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1.1 Introduction

India is a country of peasants and agriculture provides sustenance to more than two-third of the Indian population ¹ Agriculture is the backbone of Indian economy and no planning for economic growth can be fruitful without the development of agriculture sector. This sector in India assumes special importance in the context of the population explosion and it is required that agricultural planning should be so devised that agricultural productivity should keep pace with the growing population. Efficient agricultural management to ensure better and still better productivity may make valuable contribution to the balanced growth of Indian economy.² It occupies a

¹R.D.Sharma and Sachindra Kumar Azad., “Some Aspects of Agricultural Productivity in a Backward Region of India”, *The Bihar Journal of Agricultural Marketing*, Vol. V, No. 4, October-December 1997.p. 429.

²*Ibid.*, p.431.

central position in the Indian economy. It contributes 29.4 per cent of GDP, employing 64 per cent of the country's workforce. Indian agriculture is characterized by poor yields, stagnant diversification, imperfect market conditions and traditional production practices.³ There are a number of sub-fields in the agriculture sector like sericulture, floriculture, and horticulture. Among those fields, horticulture has played a dominant role in the agricultural output throughout India.

Horticulturalists are cultivating a variety of fruits in their field. Among the different fruits produced by growers the cultivation of mango is higher in terms of area as well as in output compared to other fruits. India has occupied number one position in the mango cultivation in the world.⁴

Cultivation of fruits is a very important factor contributing to the prosperity of the nation. Infact the per capita consumption and production of fruits are often taken as an index of the standard of living of the people in a country.⁵

In terms of nutrition, fruits are a very good source of several vitamins, mineral salts and dietary fibre, which are essential for good health. Fruits are health-

³Dvinv Prasada Rao., "Marketing Strategies for Horticultural Products – A Case Study in Varanasi District, U.P.", *Economic Affairs*, Vol. Qr., September, 2004, p.181.

⁴**"Hort State 1999"** Published by Directorate of Horticulture and Plantation Crops, Chennai, 1999, p 5.

⁵Padamanandam, **"Economic of Mango Cultivation in Madurai and Quaid-E-Milleth Districts"**, Ph.D Thesis submitted to Madurai Kamaraj University, 1991, p 1.

promoting as well as pleasure-giving. Because of their low energy density and appreciable amounts of dietary fibre fruits are good for health.⁶

In India, daily consumption of fruits is only 10 grams per head compared with the recommended allowance of 37 grams for balanced diet.⁷ The per capita consumption of fruits and vegetables in India is estimated at 40 kilogram per year.⁸ The per capita production of fresh fruits alone in India, as per report of food and agricultural organization, works out to 24 kilograms as compared to 40 kilograms for the whole world.⁹

The world market provides a good opportunity for the development of fresh and processed fruit and vegetables industry in India. From the point of view of the domestic market also, the horticultural products provide a higher nutrition value. Their cultivation generates higher employment and higher returns to farmers than cereals and other agricultural cash crops.¹⁰

The diverse agro-climatic conditions of soil and temperature allow India to cultivate a wide range of fruits and vegetables under natural climatic conditions as

⁶Raghuvanshi R.S and R.K. Sohane "Horticultural Crops in Human Nutrition" *Kurukshetra*, Vikas Publishing House Pvt., Ltd., June 1998, p.3.

⁷Padmanandam, *Indian Horticulture*, Vol.30, October- Dec, 1995, p.3.

⁸*Ibid.*, p.8.

⁹*Ibid.*, p.17.

¹⁰Vikas Singhal, *Hand Book of Indian Agriculture*, Vikas Publishing House Private House Limited, New Delhi, 1995, p.117.

against artificial condition needed in the most developed countries, For instance in Europe, electrical cables are installed in farms to heat the soil for cultivation of some horticultural products.¹¹

The mango, a fruit that originated in India, has admirers all over the globe. It is found in the Vedas too. Mango undoubtedly deserves to be the national fruit of India. In area of production, nutritive value and popularity, no other fruit can compete with it. Its cultivation in India dates back to 6000 years old.¹²

It is the national fruit and king among the fruits in India. In India's horticultural crops, production of mango is about 60 per cent. Mango is one of the highly eatable fruits in the country. It contains various neutering namely B. carotene, carbohydrates, vitamin 'C' fibre and energy.

Mango is one of the cheapest fruits in India, which can be eaten even by the poorest of the poor. In India large numbers of agriculturists are cultivating mango trees for their livelihood. Mango cultivation is seasonal and therefore during the off-season, the growers have to search for alternative employment.

It is very much essential to study the problems of production and marketing of mango, since large numbers of farmers are involving themselves in this field. Based on the findings, any one can easily understand the background of the mango growers

¹¹*Ibid.*, p 113.

¹²Arun Arya., *Tropical Fruits., Disease and Pests*, Kalyani Publishers, Ludiyana, 1993, p.1993, p. 2.

and also take an appropriate decision for the benefit of growers. They are facing a number of problems during their cultivation, operation and marketing practices. The most serious problems faced by the cultivators among the other things are financial indebtedness to others, and no guarantee in mango yield. But the main reason for lower production of mango is frequent climatical changes in the area of cultivation. In this context, the present study highlights the production and marketing problems of mango growers of Madurai District.

1.2 Mango – Some Aspects

The botanical name for the mango is *Mangifera indica* ¹³ *Mangifera* is derived from the combination of two words, mango and fero. In Latin they mean bare mangoes from Indica, meaning pertaining to India.¹⁴ Common names in different languages are mango, mangga, mangot, mangue, mangou, Aam, Amb, Amba.¹⁵

Mango a member of Anacharsdiacease family is an erect, broad specimen that can reach 100 feet high and 125 feet wide. A tree of this size develops a deep tap root and extensive root system. However pruning or containerizing can control the size ¹⁶

¹³ webmgr@srilanka.net.

¹⁴Charles McCann, *100 Beautiful Trees of India*, D.B.Taraporavala Sons & Co. Pvt Ltd., Bombay, 1966, p.95.

¹⁵ webmgr@srilanka.net.

¹⁶ *Ibid.*, p.4.

Mango is the choicest fruit of Hindustan and one of the most delicious fruits of the world.¹⁷

The mango is one of the best-known fruits of India. There are several varieties of the fruit and each variety is known by a special name. The timber is rather soft, rough – grained and not durable. It is only used for rough purpose.¹⁸

Summer in India comes with a tang and smell of the mango.¹⁹ The mango is widely cultivated throughout the tropics but especially in India. It is also of considerable economic importance in South America.²⁰ A mango tree of age less than five years was regarded as a young tree and that of five years or more as a tree of bearing age.²¹

Mango is the most popular fruit of the orient and has been called “King of the all fruits”, but also ‘a ball tow soaked in turpentine’ or ‘fit to be eaten in the bathtub only’. Ripe mangoes are eaten for dissert, are canned or used for making juice, jams and other preserves, pickles and chutney are prepared from unripe fruits.²²

¹⁷ Hayes. W.B., “*Fruit Growing in India*”, Kitabistan, Allahabad, 1970, p.154.

¹⁸Charless McCann, *op.cit.*, p.95.

¹⁹Bandaya Mello, “Mango Music”, *The Economic Times*, Chennai, Monday, March 1999, p.8.

²⁰*New Coxton Encyclopedia*, The Coxton Publishing Company, London, Vol.12, p. 3845.

²¹Seth, G.R. Sukhatme B.V. and A.M. Manwan, A. M., *Sample Surveys of mango and Guava in Utter Pradesh*, ICAR, 1959, p.8.

