Chapter 3

Literature and Citation

The literature review is a written overview of major writings and other sources on a selected topic. The literature review provides a description, summery and evaluation of each source. The study is about the productivity function of GI assigned mango varieties and entrepreneurship in Malda district of West Bengal. Therefore, this chapter deals with review of the past work done on different aspects of production and marketing of fruits inside and outside the state that are relevant to this study. In this chapter the basic concept of cultivation, pest, disease, impact of climate change, marketing, supply chain, export,etc and the approaches and methods to estimate the inter and intra level relationship between and amongst the predicted variables related to productive and entrepreneurial function.

3.1 The scenario of mango cultivation:

It is a matter of astonishment to many that mango (MangiferaindicaL.), one of the most celebrated fruits of tropical part of India, is a member of the family Anacardiaceae, which is notorious for embracing a number of highly poisonous plants.

It has rich luscious, aromatic flavour and a delicious taste in which sweetness and acidity is delightfully blended. Mango production has experienced continuous growth in the last decades of the twentieth century (**Baisya, 2004**).

The world's total annual mango fruit production was estimated at 22 MMT Global productions of mangoes is concentrated mainly in Asia and more precisely in India that produced 12 MMT per annum. Mangoes are cultivated in 85 countries (FAO STAT, 2007) Asia and the oriental countries produced around 80% of the world's total production. Major mango producing countries are India, Mexico, China and Pakistan

(Loeillet, 1994; Mahayothee, 2005)

3.2Mango production:

India ranks first among world's mango producing countries accounting for about 50% of the world's mango production. Other major mango producing countries include China, Thailand, Mexico, Pakistan, Philippines, Indonesia, Brazil, Nigeria and Egypt. India's share is around 52% of world production i.e. 12 million tonnes as against world's production of 23 million tonnes .An increasing trend has been observed in world mango production averaging 22 million metric tonnes per year. Worldwide production is mostly concentrated in Asia, accounting for 75% followed by South and Northern America with about 10% share. According to **Anon (1962), Negi(2000)** presented information on area and production. It is the most cultivated area occupied crop in India with 60% of total area under fruits.

Major producing States are Andhra Pradesh, Bihar, Gujarat, Karnataka, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh and West Bengal. Other States where mangoes are grown include Madhya Pradesh, Kerala, Haryana, Punjab etc. **Venkata Seshaiah and Srinivasula Raju (2001)**in their study have examined the growth rates of area, production and productivity of mango.

A study has revealed that the adoption of recommended cultivation practices would increase the productivity and the quantity of production of mango crop by **Mahasil *et.al.,* (2003).**The Government and non Government organisations have made many efforts to disseminate the recommended technologies among the farmers.

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The five fruits (mango, banana, citrus, guava and apple) alone cover about 75 percent of total fruits production of country. However, mango alone contributed about 40 percent of total fruits production in country **(Verma and Munshi, 2003).**

Mango is a high value crop; intercropping in the mango orchard with seasonal or cash crops like grains and vegetables would add more to farmer income. **Rivera(2009)** has stated that the care, cultivation and fertilizer of the intercrop would also benefit the growth and productivity of mango crop.

Mango production is the emerging sector in agriculture that would augment income of the small holders and generate employment opportunities in the rural areas **joshi (2010)**,

In a study have dealt withthe variousstrategies for increasing the production of mango. **Khanna and Gupta** in his study concluded that the new seed policy which will help in liberalizing the import of mangoes will go a long way in increasing the production of mango.

Costof production consists of the sum of establishment cost and operational cost**Alikhan Sadath and Rajagopalan** has classified total cost of production.

That The mango cultivation is a profitable venture in the study area although the returns might be negative during the first four years of cultivation has pointed out by **Rahman et.al.,**.

The study conducted by **Shaikh** has indicated that the almost all the mango growers have been found to adopt technologies related to soil requirements, spacing and filling of pits, while 50% of farmers have adopted the recommended dose of fertilizers and less than 25% of the growers have adopted the technology to prevent diseases and pest control.

