57240 ha) was covered by southern districts only. The area under chillies shows an upward trend in most parts of the southern districts (ie Thoothukudi and Ramnad districts) for Tamil Nadu because of suitability of soil and other climatic factors under rainfed situation. Of which, Thoothukudi district has major area under chillies (25,295 ha) under rainfed situation. With the emergence of importance and demand for dry chilies throughout the world it is essential to study the economics of chillies both in production and marketing aspects.\(^\text{13}\)

3.2.5. GINGER

India is an agriculture country with 70 per cent of its population depending on agriculture for its livelihood. After independence, incredible efforts have been made to boost the production of food grains which are well reflected by India’s self-sufficiency in food grains. Although various National Extension Services and

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\(^{13}\) Economics of Rainfed Chilies in Southern Agro Climatic zone of Tamil Nadu, [www.google.com](http://www.google.com)
Community Development Programmes were launched from time to time by the Government, the desired results could not be achieved due to non-participation of peasants for whom the whole efforts were made. Thus, the need of the hour is effective participation of peasants in the development and execution of the programmes for achieving the desired goals. Generally, the recommendations are made without considering the resource potential of the farmers and consequently, the wide gap always exists. Till date, all extension programmes were planned at country/state level and executed by the field functionaries without consulting the farmers for whom the programmes are planned. Recently, the concept of participatory approach (PRA) has been introduced for the overall development of different production systems.

Ginger (Ginger officinal) is one of the most important vegetable crops grown in the mid-hills of Himachal Pradesh as a leading vegetable crop. The crop is being cultivated as an important summer season crop either alone or as an intercrop in the mid-hills of Himachal Pradesh in an area of around 2,551 hectares with a production of 23,323 MT annually. Solan district alone produces 4,800 MT of ginger annually from an area of 600 hectares.
Ginger occupies the prime position amongst summer season vegetables after tomato, capsicum, cucumber and French bean. The production and productivity of ginger crop is far below due to lack of proper management practices, long duration of crop, poor resource base of the farmers and lack of knowledge to exploit the situation. Till date, around 70 to 75 per cent of ginger growers of Solan district apply only FYM as organic fertilizer irrespective of the requirement of soil or the crop. In a survey, it has been reported that the farmers are not using nitrogen, phosphorus or potassium as fertilizer for over the last 20 years\textsuperscript{14}.

Ginger is the most important of the spices obtained from roots. A native of Southeastern Asia, it was early used in china and India and was brought by caravans to Asia. It was among the first of the oriental spices to be known in Europe, where it was prominent early in the Middle Ages. Today ginger is cultivated over a wider area than most spices, owing probably to the ease which the roots can be transported. The aromatic odor of ginger is due to the essential oil, while the pungent taste is due to the presence taste of the nonvolatile oleoresisin and gingerin. Ginger is used more as a condiment than as a spice. It dilates the blood vessels in the skin, causing a feeling of warmth and increases perspiration with an accompanying drop in temperature. For

this reason it is much used in warm countries. Ginger is quite effective against bacteria which causes certain respiratory diseases. It is also used as a digestive stimulant\textsuperscript{15}.

Ginger is used since time immemorial. It is a major crop cultivated in India and marketed as fresh and dried spice. It is a small grassy plant grown in all seasons throughout the year. Indian ginger is famous for its flavour, texture and taste. More than a spice ginger is considered as a taste maker, a drug, an appetizer and a flavourant. Superior quality of ginger is produced from Kerala though it is grown throughout the country. The congenial climate and the fertile soil helps to produce quality ginger.

Several cultivars are grown in different areas in India. Ginger is always propagated by cuttings of rhizomes known as seed rhizome or sets. Rhizome sets should be treated with 0.3 % Dithane M-45 solution for 30 minutes to control fungal diseases. If required, they may also treated with 0.05% Malathion and 200 ppm Streptocycline. For planting, rhizome bits of 15 - 20 g @ 1,200 - 1,800 kg/ha may be used\textsuperscript{16}.

Garlic is one of the important bulb crops grown and used as spice or a condiment, throughout India. It is also an important foreign exchange earner for India, it is consumed by almost all people who take onion. Garlic has higher nutritive value than other bulb crops. It is rich in proteins, phosphorous, potash, calcium, magnesium and carbohydrates. Ascorbic acid content is very high in green garlic. In recent few years it is observed that demand of garlic has increased and thus increased production is essential to meet the requirement as also to eliminate the import of garlic.