²²Samson. J.A., *Tropical Fruits*, II Edition, Kittabistan, Allahabad, 1993, p.216-233.

1.2.1 History of Mango

The mango is one of the most ancient fruits of India. It was established in India in the Pre-Christian era. Its cultivation in India is estimated at more than 4000 to 6000 years old. In the Ramayana and Mahabharata forest and gardens of mango have been mentioned.²³ Hindus have held it in high esteem. Its blossoms are used for the worship of goddess Saraswathi and festoons (Toran) of mango leaves are strung over doorways on auspicious occasions. The mango has been described as “Kalpakaviruksha” or wish - giving –tree. It is not only common throughout India, but it is also the fruit of the common man.²⁴

Mango has a strong link with the cultural history of India. Its mention has been in the sacred Sanskrit scriptures dating back at 2000 B.C. and also has been portrayed in the paintings and sculptures.²⁵

The Moghul Emperor Babar called it is the choicest fruit of Hindustan.²⁶ It has also created place for itself in the Indian art. Sculptures of the mango tree and its fruit are found in the Buddhist stupa at Sanchi which dates back to about 150 B.C. ²⁷ The

²³Ranjit Singh., *Fruits*, National Book Trust, India, New Delhi., 1969, p. 18.

²⁴ Arun Arya, *op.cit.*, p.28.

²⁵Atul Chanda et.al., *Production And Post Harvest Technology Of Fruits*, NBS Publishers, Bikaner, 1996, p.83.

²⁶Ranjit Singh, *op.cit.*, p.19.

²⁷*Ibid.*, p.22.

mango had become established in India at a very early stage. The invading armies of Alexander the Great found it established in the Indus valley in 327 B.C.²⁸

In the travel notes of the Buddhist pilgrims Fahien and Sung – Yiin, a mango grove is mentioned as have been presented by Amaradharika to Lord Buddha, so that the Great Master might use it as a place of repose. This important fruit also finds mention in the notes of the early foreign travellers to India, e.g., Hsiian – tsang (632-645), ibn-Haukul (902-968), ibn-Batuta Hsiian foreign (1325-1349) and Ludovici de Varthama (1503-1508) It appears, however, that Hsiian – tsang was the first person to bring the mango to the notice of the people outside India.

The Turkoman Saint and poet, Ameer Khosru, was so much impressed by the virtues of the mango that, as early as 1330 A.D., he immortalized the fruit in Persian verse, a translation of which would be:

The choicest fruit of Hindustan,
For gardens pride the mango is sought;
Ere ripe, other fruits to cut we ban,
But mango serves us, ripe or not²⁹

1.2.2 Origin of Mango

²⁸Arun Arya, *op.cit*, p.54.

²⁹Krishan Kumar, *The Mango – A Hand book*, Indian Council for Agricultural Research, New Delhi, 1967, p.1.

The mango, which combines utility with beauty, has the status of the national tree of India and is very rightly considered 'King' among fruits grown in the country.³⁰

The mango belongs to the family of Anacardiaceae, genus mangifera, and is known to have originated in South East Asia. The natural spread of the genus is limited to the Indo- Malaysian region³¹ Evidence based on occurrence of numerous wild and cultivated varieties, phyto –geographical distribution, phylogenetic – taxonomy, philological and archaeological studies indicate³² that the Mango is indigenous to north east India and north Burma, in the foot – hills of the Himalayas. It is said to have originated in the Indo- Burma region (De Candolle 1904, Popenoe 1920, Mukherjee 1951). The mango was found throughout south – East Asia and the Malay Archipelago in the early days. The Chinese literature of the seventh century describes it as an important fruit crop in the warmest part of China and Indo- China.³³

1.2.3 Distribution of Mango

Presently, besides India, it is being cultivated in Pakistan, Bangladesh, Burma, Sri Lanka, Thailand, Vietnam, Malaysia, the Philippines, Indonesia, the Fiji Islands, Tropical Australia, Egypt, Israel, Sudan, Somalia, Kenya, Uganda, Tanzania, South

³⁰ J.S. Pal., *Fruit Growing*, Kalayani Publishers, Ludhiana, 1997, p.155.

³¹R.K.Meena et.al., *Horticultural Marketing and Post Harvest Management, Post-Harvest practices for quality Assurance of Mango*, Pointers Publishers, Jaipur, India, 2001, p.254.

³² M.K.Sadhu and P.K.Chattopadhyay, *op.cit.*, p.107.

³³R.N.Singh., *Mango*, ICAR., New Delhi, 1990, p.2.

Africa, Niger, Nigeria, Zaire, Madagascar, Mauritius, the USA (Florida, Hawaii, Puerto Rico), Venezuela, Mexico, Brazil, Australia, West Indies Islands and Cambodia.³⁴

The mango, which has been under cultivation in India for 4000 years or more, forms now a commercial crop in many countries. The account of the introduction and distribution of the mango in other countries of the world is interesting. Perhaps Malaya was one of the earliest to obtain the material from India. The size of the seeds is too great to allow carriage by birds or other animals and suggests dispersal by human agency.³⁵

The dissemination of Mango throughout the world started with the commencement of trade between Asia and Europe. The Portuguese were the first to come to India, and they seized the opportunity of trading in spices and other vegetable products of the East.³⁶ It had become established in Somaliland on the eastern coast of Africa before 1331. By the 16th century, it had reached the Persian Gulf. By 1690, it was growing under glass in England. It had also reached Yemen in the latter half of the 17th century, the Azores in 1865 and Italy in 1905. It reached Hawaii islands in about 1865 and Queens-land in Australia in about 1870.³⁷ Mango travelled to the west only after the sea- route was discovered. Alexander saw the first mango tree in Indus valley,

³⁴Ram Prakash Srivastava, *Mango Cultivation*, International Book distribution Co. Lucknow, U.P (India), 1998, p.3.

³⁵Krishan Kumar, *op.cit.*, p.4.

³⁶*Ibid.* p.32.

³⁷Ranjit Singh, *op.cit.*, p.22.

which proves that it did not travel towards the Western countries before Alexander. Portuguese people took mango fruit to South Africa and Brazil in about 1700 A.D. Spanish people introduced it in Philippines. Mango was introduced in Jamaica around 1782. From Mexico, it was introduced in Florida during 1833. In 1869 grafted mango trees were taken to Florida from India. Mango was introduced in Israel in 1929.³⁸

1.2.4 Some Varieties of Mango

For successful mango growing, it is necessary that the varieties planted in a commercial orchard are productive, of good quality and adaptable to the climate of the tract. Different varieties are suitable for growing in different climatic conditions.³⁹

The number of varieties of mango found in India is great. In fact, there are far too many varieties. The number of commercial varieties is estimated at over 1000⁴⁰ each differing in size, shape, colour, texture and taste.⁴¹ The popular varieties grown in Tamil Nadu are Neelum, Bangalara, Banganapalli, Rumani and Mulgoa.⁴² Pickle varieties are Butty, Natty and Gaddemar.⁴³ Table 1.1 explains the details of most popular commercial varieties of different regions of India.

³⁸J.S Pal, *op.cit.*, p.155.

³⁹Sham Singh, *Fruit Culture in India*, ICAR, New Delhi, 1967, p.82.

⁴⁰Ranjit Singh, *Fruits*, National Book Trust, New Delhi, India, 1969, p.25.

⁴¹Vikas Singal, *op.cit.*, p.144.

⁴²N.Ramaswamy, *Fruits - Spices and Plantation Crops*, Tamil Nadu Agricultural College, Madurai, 1995, p.8.