3.3 Ecology of mango orchard:

Dashehari mango, planted in 1979, was grown with different intercrops in rotation, and the mango crop and cumulative yield of intercrops were recorded in 1983. In the first trial, using pairs of

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vegetables in rotation, highest mango yields were obtained with fallow/chillies [Capsicum] (3.28 q/ha), bittergourd [Momordicacharantia]/brinjal [aubergines] (3.26 q/ha) and cowpea [Vignaunguiculata]/potato (3.01 q/ha), compared with the monocropped control (1.28 q/ha). In the second trial, intercropping legumes and wheat, pigeon peas [Cajanuscajan] gave the lowest mango yield (1.76 q/ha). Higher mango yields were obtained with black gram [Vignamungo]/wheat (4.32 q/ha), fallow/wheat (4.08 q/ha) and control (4.86 q/ha). **Rajput,-M-S; Srivastava,-K-C; Shukla,-V** stated that highest total monetary returns were obtained with cowpea/potato (trial 1) and black gram/wheat (trial 2). Tree volumes varied, but differences were not significant.

The available nutrient status of a mango orchard soil (alluvial soil) from India increased following the application of green manures. The green manuring crops were: dhaincha (Sesbaniaaculeata), pea (Pisumsativum), French bean (Phaseolus vulgaris), sunhemp (Crotalaria juncea), and cowpea (Vignaunguiculata). **Chattopadhyay,-P-K; Dolai,-D-N(1991)** It is concluded that the practice of green manuring, by increasing soil nutrient status, will result in better leaf nutrient status and flowering in the mango plants.

Paclobutrazol applied to the soil is used for the production management of mangoes in most of the orchards, but it presents as disadvantage the greater persistence in plant and soi stated by **Mouco,-M-A-do-C**; **Ono,-E-O; Rodrigues,-J-D(2011)** l. Three growth regulators (prohexadione-Ca, trinexapac-ethyl and chlormequat chloride) were foliar applied, at two dosages and compared to paclobutrazol applied as soil-drench. The experiment was conducted in the region of the Sao Francisco Valley, Petrolina, PE, from December 2007 to July 2008, in a mango orchard that has a spacing of 8 m between lines and 5 m between plants.

This study aimed to test controlled levels of water deficiency in soil in mango trees, under microsprinkling irrigation, in semi-arid conditions, and to evaluate its effect in the productivity and fruits

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quality by**Cotrim,-C-E; Coelho-Filho,-M-A; Coelho,-E-F; Ramos,-M-M; Cecon,-P-R(2011)**.

Yield and nutritional status of mango in orchards in Saharanpur District varied with soil characteristics, cultivars and maintenance studied by **Khan,-A; Singh (2015).**The status of neglected orchards was compared with well-maintained orchards in similar situations. Correlations between soil leaf nutrient status and yield were significantly higher in Jan. than in Sep. in most cases.

3.4 crop protection:

3.4.1 Pest:

Eleven pest species, including the pseudococcid Rastrococcusiceryoides, Scirtothripsdorsalis, the geometrid Thalassodesveraria, the lymantriid Dasy chiramendosabasivitta [D. mendosa], the chrysomelids Aspidolophamelanophthalma, Diapromorphapallens and Monolepta sp., the curculionids Astycuslateralis [Lepropuslateralis], Eugnamptusmarginellus [Deporausmarginellus] and Myllocerus sp., and the tetranychid Oligonychusmangiferus were recorded in mango seedlings in a nursery in **West Bengal** by **Zaman,-Z; Maiti,-B(1994).** D. marginellus was a major pest, defoliating new growth.

The vast numbers of thrips occurring on mango inflorescences are of concern to many producers. **Brink(1994)** the objectives of this study were to determine which thrips species occurred on the inflorescences in South Africa, and to determine the extent to which fruit set is affected by the thrips species present. The most important species of thrips occurring in mango was Scirtothripsaurantii, which causes lesions on the fruit, leaf malformation, and stunting of new growth.

Mango is attacked by various insect pests among which mango shoot gall psyllaApsyllacistellataBucton. (Psyllidae: Hemiptera) is the most important one in the district of **Malda and Murshidabad**, West Bengal.Repeated spraying without proper knowledge on the life cycle did not give good result in managing the pest. Hence,

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application of insecticides had to be synchronized with the emergence of nymphs. To manage the shoot gall psylla, mechanical control (Pruning) and insecticidal control measure were taken up in the district of Murshidabad. **Goutam-Samui; Jha,-S(2009)** stated that in mechanical control, both pruning of 15 cm and 30 cm of affected shoots resulted in the formation of lower number of gall/shoot as compared to control. But pruning at 30c m had been found to be most effective in managing the psyllid gall. In insecticidal control, lowest number of galls were recorded per shoot on the branches treated with monocrotophos (0.35 galls/shoot) followed by quinalphos (0.73 galls/shoot) and imidacloprid (1.03 galls/shoot). However, the performanceof all the three insecticides were statistically at par.

