PRODUCTION AND MARKETING OF ARECANUT IN MIZORAM: A CASE STUDY OF BILKHAWTHLIR CLUSTER

(A DISSERTATION SUBMITTED FOR THE AWARD OF THE DEGREE OF MASTER OF PHILOSOPHY IN ECONOMICS)

BY

LALRAMCHUANI

TO

THE DEPARTMENT OF ECONOMICS

SCHOOL OF ECONOMICS, MANAGEMENT

&

INFORMATION SCIENCES

MIZORAM UNIVERSITY

2016

Department of Economics

Mizoram University

Aizawl-796009

P.O Box No.190

Prof. Vanlalchhawna	**Ph. No. – (0389) 2315811**
Professor	**Mobile – 9436198845**
Department of Economics	**Email-vchhawna@yahoo.co.in**

CERTIFICATE

This is to certify that the dissertation entitled **"Production and Marketing of Arecanut in Mizoram: A Case Study of Bilkhawthlir Cluster"** by Lalramchuani has been written under my supervision and guidance.

She has fulfilled all the requirements laid down in the M.Phil regulations of the Mizoram University. The dissertation is the result of her own investigation into the subject. Neither the dissertation as a whole nor any part of it was ever been submitted to any other University for any research degree.

(PROF. VANLALCHHAWNA)

DECLARATION

I, Lalramchuani, hereby declare that the subject matter of this dissertation is the record of work done by me, that the contents of this dissertation did not form the basis of the award of any previous degree to me or to do the best of my knowledge to anybody else, and that the dissertation has not been submitted by me for any research degree in any other University/Institute.

This is being submitted to the Mizoram University for the degree of Master of Philosophy in Economics.

(LALRAMCHUANI)

(PROF. LIANZELA)   (PROF. VANLALCHHAWNA)

Head   Supervisor

ACKNOWLEDGEMENT

CONTENTS

LIST OF TABLES

LIST OF FIGURES

Figure No.   **Title**

LIST OF ABBREVIATIONS

ANOVA   :   Analysis of Variance

CAMPCO   :   Central Arecanut and Cocoa Marketing and Processing Co-operative

CV   :   Coefficient of Variation

DASD : Directorate of Arecanut and Spices Development

DGCI & S : Directorate General of Commerce, Intelligence and Statistics

FAO : Food and Agriculture Organization

GATT : General Agreement on Tariff and Trade

GSDP : Gross State Domestic Product

MIP : Mizoram Intodelhna Project

MIS : Market Intervention Scheme

MSP : Minimum Support Price

NABARD : National Bank of Agriculture and Rural Development

NEI : North East India

NLUP : New Land Use Policy

RBT : Red Boil Type

UPC : United Penticostal Church

YMA : Young Mizo Association

CHAPTER-I

INTRODUCTION

1.1 ROLE OF AGRICULTURE IN ECONOMIC DEVELOPMENT

Agriculture sector plays an important role in the process of economic development of a country. It made a significant contribution to the economic prosperity of advanced countries and its role in the economic development of less develop countries is of vital importance. The history of economic development of various advanced nation have something common in their development that the development of their secondary sector and also of the tertiary sector was preceded by the development of agriculture. England, for example relied heavily on its domestic agriculture in the early days (Soni, 2008). In most of the western European countries such as France, Belgium, Germany and Sweden, the take off rested upon a firm base of rising agricultural productivity. In U.S.A and Japan also agricultural development has helped to a great extent in the process of their development. Thus, it could be observed that, in most of the developed nations, agriculture still occupies a place of pride; it is the development of agriculture that has laid the foundation of development of the other sectors and the economy as a whole.

The significant contribution of agriculture in economic development can best be summarized as follows:

a) Agriculture is the source of capital and labor to other sectors. In a closed and in an underdeveloped economy where majority of the population is engaged in agriculture, the share of agriculture in the total national income has been gradually decreasing on account of the development of the secondary and tertiary sectors, but it still contributed about 10.5 percent of national income (Planning commission, Government of India, 2014). Presently, about 50 percent is engaged in labor sector and this indicates that Indian agriculture is the largest source of employment and brought a gainful contribution in economic development as it eases the burden of surplus labor force and improved people's standard of living.

b) Agriculture sector provides raw material to other sectors. A study of the history of industrial development of advanced nations shows that the agro-based industries were the first to develop to absorb the surplus agricultural product and surplus labor. It is easy to shift a laborer from farm to a factory if the factory uses a farm product as a raw material. The increasing agricultural productivity and production makes a considerable contribution to the general economic development of the country.

c) Provision of food grains. In a developing country like India where a very large proportion of income is spent on food and the population is increasing rapidly, the demand for food grains has been increasing at a fast rate.

Agriculture in India has played an important role in meeting almost the entire food needs of the people. The production of food grains in India has increased from 51 million tons in 1950-51 to 283.5 million tons in 2014-15, i.e. by a little more than 4 times since 1950-51. This has enabled the country to overcome the problems of food grain shortages. The country is almost self-sufficient in food grains and it no longer depends on import of food grains.

d) Agriculture plays an important role in the field of international trade. Agricultural products like tea, sugar, oilseeds, tobacco, spices, etc., constituted the main items of exports of countries and this helps to reduce countries unfavorable balance of payments as well as saving foreign exchange. Presently, Agricultural export constitutes 10 per cent of the country's exports and is the fourth-largest exported principal commodity.

According to the World Development Report 2008, agriculture continues to be a fundamental instrument for sustainable development and poverty reduction in the 21st century. The Report observed:

"Three of every four poor people in developing countries live in rural areas-2.1 billion living on less than $2 a day and 880 million on less than $1 a day- and most depend on agriculture for their livelihoods. Given where they are and what they do best, promoting agriculture is imperative for meeting the Millennium Development Goal of halving poverty and hunger by 2015 and reducing poverty and hunger for several decades

thereafter. Agriculture alone will not be enough to massively reduce poverty, but it is an essential component of effective development strategies for most developing countries."

The Report further noted agriculture's contribution to development in terms of an economic activity, as a livelihood and as a provider of environmental service, earner of foreign exchange, source of revenue for the Government. As an economic activity, agriculture is a source of growth for national economy, a provider of investment opportunities for the private sector, and a prime driver of agricultural-related industries and the rural non-farm economy. Agricultural production is important for food security because it is a source of income for the majority of the rural poor. As a livelihood, agriculture is a source of livelihoods for an estimated 86 percent of rural poor and provides jobs for many smallholders and landless laborers. As a provider of environmental services, agriculture can create bad and good environmental outcomes. It is the largest user of water, contributing of water scarcity, agrochemical pollution, soil exhaustion, and global climate accounting for up to 30 percent of greenhouse gas emission. Therefore, we can say that agriculture is the backbone of a country and it should be given utmost importance for its development.

1.2 PLANTATION CROPS

The term 'plantation crop' refers to those crops which are cultivated on an extensive scale in a large contiguous area, owned and managed by an individual or a company. Tea, coffee, rubber, cocoa, coconut, arecanut, oil palm, cashew, cinchona etc is the important plantation crops. These plantation crops are high value commercial crops of greater economic importance and play a vital role in our Indian economy, especially in view of their export potential, employment generation and poverty alleviation particularly in rural sector.

The economic importances of plantation crops are:

1) They contribute to national economy by way of export earnings. These crops occupy less than 2 per cent of the total cultivated area (i.e. 3.82 percent of total crop land) but they generate an income of around ₹ 16,000 million or about 12.72 per cent of the total export earnings of all commodities or 75 per cent of total earnings from the export of agricultural produces.

2) India is the leading country in the total production of certain plantation crops in the world. For instance, the plantation production meets the share of 47 per cent in tea and 66 per cent in each of cashew and arecanut.

3) Plantation industry provides direct as well as indirect employment to many millions of people. For instance, tea industry offers direct employment to 10 lakhs and indirect employment to 10 lakhs people, while cashew

processing factories alone provide employment to 3 lakhs people besides 2 lakhs farmers are employed in cashew cultivation.

4) Plantation industry supports many by-product industries and also many rural industries. For example, coconut husk is used to produce coir fiber annually to a tune of ₹ 2, 19,600 tones in India.

5) These crops help to conserve the soil and ecosystem. Tea planted in hill slopes and cashew in barrel and waste lands protect the land from soil erosion during the rainy season or due to heavy winds.

1.3 PROFILE OF ARECANUT CULTIVATION IN INDIA

Areca Catechu Linn, commonly known as Arecanut or betelnut is an economically important plantation crop and is the product of palm. It is well known for its consumption as a masticator nut in India, Middle East and Far East. It is an important commercial crop and finds a place in all religious, social and cultural functions and its use dates back to Vedic period with high antiquities. Arecanut is mainly grown in nine Asian countries. India is leading the race in terms of area under cultivation (365.04 thousand Hectares), followed by Indonesia, Bangladesh, China, Myanmar and so on. In India arecanut is grown in twelve states, most of which are either southern part of the country or in the north-eastern region. In India Karnataka is leading state in terms of production. The share of Karnataka is 40.87 per cent in terms of area under

cultivation to the total area under cultivation. It is followed by Kerala, Assam, Meghalaya, West Bengal, Tamil Nadu, Andaman and Nicobar. Arecanut industry forms the economic backbone of nearly six million people in India and for being a high valued commercial crop; its contribution in terms of livelihood, employment and income to the National Economy is significant.

Though India is a premier grower of arecanut, she imported a huge amount of arecanut for other countries. The import of arecanut for the year 2005-2006 stood at `53,272 tons. This adversely affected the arecanut market in India. It resulted in the unexpected variation in the prices of arecanut and affected adversely the traditional marginal and small arecanut growers.

Majority of the arecanut gardens are located in Malnad taluks of Karnataka which is situated in Western Ghats are having 400 years of history. They practiced almost natural cultivation or organic farming. For these farmers growing of arecanut is a way of life. They never thought in terms of commercialization. When price of arecanut started to rise, attracted by the price hike farmers tried to grow arecanut even in the maidan region or flat land with lower cost of production and it is resulted in the higher production of arecanut. This increased production along with imported arecanut

created improvement in the life of traditional arecanut growers in this region.

Arecanut is extensively cultivated in the tropical region. It is mostly confined to 28° North and South of the equator. It grows within a temperature range of 14°- 36°C and temperature below 10°C and beyond 40°C adversely affects the crop. Arecanut requires ample supply of soil moisture and plentiful of rainfall ranging from 3000 to 4500 mm annum. It can be grown in a variety of soils such as laterites, red and sandy loam, alluvial and deltaic and it thrives best in well drained soils. Since arecanut palms cannot withstand long dry spells; the gardens are usually irrigated during summer months.

Arecanut garden requires a minimum of seven years to get established and to yield economic return. During the first two years, more labor is required for land preparation digging pits (*around 2 cubic feet size)*, planting of seedlings and other operations; therefore, it needs more care for further production. Quick growing shade trees have to be planted on the southern and western sides well in advance of planting seedlings. (Parthasarathy et al., 2005)

Arecanut is propagated only through seeds. Being a perennial, seed-propagated crop, much care is to be bestowed on the production and selection of planting materials. The different stages in the production of

quality planting materials include selection of mother palm, seed nuts and seedlings, and adoption of proper nursery techniques. The mother palms should be selected from disease free, best yielding gardens of the locality. The palms should be middle aged (20-40 years), healthy and with a robust crown. Select medium sized seed arecanut from middle bunches of the selected palms. All nuts that are undersized, malformed or from the tips of the bunches should be avoided for the seed purpose. Seed nuts are collected from selected high-yielding mother palms, 5 years after their first bearing. Apart from high yield, the age of first bearing and higher percentage of nut set (above 50%) are important characters to be considered for selection. One can sow the selected seed nuts in seed beds immediately after harvest and up to 80 days after harvest. Germination trenches or beds should be prepared by digging the trenches of 30 cm. (12 inches) depth and convenient length and breadth and fill the same with sand. Sow the seeds with their stock pointing upwards in the sand bed, giving a spacing of 2.5 cm × 2.5 cm. (1" × 1") and cover with sand just to cover the seeds. Irrigate the beds daily. Nuts begin to germinate 30-40 days after sowing. Good quality seeds give 90-98% germination. Six months old seedlings from primary plant nursery with 2 or 3 leaves should be planted in the secondary nursery beds. Plough or dig the nursery area and prepare raised beds of 15 cm. (6 ft.) height, 120 cm (4 ft.) width and convenient length with irrigation channels in between the beds in North-South direction. Apply 25 tons Farm

Yard Manure per hectare of nursery area (10 tons per acre). Provide shade by planting banana well in advance in between the beds, alternating with irrigation channels. Transplant the seedlings in these beds at a distance of 30 cm and 12 inches apart. Give top mulching once or twice and manure with 25 kg.

Planting is prepared by ploughing, harrowing and leveling the land. Provide good perennial shade on the western and southern borders by planting dense foliage shady trees like jack fruit, neem, banana. A pit of 90 cm. cubes (3 ft.) dug at a spacing of 2.7-4.0 m × 2.7-4.0 m with north-south alignment. Fill the pits with top soil mixed with compost and plant seedlings in the centre of the pit 7.5 cm to 15 cm. (3" to 6') below the ground level to facilitate watering. May-June is the best time of planting in low rainfall area, whereas, in water logged area, planting can be done in September-October.

Manuring is done around the palm in basins 15-20 cm deep and 1 m wide. The recommended quantity of manures and fertilizers are for nursery beds and after transplanting. As arecanut palm is very sensitive to drought, the palm should be irrigated during hot and dry weather at 4-7 days interval. The fertilizers are applied in 2 split doses during May-June and September-October. These are broadcast around the base of each palm and forked. Application of 25kg organic manure as green leaf, compost or Farm Yard Manure is recommended. These can be applied as single dose during

May-June. In acidic soils, application of lime is necessary. The lime requirement in each soil has to be determined and the required quantity should be broadcast around the basins preferably during dry months and mixed with soil by forking. It is advisable that for one and two- year- old plants, apply 1/3 and 2/3 of the recommended dose of fertilizers, respectively. However, the full dose of fertilizer should be applied at three year and onward age of the plant.