⁴³*Ibid.*, p.17.

Table 1.1
Most Popular Commercial Varieties of Different Regions in India

Sl.No.	Region	Mango Varieties
1.	Northern Region	Langara, Chausa and Bombay green
2.	Eastern Region	Himsagar, Langra, Fazili, Zardalu, Krishnabhag and Gulabkas;
3.	Western Region	Alphonsa, Pairi, Kesar Rajapuri, Malkuard and Jamadar;
4.	Southern Region	Bangalara, Neelam, Swernarekha, Pairi (Peter), Banganapalli, Mulgoa and Badami (Alphonso) ⁴⁴

It is clear from Table 1.1 that the name of the mango variety varies from region to region. The same variety may be known by a different name in a different location, for example, Himsagar of South Bengal area is known as khirsapati in Malda.⁴⁵

⁴⁴Bose, *Fruits of India - Tropical and subtropical*, Naya Prakash Private limited, 1985, p.76.

⁴⁵Sammadar. H.N. "Commercial Production of Horticultural Crops," *Naya Udyog*, Calcutta, 2001, p.16.

1.2.5 Medicinal Value

The medicinal property of mango has been known since long throughout the world. Almost all the parts of the plant are used as medicine in one way or other. Although, our knowledge on medicinal properties of mango is known since long⁴⁶

Parts used: Roots, bark, Leaves, flowers, fruits, seed kernel. ⁴⁷

A fully ripe mango is especially high in vitamin A (beta – Carotene), which is considered a cancer-fighting agent. It is also high in vitamin C and is a good source fibre too. Green mangoes have more vitamin C than vitamin A, but as the mango ripens its vitamin A increases. Mangoes are good for the kidneys, aid digestion, relieve clogged skin pores and reduce cysts, excess body heat and favour. All parts of the mango have medicinal uses.⁴⁸

The roots and bark are astringent, acrid, refrigerant, styptic, antisiphilitic, vulnerary, antiemetic, anti-inflammatory and constipating. They are useful in vitiated conditions of pitta, metrorrhagia, colonorrhagia, pneumorrhagia, leucorrhoea, syphilis, wounds, ulcers, vomiting, uterities, diarrhoea, dysentery, diphtheria and rheumatism. The leaves are astringent, refrigerant, styptic, vulnerary and constipating. They are useful in vitiated conditions of kapha and pitta hiccough, hyperdipsia,,

⁴⁶Ram Prakash Srivastava, *Mango Cultivation* International Book Distributing Co., 1998, Luknow, U.P (India), p.7.

⁴⁷Prajapathi, at.el., *A Hand Book of Medicinal Plants*, Agrobios(India) Publishing India Ltd., 2003, p.332.

⁴⁸Kusam budwar, *Romance of Mango*, Penguin Publications, 2002, p.216.

burning sensation, haemorrhages, haemoptysis, haemorrhoids, wounds, ulcers, diarrhoea, dysentery, pharyngopath and stomatopathy. The ash of the burnt leaves is useful in burn and scalds. The flowers are astringent, refrigerant, styptic, vulnerary, constipating and haematinic. They are useful in vitiated conditions of pitta, haemorrhages, haemoptysis, wounds, ulcers, anorexia, and dyspepsia.⁴⁹

1.2.6 Mango in Ayurvedic Medicine

Ayurveda describes the properties of mango as heating, sweet to lightly sour, balancing all dosha or elements. Mangoes are unctuous, energising and satisfying. A hybrid mango that has no fibre is heavy to digest, although it tastes better than one with fibre. Natural mangoes are smaller and juicier than hybrids but both are a combination of sweet and sour. As its acid content increases stomach acids, one should never eat mangoes on an empty stomach nor take plain water with them. The sweeter the mango the more easily it is digested and the more energy it provides. A sour mango should never be eaten except in the form of amchur, or dried mango slices.⁵⁰

Mangoes are good for excess wind (vata) and mucus (Kapha). A sweet, juicy, ripe mango helps the body generate blood. If a glass of lukewarm milk is taken after eating a mango, it balances bile (pitta) and energizes the entire system, especially the

⁴⁹Prajabathi, *op.cit.* p.332.

⁵⁰Kusum Budwar, *op.cit.*, p.94.

intestine. During the hot season, cold water can be added to the milk to reduce the effect of the heat and give strength, vigour and vitality to the system. The fruit is beneficial in liver disorders, loss of weight and some other physical disturbances. It stimulates and energizes the nervous system and is weight producing. It is believed that this fruit helps one stay youthful for a long time, cheeks premature aging and holds back decay. Mangoes soaked in sugar syrup give energy, remove constipation and serve as a tonic for the brain, stomach, lungs and blood.⁵¹

1.2.7 Nutritional Value

In terms of nutrition, fruits are very good source of several vitamins, mineral salts and dietary fibre, all of which are essential for good health. Fruits are health – promoting as well as pleasure – giving. Because of their low energy density and appreciable amounts of dietary fibre, fruits are good for health.⁵²

Food value of fruits has been well recognized and fruits have become an essential part in a complete or a balanced diet. Fruits are generally rich in carbohydrates and proteins, which are essential for the maintenance of life and growth of body tissues. They also contain essential mineral elements like potassium, phosphorus, iron, calcium and sulphur in an easily assimilable form. Fruits are very rich in vitamins, which possess a direct influence on the growth and development of body.

⁵¹*Ibid.*, p.101.

⁵²R.S. Ragavashi and R.K. Sohane, “Horticultural Crops in Human Nutrition”, *Kurukshetra*, June 1998, p.3.

Vitamins are said to give immunity to the body against the attack of certain diseases. Fruits improve the digestion and they act as a mild laxative also.⁵³ Mango fruits contain amino acids, carbohydrates, fatty acids, minerals, organic acids, proteins and vitamins. During the ripening process the fruits are initially acidic, astringent and rich in ascorbic acid.⁵⁴ Table 1.2 explains details of nutritional contents of mango.

Table 1.2

Nutritional Contents of Mango

Sl .No	Nutrients	Green Mango	Ripe Mango
1	Moisture (%)	87.5-90.0	81.0-86.1
2	Protein (%)	0.7	0.6
3	Fat (%)	0.1	0.4
4	Mineral (%)	0.4	0.3
5	Fibre (%)	1.2	0.7

⁵³B.L. Choudri, *Practical Hints on Fruits- Gardening*, The western Book depot, Magpur, India, 1954, p.3.

⁵⁴M.Subhas Chander and V.K.Rao, *Fruits in Nutritional Security*, Indian Institute of Horticultural Research, Bangalore 2004, p.23.

6	Carbohydrate (%)	8.8-10.1	11.8-16.9
7	Calcium (mg per 100g)	0.01-10	0.01-14
8	Phosphorous (mg per 100g)	0.02-19	0.02-16
9	Iron (mg per 100g)	4.05-5.4	0.3-1.3
10	Carotene vat. A (IU)	90-150	2743-4800
11	Vitamin B1 (mg per 100g)	0.04	0.08
12	Vitamin B2 (mg per 100g)	0.01	0.09
13	Niacin (mg per 100g)	0.2	0.9
14	Riboflavin (mg per 100g)	30	50
15	Vitamin C (mg per 100g)	3	13-16
16	Magnesium (mg per 100g)	21	27
17	Sodium (mg per 100g)	43.0	26.0
18	Potassium (mg per 100g)	83	205
19	Copper (mg per 100g)	0.24	0.20
20	Sulphur (mg per 100g)	15	17
21	Chlorine (mg per 100g)	2	3
22	Chlorie (mg per 100g)	39.44	50-74
23	Base odin	40	67

Source: Indian Institute of Horticulture Research, 2004.