3.4.2 Disease:

Anthracnose, caused by Colletotrichumgloeosporioides [Glomerellacingulata], is the most important fungal disease of mango, attacking flowers, fruits and leaves. The symptoms appear as black lesions when the fruit is mature. However, during sorting immature fruits do not show any visual symptoms, and the mango disease is difficult to recognize. Reflectance spectral signatures were obtained from healthy mangoes without any anthracnose present. **Hahn,-F (1999**) in his study stated that After inoculating the fruits in the laboratory, spectral measurements were taken every 24 hours to study anthracnose behaviour for 4 days. Discriminant analysis was carried out and high success rates obtained for detecting the disease. A sensor, for assessing sorters at packinghouses, and reducing high market losses can use the best discriminant spectral bands.

A study was conducted in the Department of Plant Pathology during the year 2008 by **Muhammad-Mohsan; Muhammad-Intizar-ul-Hassan; Liaquat-Ali (2008**)The objective was to see the effect of five different fungicides like Prochloraz, Deconil, Carbendazim, TBZ (Thiabendazol) and Mancozeb as dip treatments on black spot decay of mango during storage at 20 degrees C. The results

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revealed that Mancozeb and Prochloraz proved as the most effective fungicides. Hot water treatments of fruits significantly reduced decay development caused by Alternaria.

Symptoms of mango malformation disease (MMD) were observed for the first time in April 2006 in three mango orchards in the Axarquia Region in southern Spain. Symptoms included an abnormal development of vegetative shoots with shorted internodes and dwarfe3d leaves and hypertrophied short and thickened panicles.**Crespo,-M; Cazorla,-F-M; Hermoso,-J-M; Guirado,-E; Maymon,-M; Tores,-J-A; Freeman,-S; Vicente,-A-de (2012)** pointed that in 2006, 2009 and 2010, isolates of Fusarium were obtained from vegetative shoots and floral tissue of symptomatic mango trees and a variety of minor commercial cultivars, all showing typical symptoms of MMD. Different Fusarium-like strains were isolated from infected tissues. Morphological, molecular genetics and pathogenicity tests identified the causal agent of MMD as Fusariummangiferae. This is thought to be the first report of MMD caused by F. mangiferae in Spain and Europe.

3.5 Impact of climate change:

Climatic conditions during the cold season represent a serious constraint to fruit production in eastern Canada. Meteorological models predict that temperatures of winter months will increase by 2 to 6 degrees C by 2050. The possible impact of climate change on fruit trees in eastern Canada was assessed using agroclimatic indices expressing the risks associated with known causes of damage during fall, winter, and spring. Indices were calculated for 15 agricultural regions in eastern Canada for recent (1961-1990) and future periods (2010-2039 and 2040-2069) using temperature and precipitation data predicted by the Canadian Global General Circulation Model (CGCMI). **Rochette,-R; Belanger,-G; Castonguay,-Y; Bootsma,-A; Mongrain,-D(2004)** Milder winter temperatures will also reduce the cold stress as the accumulation of cold degree-days (<-15 degrees C) would be reduced and the annual minimum temperature would be increased in all regions of

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eastern Canada. More frequent winter thaw events, however, would result in a loss of hardiness and in a thinner snow cover that would increase the plant vulnerability to subsequent extreme sub-freezing temperatures. The risk of damage to flower buds by a late frost would increase in southern Ontario, remain almost unchanged in the Maritimes and Ottawa Valley-southern Quebec regions, and decrease in the Continental North.

To quantify the effects of climate change on fruit production in Germany, this study aimed at determining long-term trends in winter chill, as calculated with the Chilling Hours and Dynamic Models (Chill Portions). **Luedeling,-E; Blanke,-M; Gebauer,-J(2007)** pointed out thatan idealized daily temperature curve was used to convert daily temperature records from 43 weather stations. Besides exposing temporal trends in winter chill, the data could be spatially interpolated, yielding contiguous maps of typical winter chill in Germany around 2010, as well as chilling losses since 1950. More than a decline in winter chill, increased heat during the winter months might become a challenge to German fruit growers. As already experienced during the extraordinarily warm winter of 2006/07, warm temperatures during the winter can cause fruit trees that fulfill their chilling requirements relatively early to bloom prematurely. This can then lead to elevated risk of frost damage and hamper the homogeneity of flowering.