The stem of areca palm has scar marks of fallen leaves. The stem becomes visible from third year onwards. The girth of stem is maximum in initial stages of growth and depends on cultivar and soil conditions. The stem grows erect and is slender and flexible. The growth is rapid in initial years. The intermodal distance ranges from 13.9 to 34.3 cm (Murthy and Bavappa, 1960). There is only one terminal growing point at top of stem. The stem size increases due to maristematic activity and production of vascular bundles (Raghavan, 1957).

Arecanut starts flowering from 3-4 years after planting and December-March is the main flowering season. The fruit of arecanut is a monocular one seeded berry, which is orange red to scarlet when ripe and is encircled by a thick fibrous outer layer (husk). Usually 100-250 fruits are present in a bunch. The fruit development takes place in three stages (Bhat et al., 1962). In the first phase the size increase is rapid. Second stage is characterized by increase in volume and dry matter accumulation in kernel.

During this period embryo becomes macroscopic and develops rapidly. In the third stage swelling occurs and green color is lost. It takes 35-47 weeks for fruit development. The spacing of arecanut depends primarily on depth and fertility of soil. Various spacing has been used at different locations like 1.25×1.25 to 3.6×3.6 (Nambiar, 1949). Studies on varying spacing conducted at several locations showed the superiority of planting at a distance of 2.7×2.7 m. The young seedlings are protected against direct exposure by providing artificial shade of areca or coconut leaves. Shade crop of banana can also be planted which also gives some economic returns during initial years.

Harvesting period is from June to July to get tender nuts and November-March for ripe nuts. The nuts are harvested at 40-50 days' interval in 3 pickings. In regularly spaced garden, the most common practice of climbers is to climb a palm at one end of the garden, harvest the bunch, then pull the nearest palm with the help of a hook and swing to it. One climber may harvest up to 100 palms by swinging from one palm to the next at a stretch before coming down to the ground. The harvest bunches are dropped to the ground or lowered by using a rope or gunny bag. Ladders could also be used for harvesting individual palms. In certain parts long bamboos with sharp sickle hook attached to the end are also used for harvesting. Lowering the ripe bunches using a rope is also advantageous.

1.4 SIGNIFICANCE OF THE STUDY

Mizoram is an underdeveloped state. Development of agriculture is crucial to increase income, output and employment and to accelerate the rate of growth of a backward area. In the traditional Mizo agricultural system, shifting agriculture (jhum) was the sole occupation. There was no alternative occupation worth mentioning as the village except pottery, black smithy, bamboo works, handicrafts which were carried on part time basis. The state is far away from self sufficiency in food grain production. But efforts have been made by the state Government continuously to abandon the practice of jhum cultivation by promoting settled cultivation. The most significant schemes that are meant for abolition of jhum cultivation are New Land Use Policy (NLUP) and Mizoram Intodelhna Project (MIP). Arecanut cultivation has also been adopted as one of the activities under NLUP with Horticulture Department since 2011.

As arecanut is by nature long lasting crops, its cultivation will ensure reliable source of income for a very long period. Many farmers sustain their family from Arecanut and create family assets and are well established. One major advantage of this crop is that complicate processing process is not required and the fruit by itself is ready for market. Moreover, keeping quality is good and it can withstand long distance Transportation and it can be roughly handled at all level.

This work may prove to be the pathfinder to the new generation who are roaming here and there and chasing after government jobs. This research would be of immense help to the common people, the policy makers, government officials, researchers and also to other non-Governmental organizations who are engaging themselves for the upliftment of the poor in particular and the socio economic development of Mizoram as a whole. Furthermore, this will be helpful for the economic as well as agriculture development to know the present status and to improve from the present situation.

1.5 STATEMENT OF THE PROBLEM

This research attempts to analyze the economics of arecanut cultivation in Mizoram with reference to the arecanut farmers of Bilkhawthlir cluster in Kolasib District, bordering Cachar district of Assam. The title of the present is "Production and Marketing of Arecanut in Mizoram: A Case Study of Bilkhawthlir cluster".

1.6 OBJECTIVES

The present study is set with the following specific objectives:

1)   To examine the present status of arecanut cultivation in Mizoram.

2)   To evaluate the production and marketing of arecanut cultivation in Bilkhawthlir cluster.

3) To analyse and understand the contribution of arecanut cultivation in promoting livelihood contribution in the rural areas of the State.

1.7 HYPOTHESES

(i) Production under arecanut cultivation is significantly contributed by labour and land inputs; there is increasing returns to scale to these two factors of production.

(ii) Arecanut cultivation significantly promotes livelihood security among the rural households.

1.8 RESEARCH METHODOLOGY

a) **Data Source:** The study is based on both primary and secondary data. For primary data, out of 353 arecanut cultivators in Bilkhawthlir cluster i.e. from the association records, 79 cultivators were selected through random sampling method and they were given questionnaires to know their yields, production and marketing channels. Secondary data are collected from different sources like Agriculture department reports, Statistical Handbooks, published and unpublished works like books, survey reports, previous related research works, and other publication from government and other official records.

b) **Tools of Analysis**

The data so collected from different sources is arranged and analyzed to suit the need of the study. Simple descriptive statistical tools like percentage, mean, standard deviation, and coefficient of variations are used to explore the general trends and patterns. A log-linear production function was adopted to examine labour and land area under cultivation as determinants of arecanut output.

1.9 BRIEF PROFILE OF MIZORAM

Mizoram is one of the seven northeastern states of India and is enclosed by Myanmar, Bangladesh, Manipur, Assam, and Tripura. In the local language, Mizoram means "Land of the Highlanders". The Mizo Hills, which dominate the state's topography, rise to more than 6560 ft near the Myanmar border.

Mizoram is lying approximately between 21°.58' N to 23°.35'N latitude and 92°.15'E to 93°.29'E longitude. It covers an area of approximately 21,087 sq. km. It has a strategic location having international boundaries with Myanmar in the east and south, Bangladesh and of Tripura in the west. Further, the Cachar district of Assam and Manipur is the neighbor in the north. Mizoram has about 404 km length of international boundary with Myanmar and 316 km with Bangladesh.

The topography of Mizoram consists predominantly of mountainous terrain of tertiary rocks. The mountain ranges run north to south direction in

parallel series. These ranges are separated from one another by narrow and deep river valley with only a few and small patches of flat lands lying in between them. The terrain of Mizoram is young and so the geomorphic features do not show much diversity in the formation of the landforms. Most of the landforms observed are of erosive in nature.

The drainage system of the state consists of a number of small rivers and streams. Most of them are of ephemeral nature, depending on monsoon rains. Their volume and level fluctuate greatly in dry and rainy seasons. Most of the drainage lines originated in the central part of the state and flow towards either north or south influenced by the north-south trending ridge. The main rivers of the state are Tlawng, Tuirial, Tuivawl, Serlui all flowing north-wards and Tiau, Chhimtuipui, Khawtlangtuipui all flowing south-wards.

Mizoram enjoys a pleasant climate, which is neither too hot nor too cold throughout the year. The summer temperature ranges from 15°C to 29°C, whereas it is 18°C to 27°C in autumn and 11°C to 25°C in winter. The average rainfall is almost 200cm per year, though it may come to 350cm in the northwest part of the state. Generally, it rains during May to September; July and August being the rainiest month. November to January is a dry period with minimum rainfall. The average rainfall in the state was about 2437.75 mm per annum during the period 2012-2013.

The economy of the state is mainly of agricultural, with minimal industrial activities and a highly inflated and expanding tertiary sector. Public expenditure is the driving force of the state economy. However, the state is highly dependent on resource transfer from the central government and it generates a small amount of internal resources. With non-plan revenue expenditure increasing year by year, the state government is facing acute financial mismatches between receipt and expenditure. Hence, the state government is resorting to heavy public borrowing to finance not only capital expenditure but also its revenue expenditure.

The Gross State Domestic Product (GSDP) of Mizoram has been continuously growing over the years with impressive rate. GSDP at factor cost at constant (2004-2005) prices is expected to attain an amount of ₹ 5, 60, 779 lakhs in 2013-2014 against the provisional estimates of ₹ 5, 20, 289 lakhs for the year 2012-2013 showing a growth of about 8 percent over the previous year. The GSDP at constant (2004-2005) prices has clocked 9 percent average annual growth rate during the financial years 2004-2005 to 2013-2014. GSDP at factor cost at current prices is projected to touch ₹ 1, 02, 9698 lakhs in 2013-2014, a change of 20.05 percent over the previous year's (2012-2013) figure of ₹ 8, 36,292 lakhs. The per capita income of Mizoram for the year 2012-2013 is estimated at ₹ 6, 34, 13 as against the previous year's estimate of ₹ 5, 36, 24. Per capita income at the national level is ₹ 6, 78, 39 for the year 2012-2013 (Revised Estimates). The

Primary Sector comprising agriculture & allied activities contributed 16.26 percent (2013-2014) to the GSDP. With more than half of our population deriving the greater part of their income from agriculture, faster growth in agriculture is necessary to provide boost to their income. Rising incomes in agriculture will also be an impetus to non-agricultural income in rural areas thus helping redress the rural-urban imbalance. Recently horticulture and floriculture has gained momentum and shown marked improvement in their production.

As per details from Census 2011, Mizoram has population of 1,09,7206 of which male and female are 555,339 and 541,867 respectively. The decadal growth rate during 2001-2011 was 23.48 percent which is the third highest among the 7 (seven) north eastern states while the country's decadal growth rate was 17.64 percent. In 2001, total population was 888,573 in which males were 459,109 while females were 429,464. The total population growth in this decade was 23.48 percent while in previous decade it was 29.18 percent. The population of Mizoram forms 0.09 percent of India in 2011. In 2001, the figure was 0.09 percent.

Literacy rate in Mizoram has seen upward trend and is 91.33 percent which is the 3rd highest in the country as per 2011 population census. Of that, male literacy stands at 93.35 percent while female literacy is at 86.72 percent. Among the 8 (eight) districts, Serchhip district recorded the highest

literacy rate of 97.91 percent while Lawngtlai district recorded the lowest at 65.88 percent.

As per Population census 2011 (provisional figures), the density of population of Mizoram is 52 persons per sq. km. while it is 382 persons per sq. km. in India. In 2001, density of Mizoram was 42 per sq km; while nation average in 2001 was 324 per sq km. Sex ratio of the state i.e. the sex ratio recorded in Mizoram are 976 as compared to 935 in 2001 census. The national figure for the same is 943 as per 2011 census figure. Among the 8 (eight) districts, Aizawl recorded the highest sex ratio at 1009 while Mamit district recorded the lowest at 927 though showing a marked improvement compared to 2001 census figure of 896 females per 1000 males.

1.10 PROFILE OF THE STUDY VILLAGE

Bilkhawthlir is a small village located in Bilkhawthlir Block of Kolasib district, Mizoram with total 1100 families residing. It is lying approximately between 24°19'53"N latitude and 92°42'38"E longitude. According to 2011 Census, Bilkhawthlir cluster had a population of 5385 of which 2735 are males while 2650 are females. In Bilkhawthlir cluster, more than 60% of the populations are engaged in shifting cultivation. It has total geographical area of 46098 ha and forest area of 18336 ha. Average Sex Ratio of Bilkhawthlir cluster is 969 which are lower than Mizoram state average of 976. Child Sex Ratio for the Bilkhawthlir as per census is 1013,

higher than Mizoram average of 970. In 2011, literacy rate of Bilkhawthlir village was 90.31 percent compared to 91.33 percent of Mizoram. Male literacy stands at 90.11percent while female literacy rate was 90.52 percent.

Bilkhawthlir is the main growing place of arecanut in the state. Most of the farmers grow arecanut in their own orchards and it is the main livelihood for many families. The cultivation of arecanut had been started in the village since 1980-1990. Since then we can see successful farmers in this village.

Majority of the people in Bilkhawthlir are Christians. There is four Presbyterian Church and one Branch church. There is one Baptist church, two United Penticostal Church (UPC) (NEI) and one UPC (Mizoram) church, Seventh Day Adventist and Mizo Kohhran have one church each. In Young Mizo Association (YMA) the village has four Branches and it is a seat of Block Development Officer (BDO) as well as a Constituency Headquarters. From the educational side, the village has one Government Higher Secondary School, one Government and one Private High School, three Governments and two Private Middle school, four Government Primary School, and one Presbyterian English Middle School.

1.11 SCHEME OF CHAPTERISATION

The study is organized in five chapters as follows:

Chapter-1: Introduction

It gives a brief profile of arecanut cultivation in India, significance of the study, statement of the problem, objectives, hypothesis, methodology, brief profile of Mizoram, profile of Bilkhawthlir, and chapterisation.

Chapter-2: Review of Literature

It presents a brief outline of related literature and studies.

Chapter-3: Data Analysis and Interpretation

It discusses the overview and growth performance of arecanut economy in global, India, Mizoram and Bilkhawthlir cluster. It also examines and analyzes the economics of arecanut production and marketing of arecanut including cost and revenue.

Chapter-4: Major Findings and Conclusion

It summarizes the findings and conclusion in the study.

CHAPTER-II

REVIEW OF LITERATURE

There have been a number of studies done by expert groups and individual scholars on several aspects of arecanut development in the country. The review of literature given here relates to production and marketing of arecanut cultivation across various parts of the country.

Nambiar (1949) in his study of Southern Kerala and coastal Karnataka found that arecanut is a highly input intensive crop and a high dosage of organic manures and chemical fertilizers are applied to increase the yield level. It is cultivated in a wide variety of soils and the largest area under arecanut cultivation is in gravelly laterite soils of red clay type in this region. He further stated that in North Eastern region lower temperatures at higher elevations become limiting for growth. However, the palm grows up to 1000m altitude above Mean Sea Level and beyond this the quality of nut produced is reduced.