It is clear from Table 1.2 that the moisture content in mango is much higher than other nutrients in both green mango and ripe mango. It is also found from the Table that potassium content has high level portion from the stage of green mango (83) and ripe (205).

1.2.8 General uses of Mango

Every part of mango, from root to top, is used in a variety of ways. The fruit itself, in the various stages of its development, is used in many ways. In its raw stage,

the fruit is used for extraction of tannin and other astringent products as well as for the preparation of delightful chutneys, curries and pickles.⁵⁵

Ripe fruits are eaten fresh, preserved and canned, mango stones and leaves are fed to livestock.⁵⁶ Leaves are therefore used to decorate houses on festive occasions. The fruit is regarded as being the nectar of the gods.⁵⁷ Dried branches and twigs make fuel wood while the trunk has timber values (for furniture's).⁵⁸

1.2.9 Industrial Uses

No other fruit can be put to so many diversified uses in the form of processed products as mango. It is used extensively by the food- processing industry to prepare wide variety of products. Both ripe and unripe mangoes are utilized for this purpose. The following mango products can be manufactured from ripe mango. Canned mango slices in syrup, mango pulp, mango jam, Mango squash, mango juice, mango nectar, mango cereals flakes, mango custard powder, mango toffee, mango leather and mango juice powder.

⁵⁵ J.S.Bal, *op.cit.*, p.156.

⁵⁶Gyan K. Shrestha, *Commercial Fruits at a Glance, Technical Concern*, Katmandu, Nepal, 1996, p.110.

⁵⁷Pippa Mukherjee, *Common Trees of India*, India, 1998, p.37.

⁵⁸Gyan. K. Shrestha, *op.cit.*, p.110.

The following mango products can be manufactured from unripe mango. Mango pickle, Mango chutney, Brined mango slices, Dried green mango slices and powder (amchur) and mango wine. Various other products such as candy, jam, jelly, preserve, squash and the like can be prepared from unripe mango.⁵⁹

1.2.10 Nomenclature of Mango

Mango word comes from Malayalam, man-ka. In Kerala, people call the tree as “Ma” or Mavu.’ The first mention of mango (Manga) appeared in English in 1582 AD in Litchfield’s translation of Castenheda’s conq E.Indies (1.XVI: 42). In India, the ripe and green fruits are referred as Amkeri (Hindi) , Mangai (Tamil), Mamidi kayi (Telugu), Mavin kayi (Kannada), Kancha ambu (Oriya), Ambo (Marathi), Kanchcha am (Bengali), Keri (Gujarat), Pacha manga (Malayalam), Mamidi Pandu (Telugu), Mavina hannu (Kannada), Pachila Ambo (Oriya), Amba pikleta (Marathi), paka Aam (Bengali) and Amba (Kashmiri).⁶⁰

In Nepal, it is called as Ago; in Sri Lanka - Amba, Ambi, Kaddum and watamba; in Burma-Taw, Tharat; in Siam–Mamong; in Vietnam - Cay Xoai; in Cambodia–Soai, in Malaysia–Manga, Mangga, Mampalam and Pauch ; in Indonesia–Ampalam, Manga, Maplane, Mapoolane Booah Bibe, Manilja and Pager; in Phillipines–Mampalam, Mangka and Pao; in Formosa– Jap; in China–Anlokuo and Mon-kwo; in Persia – Amba

⁵⁹R.N. Singh, *Mango*, Indian Council for Agriculture Research, Publication and Information Division, New Delhi, 1990, p.p.109-112.

⁶⁰Ram Prakash Srivastava, *Mango Cultivation*, International Book distributing Company, Lucknow, India 1998, p.11.

and Ambeh; in Turkey – Manguag; in Arabia – Abning; in Africa – Manoro, Mango, Mano, Mangga and Mangueira; in French – Mangier, Manguier and Loubi; in German – Mangga, Muembe; in Brazil – Mangaiba; in Dutch – Manja and in English – Mango. ⁶¹

1.3 Statement of the Problem

Agriculture employs about 70 per cent of the Indian population. The success of agriculture is highly influenced by the strategies adopted by the agriculturist. It is quite obvious that the farmers have been facing a variety of problems during the time of cultivation. The major problem included production, finance, and maintenance of field. The problems faced by the mango growers is entirely different from other agriculturists.

The increase of agricultural production and the development of agri- processing industries are mainly depending on agricultural operations. The mango cultivation is one of the important segments in the horticultural operation of this country. In general, the mango growers are economically and socially weaker people and faced by various problems such as under employment, lack of financial resources and involvement of intermediaries. Since the mango cultivation is a seasonal one, it is obvious that they have been unemployed for about six months in a year.

Mango is a horticultural commodity. The mango growers are exploiting from marketing intermediaries like moneylenders and pawnbrokers. Most of the farmers

⁶¹*Ibid.*, p.19.

are illiterate and therefore they are not aware of marketing strategies to market their produce. Moreover, they are not aware of the prevailing price trend in different centres.

The mango growers are facing many problems each and every day due to innocent behaviour. There is no well-organized marketing system and co-operation among the growers. Commission agents and middlemen are exploiting the illiterate farmers by fixing the prices below the cost of production. Generally mango prices are fixed by the middlemen, not by the Growers with the result that they have lost their share in the mango business.

The study area namely Madurai district is very famous for the mango cultivation. Especially the blocks around the Madurai district are contributing the maximum quantity of mango to the Madurai market. Madurai district is world famous for a farmer's festival namely jallikkattu, in which young men browe death or injury tying to tame a ferocious bull. Also the district is called the temple city of Tamil Nadu. Previously the entire production of mangoes had been sent to the Madurai market, which involved high amount of work cost. But at present the mango growers themselves organize a local mango market at the production places. Though the mango cultivation is not a profitable one, many people are continually doing the cultivation due to the non- availability of alternative occupation. Therefore, there is necessity to study the production and marketing problems of the mango growers in

Madurai district for the purpose of analyzing their conditions, and hence the present study.

1.4 Scope of the Study

Madurai district is one of the important districts in Tamil Nadu and agriculture forms the backbone of the district economy. It is one of the major mango producing districts of Tamil Nadu. During 2001-2002 the area under mango in Madurai district was 5198 hectares, which was nearly 5 per cent of area under mango in Tamil Nadu. The production of mango during the corresponding period was 35588 tonnes, which was about 6.40 per cent of the state production. Mango is an important commercial crop, which plays a vital role in the agricultural economy of Madurai District. Besides, mango is grown under irrigated and unirrigated conditions. Several thousands of people get employment directly as well as indirectly.

In Madurai district, Mango is the most popular fruit. It is equally liked by both the rich and the poor. The district has the sixth place in mango cultivation in Tamil Nadu. In this district a large number of farmers are engaging in mango cultivation. Presently in Madurai district, mango is being cultivated in Alanganallur, Vadippatti, Melur, Kottampatti, Sedapatti, Maduarai West and Thirumangalm blocks. Hence, the researcher has selected the entire district for the study. The study is mainly conducted on behalf of mango growers. It does not include other persons who are directly or indirectly connected with mango cultivations.

1.5 Objectives of the Study

The following are the main objectives of the present study

- i) To study the socio-economic conditions of the mango growers of Madurai district,
- (ii) To review the mango cultivation practices adopted by the mango growers.
- (iii) To analyse the cost and returns of mango cultivation in Madurai district,
- (iv) To analyse the production problems faced by the mango growers of Madurai district.
- (v) To analyse the marketing problems of mango cultivation of Madurai District.
- (vi) To offer suitable suggestions for the improvement of production and marketing of mangoes in Madurai district.