In the context of climate change, the fruit tree sector has specific vulnerabilities, such as perennial plantations and a complex flowering process to achieve fruit production. More particularly, warming impacts on floral bud phenology and their subjacent effects have been investigated for fruit tree species in different European regions.**Legave,-J-M; Christen,-D; Giovannini,-D; Oger,-R(2009)** in their study numerous flowering data collected in contrasting temperature conditions (location, period) highlighted similar and significant advances in dates of different phenological stages for all the locations and fruit species. That means strong impacts of temperature changes in Europe (low interactions cultivar x temperature). Moreover, the use of modelling parameters highly

suggests that warming exerted two opposing effects simultaneously, i.e., a slower mean rate of completion for the chilling requirement and a higher mean rate of completion of the heat requirement.

Impact of climate and agriculture factors such as temperature, rain fall and water availability on agriculture (fruit crops) production with the support of Vector Auto Regressive (VAR) econometric approach based upon time series data over the period of 44 years from 1966-2009. This study also captures the trend of climate change impact on fruit crops production for the phase 2010-2020. **Baig,-M-A; Shahid-Amjad(2014)** This study examines that Initially, it has been observed that average temperature and rainfall have no unit root while water availability and fruit crops output have a unit root at 1% level of significance through Augmented Duckey Fuller (ADF) test. The econometric results reveal that change in global climate has an adverse impact on Pakistan agriculture (fruit crops) production. In 2020, additional increase in the level of average temperature would reduce the fruit crops production whereas water availability and average rainfall are positively correlated with fruit crops production in Pakistan. Greenhouse gases (GHGs) emissions will rise global warming resulting the occurrence and intensity of extreme events such as flood, drought, cyclone that would further harm the agriculture production and affect the water balance in future.

3.6 Marketing:

3.6.1 Marketing:

Marketing is the performance of all business activities involved in the flow of products and services from the point of initial production until they are in the hands of consumers **Kohl and Uhl (1985)**defined.

Marketing is a major function after production. **Acharya and Agrawal (1999)** stated Production is the door to economic development but it is marketing that opens the lock. Thus, marketing plays an important role in agricultural production. Moreover marketing is the creation of time, place and possession

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utilities through which human wants are satisfied by the exchange of goods and services.

3.6.2 Agricultural Marketing:

Agricultural marketing is a process, which includes farmer's decision to produce a saleable farm commodity and various aspects of marketing structures both functional and economic consideration including products assembling, preparation of market distribution and use by final consumer. According to **Pokhrel and Thapa(2005)** thus, marketing starts with the decision to plant unlike to the conventional way of thinking.

Agricultural marketing encompasses of all the activities from production to consumption such as harvesting, grading, packaging, storing, price fixation, selling and buying. According to **MDD (2001)** in performing these actions, it adds value to the produce in terms of time, place and farm utilities. It also covers marketing cost, organizational structures, rules and regulation, market Competition.

Agricultural marketing comprises buying, selling, storage, processing, standardization, certification and distribution of farm products.**Pokhrel and Thapa(2005)** defined in the process of transfer from farmer to consumers, agro-products pass through a channel involving a sequence of change in their forms and prices and numerous intermediaries play a significant role in getting products transferred from farm gate to the consumer.

The development of agriculture sector requires a balance improvement in the production and marketing. It is inefficient to improve the production side and neglect marketing side as the former's improvement is dependent on the latter's development stated by**Rayamajhi (2005)**.Marketing is also the most important multiplier of economic development.

3.6.3 Horticultural Marketing:

Horticulture marketing is one of the important branches of agricultural marketing and deals with the marketing of horticultural commodities (fruits, vegetables, flower etc.). The conventional

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definition of agricultural marketing states that agricultural marketing starts when the crop is harvested. But, the concept has been changed. Marketing of vegetable products begins at the farm when the farmers plan his production to meet specific demands and market prospects. According to **Awasthi (2007)** efficient marketing system plays a crucial role in getting the remunerative prices to the producers

3.7 Marketing Channels, Marketing Cost and Price Spread:

The cost and returns of mango orchards in Karnataka **Subrahmanyam (1987**) studied. It was observed that on an average the establishment of mango orchard required Rs. 3000 per ha. The maintenance cost of mango orchards was only Rs. 200.00 per ha. The gross returns from a hectare of mango orchard were Rs 1200 in Karnataka. As indicated by the study the payback period was 11 years. Internal rate of return was 30 per cent and B: C ratio was 2.00 indicating that the investment was profitable

The total marketing cost incurred by pomegranate producer seller was Rs. 71.94 per quintal. The four items namely commission, transportation, packing material and harvesting together formed 95.88 per cent of total marketing cost. The other items namely labour charges and miscellaneous expenditure constituted the remaining part of marketing cost. **Koujalagi and Kunnal(1991)** made an attempt to identify the marketing channels and estimated the marketing costs of pomegranate in Bijapur district. They have identified two channels.