Naidu (1962) examined arecanut farmers had the distinction of adopting the modern scientific agricultural practices in very early days in Karnataka. The Bordeaux mixture, a most effective prophylactic chemical against fungal attack was used first against Mahali disease (also called as *Koleroga*) in arecanut as early as 1926. It was developed by Dr. Leslie Coleman (1878) who was the Director of Agriculture, Mysore province. He further discovered that a research station on arecanut was first established in Marthur in Shimoga in 1928. Later a full-fledged arecanut research

station was also established in 1952 in Sibinakere in Thirthallitaluk in Shimoga district.

Rao et al. (1980) conducted a study on grading of arecanut in Jalpaiguri district of west Bengal. The study revealed that grading is not usually done by growers, however, the wholesalers grade the produce but not on any scientific basis, it is done on the basis of size, color and quality. The study also indicated that the growers received 61 percent of the price paid by the consumer and suggested cooperative action for the further improvement of marketing system in the region.

Das and Kumar (1982) observed that the facilities provided by the Central Arecanut and Cocoa Marketing and Processing Co-operative (CAMPCO) Ltd, to arecanut growers of Kerala and Karnataka states motivated them to adopt scientific crop management, thereby resulting in an increase in the productivity of arecanut in the areas served by the CAMPCO Ltd.

Bhat et.al (1982) in their study on arecanut cultivation in Karnataka and Tamil Nadu observed that the arecanut palm as a crop of sub humid tropics and thrives well in the region of 28°N and 28°S of the equator. The altitude at which arecanut grows depends on the latitude.

Rao (1982) in his study observed that an evaluation of the sound performance of the co-operative, its high growth and growth rate, a deep impact on arecanut markets, its success in achieving the objective of its establishment and the confidence of the arecanut growers. Manifestations of the exemplary performance of the CAMPCO Ltd., he further reported that to protect the producers from the exploitation of private intermediaries, co-operative marketing can certainly be an effective solution and it can replace superfluous middlemen in trade, thus reducing the price spread entailing the welfare of both the producers and the consumers.

Khader (1983) studied on the climatic variables in pure arecanut gardens found that the evaporation during January to May from the soil surface of the arecanut garden was lower than in the open surface. This is because of the lower evaporative demand in the arecanut garden. Lower radiation in cropping systems especially of poly culture nature reduces the evapotranspiration. Consequently, the air temperatures were lowered and humidity was increased in the garden.

Bhat (1983) had made detailed investigation on microclimate of arecanut-cocoa mixed cropping. The variables studied were evaporation rate, wind velocity, soil temperature, relative humidity, vapor pressure and air temperature. The evaporation, air and soil temperature were lower in

mixed cropping as compared to the sole crops. Another important feature to be noted here is least differences between morning and afternoon values in these factors within the mixed cropping. In general, there was lower evaporative demand, higher soil moisture content and least diurnal variations in temperature in standing cocoa plantations. The mean wind velocity inside the sole crop of arecanut was 33 percent and inside the mixed crop 9 per cent that of the velocity in the open. Thus, it is clear from the investigation that the arecanut palms provide excellent protection to the intercrops against wind.

Gajanana (1985) studied the impact of the CAMPCO Ltd, on prices of arecanut indifferent markets of Karnataka. The study indicated that the establishment of CAMPCO Ltd had salutary effects in stabilizing the arecanut prices in Karnataka. The prices in all the markets indicated a tendency to increase vis-à-vis those observed prior to CAMPCO Ltd period. A considerable amount or reduction in the variability of prices was observed during the CAMPCO Ltd period.

Balasimha (1989) observed cultivation of arecanut is concentrated in South Western and North Eastern regions of India. Arecanut industry forms the economic backbone of nearly six million people in India and for many of them it is the sole means of livelihood. The nuts also have medicinal and

pharmacological properties. It is estimated that one tenth of the world population has the habit of betel chewing.

He further showed that India has about 57 percent in area and 53 percent of the total world production and has recorded the highest growth rate in the world. India is followed by China, Bangladesh and Myanmar. Other countries where arecanut is grown are Malaysia, Indonesia, Vietnam, Thailand, Philippines, Maldives, Sri Lanka, Solomon Island, Fiji, and Mauritius. Highest productivity is recorded in China followed by Malaysia, Thailand and India. Arecanut is largely cultivated in the plains and foothills of Western Ghats and North Eastern regions of India. Three states viz., Kerala, Karnataka and Assam account for 90 percent of area under cultivation and 95 percent of the production. Production of arecanut has increased from a mere 0.074 million tons in 1956-57 to 0.333 million tons in 1997-98 in the country. The area under cultivation has increased from 0.094 to 0.270 million hectares during the same period. The productivity has increased from 788 kg/ha to 1242 kg/ha. Thus India became self sufficient in its arecanut requirements in the early 1970s.

Chadha (1988) in his study of horticultural crops observed by virtue of its geographical position, India enjoys diverse agro-climatic conditions that allow the growth of a wide variety of horticultural crops. He found that Horticultural crops constitute a significant component of the total

agricultural production in the country. They comprise fruit, vegetable, ornamental, medicinal and aromatic, tuber, plantation, and spice crops. They occupy a total area of 12.8 m ha and yield 127.9 m tons of produce. Fruits and vegetables supply vitamins and minerals that are essential for maintaining the general health of the body. Nearly 50 percent of the per capita daily diet in the western countries is made up of fruits and vegetables. Tuber crops, e.g., tapioca, edible varieties of yam and amorphophallus are a rich source of carbohydrate and constitute poor man's food. Plantation crops, aromatics, ornamentals and spices fetch us foreign exchange. Medicinal crops are invaluable in the preparation of pharmaceutical products in all the three systems of medicine and commercial cultivation of several crops is now undertaken in the country. The Government of India has plans to expand the acreage under horticultural crops, especially fruit and vegetable, to almost double. The targeted fruit growing area for 2000 is 4m ha with a production estimate of 81m tons. The diverse soil types and climatic conditions in our country encourage the growth of a broad spectrum of grassy and broad leaf weeds. All the 18 world's worst weeds are found in India in association with one or the other horticultural crop.

Giriappa (1989) observed that under proper management, arecanut crop start yielding from the sixth year. Stabilized yield is obtained after ten

years and is maintained till about the 40th year. The yield declines thereafter and becomes uneconomical by the 60th year. Under proper management conditions the yield of arecanut varies from 1500 to 3500 kg/ha. About 70 percent of arecanut is sold in the processed form i.e. boiled and unboiled types. About 72 percent of the farmers prefer sales of food to traders in the village or primary market whereas 6 percent of the farmer's sale through commission agents, 5 percent through regulated markets and 17 percent through CAMPCO (Central Arecanut and Cocoa Marketing and Processing Cooperative Society). It has been estimated that the farmers receive about 55 percent of the consumer's price. In the cost of cultivation, labor cost accounted for the bulk of the total cost. It was 54.2, 50.1 and 52.1 percent in small, medium and large gardens respectively. Around 1970-71 onwards it can be seen that due to intensive cultivation increase in area has been marginal. The yield increased from 813 kg/ha in 1961-62 to 843 kg/ha in 1970-71 and 1037 kg/ha in 1980-81. Unlike the nation, average yield level in Karnataka has been quite significant. The yield level increased from 1229 kg/ha in 1970-71 to 1459 in 1980-81 and 1462 kg/ha in 1983-84.

Goswami (1993) examined agricultural development in North East India with special reference to settled agriculture and observed that the compound growth rate of agricultural production is very low in the region of North East India. One of the major constraining factors is the low level

of irrigation facilities. According to him, 83.3 percent of the net cropped area is still under uncertain monsoon condition. Another problem is irregular supply of improved seeds, fertilizers, pesticides etc.

As per the Food and Agriculture Organization (FAO) (1995-2009) the world production of arecanut was around 8.54 lakhs metric tons with a total area of around 7.03 lakh hectares in the year 2006. India's share in production comes to 55 per cent and that of Indonesia 17 per cent, Bangladesh 10 per cent, China 8 per cent, Myanmar 4 per cent and Thailand was around 2 per cent. The share of Sri Lanka, in total production of arecanut in the world is hardly 1.6 per cent and that of Nepal, Malaysia, Maldives and Kenya as per this source, is very negligible. It has estimated that world production of arecanut is increasing. World production and area have shown increasing trend at compound annual growth rates of four and seven per cent respectively since 1995. In most South Asian countries where information is available, the production of arecanut has increased several folds over the past four decades. In India, production of the nut has risen nearly threefold and may reflect the commercialization of areca products since the early 1980s. Notably, Bangladesh is a significant contributor to the agricultural base of arecanut production.

Parthasarathy et al., (2005) in their study observed that arecanut is extensively cultivated in the tropical region. It is mostly confined to 28°

North and South of the equator. It grows within a temperature range of 14°-36°C and temperature below 10°C and beyond 40°C adversely affects the crop. Arecanut requires ample supply of soil moisture and plentiful of rainfall ranging from 3000 to 4500 mm annum. It can be grown in a variety of soils such as laterites, red loams and alluvial. It thrives best in well drained soils. Since arecanut palms cannot withstand long dry spells; the gardens are usually irrigated during summer months. Arecanut garden requires a minimum of seven years to get established and to yield economic return. During the first two years, more labor is required for land preparation digging pits (*around 2 cubic feet size)*, planting of seedlings and other operations; therefore it needs more care for further production. Quick growing shade trees have to be planted on the southern and western sides well in advance of planting seedlings.

Dashora et al., (2006) observed that Arecanut or betel nut is an economically important plantation crop and is the product of palm. It is well known for its consumption as a masticator nut consumed by all sections of the population, cutting across caste, region, religion, age and gender in India. Arecanut forms an essential requisite for several religious and social ceremonies and its use dates back to Vedic period with high antiquities. People in India and many parts of Asia are using arecanut. Reference to arecanut is in Rig-Veda (2000 BC). *Dhanwantari Nighantu* an

ancient text of Indian system of medicine mentions the use of arecanut (*Puga)* as one of the five natural aromatics (*Panchasugandhikam*) with pepper, clove, nutmeg and camphor.

On his further study of West Bengal, Assam and southern parts of Kerala, arecanut is generally grown as a rain fed crop. However, irrigation increases its yield and it is recommended to irrigate arecanut plants during long dry spell. In West Coast, watering once in 7 days during November-December, once in 6 days during January-February and once in 3-5 days during March-May is recommended. The arecanut are harvest when they are fully ripe if the end use is chali or kotapak (dried ripe nuts). About 6-7 months old nuts which are dark green and soft are harvested to produce kalipak. In regularly spaced garden, the most common practice of climbers is to climb a palm at one end of the garden, harvest the bunch, then pull the nearest palm with the help of a hook and swing to it. One climber may harvest up to 100 palms by swinging from one palm to the next at a stretch before coming down to the ground. The harvest bunches are dropped to the ground or lowered by using a rope or gunny bag. Ladders could also be used for harvesting individual palms. In certain parts long bamboos with sharp sickle hook attached to the end are also used for harvesting. More than 10 kg of ripe nuts per palm at the 10th year is considered as normal

yield in any plantation. Average yield varies from 200-260 q/ha ripe nuts and 25-60 q/ha.

Chadha et al. (2011) in their study found out that in the recent years prices of arecanut are fluctuating widely worrying farmers, arecanut cooperatives and policy makers and the supply (or market arrival) has exhibited high seasonality in all the major markets. The weighted average indices of prices of prominent grades of arecanut exhibited a stable pattern in all the markets except Shimoga. The intra (within) year stability in the prices of arecanut is due to the presence of well established co-operative marketing system in the traditional arecanut growing regions of Karnataka. As a result of the role of co-operatives there is a fair degree of competition in arecanut marketing at the primary levels. CAMPCO's price influencing mechanism is relatively effective compared with its intervention through procurement. However, the CAMPCO lead co-operative marketing arrangement is yet to assure the much needed inter year stability in prices over the period of time by arresting the price turbulence caused due to market forces exogenous to the system.

Prakash (2012) found that due to the presence of a large number of native varieties, Philippines are generally considered as the home of arecanut. In the background of a 9th century old painting in Ajanta cave a picture of arecanut palm was drawn, implying the antiquity value of

arecanut. It is believed that arecanut was introduced to the State through Bombay in the 7th century. Hence, its cultivation first began in Mumbai Karnataka region starting from Badami to Kantilla area which now falls into Soraba and Shikari pure taluks of Shimoga district.

He made further investigation on cost of cultivation of arecanut in Karnataka state in 2012 and highlighted that arecanut was fletching a reasonable return until 2000. Due to various reasons the price started declining from 2000 onwards. In this background the Government of Karnataka in its budget 2002-03 included arecanut as one of the commodities along with maize, raga, and paddy and ball copra under Market Intervention Scheme (MIS) to support farmers with the assistant from the Central Government. The Central Arecanut and Cocoa Marketing and Processing Co-operative (CAMPO) Ltd., the multi-state marketing co-operative was appointed as the state level designated agency for procurement of arecanut under the scheme. He pointed out that procurement of 'White Chali' type under MIS was commenced on 2nd September 2002 with Minimum Support Price (MSP) of ₹ 60 per kg, first time in the history of arecanut marketing in Karnataka. By looking into the positive impact of MIS on the price of white chali type, the scheme was extended to Red Boil Type (RBT) with MSP of ₹ 85 per kg during 2004-05. The procurement rate was not fixed and it varies from time to time.

Depending on land holding, the CAMPCO were permitted to procure up to 10 quintals of arecanut from a grower under this scheme.

CHAPTER-III

DATA ANALYSIS AND INTERPRETATION

INTRODUCTION

Arecanut cultivation is one of the most important livelihoods for a nation, it generate income, employment and alleviate poverty is worth mentioning till today. Though arecanut cultivation has faced a several structural change, we can still see successful growth in the country. This chapter is divided into twelve sections.