1.6 Review of Literature

The review of earlier studies on this topic and related topic is essential to have a clear view on the areas already studied. The studies related in this field are described below:

K.Ramamoorthy and N. Srinivasan, in their study “The problems of production and marketing of tomatoes in Coimbatore taluk”, have observed that in the wholesale market, tomato has been sold on volume basis in bamboo baskets and the retailers have sold tomato on weight basis. The farmers are not aware of the ruling price for

tomato in the retail market and this has led to a low share of consumer's rupee to the farmers.⁶²

Gopal has studied the market structure for vegetables in Bangalore and has concluded that the producer has obtained a net share of about 55 per cent in the consumer rupee. Among the different modes of transport used by the producers, transporting by lorry has been the cheapest.⁶³

J.S. Sharma and S.L. Shah, in their study, have observed that Agriculture marketing is concerned with demand and supply conditions, marketing operations, including marketing function, market structure, conduct and performance of and marketing efficiency.⁶⁴

According to Irvin, agricultural marketing includes all the services, intangible and physical rendered between the farmers and the ultimate consumers. The intangible functions include pricing plus financing and risking and physical function including, transporting, processing, sorting and grading farm products.⁶⁵

⁶²K.Ramamoorthy and N. Srinivasan, *An Economic Enquiry in to the problems of Production and Marketing of Tomato in Coimbatore taluk* Department of Agriculture Economics, Tamil Nadu Agricultural University, Coimbatore, 1975, p.45.

⁶³Gopal, "An Analysis of Problems of Marketing a Few Vegetables in Bangalore City," *Thesis Abstracts*, 4(1), 1978, pp. 4-5.

⁶⁴J,S Sharma and S.L.Shah, " Problems Identifications in Marketing Research - Seminar on Emerging problem of Marketing of Agricultural Commodities," *Indian Society of Agricultural Economics*, Bombay, 1965, p.72

⁶⁵H.S. Irvin, " Intangible side of Agricultural Marketing – A Neglected Area of Research," *Journal of farm Economics*, 44(3), 1962, pp.80-89.

Star.et.al, refer marketing as the process through which a business enterprise. Institution or organization would i) select target customers or constituents, ii) assess the needs or wants of such target customers, and iii) manage its resources to satisfy those customers' needs or wants. ⁶⁶

Hariharan and Rajagobalan analysed the marketing channels for vegetables including banana. According to them the auction could be conducted between 12 noon and 4 p.m and the per centage of the commission to agent on sale identified. The problems faced by the commission agents on sale value could be fixed at ten per cent. They also identified the problems faced by the commission agents like requirement of working capital, bad debt, irregular supply and competition from new marketing centres. Retailers face problems like the perishable nature of goods, high interest rate and uncertainty of profit. ⁶⁷

Joshi. et.al stated that marketing was a very complex procedure which involved many marketing channels at different stages with the involvement of a number of intermediaries. There was exploitation of the farmers by the intermediaries who gained a lion's share of the income. In spite of token to solve the marketing problem, it still

⁶⁶Stern K. Star, Nancy and Davis, *Problems in Marketing*, McGraw Hill Book Company, New York, 1997, p.37.

⁶⁷Hariharan and S.Rajagobalan, "Marketing of vegetables at Trichirapalli – Problems of Intermediaries", *Indian Journal of Marketing*" 24(8), 1995, pp.13-20.

remains. Improving market efficiency was necessary to understand marketing practices and the behaviours of the farmers.⁶⁸

In the view of Varma and Agarwal, Agricultural Marketing in the study of all activities agencies and policies involved in the procurement of farm inputs by the farmers and the movement of rural products from the farms to the consumers.⁶⁹

Akbar and Rahman stated marketing of banana in selected areas of Bangladesh. They found that largest volume of banana was sold (63 per cent) at the market place itself. They identified the different channels and worked out the price – spread and found that as the consumer’s rupee. They found that as the length of the marketing channels increased, the farmer’s share declined considerably and vice versa.⁷⁰

According to Suresh and Devaraja, for elimination of pre – harvest contractors in fruit marketing, steps like advancing for production and marketing against hypothecating the future produce, entering into direct contract with processing units and the like should be taken up.⁷¹

The description of Pawar and Patil on the system followed in the Bombay markets was different. They found that the wholesales played the role of commission

⁶⁸Memoria Joshi, Pandiarajan and Monoharan, “Marketing Behavior of Farmers,” *Indian Journal Marketing*, vol.25 (2-3), 1996, p.29.

⁶⁹M.M.Varma and R.K. Agarwal, *Rural and Agricultural Marketing*, Forward Publishing company, New Delhi, 1997, p.11.

⁷⁰M.A. Akbar and M.L. Rahman, “Marketing of banana by farmers in some selected Areas of Bangladesh, Bangladesh,” *Journal of Training and Development*, 4(1), 1991, pp.88-97.

⁷¹B.H. Suresh and T.S Devaraja, “Marketing of Horticultural Produce in Karnataka State,” *Agricultural Situation of India*, November 1999, p.49.

agents as well as brokers in the trade. They acted as the pre – harvest contractors with the producers of fruits. They undertook all responsibilities right from the movement of consignment to the final payment of bills.⁷²

Vekatram studied the economics of grape cultivation in Bangalore South Taluk by classifying costs into establishment and maintenance costs. He considered the expenditure incurred in the first year of planting as establishment cost and all other cost incurred in the subsequent years as maintenance cost. He extended the establishment cost over the life period of the vineyard viz., 25 years along with a 10 per cent interest on apportioned value of land, and was considered as constituting the components of fixed capital. The study indicated very high investments of fixed capital and comparatively small investments of variable capital spent on items like human labour, manure, plant protection and irrigation.⁷³

Khishagal, et al., analysed the Marketing of Mango in South Konkan Region of Maharashtra State. The farmers reported that in Vashi market mangoes are not having healthy competition among traders while purchasing mango, also reported by the farmers that price received from wholesaler of Vashi market less than their expectation. The traders decide the price secretly. The farmers faced problems of skilled labour at the time of harvesting of mangoes and have to pay heavy transport cost.⁷⁴

⁷²J.R.Pawar and S.P.Patil, “Price spread in Marketing of important fruits in Bombay”, *Indian Journal of Marketing*, vol.8, No.3, 1976, pp 15-18.

⁷³J.V Vekatraman, *Economics of Production and Marketing of Grapes in Bangalore south Taluk*, (Unpublished M.Sc. (Ag.) Dissertation, Madras University, Madras, 1964, p.40.

⁷⁴P.J. Khrisagar, A.A. Krisager, A.A.Rane, S.R.Bagade, B.P.Patil, “Marketing of Mango in South Konkan Region”, *Indian Journal of Marketing*. Vol.7. July 2003, pp..28-30.

Thambi points out that agricultural is not mere selling or distribution. It embraces all activities that begin with ascertaining the needs of the consumer and market opportunity, setting up production to meet the anticipated demand, pricing, distribution, advertising and culminating in the sale of the product, hopeful at a small profit.⁷⁵

National Commission on Agriculture has stated that, “Agriculture Marketing” is a process which starts with a decision to produce a saleable farm commodity and it involves all aspects of market structure or system, both functional and institutional based on system, both functional and considerations and includes pre-and post – harvest operation assembly, storage, transportation and distribution.⁷⁶

Sunderation and Thanasekaran in their study, “Production and Marketing of Grapes in Madurai District,” identified severity of diseases and pest attack, lack of adequate capital facilities to meet the initial establishment costs and high costs of inputs as a major production problems in the unorganized market structure.⁷⁷

Bell defines marketing as primarily a sophisticated strategy of supplying what the consumers would want in quality and quantity.⁷⁸

⁷⁵J.M.L.Thambi, “Small Scale Industries – problems of Marketing,” *Indian Journal Marketing*, vol.3, No.6, 1973, pp.11-13.