Channel-1: Producer → Pre-harvest Contractor→ Commission agent cum Wholesaler →Retailer → Consumer.

Channel–II: Producer→Commission agent cum Wholesaler→ Retailer → Consumer.

The different channels of transfer of mangoes from the farmer to the consumer are mentioned here. The channels arethe medium through which the produce of farmers reached to the customers or buyers. **Gummangolmath (1994)** studied the economics of

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production and marketing of mango in Dharwad district, Karnataka and identified this.

Channel-1: Producer →Commission agent→Retailer→Consumer

Channel-2: Producer→Pre-harvest Contractor (wholesale)→Retailer→ Consumer

Channel-3: Producer →Processing Units Agents→ Retailer→Consumer.

Channel-4: Producer→Pre-Harvest Contractor→Commission agent→ Retailer→ Consumer.

The marketing cost, margin, price spread and marketing officers of cashew in Tamil Nadu, observed following five different marketing channels of cashew studied by**Sundaravaradarajan and Jahanmohan (2002**)

1] Farmer →Village trader→Wholesaler→Processor→Trader

2] Farmer →cooperative marketing society.

3] Farmer →Commission agent→Wholesaler→Processor.

4] Farmer→Processor.

A majority of the farmers (60%) adopted channel –1. followed by channel-2 (26.25%), channel - 3 (10%) and channel - 4 (3.75%).

3.8 Export:

The Australian **mango** industry produces 50,000 tonnes of fresh **mangoes** each season. Currently, between 4,000 tonnes and 5,000 tonnes are **exported.** Fresh **mangoes** are **exported** to a wide range of countries throughout the world.**Chasa (1994)** has pointed out that among all the fruit exports, mango has accounted for 36.4 per cent of total volume of the fruits exported.

World mango production in 1995 was 19 003 000 metric tonnes, 75.66% of which was produced in Asia. **Monteverde (2010)** .This article presents a breakdown of production by country for the years 1993, 1994 and 1995; mango exports to the USA 1989-95 by

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country; and mango exports to the EU 1991-95 by exporting country. Rising trends in production and exports are evident.

India is native to mango and is also the largest producer of mangoes with 44.14 per cent of the total world production. The export of fresh mangoes has increased from Rs 35.2 crores in 1991-92 to Rs 162 crores in 2010-11. **Kusuma,-D-K; Basavaraja,-H (2014**) The paper attempts to quantify the changing structure of Indian mango exports. Data for analysis was taken for a period of 10 years from 2001-02 to 2010-11. Compound growth rate (CGR) was used for analyzing the growth in mango production, area, yield, export quantity and export value over the years. The markov chain analysis was attempted through linear programming method to assess the transition probabilities for the major mango markets. The major Indian mango export markets were categorized as stable market (Bangladesh, U.K, and U.A.E) and unstable markets (Nepal, Saudi Arabia) based on the magnitude of transition probabilities. The major export markets for Indian mangoes are Bangladesh (46.22%), U.A.E (33.26%), Nepal (6.06%), Saudi Arabia (3.63%) and UK (3.06%). Efforts are also needed to improve the efficiency of production and quality in order to stabilize the markets and also to make the product acceptable and price competitive in other importing countries.

India's mango exports are likely to surpass last year's level and touch 50,000 tonne mark in the ongoing fiscal, buoyed by strong demand and supply of **export** quality fruit, government body APEDA said. The country had shipped 45,730 tonnes of mangoes.**Jalathi *et.al.,*** have pointed out that mango exports and its export competitiveness has revealed that as regards earnings through exports of fresh mango from India.

Out of total 1000 varieties, 20 are commercially viable while only Deshehari and Alpanso are exported.**Jogindar and Kulwinder**have indicated that the mango has become a good foreign exchange earner.

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3.9 Value addition:

The major processed products from fruits include averages 30% followed by juice pulp and concentrates to be extent of 21% and pickles and chutney 11% have been studied by **Kumar et.al.,(1991)** . Since fruits are seasonal and perishable by nature, and absence of processing is one of the major reasons for the high magnitude of wastage that has occurred in this commodities.