3.1 OVERVIEW OF ARECANUT ECONOMY: A GLOBAL PERSPECTIVE

As per the Food and Agriculture Organization (FAO), the world production of arecanut was around ₹ 10.33 lakhs metric tons with a total area of around 8.29 lakhs hectares in the year 2009-10. India ranks first in terms of both area (47%) and production (47%) of arecanut. The other countries which produce arecanut in the world are Bangladesh (21% in area and 9% in production), China (6% in area and 20% in production) and Indonesia (16% in area and 6% production). It is also cultivated in Myanmar and Thailand on a smaller scale (Figure.3.1). As per the Food and Agriculture Organization (FAO), world production and area have shown increasing trend (Table 3.1 and Figure.3.2) at compound annual growth rates of four and seven per cent respectively since 1995.

But according to Directorate of Arecanut and Spices Development, Ministry of agriculture, Government of India arecanut production in the country crossed 7 lakh tones during 2013-14. As per the revised estimates area under arecanut during 2013-14 was 445, 000 ha and production was 729,810 tonnes. The world productivity of arecanut stood at 1.21 tonnes/ha. Indian productivity is also on par with the world productivity (1.27 tonnes/ha).

Fig 3.1: Area and Production Shares of Major Global Producers, 2010
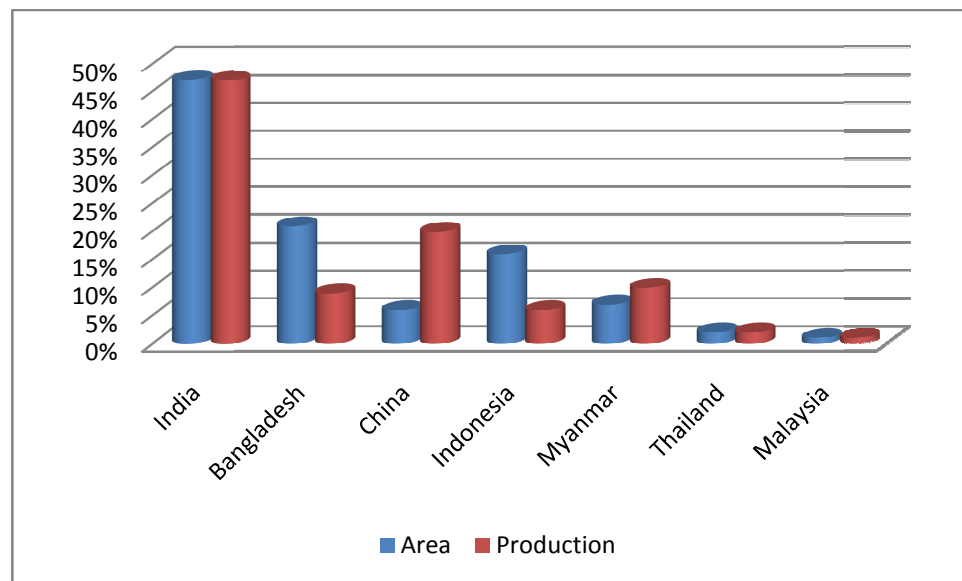
Sources: Directorate of Arecanut and Spices Development, (DASD) Calicut & Food and Agriculture Organization (FAO), Rome

Table 3.1: Area and Production of Arecanut in World (1995-2009)

Year	Area ('000 ha)	Production ('000 tons)
1995	440	550
1996	450	560
1997	460	580
1998	470	600
1999	520	650
2000	560	650
2001	600	700
2002	640	750
2003	660	780
2004	690	800
2005	700	840
2006	700	850
2007	710	870
2008	720	890
2009	720	860

Sources: Directorate of Arecanut and Spices Development, (DASD) Calicut & Food and Agriculture Organization (FAO), Rome

The growth of global arecanut area and production presented in Table 3.1 shows arecanut productions have increased from ₹ 550, 000 tons in 1995 to ₹ 860, 000 tons in 2009. It may be noted here that production of arecanut is increasing till 2008 and it is decreasing a bit in 2009.

Fig 3.2: Area and Production of Arecanut in World (1995-2009)
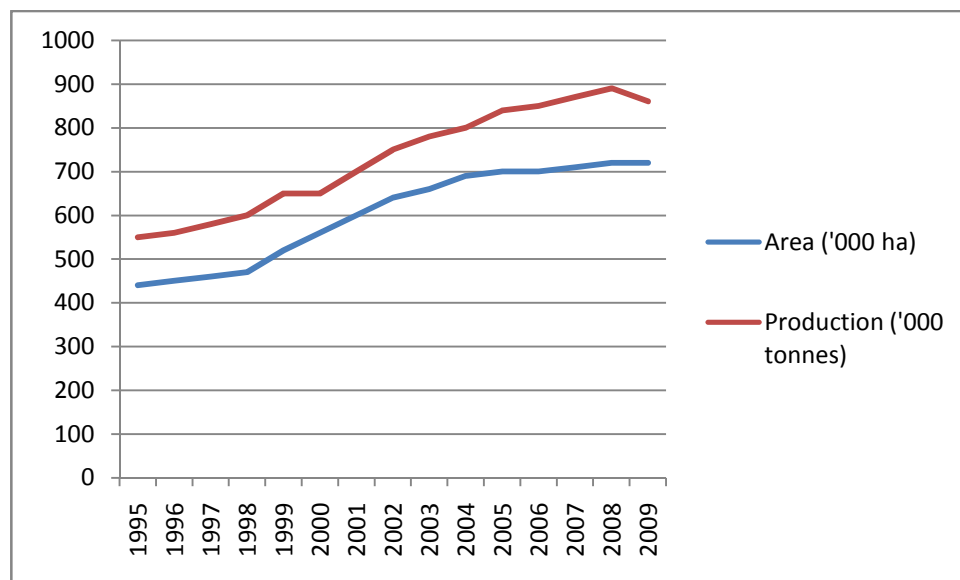
The trends of arecanut area and production across the world during the period of 1995 to 2009 are shown on fig 3.2. From the figure, it is clear that the growth of world arecanut area and production were not much difference from 1995 to 1998. But beyond 1998 the world production of arecanut was increase more rapidly. Meanwhile the production increasing rate was remaining always the same during 1999-2000. This observation showed that the percentage share of total arecanut area from total arecanut production was start declining since 1998. The reason for declining of global arecanut production increasing rate was largely due to increasing domestic consumption due to population increase especially among the developing countries.

World Productivity of Arecanut

In arecanut productivity around the world, China stood first with a productivity of 4164.76 kg/ha, followed by Myanmar occupying second position with a productivity of 2264.15 kg/ha and Thailand. Even though India stands first in global production of arecanut, is ranked 4th in terms of productivity, followed by Malaysia, Bangladesh and Indonesia in 5th, 6th and 7th positions.

Fig 3.3: Arecanut Productivity in Major Producing Countries

Sources: Directorate of Arecanut and Spices Development, (DASD) Calicut & Food and Agriculture Organization (FAO), Rome
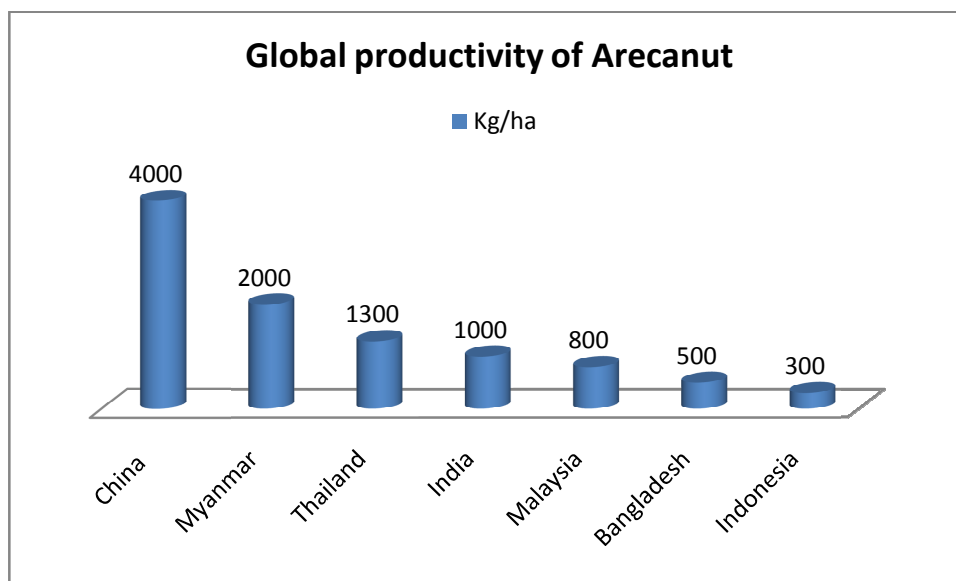
3.2 PERFORMANCE OF ARECANUT CULTIVATION IN INDIA

India is the traditional areca-growing country in the world. At the time of partition during 1947, nearly half of the area under arecanut was lost to Pakistan. As a result, the country faced the shortage in supply of arecanut during the early fifties. The increasing internal demand was made good by import of arecanut from Sri Lanka and Malaysia in the beginning. Hence, the Government had encouraged the expansion of area under arecanut cultivation on a large scale and provided liberal financial assistance through co-operatives and scheduled banks for its cultivation. Consequently, the production of arecanut increased steadily and the country achieved the self-sufficiency by early 60's.

As per the Ministry of Agriculture, Government of India, the area under arecanut is around 4 lakh hectares with a production of around ₹ 4.78 lakh metric tons in 2009-10 in India. Main arecanut growing states are Karnataka and Kerala which together account for 70 percent of both area and production in the country. Kerala, Assam, Meghalaya, West Bengal etc. are the other major arecanut growing states in the country. Assam, West Bengal, Meghalaya, Tamil Nadu, Tripura, Mizoram are other minor arecanut producing states in India. Details are given in the table 3.2 and figure 3.4.

The area and production of arecanut in India have been increasing continuously since 1991-92 with a compound annual growth rate of 3.6

percent and 4.1 percent respectively. Area under arecanut has increased to 4.01 lakh hectares in 2009-2010 which is almost twice that of the area prevailing in 1991-92 (2.2 lakh hectares). Production of Arecanut during 2009-2010 was ₹ 4.78 lakh MT which was more than two times produced during 1991-92 (₹ 2.5 lakh MT).The same is depicted in figure 3.5.

Table 3.2: State wise Area and Production of Arecanut in India (2009-2010)

Sl. No.	State	Area (hectare)	Percentage	Production (metric tons)	Percentage
1	Karnataka	1,84,520	46.12	2,24,000	46.86
2	Kerala	97,170	24.29	112,140	23.46
3	Assam	69,970	17.49	62,700	13.12
4	West Bengal	11,390	2.85	21,160	4.43
5	Meghalaya	12,360	3.09	17,100	3.58
6	Tamil Nadu	5,030	1.26	10,390	2.17
7	Tripura	4,430	1.11	8,360	1.75
8	Mizoram	6,580	1.64	8,210	1.72
9	Andaman & Nicobar	4,100	1.02	6,000	1.26
10	Maharashtra	2,200	0.55	3,600	0.75
11	Goa	1,850	0.46	2,780	0.58
12	Nagaland	200	0.05	1,300	0.27
13	Andhra Pradesh	250	0.06	190	0.04
14	Pondicherry	60	0.01	80	0.02
	India	**4,00,110**	**100**	**4,78,010**	**100**

Source: National Horticulture Board, GOI, (2009-10)

Statewise area and production of arecanut 2009-2010 were express in Table 3.2. It is observed from the table that Karnataka is the largest producer of arecanut in India which accounted for 46.86 per cent out of a total area 46.12 per cent in 2009-2010, followed by Kerala 23.46 per cent, while Assam and Meghalaya produce 13.12 and 3.58 respectively.

Fig 3.4: Area and Production of Arecanut in Different States in India (2009-2010) (In percent)
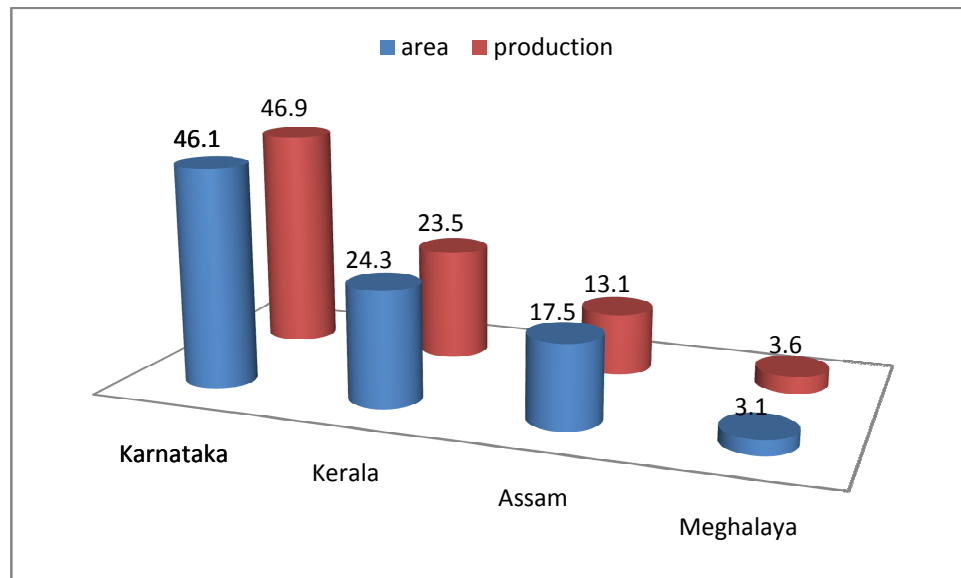
Source: National Horticulture Board, GOI, (2009-10)