⁷⁶Government of India, Ministry of Agriculture and Irrigation, *Report of the National Commission of Agriculture*, Part XII, New Delhi, 1976, p.110.

⁷⁷R.Suderation and M.Thanasekaran,” Production and Marketing of Grapes in Madurai District,” *Indian Journal of Marketing*, vol.14, No.8, 1984, pp.26-27.

⁷⁸M.L. Bell, *Marketing Concepts and Strategy*, The Macmillan Company, London, 1966, p.22.

Haque T. and G. Singh, while analyzing the problems of small farmers in the production and Marketing of fruits and vegetables, have observed that the farmers are facing non – availability of labour, monsoon, disease problem in production, inadequacy of transport and exploiting commission agents.⁷⁹

Thambi has defined marketing as that part of business, which concerns itself with expectation and income generation for profitable operation. It is concerned with both revenue and costs. It consists of a complicated set of choices concerning the product and services the firm should offer to the market. It involves the questions of the generation of what and how much and to whom, through whom and when, on what terms.⁸⁰

According to Cundiff and Still market is the aggregate of forces as conditions within which buyers and sellers make decision that result in transfer of goods and services.⁸¹

Cundiff and Still have stated that Marketing comprises activities to meet the consumer's needs at a reasonable profit to the producer and at a reasonable price to the consumer.⁸²

⁷⁹Haque. T.and G.Singh (2001), *Problems of small farmers in the production and marketing of fruits and vegetables*, Books international, New Delhi, pp.74-86.

⁸⁰J.M.L.Thambi, *op.cit.*, p.74.

⁸¹E.W. Cundiff and R.R. Still, *Basic Marketing Concepts, Environment and Decisions*, Prentice Hall of India Private Limited, New Delhi, 1968, p.21.

⁸²E.W. Cundiff and R.R. Still, *op.cit.*, p.4.

Singla and George found that most of the producers sold their orange production through pre – harvest contract system and through direct sale to retailers and consumers.⁸³

Amita Shah and Sah studied the relative performance of irrigated and rain fed farming in Gujarats agriculture sector. The study illustrated that area under crops has contributed to output growth in rainfed areas. Higher productivity was achieved in irrigated crops. The study observed inter farm variations in field. The variations in yield in rain fed farming were found to be higher. The study also found the agronomic practices in irrigated farming and soil moisture conservation in rain fed farming increased yield.⁸⁴

P. M. Kahage et.al., observe marketing cost is generally measured by the difference in the price received by its producer and price paid for it by the final user. The difference between the consumer price and producer price is known as the price spread.⁸⁵

G.S. Chandra Sekar observes that the cost of marketing each mango fruit worked out to 2.07 paise. The pre-harvest contractor

⁸³A.R. Singla and M.V. George, “Marketing of sweet oranges in Punjab,” *Journal of Marketing Research*, vol.63, 1969,pp.707-715.

⁸⁴Amita Shah and D.C. Sah. (1933), “Dry land Farming under the changing sources of Environment; A Case Study of Gujarat,” *Arthavijnana*, September, vol. 35, No.3, pp.241-269.

⁸⁵ P.M. Kahage, “Production and Marketing of Mango in Western Maharashtra”, *Indian Journal of Marketing*,. Vol. 12, No.6, 1979, p.18.

paid on an average Rs.47.60 to the producer. For every 1200 mangoes, he sold them for Rs.97.15 at wholesale market. The producer gained about 47 per cent of the whole sales price. The average gross margin made by the pre-harvest contractor was Rs.46.25 per 1200 mangoes'. Net returns obtained by the pre-harvest contractor for every 1200 mangoes is Rs.23.65. In other words he makes a net profit margin of 2.21 paise per fruit. On an average each pre-harvest contractor handled 392780 mangoes and thus obtained a net profit of Rs.10, 092 for a period of four months, which amounts to about Rs.2, 800 per month. Including his entrepreneurial ability he needs an operating capital of Rs.30, 868.

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Senam Raju in, "Fruit marketing in India," includes a detailed, study of problem and prospects of fruit marketing with specific reference to mango and banana fruits. He gives a good account of the different aspects of fruit production and marketing like suitable climate and soil condition required for growing output trends, and the role of middlemen, price fixing methods, problems of growers and the like.⁸⁷

⁸⁶ G.S. Chandra Sekhar, H.G. Shankara Murthy, "Economics of Production and Marketing of Mangoes in Karnataka," November 1978, No.3, p.27.

⁸⁷ M.S. Senam Raju, *Fruit Marketing in India*, Daya Publication, New Delhi, Vol. XVII, 2002, p.212.

Kusum Budhwar studied the Romance of mango, which includes a detailed description of mango by a history and lore, botany of the mango plant and using the mango. It is a complete study of the king of fruits.⁸⁸

Ram Prakash Srivastava has studied the mango cultivation it includes the cultivation practices from planting to till marketing of mango and also his studied history, origin and nomenclatures of mango, disease affected to the mango.⁸⁹

Singh has analysed various problems at production and marketing level faced by the off-season vegetables growers in Himachal Pradesh. Further he studied ways of meeting uncertainty and income variability of the farmers.⁹⁰

Swarup and Sikka in their study “Production and Marketing Problems of Apple Orchardists” identified grading and packing

⁸⁸ Kusum Budhwar, *Romance of Mango*, Penguin Books, India, 2002.p.171-196.

⁸⁹ Ram Prakash Srivastava, *Mango Cultivation*, International Book Distributing Company, Lucknow, 1998, p.413.

⁹⁰D.V. Singh *Growers Production and Marketing Problems of off-season Vegetables*, Mittal Publications, New Delhi, 1990, p.165.

problems, problem of packing material, storage problem, and the problem of transportation in the unorganised market structure. ⁹¹

1.7 Methodology and Data Collection

The present study is based on both primary and secondary data. The primary data were collected from mango growers of Madurai District with the help of an interview schedule (vide appendix A). The secondary data were collected from various journals, books and mango statistics, published by National Horticulture Board and Directorate of Horticulture, Chennai, Indian Institute of Horticulture Research, Bangalore and Agricultural University in Karnataka, Tamil Nadu state Agricultural University, Coimbatore, Horticultural College, Madurai and also from various websites.

1.8 Operational Definitions of Concepts

The researcher has used many concepts in this thesis, the definitions of those concepts are presented below.

1.8.1 Mango grafts

⁹¹R. Swarup and B.K. Sikka, *Production and Marketing Problems of Apple Orchardists*, Mittal Publications, New Delhi, 1987, p. 113.

It is the earlier stage of mango trees. Mango grafts were produced in the private farm, horticulture department and the sample farms itself. In the case of farm-produced grafts, the prevailing market price was taken into account.

1.8.2 Labour

Labour means persons who are directly involved in the mango cultivation. Men and women were standardized into man-day. In this study, family labour and hired labour are treated alike and converted into common physical units in terms of man days equivalent and valued at existing wage rate of Rs 150 for men and Rs 55 for women.