Mango fruit is utilised at all stages of its development both in its immature and mature state. Raw fruits are used for making chutney, pickles and juices. The ripe fruits besides being used for desert are also utilised for preparing several products like squashes, syrups, nectars, jams and jellies. The mango kernel also contains 8-10 per cent good quality fat which can be used for soap and also as a substitute for cola in confectionery (**Pott *et al.,*2005; Vazquez-Caicedo *et al.,*2004).**

The business of mango processing for pulp making is quite remunerative. It required a large capital investment of Rs. 19.28 lakhs of which only 18 (Rs. 3.00)% was fixed and 82% (Rs. 16.28) was working capital. **Naik,-V-G; Talathi,-J-M; Torane,-S-R (2009)** his study discusses the profitability of mango processing. Inmango processing for pulp production, the gross value addition was 204.22% and the net value addition was 116.16%. The major problems expressed by pulp making factory owners were high prices of raw material (fruits) in the beginning of the season, shortage of labours during the peak period of processing, high prices of tins and high transportation and marketing expenses. The whole analysis revealed scope for further expansion of this capital-intensive agro-processing industry for value addition in mango fruits.

Mango powders were obtained at water content below 0.05 kg water/kg dry solids using Refractance Window Reg. (RW) drying, freeze drying (FD), drum drying (DD), and spray drying (SD). **Caparino,-O-A; Tang,-J; Nindo,-C-I; Sablani,-S-S; Powers,-J-R; Fellman,-J-K (2012)** in his study concludes that RW drying can produce mango powder with quality comparable to that obtained via

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freeze drying and better than the drum and spray-dried mango powders.

Unlike mango wine fermented with Saccharomyces cerevisiae, most terpenoids derived from mango juice were retained in the resultant mango wine fermented with the two Williopsis yeast strains, suggesting the mango wine could retain the aromatic hints of fresh mango.The aim of the research was to study the volatile composition of mango wine fermented with two Williopsis yeast strains: Williopsissaturnus var. mrakii NCYC500 and W. staurnus var. suaveolens NCYC2586 stated by **Li-Xiao; Yu-Bin; Curran,-P; Liu-ShaoQuan.**

3.10 Problem in production and marketing:

The absence of processing facility, absence of cold storage facility, fluctuations in prices were the major problems expressed by cent per cent farmer's, and other problems were absence of cooperative marketing of lime, non-availability of packing material at reasonable price and difficulty in transportation expressed by **Hiremath 1993**.

Problem of non-availability of labour was expressed by most of the medium orchardists (66.67%) followed by small orchardists (40%) and large orchardists (33.37%).**Gummagolmath(1994)** identified the problems through the opinion survey revealed that the problem of alternative bearing was expressed by 100 per cent orchardists in all categories of farmers. Among the marketing problems, the problem of price fluctuation was expressed by 44.44 per cent of small, 36.80 per cent of medium and 50 per cent of large orchardists and other problems were high commission and existence of mutual understanding between wholesaler and commission agents.

There are so many problems in poovan banana cultivation in Tamil Nadu. **Senthilnathan and Srinivasan(1994)** studied the problems in poovan banana cultivation in Trichy, Lalgudi and Kulithalitaluks of Rrichirapalli district of Tamil Nadu. They reported that, in Trichytaluk 20 farmers expressed high initial investment, 16

wind damages, 12 price fluctuations and 10 disease problems. In Lalguditaluk, 17 farmers expressed high initial investment, 11 price fluctuations, 13 diseases incidence and 9 wind damage. In Kulithali, disease incidence expressed by 2, wind damage by 20, initial investment by 18 and price factor by 14 farmers.

The constraints in technology adoption of cashewnut cultivation in the Sindhudurga district of Konkan region, Maharashtra studied by**Deorukhakar *et al*. (1995)**. They found that two third of the growers opined that there was no need to use of fertilizers and plant protection chemicals, high cost of fertilizers (13%) and plant protection chemicals (27%) were other constraints expressed by the cashew growers. They further reported that the 41 and 32 per cent of the respondents expressed the high cost of improved planting material and irregular supply of this input, respectively.

Govinda Reddy *et al*. (1997) identified the problems of mango growers in Srinivasapur region of Karnataka. The major constraints faced by mango growers at the production level were lack of awareness on drip irrigation technology, heavy rain and wind during flowering and fruit development stage, non- availability of credit, high cost of inputs, lack of knowledge on proper plant protection chemicals and high incidence of pests and diseases and non availability of quality grafts.