Fig 3.5: All India Area and Production of Arecanut (1991-2009)
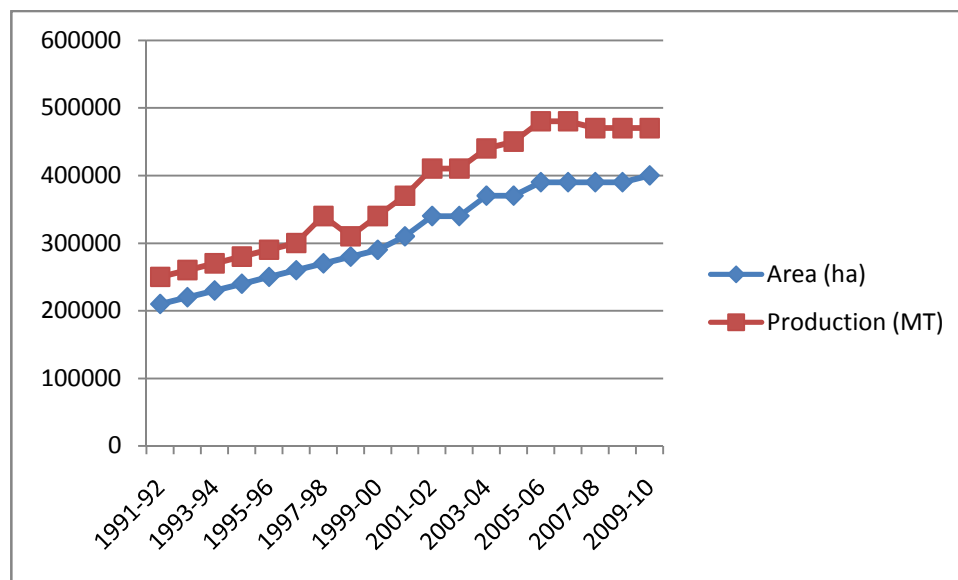
The growth trend of area and production under arecanut cultivation in India (1991-2009) is indicated in fig 3.5. From the figure, it is clear that the area of arecanut cultivation witness steady increase from 1991-2003. In 2004 and 2006 it shows as a decline in the area under arecanut cultivation in India. Unlike the area, the trend of production was rose more significant than area with several fluctuations. The production increased was largest in 2006-2007 and the decline in production was large in the year 1998-1999 as it is assumed to increase from 1991 but within this year it goes down unexpectedly.

Production, Consumption and Trade of Arecanut in India

Though arecanut production is location specific, its consumption is wide spread throughout the country. Prior to the 1980s, arecanut was consumed mostly in the raw forms to prepare either traditional Tambulam or the Beeda. Production was not sufficient to meet even internal demand up to 1965. Emergence of the value added arecanut products such as Scented Supari, and Gutka had given a real boost to the arecanut economy in India. Value added arecanut products promised a lucrative enterprise in view of its increasing consumption by all groups. This enhanced the choice and convenience of the consumers, as a result of which the consumption of arecanut especially in the northern states such as Uttar Pradesh, Gujarat, Delhi and Maharashtra increased by many folds.

Demand for arecanut products has increased steadily in India. Arecanut being a 'habitual' item, its consumption is 'income elastic and price inelastic' i.e. for an increase in the income, its consumption increase more than proportionately and for a given level of price raise, proportionately less reduction in consumption takes place. Consumption of arecanut in India has increased from ₹ 2.50 lakh tons during 1991-92 to around ₹ 5.2 lakh tons in 2009-10 with annual growth rate of around five per cent. The projected demand of arecanut by 2020 is estimated to be more than six lakh tones in India. (The compound annual growth rate of production is around 4.20 percent which is less than that of consumption

which is growing at the rate of around five percent annually in India. This is a happy sign for Arecanut economy in India).

However, foreign trade with in which import of arecanut is growing at a very high rate of around 23 percent compared to the export whose annual growth rate is just around 10 percent in recent years. This must give sufficient cause for concern for farmers, co-operatives and policy makers in India. The Coefficient of Variation (CV) which explains annual fluctuations also calculated for production consumption and trade in India. As seen in the table below, the trade (import and export) has been fluctuationing heavily (around 80% of the mean value) over the years. Such a huge fluctuation especially in imports has very destabilizing impacts not only on arecanut economy but also on income earning capacity of farmers producing arecanut in India. Hence proper preventive measures are needed immediately in this regard. The details of production, consumption and trade are given in table 3.3 and the same is represented in figure 3.6.

Table 3.3: Production, Consumption and Trade of Arecanut in India (In Metric Tons)

Year	Production	Export	Import	Consumption
1991-92	2,51,000	658	0	2,50,342
1992-93	2,56,300	629	0	2,55,671
1993-94	2,71,100	525	0	2,70,575
1994-95	2,89,700	823	545	2,89,422

1995-96	2,95,500	406	5,091	3,00,185
1996-97	3,07,700	513	9,565	3,16,752
1997-98	3,35,500	664	10,823	3,45,659
1998-99	3,09,800	533	6,707	3,15,974
1999-00	3,34,400	734	11,695	3,45,361
2000-01	3,73,100	712	29,350	4,01,738
2001-02	4,09,300	1,483	14,788	4,22,605
2002-03	4,09,300	1,555	21,452	4,29,197
2003-04	4,39,200	1,809	27,957	4,65,348
2004-05	4,52,700	3,695	32,124	4,81,129
2005-06	4,83,100	4,113	53,275	5,35,331
2006-07	4,83,300	2,268	76,678	5,37,067
2007-08	4,76,000	1,472	21,299	4,95,827
2008-09	4,81,300	1,518	41,797	5,21,579
2009-10	4,78,010	1,757	39,527	5,15,780
CGAR(%)	**4.19**	**10.04**	**22.47**	**4.75**
CV (%)	**22.96**	**77.28**	**80.24**	**25.92**

Note: CAGR- Compound Annual Growth Rate and CV- Co-efficient of Variation

Source: National Horticulture Board and DGCI & S, Kolkata

It is important to note that production and consumption of arecanut have also exhibited more or less equal degree of variability (fluctuations) as seen from the co-efficient of variation (CV) over the years. The CV that explains year to year fluctuations in a variable recorded a high value of 23 and 26 per cent respectively in production and consumption of arecanut in India.

Value addition helped farmers to get good prices. For instance, in a span of just 15 years, from 1985 to 2000, the increase in the price for raw nuts was more than 500 percent and the area under arecanut has almost

doubled in Karnataka. This enabled the small farmers with one acre area under arecanut to earn an assured income sufficient enough to lead a decent standard of living. If unaccounted area is taken in to account the annual arecanut production may exceed five lakh tons in India. With a modest average price of rupees five thousand per quintal, the income that the farmers cultivating arecanut receive, would easily exceed rupees 2500 crores (at current price) annually in India. As a result of this income generation, the consumer durables such as bike, TV, fridge and cars, which are otherwise confined only to the urban upper middle class, became common household items in the region's growing arecanut in India.

A study by Preeti (1998) also highlights that there is a significant improvement in the socio-economic status of arecanut farmers during the early 90's. For instance, farmers especially large farmers, have began to spend more on items like LPG gas, electric appliances, phone connection, purchase of four wheelers, house construction and even to purchase of agriculture land after the price boom. At the retail levels, Ghutkhas are sold at an average price of ₹ 800 per kg where as the price of scented supari are around 400 per kg. When areca nut is used for beedas it fetches a price of around 500 per kilogram. In this way, arecanut gets a value addition ranging from 350 percent to 600 percent when consumed ultimately. And hence, it is up to anybody's imagination that the huge contribution that the

value added areca nut products could make to the country's National Income. A simple estimation indicates that arecanut contributes around ₹ 15,000 crore rupees annually to the National Income of India.

Fig 3.6: Production and Consumption of Arecanut in India (1991-2009)
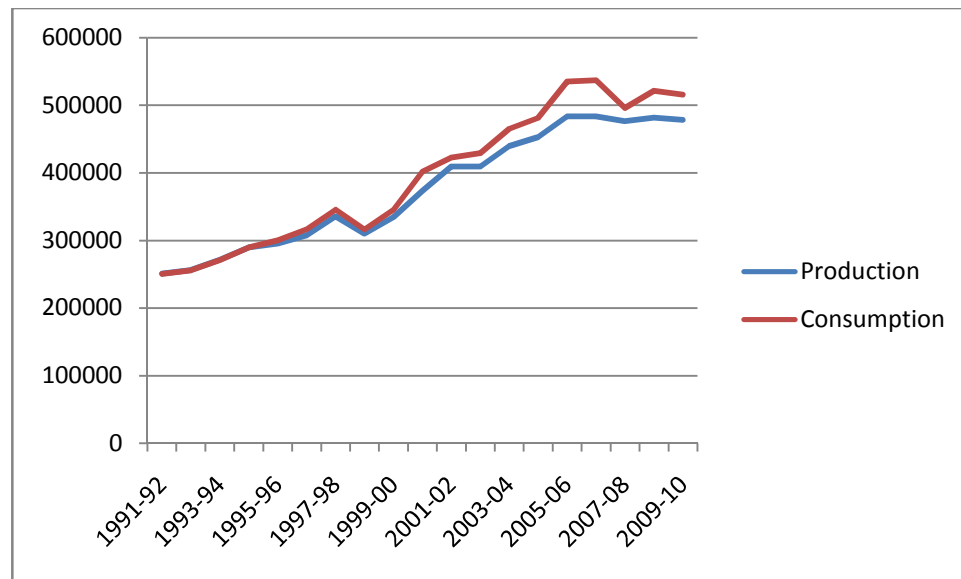
Source: National Horticulture Board and DGCI & S, Kolkata

Fig 3.7: Export and Import of Arecanut in India (1991-2009)
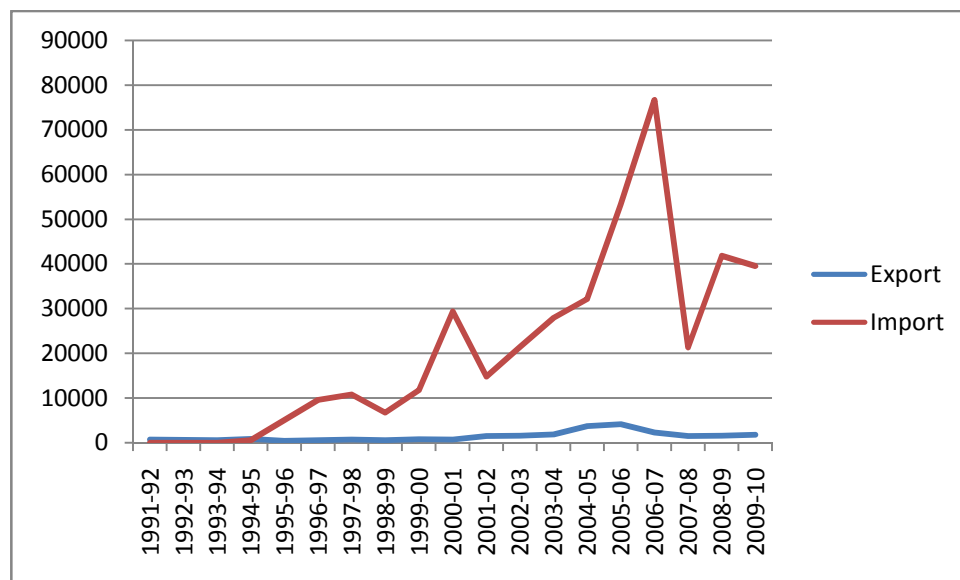
Export of Arecanut into India

Not only our neighboring South Asian Association for Regional Cooperation (SAARC) countries but also Middle East and other Muslim countries have become an assured destination for the value- added arecanut products. Demand for these products has been fast increasing globally, especially among the people of Indian / Asian origin. Export of arecanut products from India has almost trebled in a span of 20 years since 1991. India's export currently reaches more than 40 countries in the world. During 2009-10 India exported nearly 1750 tons of arecanut in the forms of splits nuts (13%), whole nuts (37%) and value added forms like scented Supari (50 %). Major destinations of these items are Malaysia, Maldives, UAE, Nepal, UK, Sri Lanka, South Africa, Canada and Kenya.

Interestingly, the demand is increasing gradually in the developed world also including USA, UK, Canada, Australia, Thailand, Singapore and France, that too for the products such as Ghutka and Pan masala. The pan masala and scented supari are exported to countries like UAE, Afghanistan, Canada, Mexico, Saudi Arabia, Singapore, UK etc. The UAE has been major market for Indian pan masala, accounts for 50 per cent of export from India in recent years. The UK, Canada, Saudi Arabia and USA stand next to UAE in import of Indian panmasala.

Import of Arecanut into India

Various promotional measures were introduced by the State as well as Central governments to increase the production of arecanut during the 70's. These helped in the gradual expansion of area, increased production and ultimately resulted in self sufficiency in the consumption of arecanut in India. From 1974-75 to 1993-94 there was no import of arecanut into the country. But, the situation had changed thereafter. As a result of liberalizing the economy during the early 90's and signing of General Agreement on Tariff and Trade (GATT) agreement, the import of arecanut in to India has started increasing at an alarming rate. The annual rate of increase in import of arecanut has crossed 22 % since 1995. The details can be seen in the table 3.3. Arecanut imports in 2006-07 has touched an all time high of 76,678 tons at a unit cost of less than rupees 15 per kg! This is equal to

around 15 percent of Country's production and almost 35 percent of arecanut produced in Karnataka.

Such imports had a very deleterious effect on the stability of the economy and well being of the farmers producing the arecanut in the country. Nearly 40,000 quintals of arecanut valuing around 100 crore rupees have been imported to India in the recent years (2009-10) from eight Asian countries and an African country i.e. Tanzania. Nearly 43 % imports were in the whole nut form, 32 % in the split form and remaining 25 % import was in other forms. Nearly half of the imports came from Indonesia. Bangladesh (15 %), Nepal (13 %), Myanmar (6 %) and Thailand (5 %) are the other major countries exporting arecanut to India in recent years.