1.8.3 Manure

It is a type of fertilizer produced with help of dung, which is obtained from house animals such as cow, buffalo, oxen and sheep. The farm-produced manure was valued at the market price prevailing in the area. The purchased farmyard manure was valued at the purchase price plus the cost of overhead charges.

1.8.4 Pesticide

It is a type of chemical used to control the pest and some diseases. The purchased farmyard pesticide was valued at the purchase price plus the cost of applying charges.

1.8.5 Fertilizer

It is a type of chemical, which is used for improving the mango production. The purchased farmyard fertilizers were valued at the purchase price plus cost of overheads.

1.8.6 Garden Protection

Generally it includes the tying the mango at the time of yielding, cleaning and ward and watch. The coir threads are used to tie mango for protection of mango. In the actual purchase price of tying materials, cleaning and day-to-day operation of orchard protection was taken in to account.

1.8.7 Land Revenue

The common land tax as per the Government rate was charged.

1.8.8 Depreciation

Depreciation was calculated under straight-line method. It was done separately for farm building machinery, tools and equipment and material. Depreciation was charged at the rate specified below.⁹²

Farm building:	2 per cent
Machinery:	10 per cent
Tools and Equipment:	25 per cent
Material:	50 per cent

⁹²Studies on Economics of Farm Management in Coimbatore District, Tamil Nadu.

1.8.9 Interest on Working Capital

Interest on fixed capital was calculated at the rate of 8 per cent per annum. It is the rate which a grower can get if he makes any deposit in a co-operative bank. Interest on working capital was calculated at the rate of 11.5 per cent per annum.

1.8.10 Total Establishment Cost

It refers to the cost incurred in the establishment of mango orchard up to the commercial bearing stage of 5 years. This included rental value of land, cost incurred seedling, tillage practice, garden protection, manure fertilizer, labour involved in various operations of the farm, interest on working capital and other costs such as interest on fixed capital, depreciation and maintenance.

1.8.11 Annual Share of Net Establishment Cost

The value of yield of mango during the establishment period was deducted from the total establishment cost to arrive at the net establishment cost. These costs were spread over to the economic life span of the mango, which was taken as 55 years. The annual share of net establishment cost thus arrived at was used in estimating the cost of production.

1.8.12 Mango Orchard

It is the area of mango tree grown by a single grower and situated within the sample village limits.

1.8.13 Farm House

It refers to the shed used for storage of mango and for keeping agricultural implements.

1.8.14 Machinery

It refers to the oil engine, tractor, tiller and motor pump owned by a grower.

1.8.15 Tools and Equipments

It includes sprayer, spade, crowbar, hammer, sickle, net and mango picker, owned by the grower.

1.8.16 Materials

It includes knife, basket, gunny and tarpaulin purchased by a grower for the garden.

1.9 Construction of Interview Schedule

In order to collect the primary data from the mango growers of Madurai District, a comprehensive interview schedule was prepared. For preparing the interview schedule the researcher had trial interview with many farmers. Based on the variables and the objectives identified for the present study the interview schedule was prepared. The schedule thus got ready was handed over to the experts for their critical evaluation. It was revised in the light of their comments. Then, a pre – test of

the schedule was conducted with 25 farmers belonging to Madurai District. In the light of their comments, the schedule was modified by incorporating all valid comments. After the pre- test schedule was revised and the final draft was prepared, a pilot Study by identifying 30 farmers belonging to Madurai District was conducted and then the schedule was finalised for collecting the primary data. Even though the growers did not maintain adequate farm records and accounts by virtue of their experience and long association with farming, they could furnish the required information. However, to recall bias, suitable cross – checks and rechecks were carried out.

1.10 Sampling Design

The researcher has adopted for the present study multi- stage random sampling with Madurai district as the universe, the taluk as the stratum, the village as the primary unit of sampling and the mango growers as the ultimate unit.

Madurai district consists of 7 taluks namely Vadippiati, Melur, Madurai South, Madurai North, Usilampatti, Peraiyur and Thirumangalam. There are thirteen revenue blocks. Each taluks consists of two revenue blocks except Madurai South. Two in Melur

(Melur and Kottampatti), in Vadippatti, (Vadippatti and Alangaallure), in Madurai North (Mdurai East and Madurai West), in Usilampatti (Usilampatti and Chellampatti), in Peraiyur (T.Kallupatti and Sedapatti), in Thirumangalm (Thirumangalam and Kalligudi) and one block in Madurai South namely Thirupparamkundram.

On enquiry with the office of the Assistant Director of Horticulture of Madurai, it is understood that there are around 2500 growers actively engaging in mango cultivation in the district. Out of the 2500 growers that constitute the total population 12 per cent numbering 300 respondents is considered as an ideal sample size. Melur taluk covers 35 per cent of area, Vadippatti 25 per cent, Madurai North 14 per cent, Madurai South and Usilampatti taluks individually cover 8 per cent of mango cultivating area. Peraiyur and Thirumangalam taluks separately cover each five per cent of mango cultivating area. 12 villages were selected from Melur at random, 8 from Vadippatti, 4 from Mdurai North, two each from Madurai South and Usilampatti and one village each from Peraiyur and Thirumangalam taluks.

105 growers were selected at random from all the 12 villages from Melur taluk, 75 growers from villages of Vadippatti, 42 growers from Madurai North, 24 growers were selected each from Madurai south and Usilampatti and 15 each from two villages of Peraiyur and Thirumangalam. Table 1.3 explains the sample selection of the study area.

Table 1.3
Sample framework in Madurai district

Sl. No	Taluk	Block	Growers' sample Size
1	Melur	Melur	105

		Kottampatti	
2	Vadippati	Vadippati Alanganallure	75
3	Madurai North	Maduari East Maduari West	42
4	Madurai South	Thiruparankundram	24
5	Usilampatti	Usilampatti Chellampatti	24
6	Peraiyur	T. Kallupatti Sedapatti	15
7	Thirumangalam	Thirumangalam Kalligudi	15
	Total sample		300

It is clear from Table 1.3 that the total 300 respondents identified in the study consisted of 150 each from small and large growers. The growers having up to 5 acres were grouped as small size and the growers having more than 5 acres were grouped as large size.

1.11 Period of Study

Primary data were collected from mango growers. The secondary data on area, production and productivity of mango were collected for the period from 1989-1990 to 2003-2004. The field survey was carried out during November 2004. Thus the present study is related to agriculture year 2003-2004.

1.12 Data Processing

After completion of the data collection, the filled up interview schedule was edited properly to make it ready for coding. A master table had been prepared to sum

up all the information obtained in the interview schedule. With the help of the master table, every information was coded and then transcribed on transcription cards. With the help of the transcription cards classifications tables were prepared. The classification tables were used for further analysis.

1.13 Framework of Analysis

In order to study the production and marketing problems of the mango growers of Madurai District, the researcher has identified a number of statistical tools, which are described. The compound growth rate with regard to area, production and productivity has been estimated on the basis of the semi-log or exponential function.

$$\text{Log } Y = a + bT$$

Where,

Y = Area / Production / Productivity

T = Time.

' a ' and ' b ' are the parameters to be estimated.

$$\text{Compound growth rate} = [(\text{anti log } b-1) \times 100]$$

The study cost and return structure in the mango cultivation, cost has been classified into as Cost A, Cost B and Cost C for the purpose of suitable analysis. Each of these categories contains a separate set of elements. The category and the elements are given below.