Today's agricultural marketing system is going through a rough period as there is no proper management in the market system. The shortcomings of public sector extension arrangements in India are well documented (**Farrington *et al*, 1998**) and some reform measures have been implemented. But unfortunately, planning and evaluation of such programmes is based on a very narrow view of the proper role of extension, equating it to an agency for technology dissemination.

Economics of production and marketing of pomegranate and found that dying of young plant, problem of mite, inadequate irrigation water and its poor quality and short supply of electricity

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were major problems faced by pomegranate growers of Bahavnagar district studied by**Khunt *et al*.(2001)**.

As per research findings by **Shallu Gupta and Shakuntla Gupta, (2013)**, the Indian horticulture sector is facing severe constraints such as low productivity, limited irrigation facilities and inadequate and improper infrastructure facilities like cold storages, markets, roads, transportation, processing etc.

3.11 Mango Entrepreneurship:

Entrepreneurship is the character, practice and skill of an entrepreneur. An entrepreneur is a person who organizes, manages and assumes the risk of a business. Accordingly entrepreneurship refers to identifying / involving ideas, product and services, mobilizing resources, organizing production / service and finally marketing those covering the risk with constant strive for growth and excellence. Entrepreneurship development is at the centre of economic development. For achieving the economic prosperity of an individual or even a country entrepreneurship development is almost necessary.

Schumpeter (1947) viewed entrepreneur as a manager who was making creative of innovative response**. McClelland (1961)** pointed out that the man who organized the business unit and/or increases its productive capacity is an entrepreneur**. Heredero (1979)** described agricultural entrepreneur as a person who introduced changes which directly or indirectly lead to higher agricultural output. According to **Ramkrishnan (1979)** the characteristics of entrepreneur are (a) Level of motivation (b) Managerial competence (c) Self-confidence (d) Leadership qualities (e) Risk taking ability and (g) Independence in thought and action. Entrepreneurial does not only depend upon progressive behaviour, but it is governed by several other characters which are different from the progressive behaviour. Thus, entrepreneurial behaviour is influenced by personal, socio economic, situational psychological and extension communicational factors. On the basis of this understanding the factors which influenced entrepreneurial behaviour of mango

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growers were grouped as personal, socio economic & situational, extension communication and psychological variables.

Mango production is an important commercial enterprise in the Kolar district of Karnataka, India. According to **Reddy,-B-V-C; Nagaraja,-G-N; Venkataram,-J-V; Ramegowda,-P-V (1997)** the economic viability of mango is explored: the crop requires considerable initial investment and is prone to risk due to dependence on rainfall. The conventional measures of investment evaluation, namely payback period, net present worth, benefit-cost ratio and internal rate of return, justified the investment made in mango orchards.

The term “entrepreneur” can be defined as creative and innovative response to the environment. The entrepreneur is an economic man, who strives to maximize his profits by adopting innovations. They are men with a will to act, to assume risk and to bring about a change through organization of human efforts. **Shri N. D. Bharad, Dr. M. N. Popat(2007)** made a study about “Entrepreneurial behaviour of mango growers of Gir area of Gujarat”. They study the personal, socio-economic & situational, extension communication and psychological profile of mango growers, the entrepreneurial behaviour of mango growers, assess the extent of adoption of recommended mango production technologies by the mango growers, ascertain the relationship between the personal, socio economic & situational, extension communication and psychological characteristics of mango growers and their entrepreneurial behaviour.

Mango is a very important fruit crop of the country. India rank first having the highest share of 44 percent to world production of mango. Present research study conducted on Entrepreneurial behaviour of mango growers of Valsad district of Gujarat state by **Mehta,-B-M; Madhuri-Sonawane(2007).** Mango growers from 10 villages who cultivated mango since five years were selected randomly. Majority of the mango growers were founds in medium to high level category as far as entrepreneurial behaviour is concerned.

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The indicators decision making was ranked first followed by market orientation (rank second) and economic motivation (rank third). Majority of respondents (73.00 per cent) were observed in the medium entrepreneurial behaviour category, thus, the entrepreneurial behaviour of the respondents was predominantly medium. Education, area under mango cultivation, annual income, social participation, awareness regarding value addition, mango yield index, employment generation, extension participation, mass media exposure, extent of adoption, management orientation, innovativeness, progressiveness and knowledge of mango growers had significant relationship with entrepreneurial behaviour of mango growers. Whereas age, land holding, irrigation facility, family size and cropping intensity had no association with entrepreneurial behaviour of mango growers.