From the above it is clearly demonstrates that the arecanut at the macro level has been playing diverse roles and contributing in multiple ways to the economic development of India. Ultimately, these must result in welfare and well being of the farmers producing the arecanut. However, the recent collapse in the prices and severe pests and disease attack on palms in the traditional areas are threatening the very sustenance of arecanut economy in India. The situation called for "intervention" by the Government, in the form of Minimum Support Price (MSP) that provided, to some extent, much needed stability to arecanut economy in the State. Nonetheless, the recurrent pronouncements to ban some of the value added

areca products like Ghutka and Panmasala add salts to the injury and have put in jeopardy, the very livelihood security of millions of farmers and workers depending on arecanut cultivation and trade in the country. This calls for rigorous policy interventions, thorough R & D efforts, coherent planning and program initiatives to resurrect arecanut economy in India.

Marketing of arecanut in India

Arecanut is a crop whose production is concentrated in a few states but consumption spreads throughout the country. The produce gathered in the producing centres is distributed to the other areas. In India, arecanut is marketed as unhusked whole fruit, dehusked and dried nut, boiled dried whole kernel or boiled split. About 20 percent of total area production in the country is consumed as ripe fruit and the rest in the form of whole nut and processed forms. Marketing of semi-ripe, fully-ripe or fermented arecanut has gained considerable value in Assam, Kerala and West Bengal. In Kerala, nearly 25 percent of the produce is marketed after harvest either as semi-ripe or fully ripe. In most arecanut markets in Karnataka the commission agents conduct auction and arrange sale for the produce. The buyers, after taking delivery, dispatch this produce to different terminal centres for consumption. Karnataka, Kerala, Tamil Nadu, and Goa have established regulated markets for arecanut. In Karnataka there are 23 regulated markets for arecanut growing regions. In Kerala, there are 4

regulated markets. In Tamil Nadu and Goa, the role of regulated markets is minimum. In Karnataka, Kerala and Tamil Nadu more than 30 percent of the marketable surplus is dealt by co-operative societies. There are more than 16 major co-operative marketing societies handling arecanut in Karnataka. The Daxshina Kannada society is the oldest at Mangalore (set up in 1919, at Mangalore) followed by the one at Sirsi. The price of arecanut varies from market on account of differences in variety grade colour maturity moisture content. The price fluctuation are not only due to variation in supply position of the commodity but also due to availability or otherwise of the lack of transport facilities from one region to other, efficiency of the market services, availability of credit and storage facilities and above all, the system of marketing free from exploitation.

Areca marketing is the systematic performance of areca business activities related to processing, grading, standardizing, packing, assembling, transporting, storing, financing, selling and distributing in order to reach the areca produce from the point of producer farmers to the point of ultimate consumers. In the process of areca marketing production being the starting point of marketing it provides proper base, shape and colour to the marketing arrangement.

3.3 AREA AND PRODUCTION OF ARECANUT IN MIZORAM

Arecanut is one of the most important commercial plantation crops cultivated in Mizoram since many years back. Mizoram climatic condition in the low lying areas is very conducive for Arecanut plantation. The fruit quality is good and fruit size is big. There had been no market problem for Arecanut till date and demand is rather increasing year after year. Many farmers sustain their family from Arecanut and create family assets and are well established. One major advantage of this crop is that complicate processing process is not required and the fruit by itself is ready for market. Moreover, keeping quality is good and it can withstand long distance transportation and it can be roughly handled at all level. When processing is involved and long transportation is required farmers always face problem. Therefore, this crop is recommendable by the Government of Mizoram for inclusion in the programme of New Land Use Policy. It is proposed to take up 4000 hectares in 5 years by 4000 households and during 1st year 2009 – 10, 800 hectares will be taken up by 500 households for cultivation.

The Mizo community has experienced the practice of chewing of pan for a long time back. There are a large number of consumers for arecanut within the state. Most of the cropping areas of arecanut are concentrated in the western part and northern part of the Mizoram. In the western part, it is cultivated in Zamuang, Rengdil, Kawrthah, Tuidam,

Hriphaw, Saikhawthlir and Chuhvel villages. Zamuang village is the main growing centre of arecanut in the whole state. In the northern area, Bilkhawthlir and Vairengte are the two main growing areas. Mizoram has moderate climate and abundant rainfall in a year, which is very suitable for growing of arecanut. The growing areas in the western belt and northern belt are near the border of Tripura and Assam state. Previously, the nut is cultivated in a village for local consumption only and grown them in the house garden only. Today, cultivation of arecanut in a large scale for commercial purposes has been undertaken in the north western part of Mizoram. The growth of area and production of arecanut during 1997-98 to 2014-15 is given in the following table 3.4.

From the table below it is clear that the cropping area of arecanut in Mizoram had increased consistently from 671 hectares in 1997-98 to 7574 hectares in 2012-13, which was approximately 11 times increased over the years. In case of production, the trend showed a fluctuation, initially it rose from 56 metric tons in 1997-98 to 12390 metric tons in 2011-12 and fell down to 4320 metric tons in the next year recording an annual average growth rate of 57.1 percent during these years. This may be because in Mizoram people started building houses in vacant areas and did not plant the arecanut trees for occupying that are damaged. As given in the table

there is an improvement in the yield rate of arecanut from 0.08 MT/Ha in 1997-98 to 0.6 MT/Ha in 2012-13.

Table 3.4: Area and Production of Arecanut in Mizoram from 1997-98 to 2011-12

| Year | Area | | Production | |
	(in Hectares)	Annual Growth Rate (in Percent)	(in Metric Tonnes)	Annual Growth Rate (in Percent)
1997-98	671		56	
1998-99	1163	73.32	168.5	200.9
1999-00	900	-22.61	560.3	232.52
2000-01	950	5.6	1787	218.9
2001-02	1334	40.42	5577	212.1
2002-03	1709	28.11	5736	2.85
2003-04	2040	19.37	5317.5	-7.3
2004-05	2175	6.62	5059.8	-4.85
2005-06	2291	5.33	4134	-18.3
2006-07	1562	-31.82	4436	7.3
2007-08	1562	0	4451.7	0.35
2008-09	4562	192.1	8211	84.4
2009-10	4800	5.21	12000	46.14
2010-11	4800	0	12200	1.7
2011-12	5010	4.4	12390	1.5
2012-13	7574	51.2	4320	-65.13
AAGR (in Percent)		**23.57**		**57.1**

Source: Directorate of Horticulture, Government of Mizoram

New Land Use Policy (NLUP) is a Flagship programme by the Government of Mizoram. It is a comprehensive project for inclusive development focused mainly among others, on a major overhaul of the economy through structural changes by weaning away farmers from destructive jhum practices to sustainable livelihood opportunities based on

local resources, genius of the people and keeping in view regeneration of resources. The programme is implemented in Phase-wise and beneficiaries for each phase are allocated to the implementing Departments. Fund is released to the beneficiaries as per the approved work calendar on installment basis through their individual Bank account. Mizoram government launched NLUP in 2011; arecanut is one of the trade (crops) lists. The number of Families and financial allotment in each phase of NLUP are express in Table 3.5.

Table 3.5: Arecanut Trade under NLUP in Mizoram (as on Aug. 2015)

Phase	No. of Beneficiaries	Amount Sanction (₹ in lakh)	Duration	Remarks
1st	2753	2753.00	13.1.11-20.9.12	Completed
2nd	2514	2514.00	29.6.12-3.6.15	Completed
3rd	849	356.64	30.8.13-till date	On going
4th	371	177.424	3.9.13-till date	On going

Sources: Department of Horticulture, Govt. of Mizoram

From the above table it is clear that first and second beneficiaries of NLUP received a complete amount, ₹ 2, 753 lakhs and ₹ 2, 514 lakhs respectively. The number of beneficiaries was 2753 household in first phase and 2514 household in second phase. Meanwhile, third and fourth phases are continuous till day. The third phase was introduced in 30th Aug. 2013 with 849 beneficiaries. The total amount sanction in third phase is ₹

356.64 lakhs. The fourth phase also introduced after four days when third phase launched, i.e. 3rd Sept. 2013 with 371 beneficiaries. For the fourth phases ₹ 177.424 lakhs is sanctions to the beneficiaries.

3.4 ARECANUT CULTIVATION IN BILKHAWTHLIR

Bilkhawthlir is the main growing place of arecanut in the state. It has a population of 5385, around 1100 houses and more than 60% are engaged in arecanut cultivation. Most of the farmers in Bilkhawthlir cluster grow arecanut in their own orchards and it is the main livelihood for majority of the population. The cultivation of arecanut had been started in the village since 1953. Since then we can see successful farmers in this village and with the help of these farmers the cultivation goes on and in the year of 1980 arecanut cultivation become popular. Presently many successful arecanut cultivators can be seen from this village.

The type of arecanut cultivation in Bilkhawthlir is mainly of Assam and Indian variety while Indian variety is the most cultivated one. The farmers start to jut out the ripe arecanut from November to March. In Bilkhawthlir cluster 450 families are involved in arecanut plantation. Out of 450 families only 262 families are registered in arecanut grower's society due to less production with little area and arecanut tree.

The arecanut generally start to bear fruit within seven years from the cultivation, if the area is clean it can also bear fruit within five months and it is qualified to sell within ten years. In case of Bilkhawthlir cluster a marketing channel is local market and through middle man. The arecanut price depends on how they sell in Bangladesh, when the rate is high the middleman buys them costly and there is more profit. Particularly the arecanut farmers sell their production wholly in terms of their land to middle man but a large number of families now found out that it is more profitable to sell per arecanut rather than selling in terms of land, thus, they give up farm type selling and started to sell in per arecanut. So far the National Bank of Agriculture and Rural Development (NABARD) has noticed much progress and development in Bilkhawthlir arecanut cultivation, and thus promise to cooperate with the farmer.

The Mizoram government launched NLUP in 2011, the number of NLUP beneficiaries in Bilkhawthlir town as recorded by Horticulture Department, Mizoram are shown in Table 3.6.

Table 3.6: Number of NLUP Beneficiaries of arecanut grower in Bilkhawthlir town during 2014-2015

Phase	Town	No. of Beneficiaries
1st	Bilkhawthlir N	21
	Bilkhawthlir S	52
2nd	Bilkhawthlir N	37
	Bilkhawthlir S	75

3rd	Bilkhawthlir N	18
	Bilkhawthlir S	16
4th	Bilkhawthlir N	5
	Bilkhawthlir S	10

Sources: Department of Horticulture, Govt. of Mizoram

From the above table it is clear that the number of NLUP Beneficiaries of arecanut grower in Bilkhawthlir town during 2014-2015 is high in Bilkhawthlir south. The third and fourth phase is still going on.

3.5 PROFILE OF THE ARECANUT CULTIVATOR

Table 3.7: Descriptive Statistics of the Household Variables of the Arecanut Cultivator (Physical Capital)

Sl.No	Household Variables	Mean	Minimum	Maximum	Standard Deviation	CV
1	Age of the family head	60	43	88	11.11	5.4
2	Family size	3	2	11	2.13	1.4
3	Income of the Household (₹ '000')	210	10	500	164.6	1.27
4	Land Area in acre	4.22	0	18	3.19	1.32

Source: Field Survey

From the above table it is observed that out of the sample 79 arecanut cultivators the average age of the family head is 60 years with size

varying between a minimum of 43 years and maximum of 88 years. The average family size is 3 with size varying between a minimum of 2 and maximum of 11. During 2014-15, the average income of Bilkhawthlir arecanut cultivator is ₹ 210, 000 and the average land area is 4 acre.

Table 3.8: Descriptive Statistics of the Household Variables of the Arecanut Cultivator (Human Capital)

Sl.No	Household Variables	Frequency	Percent
1	Number of male headed household	57	72.2
	Number of female headed household	22	27.8
2	House type 1=owned	69	87
	House type 2=rented	10	13
3	Family Head education level		
	Primary	23	29.1
	Middle	25	31.6
	High School	18	22.8
	Higher Secondary	7	8.9
	Graduate & above	6	7.6

Source: Field Survey

Table 3.8 indicates that out of the sample 79 arecanut farmers the number of male headed household were 72 percent and 28 percent were female headed household. Among the cultivators 87 percent arecanut cultivator were staying in their own house whereas 13 percent were staying in rented house. A study of the level of farmer's education shows that 66 of

them are educating below higher secondary with 83 percent. And 13 of them are educating above higher secondary with 17 percent. Thus, we can conclude that majority of the arecanut farmers in Bilkhawthlir town are below matriculate.