Garlic (Allium Satium) is one of the important spices cum vegetable crop commercially grown in India. It is also important foreign exchange earner for India. It is used in various processed forms like, powder, paste and pickles. It has very good medicinal property also India, in spite of being a major garlic producing country, has very low productivity of 4.07 t/ha. The reason for low
productivity of garlic are unawareness of the farmers about improved **Varieties, climate** soil agronomic practices, pest and diseases management and improper post harvest management practices. One of the way is to increase the production and productivity of garlic through drip fertigation. Hence an attempt was made to study the effect of drip fertigation on growth, yield and quality of garlic var, G.41 at National Research Centre for Onion and Garlic, Raj guru nagar, Pune, Maharashtra state.

The study was conducted in garlic during the year 2003 - 06 to find out the optimum nutrient requirement of garlic through drip fertigation. The results revealed that water soluble fertilizers through drip irrigation improved the yield and yield contribution characters of garlic. The percentage of A grade bulbs were more in 100 per cent of recommended dose of fertilizers as water soluble through drip irrigation than conventional fertilizer application method. The reduction in fertilizer dose significantly reduced the marketable bulb yield of garlic. The higher marketable bulb yield of 8.77 t/ha was noticed in 100 % NPK as WSF through drip fertigation in garlic. More over, data from the experimental results indicated that an increase in fertilizer close from 60 - 100 per cent, the value of additional yield was less than the additional cost of fertilizer incurred,
while calculating the benefit - cost ratio, the treatment comprising of NPK 50:50:80 kg/ha as basal + 50 kg. As far as water saving is concerned there was 30-40 percent saving of water in drip fertigation over surface irrigation.\(^{17}\)

Garlic and onion are cultivated all over India. India is one of the largest producers of onion and export considerable quantities. They are the well known members of the family “allin” (inactive form) which is converted “allicin” (active form) by the enzyme allinase. The active principal present in onion is allyl proply disulphide.

“Ajorne” which is an unsaturated polysulphide substance from allium has hypotensive action. Onion and garlic is reported to possess platelet aggregation inhibitor factor. Onion oil is reported to possess greater antiplatelet activity compared to garlic oil.

Both have the property of reducing serum cholesterol level. The essential oils present are considered to be responsible for this property. Experiments have shown that they have hypoglycemic properties. They also possess beneficial effects against malignancy. Garlic have more anti-cell dividing (antimitotic) property than onion.

Garlic and onion are also associated with anti bacterial activity. Growth of many pathogenic fungi, yeasts and some viruses are inhibited by them. Garlic inhibit aflatoxin producing fungi namely Aspergillus flavus. In unani and ayurvedic medicines also garlic is used to treat various digestive disorders\textsuperscript{18}.

Garlic is one of the important spices cum vegetable crop commercially grown in India. Garlic (Allium Sativum. L) is classified in the family Amaryllidaceae as the decorative plants Amaryllis, Omithogolum and the edible crops onion, chive, leek. Garlic is revered medicinally and as an essential culinary ingredient. It has a characteristic pungent, spicy flavour that mellows and sweetens considerably with cooking. India ranks second after china in world’s garlic production. Its chemical properties include isolated and identified compounds, which are antibacterial, antifungal and antithrombotic. Some of the healthful and healing powers of garlic, which had been considered myth, are now scientifically verified. Increasingly, garlic is being used more widely by our culture for its versatile flavouring ability.

Garlic is a rich source of nutrients required for body metabolism. It has a substantial amount of calories and protein. It also contains the adequate amount of vitamins especially B Vitamins specifically thiamine, riboflavin and niacin, all of which are essential for growth. It also contains Vitamin C, which is needed to strengthen blood veins, gums and teeth. Its mineral content is more than enough to supply the recommended daily intake of an individual. Completely ripe bulbs contained crude protein, crude oil, crude energy, crude fiber, ash, dimethyl sulphite (DMS) and essential oil and minerals including k, p, Mg, Na, Campaign, Fe, etc., Garlic contains the phytochemicals allicin, ajoene, saponins, and phenolic compounds that may have antioxidant and immune promoting functions. Garlic acquired a reputation in the folklore of many cultures over centuries as a formidable prophylactic therapeutic medicinal agent. Garlic has attracted particular attention of modern medicine because of its widespread health use around the world, and the cherished belief that it helps in maintaining good health warding off illnesses and providing more vigour.

Garlic is widely used around the world for its pungent flavour as a seasoning or condiment. As a classic ingredient in pickles, chutney, curries powder, curried vegetables, meat preparations, etc.,
Garlic has a powerful aroma and pungent taste, fresh young clove and leaves, however can be eaten as vegetables. It is used in various processed forms like powder, paste and pickles.

Physical properties of bio materials play important role in designing the equipments which are used for post harvest operations and storage\textsuperscript{19}.