The status of the mango industry in Brazil and provides an overview of mango production in Minas Gerais, described by **Siqueira,-D-L-de; Santos,-D-dos (2011)** where production areas are proliferating. The economic, preharvest (cultivars, cultural treatments, pests and diseases) and postharvest aspects of mango production in the region are covered.

In the era of globalisation, there is a need to concentrate upon the value added product from the available resources to go with the global market with the help of supply chain management system for the upliftment of the livelihood status of the ultimate stakeholders. The present study was conducted to estimate the socio-economic attributes of the mango growers embedded with the economy of the mango enterprise at the Malda district of West Bengal, India. **Das,-J-K; Pradhan,-K; Mazumder,-G; Ghosal,-R (2013)** conducted study using multistage sampling with purposively selected villages **Dhantola, Kalyanpur, Arapur, Govindapur and Ganipur in the English Bazar block of Malda district.** The dependent and the independent variables were operationalised and measured with the help of structured interview schedule. For analyzing and interpretation of the data statistical tools like co-efficient of correlation, regression and path analysis were used. The study

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revealed that the age, secondary occupation, education, size of orchard, age of orchard, family composition, experience of growers, percentage of variety grown, return from orchard, primary income and secondary income found to be associated with the total income, total expenditure and total savings of the family and the fourteen predictor variables had contributed to explain total family income 57 percent, total yearly expenditure 49 percent and yearly savings 83 percent variations embedded with the predicted variables.

Mango production in Asia covers more than 1 million ha, producing a total of 12.42 Mt [per year]; this accounts for 60.5% of world production. According to **Chadha,-K-L; Pal,-R-N** the main cultivars grown are Mallika, Amrapalli, Ratna, ArkaAruna, ArkaPuneet and ArkaAnmol. Propagation, rootstocks, nutrient requirements, irrigation, intercropping, high density planting, physiological disorders, ripening, packaging, transport, storage, processing, waste utilization, pests and diseases are also discussed.

3.12 Geographical Indications:

Geographical indication is an indication or appellation of origin used to identify agricultural, natural, or manufactured goods originating from a definite territory. Those registered for geographical indication should have special qualities whose manifestation is dependent on the climate or production characteristics unique to the geographical indication. The GI has also been identified as a guarantee of food safety.

Geographical indication is an indication or appellation of origin used to identify agricultural, natural, or manufactured goods originating from a definite territory.**Ramakrishnappa,-K (2006)** stated that those registered for geographical indication should have special qualities whose manifestation are dependent on the climate or production characteristics unique to the geographical indication. This paper describes the characteristics of 3 products that form the basis of their registration under the Geographical Indications of Goods (Registration and Protection) Act of 1999 (the application for

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registration was submitted by the Department of Horticulture in Karnataka, India, during 2004-05): *Nanjanagud Rasabale* (Nanjanagud banana), *Kodagina Kittale* (Coorg orange) and Mysore betel leaf.

Impacts are observed effects of the implement of a Geographical Indication (GI) system or protection scheme in the three dimensions of the sustainable rural development (economic, social and environmental) and partly on human health.

This paper focuses on methods for assessing the territorial impact (economic, social and environmental) of geographical indication systems. Marguerite PAUS

Agricultural Economics - Agri-food and Agri-environmental Economics Group, Institute for Environmental Decisions, ETH Zurich – Switzerland – (2008)

Observed or expected impacts of geographical indication systems are mainly linked with economic or economic-related issues. But the review of the 14 case studies also shows that if the economic concerns are the only motives in the implementation of the GI protection schemes, there are some crucial risks.

The GI has also been identified as a guarantee of food safety. This has become particularly important where agricultural diseases such as BSE and Avian Flu are attributed to particular localities. It has been suggested that the traditional agricultural knowledge of traditional farmers and indigenous people could be protected through GIs. **Blakeney,-M (2009)** this chapter examines the contribution of geographical indication to achieving food security. A more optimistic assessment of the potential for GIs to protect TK is made by Marion Panizzon and Thomas Cottier in their study: 'Traditional Knowledge and Geographical Indications: Foundations, Interests and Negotiating Positions'. They observed that: Traditional Knowledge (TK) and Geographical Indications (GIs) share a common element insofar as they both protect accumulated knowledge typical to a specific locality.

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