3.6 GROWTH TREND OF ARECANUT PRODUCTION IN THE STUDY AREA

During 2015-16, Bilkhawthlir generated total production worth ₹ 3.20 crore from arecanut cultivation. One of the arecanut cultivating households earned as much as ₹ 11 lakh during 2015-16. The growth of arecanut production is represented in the following figure

Fig 3.8: Growth of Arecanut Production in Bilkhawthlir cluster during 2010-2015 (Rs in lakh)
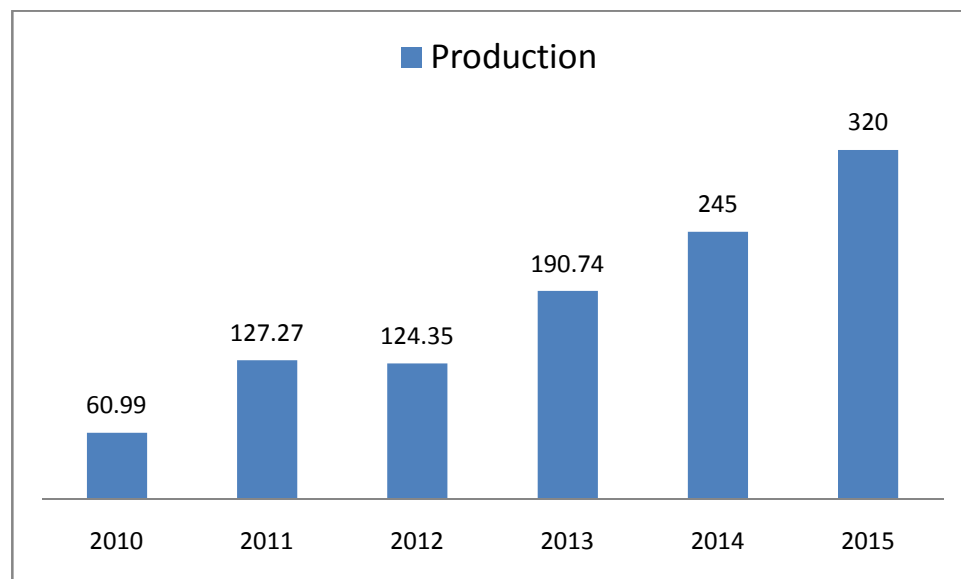
Fig 3.9: Growth of arecanut production by the sample growers
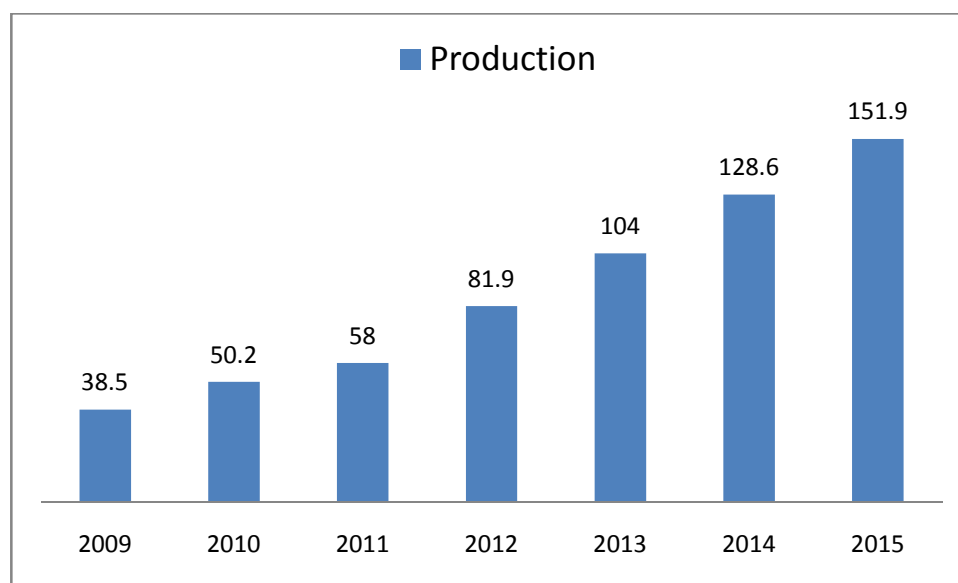
Source: Field Survey

A study of the total production of 79 arecanut farmers in Bilkhawthlir cluster during 2009-2015 showed positive growth rate. The total production in 2009 is ₹ 38.5 lakh while in 2015 it rose to ₹ 151.9 lakh.

Table 3.9: Descriptive Statistics of output in Kgs

Variables	Mean	Minimum	Maximum	Standard Deviation	CV
Total output	8730	2000	10057	2633	**3.32**
Output per acre	2846	559	10033	1948	**1.46**
Output per labour	144	31	419	61	**2.36**

From table 3.9 we can see that the average total output during 2014-15 is as much as 8730 kgs with size varying between a minimum of 2000 kgs and maximum of 10057 kgs. Likewise, the average output per acre is 2846 kgs with size varying between a minimum of 559 kgs and maximum of 10033 kgs. Similarly, the average output per labour is 144 kgs with size varying between a minimum of 31 kgs and maximum of 419.

3.7 DETERMINANTS OF THE ARECANUT OUTPUT

Relation between arecanut output, area and labour inputs

Several factors influence the total output produced by arecanut growers. The basic determinants are land and labour inputs. The total land area is measured in terms of acre while labour inputs are measured in mandays per labour. Both land and labour inputs positively contributed towards output increase i.e., the level of output is rising as both factors are increasing. The estimated correlation coefficient between output and area under cultivation is 40 percent. The correlation is between output and area is significant at the 0.01 level (2-tailed) while output and labour input is significant at the .05 level. As given in the table, the more significant factor is the total area operated by the growers. This is in line with our study hypotheses number 1.

Table 3.10: Correlations coefficient between arecanut output, area (in acre) and labour inputs (mandays)

Particulars	Output (in kgs)	Area (in acre)	Labour
Output (in kgs) Pearson Correlation Sig. (2-tailed) N	1 79	.404** .000 79	.257* .022 79
Area (in acre) Pearson Correlation Sig. (2-tailed) N	.404** .000 79	1 79	.719** .000 79
Labour Pearson Correlation Sig. (2-tailed) N	.257* .022 79	.719** .000 79	1 79

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Land area and labour inputs as determinants of arecanut production

Arecanut production depends on human labour input and total area under cultivation. The following log linear production function has been adopted to estimate the relationship between arecanut output and its input such as labour and land area:

Ln (output) = B_1 + B_2ln (Area$_1$) + B_3ln (Labour) + u

The estimated coefficients are given in table 3.11. The adjusted R^2 showed that the model explained approximately 33 percent of the variation in the total output which is significantly different from zero at 1% level. The sum of the coefficients is less than 1, implying that the production function is characterised by decreasing returns to scale. The regression

coefficient for area is 0.36 percent which is postive and significant at 1%
level. The coefficient implies that, while other inputs being kept constant,
one percent increase in land area would increase arecanut production by
0.36 percent. The coefficient for labour is positive but not significant
implying that, although labour made contribution but its impact is not
significant. The coefficient indicates that, as the use of labour inputs
increased by one percent, output will increase at the rate of 0.12 percent
only while holding land area constant.

**Table 3.11: Labour and Land Area under cultivation as determinants
of arecanut output**

Dependent Variable: Ln (OUTPUT)

Method: Least Squares

Sample: 79

Included observations: 79

Variables	Coefficient	Std. Error	t-Statistic	Probability
C	8.062837	0.540189	14.92595	0.0000
Ln (Labour)	0.120730	0.142916	0.844763	0.4009
Ln (Land Area)	0.357867	0.078145	4.579542	0.0000
R-squared	0.347767	Mean dependent var		8.992746
Adjusted R-squared	0.330603	S.D. dependent		0.475007

		var		
S.E. of regression	0.388635	Akaike info criterion		0.984880
Sum squared resid	11.47880	Schwarz criterion		1.074859
Log likelihood	-35.90276	Hannan-Quinn criterion		1.020928
F-statistic	20.26143	Durbin-Watson stat		1.094792
Prob(F-statistic)	0.000000			

Educational level of the farmers and arecanut output

Table 3.12: ANOVA

Output Qnts	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	5055.913	4	1263.978	1.533	.202
Within Groups	61030.163	74	824.732		
Total	66086.076	78			

ANOVA test has been conducted to see if there is any difference in arecanut output based on educational level of the head of arecanut farmers. The educational levels are categorized into primary (N=23), middle (N=25), high school (N=18), higher secondary school (N=7) and graduate (N=6). ANOVA test result, $F_{(4, 74)}$ =1.533, p=0.202 showed that there

were no significant difference between the mean values of output based on the educational level of the head of the arecanut farmers.

3.8 PROBLEMS FACED BY THE ARECANUT FARMERS

Table 3.13: Problems faced by the arecanut farmers

Nature of Problems	Frequency	Percent
Transportation	12	15.2
Lack of Storage	1	1.3
No Problem	66	83.5

Source: Field Survey

From the above table it is observed that out of the sample 79 arecanut farmer's majorities i.e. 84 percent are not having problem in arecanut cultivation where 15 percent are having problems of transportation and 1 percent of lack of storage problem.

3.9 COSTS AND RETURNS TO ARECANUT CULTIVATION

Costs refer to the annual maintenance cost of the arecanut garden incurred by the farmers which basically involve the labour costs, i.e., wages of labour engaged in the clearing of the weeds. No insecticides and fertilizers are used by the farmers. The farmers did not incur even marketing costs as pre-harvest buyers bear all the costs involved in harvesting, grading, packing and even transport costs. In this study, the returns to arecanut cultivation is estimated by deducting labour costs engaged in the arecanut garden for clearing of weeds etc. These labour

costs include two components- wages of hired labour and the implicit family labour wage which is evaluated at the prevailing local wage rate, i.e., ₹ 250 per day for male and female labour. The descriptive statistics of these two components are highlighted in figure:

Table 3.14: Descriptive Statistics of different components of labour costs

Variables	Mean	Std. Dev	Min	Max
Total labour cost (₹)	16822.78	9751.738	6000	80000
Total hired labour cost (₹)	10585.44	4100.087	500	22500
Total family labour cost (implicit) (₹)	6237.342	8561.139	500	65000
Percentage share of family labour	33.6343	21.49	2.78	91.67

Source: Field Survey

The estimated returns considering these different cost components are given in table below

Table 3.15: Costs and Returns to Arecanut Cultivation (Per Acre)

Sl. No	Particulars	Total Amount
1	Value of total output per acre	₹ 25,000
2	Value of total labour cost per acre (Cost A1)	₹ 5,358

3	Value of Hired Labour per acre (Cost A2)	₹ 3,369
4	Net Returns per acre (Total output-Cost A1)	₹ 19,642
5	Net Returns per acre (Total output-Cost A2)	₹ 21,631

Source: Field Survey

A closer look at the costs and returns to arecanut cultivation (Per Acre) shows that total production per acre is as much as ₹ 25,000 value of total labour cost per acre is ₹ 5,358 and value of hired labour per acre is ₹ 3,369.

3.10 ARECANUT CULTIVATION AND LIVELIHOOD PROMOTION

Table 3.16: Main and Subsidiary Arecanut Cultivators

Variables	Frequency	Percent
Main	63	80
Subsidiary	16	20
Total	79	100.0

Source: Field Survey

The above table shows that in Bilkhawthlir town, out of the total 79 respondents 80 percent depend chiefly on the arecanut cultivation whereas 20 percent are cultivating arecanut plus they are also engaged in some other work like teaching and other office work.

Table 3.17: Descriptive Statistics of income and production (₹)

Particulars	Mean	Minimum	Maximum	Std.

(Rs)				Deviation
1.Income (₹ '000')	210.00	10	800	164.570
2.Production (₹ '000')	109.12	5	530	120.967
3.Percentage share of income from arecanut cultivation	51.34	5	200	36.350

Source: Field Survey

The above table shows that out of the sample 79 arecanut farmers the average income of the family is ₹ 210,000 with size varying between a minimum of ₹ 10,000 and maximum of ₹ 800,000. The average production is ₹ 109,000 with size varying between a minimum of ₹ 5,000 and maximum of ₹ 530,000 and the percentage share of income from arecanut cultivation is 51 percent.

Table 3.18: Level of Livelihood Promotion by Arecanut

Level of promotion	Frequency	Percent
High	70	88.6
Average	8	10.1
Low	1	1.3
Total	79	100.0

Source: Field Survey

The above table reveals that majority of the sample arecanut cultivators in Bilkhawthlir cluster i.e. 89 percent stated that there is high

improvement in arecanut cultivation, where 10 percent stated it is average

improvement and 1 percent stated it is low improvement.

Table 3.19: Farmers intended to continue Arecanut cultivation

Variables	Frequency	Percent
Yes	72	91.1
No	7	8.9
Total	79	100.0

Source: Field Survey

Out of the respondents 79 arecanut farmers majority i.e. 91 percent

intended to continue arecanut cultivation whereas 9 percent intended not to

continue it.

Table 3.20: Farmers intended to expand Arecanut cultivation

Variables	Frequency	Percent
Yes	68	86.1
No	11	13.9
Total	79	100.0

Source: Field Survey

The above table observed that majority i.e. 86 percent intended to

expand their arecanut cultivation whereas 14 percent do not intended to

expand their cultivation.

3.11 MARKETING OF ARECANUT BY THE GROWERS

Table 3.21: Payment Time to the Farmers by the Buyers

Variables	Frequency	Percent

Direct Payment	23	29.1
Payment at the end of the week	1	1.3
Payment at any convenient time	55	69.6
Total	79	100.0

Source: Field Survey

In marketing 29 percent stated they get the arecanut price directly from the middlemen, where 1 percent gets payment in weekend and 70 percent get in any convenient time.

3.12 CONCLUSION

The arecanut at the macro level has been playing diverse roles and contributing in multiple ways to the economic development of a country. Ultimately, these must result in welfare and well being of the farmers producing the arecanut. However, the recent collapse in the prices and severe pests and disease attack on palms in the traditional areas are threatening the very sustenance of arecanut economy in India. The growth and development of arecanut in Mizoram was average compared to other crops but it needs to adjust the production and quality to meet the changes of the global market. For this the responsibility of various departments and state government is utmost important to increase productivity and become a self-supporting state.

CHAPTER-IV

MAJOR FINDINGS AND CONCLUSION

The present chapter gives major findings of the study and observations.

FINDINGS

1. The study observed that out of the sample 79 arecanut cultivators the average age of the family head is 60 years with size varying between a minimum of 43 years and maximum of 88 years. The average household size of the sampled household in Bilkhawthlir town is 3 in which 72 percent are male headed household and 28 percent are female headed household. Among the cultivators 87 percent arecanut cultivator were staying in their own house whereas 13 percent were staying in rented house.

2. The study reveals that the average household income of the 79 sample farmers in Bilkhawthlir cluster is ₹ 210, 000 daily in an average land area of 4 acre. And the average production is ₹ 109, 000. This is quite a sufficient amount to sustain a family keeping in mind the overall total income and production the population will acquire in one month.

3. A study of the level of farmer's education shows that 66 of them are educating below higher secondary with 83 percent. And 13 of them are educating above higher secondary with 17 percent. Thus, we can see that majority of the arecanut farmers in Bilkhawthlir town are below

matriculate. This clearly states a successful cultivation is not based on the educational level, but their hard work, interest and proper method they have established in their cultivation.