Cost A

Wages of hired labourers,

Value of Manure owned and purchased,

Cost incurred for Watch and ward

Cost of Pesticides purchased

Expenses of irrigation charges,

Value of purchased fertilizer,

Depreciation, repairs and maintenance cost of implements and farm buildings, land tax, and other taxes, interest on working capital

Cost B

Cost A + imputed rental value of owned land + imputed interest on owned fixed capital.

Cost C

Cost B + imputed value of family labour

The individual cost items are included in total cost, which its cost C also has been grouped into operational cost and fixed cost as under:

Operational costs = Wages of hired labourers + Value of Manure owned and purchased + Cost incurred for Watch and ward + Cost of Pesticides purchased + Expenses of irrigation charges + Value of purchased fertilizer + Depreciation, repairs and maintenance cost of implements and farm buildings + land tax + and other taxes + interest on working capital

Fixed costs = Cost C – Operational cost

An attempt has been made in the section to rank the factors Garrett’s Ranking Technique, which is used to identify the problems in production and marketing of mango. The growers were asked to rank the identified problems. The order of merit assigned to the respondents was converted into scores by using by the Garret’s ranking Technique.⁹³ The following formula given below: -

$$\text{Per cent position} = \frac{100 (R_{ij} - 0.5)}{N_j}$$

Where,

R_{ij} = Rank given for i^{th} factor by J^{th} farmer,

N_j = Number of factors ranked by j^{th} farmer

⁹³Henry. E. Garrett and P.S. Woodworth, *Statistics in Psychology and Education*, Vikar Feffer and Science Private Ltd, Bombay, 1969, p.329.

By referring to Garrett's table, the per cent positions estimated was converted into scores. The scores of various respondents were added and mean values were calculated. The mean values were arranged in descending order. The problem with the highest mean value was considered to be the most important, followed by second, third and so on.

To find the resources productivity on the variables, which influence the gross returns, a multiple log linear regression model of Cobb-Douglas type production function was used. In the present study, the determinants of gross returns, returns to scale and resources-use efficiency were analysed, using Cobb-Douglas type production function. The function in log form would be as follows:

$$\text{Log } Y = \beta_0 + \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_3 \log X_3 + \beta_4 \log X_4 + \beta_5 \log X_5 + \beta_6 \log X_6 + U$$

where,

Y = Yield of mango per acre (in Rs.),

X₁ = Watch and Ward per acre (in Rs.),

X₂ = Pesticide per acre (in Rs.),

X₃ = Manure per acre (in Rs.),

X₄ = Human labour per acre (in Rs.),

X_5 = Irrigation per acre (in Rs.),

X_6 = Fertilizer per acre (in Rs.) and

U = Disturbance term

$\beta_0, \beta_1, \beta_2, \dots, \beta_6$ are parameters to be estimated.

β_0 = Regression constant

β_1 to β_6 , = **Partial elasticity of yield with respect of the factors x_1 to x_6 respectively**

Benefit-cost ratio is the ratio of present value of returns, at the required rate of return, to the present value of costs. When the benefit cost ratio exceeds one, the investment is considered feasible at the required rate of return.

$$\text{Benefit-Cost Ratio} = \frac{\text{Present Value of returns}}{\text{Present Value of Costs}}$$

Symbolically,

$$\text{B-C} = \frac{\sum_{t=1}^n B_t / (1+i)^t}{\sum_{t=1}^n C_t / (1+i)^t}$$

Where

- n** = Life period of the project in years
- B_t** = Returns in the year 't'
- C_t** = Costs in the year 't'
- i** = Discount rate

Net present value is found out by subtracting present value of cost from the present value of return. A project whose net present value is greater or equal to zero is considered as worthy investment.

Net Present Value = Present Value of Returns – Present Value of Cost Symbolically,

$$NPV = \sum_{t=1}^n \frac{B_t - C_t}{(1+i)^t}$$

Internal Rate of Return is the rate of discount at which NPV is zero. If the IRR exceeds cut-off rate (opportunity cost of capital) the investment is economically viable.

Symbolically,

$$B-C = \frac{\sum_{t=1}^n (B_t / C_t)}{(1+i)^t} = 0$$

Where, the symbols used are the same as in the case of benefit cost ratio.

Mathematically, factor analysis is somewhat similar to multiple regression analysis, in which each variable is expressed as a linear combination of underlying factors. The amount of variance a variable share with all other variables included in the analysis is referred to a communality. The co-variation among the variables is described in terms of a small number of common factors plus a unique factor for each variable. These factors are not over observed. If the variables are standardized, the factor model may be represented as:

$$X_i = A_{i1} F_1 + A_{i2} F_2 + A_{i3} F_3 + \dots + A_{im} F_m + V_i U_i$$

Where,

X_i = i^{th} standardized variable,

A_{ij} = **Standardized multiple regression coefficient of variable
i on common factor j**

F = Common factor,

V_i = Standardized regression coefficient of variable i on
unique factor i

U_i = The unique factor for variable i

m = Number of common factors

The unique factors are uncorrelated with each other and with the common factors. The common factors themselves can be expressed as linear combinations of the observed variables.

$$F_i = W_{i1} X_1 + W_{i2} X_2 + W_{i3} X_3 + \dots + W_{ik} X_k$$

Where,

F_i = Estimate of i^{th} factor

W_i = Weight or factor score coefficient

K = Number of variables.

1.14 Limitation of the study

The study suffers from the respondent's recall bias and the inherent limitation of cross sectional studies namely the absence of proper form records with the sample growers. These had been minimized by suitable interaction as well as cross checks then and there with the agricultural departmental fields staff during the survey. As the study is based on opinion provided by the sample respondents, results of the study cannot be generalized and should be used with caution.

1.15 Scheme of the Report

The thesis consists of six chapters

The First Chapter “Introduction and Design of the Study” deals with methodological aspects of the study. It covers statement of the problem, review of literature, methodology, objectives, limitations and the scheme of the report.

The Second Chapter “Profile of Madurai District” highlights the background of the study area namely Madurai District. It covers origin and growth of Madurai District.

The Third Chapter “Mango Cultivation Practices” deals with mango cultivation practices adopted by mango growers. It covers cultivation practices, mango production in the world, area under cultivation of mango in India, Mango production in India, area under cultivation of mango in Tamil Nadu, Mango production in Tamil Nadu, productivity of mango in Tamil Nadu, area under mango cultivation in Madurai District, Mango production in Madurai District, productivity of mango in Madurai District, share of Tamil Nadu in area under mango cultivation in India, share of Tamil Nadu mango production in India and share of Madurai District area under mango cultivation in Tamil Nadu.

The Fourth Chapter “ Production Problems in Mango Cultivation” evaluates the problems faced by the farmers at production level which includes, water problem, problems of fruit losses, problems in mango cultivation, input problems, labour problems, problems faced by the growers at the time of blossoming days, disease in mango cultivation, cost and return analysis of mango production.

The Fifth Chapter “Marketing Problems in Mango Cultivation” analyses the problems faced by the farmers at marketing level, which include, problems in storage facilities of mango by growers, problems in transporting, problems in procurement of packing materials of mango by growers, problems of getting marketing information, problems faced by the growers in the market, problems of expenses in marketing of mango, problems in the marketing of mango, problems of sample growers with regard to procurement of mango by middlemen, problems of malpractices by middlemen, nature of problems for mobilizing finance from unorganized sector, interest charged by the unorganized sector from the growers, problems in getting finance from the organized sector and reasons for satisfaction and dissatisfaction in the mango cultivation by the farmers.

Sixth and Final Chapter, “Summary of findings and conclusion” deals with the conclusion aspects of study. It covers summary of findings, problems and suggestions and conclusion.

2.1 Introduction