4. The study shows that area and production of arecanut in Mizoram had negative growth rate from 1997-2015 and the area of arecanut fell by 54 percent and production fell by 181 percent. This may be because in Mizoram people build houses in vacant areas and did not plant the arecanut trees for occupying that are damaged. (*Objective No.1*)

5. The present study observed that during 2015-16, Bilkhawthlir generated total production worth ₹ 3.20 crore from arecanut cultivation. One of the arecanut cultivating households earned as much as ₹ 11 lakh during 2015-16. This is clearly a progress in agricultural development and the economy of Mizoram.

6. A study of the total production of 79 arecanut farmers in Bilkhawthlir cluster during 2009-2015 showed positive growth rate. The total production in 2009 is as much as Rs. 38.5 lakh while in 2015 it rose to Rs. 151.9 lakh. (*Objective No. 2*)

7. According to the present study the average total output during 2014-15 is as much as 8730 kgs with size varying between a minimum of 2000 kgs and maximum of 10057 kgs. Likewise, the average output per acre is 2846 kgs with size varying between a minimum of 559 kgs and maximum of 10033 kgs. Similarly, the average output per labour is 144

kgs with size varying between a minimum of 31 kgs and maximum of 419.

8. The study shows that several factors influence the total output produced by arecanut growers. The basic determinants are land and labour inputs. The total land area is measured in terms of acre while labour inputs are measured in mandays per labour. Both land and labour inputs positively contributed towards output increase i.e., the level of output is rising as both factors are increasing. The estimated correlation coefficient between output and area under cultivation is 40 percent. The correlation is between output and area is significant at the 0.01 level (2-tailed) while output and labour input is significant at the .05 level. *This is in line with our study hypotheses No.1.*

9. The study conducted ANOVA test to see if there is any difference in arecanut output based on educational level of the head of arecanut farmers. The educational levels are categorized into primary (N=23), middle (N=25), high school (N=18), higher secondary school (N=7) and graduate (N=6). ANOVA test result, $F_{(4, 74)} = 1.533$, $p = 0.202$ showed that there were no significant difference between the mean values of output based on the educational level of the head of the arecanut farmers.

10. From the study it is found out that the sample arecanut cultivator of 15 percent are having problems of transportation and 1 percent are having storage problem while majority of them satisfied in their cultivation.

11. The study observed costs refer to the annual maintenance cost of the arecanut garden incurred by the farmers which basically involve the labour costs, i.e., wages of labour engaged in the clearing of the weeds. No insecticides and fertilizers are used by the farmers. The farmers did not incur even marketing costs as pre-harvest buyers bear all the costs involved in harvesting, grading, packing and even transport costs. In this study, the returns to arecanut cultivation is estimated by deducting labour costs engaged in the arecanut garden for clearing of weeds etc. These labour costs include two components- wages of hired labour and the implicit family labour wage which is evaluated at the prevailing local wage rate, i.e., ₹ 250 per day for male and female labour.

12. A closer look at the costs and returns to arecanut cultivation (Per Acre) shows that total production per acre is as much as ₹ 25,000 value of total labour cost per acre is ₹ 5,358 and value of hired labour per acre is ₹ 3,369.

13. The study shows that in Bilkhawthlir town, out of the total 79 respondents 80 percent depend chiefly on the arecanut cultivation whereas 20 percent are cultivating arecanut plus they are also engaged in some other work like teaching and other office work. This shows that
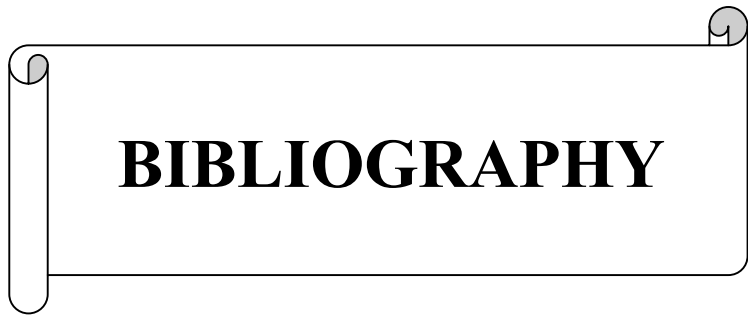
maximum numbers of arecanut cultivator in Bilkhawthlir cluster are satisfied in arecanut cultivation, this is because of the fact that the daily income generated is sufficient for livelihood of their family. (*Objective No. 3*) (*Hypotheses No. 2*)

14. The study shows that majority of the sample arecanut cultivators in Bilkhawthlir cluster i.e. 89 percent stated that there is high improvement in arecanut cultivation, where 10 percent stated it is average improvement and 1 percent stated it is low improvement.

15. In the study majority of the farmers i.e. 91 percent intended to continue arecanut cultivation whereas 9 percent intended not to continue it. Meanwhile 86 percent intended to expand their arecanut cultivation whereas 14 percent do not intended to expand their cultivation.

16. In the study of marketing 29 percent stated they get the arecanut price directly from the middlemen, where 1 percent gets payment in weekend and 70 percent get in any convenient time.

CONCLUSION

From the study it can be concluded that cultivation of arecanut in Mizoram shows a promising trend and continuing their cultivation will be an important strategy for uplifting the rural poor for their livelihood. This will further be one way of generating employment and thereby reducing poverty. The role of the concerned department and the state

government itself is of utmost importance. The findings of the study are

hoped to have policy implications for the policy makers of the state.

BIBLIOGRAPHY

Abdul Khader, K.B. (1983),' Effect of Depth of Irrigation Based on Cumulative Pan Evaporation, Mulching and Drip Irrigation with Fertilizer Levels on Growth and Yield of Arecanut (Areca catechu L.)'. Ph.D. Thesis, University of Agricultural Sciences, Bangalore, India, p 325.

Balasimha, D. (1989), 'Light Penetration Patterns through Arecanut Canopy and Leaf Physiological Characteristics of Intercrops', *Journal Plantation Crops,* 16:61-67.

Bhale Rao D.S., Saini S, Saini S.R., Katiyar R, Munde A. (1980), 'The Use Of Tobacco And Betel Leaf And Its Effect On The Normal Microbial Flora Of Oral Cavity' , *Pravar Med. Review* pp 1-5.

Chadha, K.L. (1988), 'Horticultural Crops, Accent on High Yielders'- *The Hindu Survey of Indian Agriculture,* Section 5, pp 125.

Chadha, K.L., Singh A.K., and Patel V.B. (2011), 'Horticulture to Horti-Business', Westville Publishing House, New Delhi.

Das, P.K. and Vijaya Kumar, K. (1982), 'Evaluation of LER and Advantages in Coconut/Arecanut Based Systems'. *Journal Plantation Crops* 18: 356-358.

Dashora, L.K., Abhay Dashora, Lakhawat S.S. (2006), 'Production Technology of Plantation Crops, Spices, Aromatic and Medicinal Plants', Geeta Somani Agrotech Publishing Academy, Udaipur.

FAO (1995-2009), 'Improving Agricultural Marketing Information System', *Agricultural Marketing,* 45 (4): 2-3.

Gajanana, T.M. (1985), 'An Analysis of Supply Response of Arecanut in Karnataka', M.Sc Thesis (Unpublished), submitted to University of Agricultural Sciences, Bangalore.

Giriappa, S. (1989), 'The Role of Plantation Crops in Agricultural Development', Daya Publishing House, and New Delhi.

Goswami, Jyoti Pranay (1993), 'Agricultural development in North East India with special reference to Settled Agriculture', Agriculture

Development in North East India, Constraint and Prospect Edited by K.Alam, Mittal Publications, and New Delhi.

Government of Mizoram, (2012-2014), 'Annual Report'. Directorate of Horticulture, Mizoram: Aizawl.

Government of Mizoram: Economic Survey, Mizoram (2008-09, 2012-13 and 2013-14), Planning and Programmed Implementation Department.

Government of Mizoram: Statistical Handbook, Mizoram (2010-2012), Directorate of Economics and Statistics.

Lalchhuanmawia (2014), 'Economics of Production and Marketing of Horticultural Crops in Mizoram: A Study of Selected Crops', Unpublished Ph.D thesis, submitted to Mizoram University. Mizoram

Murthy, K.N. and Bavappa, K.V.A. (1960), 'Morphology of Arecanut Palm- The Shoot', *Arecanut Journal,* 11:51-102.

Naidu, A.K. (1962): 'Betelvine Cultivation in Arecanut Gardens and its Benefits'. *Arecanut Journal* 9(4): 128-130.

Nambiar, K.K. (1949), 'A Survey of Arecanut Crop in Indian Union', Indian Central Arecanut Committee, Calicut, p 78.

Parthasarathy V.A., Chatto Padhyay, P.K., and T.K. Bose (2005), 'Plantation Crops', Published by Partha Sankar Basu, Naya Udyog 206, Kolkata, India.

Prakash, T.N. (2012), 'Cost of Cultivation of Arecanut in Karnataka', Research report, Department of Agriculture Economics, University of Agricultural Sciences, Bangalore.

Preeti, N. S. (1998), 'Economic Analysis of Arecanut Cultivation and its Impact on non Farm Economy in Shivmoga District of Karnataka', M.Sc. Thesis (Unpublished), submitted to University of Agricultural Sciences, Bangalore.

Raghavan, V. (1957), 'On Certain Aspects of the Biology of Arecanut *(Areca catechu* Linn.) and Utilization of Itys By-Products'. *D.Phi1. Thesis.* Gauhati University, pp 186.

Shama Bhat, K. Krishna Murthy, S. and Madhana Rao, V.N. (1962): 'The Effect of Density of Planting on the Distribution of Arecanut Roots'. *Tropical Agric*. 46: 55-61.

Shama Bhat, K. and Abdul Khader, K.B. (1982): 'The Arecanut Palm', Central Plantation Crops Research Institute, Kasaragod, India, pp 105-131.

Shama Bhat, K. (1983), 'Plant Interactions in a Mixed Crop Community of Arecanut (Areca catechu L.) and cacao (Theobroma cacao L.)', Ph. D. Thesis, University of Mysore, Mysore, India, p 158.

Soni, R.N. (2008), *Leading Issues in Agricultural Economics – Theoretical & Applied*, Vishal Publishing Co. Delhi, p-9.

Subba Rao (1982), 'Analysis of Business Performance of Central Arecanut Marketing and Processing Cooperative Limited', Mangalore, Karnataka, Thesis submitted to University of Agricultural Science, Bangalore.

World Development Report (2008), Agriculture development Retrieve from http://www.worldbank.org/en/topic/agriculture.

APPENDIX

APPENDIX

QUESTIONNAIRE ON PRODUCTION AND MARKETING OF ARECANUT IN MIZORAM: A CASE STUDY OF BILKHAWTHLIR CLUSTER

A. General Profile of the Respondent:

Name						Father/ Mother Name			
Age		Sex (1- male & 2- female)		Family Size		Status (1 - APL, 2 - BPL & 3 - AAY)		Dwelling House (1- Owned & 2 - rented)	
Grower education (1 – Primary, 2 – Middle, 3 – High School, 4 – Higher Secondary, & 5 – Graduate & Above)									
Arecanut cultivation main work? (1 – Yes & 2 – No)									
No. of Workers		Male			Female			Below 14 years & Above 60	
Average Annual Income (in ₹)									

B. Cultivation Details:

Sl no.	Total Area (tin)	Areca nut Area (tin)	Area considered (tin)	Other plant cultivated (tin)	Vacant area (tin)	Pass (1-vc,2-lsc, 3-periodic, 4- no pass)	No of arecanut trees	Areca nut cultivated year	Distance from main road (1- Road side, 2- within 1 km, 3- within 2 km & 4- outside 2 km)

Quantity of arecanut plucked in a year (in kg)		Amount of manpower used in a year	
No of times labour cut down the area	Manpower used for cutting down	Manpower used overall	
Do you use Fertilizer (1-yes & 2-no)		How many times	Price
Do you use Pesticides (1-yes & 2-no)		How many times	Price
Do you buy arecanut seed (1-yes & 2-no)		How many times	Price
Problem (1- Cutting down farm , 2- Insects and disease, 3- High cost of manure & Pesticides, 4- Lack of skill labour, 5- soil erosions, 6- Burning of land, 7- Other, 8- no problem)			

C. Production & Marketing

C.1. Yearly Production & Marketing:

Year	2015	2014	2013	2012	2011	2010	2009
Productions (in kg)							

Method of labour employed	Daily		Others	
No. of worker in a year				
Rate per day (in ₹)				

C.2. Marketing & Production perception

To whom you sell arecanut most (in %)	Others (%)	rate (in ₹)	
Do you think you made a good relation between the buyer/middlemen? (1- yes & 2- no)			
Payment time (1- direct payment, 2- payment at the end of the week, & 3- payment at any convenient time)			
Main problems (1- marketing, 2- transportation, 3- hiring of labour, 4- lack of storage facility, 5- low prices, 6- others & 7- no problem)			

C.3.Financial Assistances

Sources	Department	Bank loan	NLUP	Others	Self
Amount (in ₹)					

D. Perception

Do you think arecanut cultivation is sufficient for livelihood of family? (1-yes, 2- no & 3- no idea)	
How does it improve family livelihood or income? (1- very good, 2- good, 3- average)	
Do you have planned to continue arecanut cultivation? (1- yes & 2- no)	
Do you have planned to expand your cultivation? (1- yes & 2- no)	
Why do you plant arecanut (1- I have uncultivated farm, 2- To abandon shifting cultivation , 3-because others do it, & 4- others)	
If you are going to get subsidiary, what will you choose? (1- Link road, 2- production skill, 3-working materials, 4- storage facility, 5- good marketing, 6- fertilizer, 7- farm extension, 8- farm cleaning and grading & 9- no idea)	
Do you satisfied with the work made by the department and association? (1- yes & 2- no)	

Remark : -

_____

_____
_____

Signature of the Respondent

THANK YOU